



**Feasibility Study  
For  
Generation Interconnection  
Request  
GEN-2007-039**

SPP Tariff Studies  
(#GEN-2007-039)

April, 2008

## **Executive Summary**

<OMITTED TEXT> (Customer) has requested a Feasibility Study for the purpose of interconnecting 120 MW of wind generation within the control area of Southwestern Public Service Company (SPS) located in Hansford County, Texas. The proposed interconnection point is at the existing Hansford 115 kV substation, owned by SPS. The proposed in-service date is December, 2009.

The interconnection of GEN-2007-039 will require the addition of two additional 345kV transmission lines to Oklahoma. For this study, a 345kV transmission line from GEN-2003-013 to the Mooreland / Woodward substation (\$160,000,000) and a 345kV transmission line from the Mooreland / Woodward to Northwest substation were added and the results analyzed. These lines have been assigned to GEN-2006-049. All SPS Expansion Planning projects in the area of Hitchland were included. The Hitchland – Woodward 345kV transmission line which has been assigned to GEN-2006-044 (\$120,000,000) was included. In the event, which these interconnection requests withdraw from the queue, the Customer could be responsible for the cost of these network upgrades.

Power flow analysis has indicated that for the powerflow cases studied, it is possible to interconnect the 120 MW of generation with transmission system reinforcements within the local transmission system. The need for reactive compensation for this interconnection request will be evaluated in the Impact Study based on the wind turbine manufacturer and type requested by the Customer. 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).

The requirement to interconnect the 120 MW of wind generation at the existing Hansford 115kV substation consists of adding a new 115 kV circuit-breaker and a line terminal at the existing Hansford substation. The new terminal will be constructed and maintained by SPS. The Customer did not propose a specific route for the 115 kV line extending to serve its 115/34.5 kV collection 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 120 MW of generation is \$800,000. These costs are shown in Tables 1 and 2. This cost does not include building the 115 kV line from the Customer 115/34.5 kV collector substation into the point of interconnection. This cost also does not include the Customer's 115/34.5 kV collector substation or possible need for reactive compensation. Network constraints in the Southwestern Public Service Company (SPS) transmission systems that were identified are shown in Table 3. These Network constraints will have to be verified with a Transmission Service Request (TSR) and associated studies. 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, 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 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 SPP control areas 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.

The required interconnection costs listed in Tables 1 and 2 and other upgrades associated with Network Constraints 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 submits a Transmission Service Request through Southwest Power Pool's OASIS.

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## **Introduction**

<OMITTED TEXT> (Customer) has requested a Feasibility Study for the purpose of interconnecting 120 MW of wind generation within the control area of Southwestern Public Service Company (SPS) located in Hansford County, Texas. The proposed interconnection point is at the existing Hansford 115 kV substation, owned by SPS. The proposed in-service date is December, 2009.

## **Interconnection Facilities**

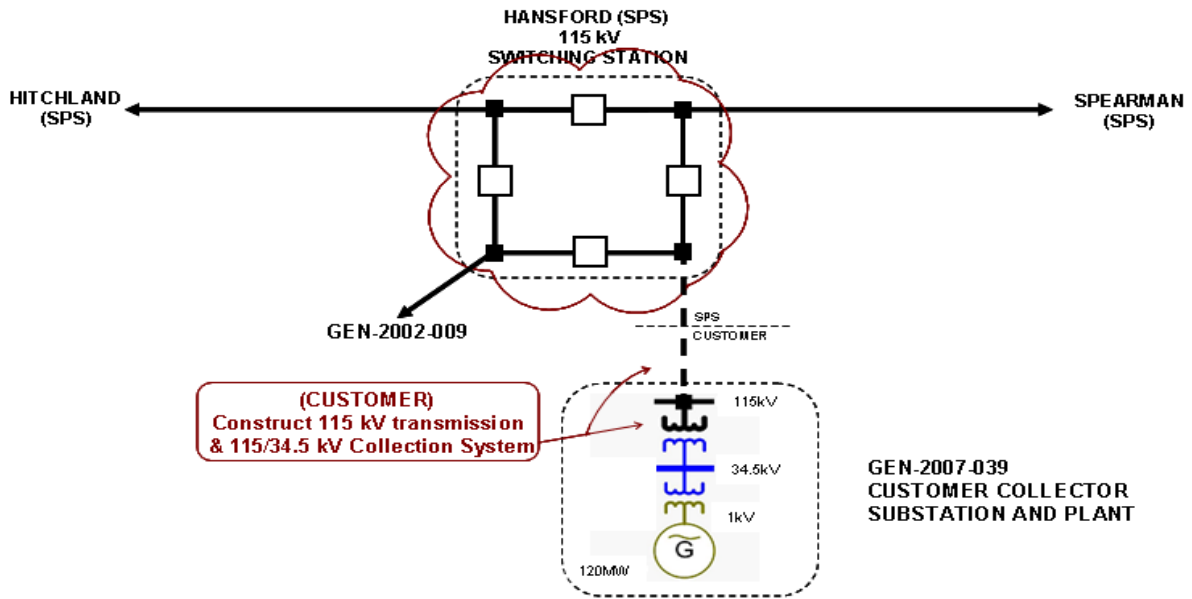
The primary objective of this study is to identify the system problems associated with connecting the generation to the area transmission system. The Feasibility and other subsequent Interconnection Studies are designed to identify attachment facilities, Network Upgrades and other Direct Assignment Facilities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

The requirement to interconnect the 120 MW of wind generation on the existing Hansford 115 kV substation consists of adding a new 115 kV circuit-breaker and line terminal at Hansford. The line terminal will be constructed and maintained by SPS. The Customer did not propose a specific route for the 115 kV line extending to serve its 115/34.5 kV collection 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.

Other Network Constraints in the Southwestern Public Service Company transmission systems that were identified are shown in Table 3. 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.

Certain other network upgrades were included in this analysis. These include two 345kV lines from the Texas panhandle to Oklahoma. If previous queued generation interconnection requests withdraw from the queue, the Customer could be expected to pay for these upgrades.

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



**Figure 1: Proposed Method of Interconnection**

(Final design to be determined)

## Interconnection Estimated Costs

The minimum cost for adding a new 115 kV circuit-breaker and line terminal serving GEN-2007-039 facilities is estimated at \$800,000. These costs are listed in Tables 1 and 2. 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 Customer's 115 kV transmission line extending from the point of interconnection to serve its 115/34.5 kV collection facilities. This cost also does not include the Customer's 115/34.5 kV collector substation or the possible need for reactive compensation, all of which should be determined by the Customer. The Customer is responsible for these 115 kV – 34.5 kV facilities up to the point of interconnection.

The costs of interconnecting the facility to the SUNC 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 (2008 DOLLARS)
CUSTOMER – 115/34.5 kV substation facilities.	*
CUSTOMER – 115 kV line between Customer substation and Hansford (SPS) 115 kV substation.	*
CUSTOMER – Possible reactive compensation to be determined during impact study.	*
CUSTOMER – Right-of-Way for all Customer facilities.	*
<b>TOTAL</b>	<b>*</b>

\* Estimates of cost to be determined.

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

FACILITY	ESTIMATED COST (2008 DOLLARS)
SPS – 115 kV circuit-breaker and line terminal to be built for generation request #GEN-2007-039 on the Hansford 115 kV substation. Work to include associated switches, control relaying, high speed communications, metering and related equipment and all related structures.	\$800,000
<b>TOTAL</b>	<b>\$800,000</b>
<b>345kV transmission construction (if prior queued projects withdraw)</b>	<b>\$160,000,000</b>
<b>Total Including Transmission</b>	<b>\$160,800,000</b>

\* Estimates of cost to be determined.

## Powerflow Analysis

A powerflow analysis was conducted for the facility using modified versions of the 2009 winter peak model, 2012 summer and winter peak models and the 2017 summer peak model. 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, 2009. The available seasonal models used were through the 2017 Summer Peak of which is the end of the current SPP planning horizon.

Following current practice, this analysis was conducted assuming that previous queued requests in the immediate area of this interconnect request were in service. Assuming these interconnection requests are in service, two 345kV lines from the Texas panhandle to Oklahoma were modeled as being in service. The analysis of the Customer's project indicates that, given the requested generation level of 120 MW and location, additional criteria violations will occur on the existing SPS transmission systems under steady state and contingency conditions in the peak seasons. Table 3 lists these overloaded 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 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.

The need for reactive compensation will be determined during the Impact Study. The need for reactive compensation will be based on the Customer's choice of wind turbine make and manufacturer. 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.

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. Not all 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 Energy (WERE), 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 Company (SPS), Western Farmers Electric Cooperative (WFEC) 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.

## Powerflow Results

**Table 3: Network Constraints**

AREA	OVERLOADED ELEMENT
AEPW	ALTUS JCT TAP - RUSSELL 138KV CKT 1
AEPW	ARSENAL HILL (ARSHILL1) 138/69/12.47KV TRANSFORMER CKT 1
AEPW	ARSENAL HILL (ARSHILL2) 138/69/14.5KV TRANSFORMER CKT 2
AEPW	CARNEGIE - HOBART JUNCTION 138KV CKT 1
AEPW	CLINTON AIR FORCE BASE TAP - ELK CITY 138KV CKT 1
AEPW	CLINTON AIR FORCE BASE TAP - HOBART JUNCTION 138KV CKT 1
AEPW	CLINTON JUNCTION - ELK CITY 138KV CKT 1
AEPW	ELK CITY 230KV (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1
AEPW/SPS	ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1
MIDW	COLBY - HOXIE 115KV CKT 1
OKGE	ALVA - KNOBHILL 69KV CKT 1
OKGE	CIMARRON - HAYMAKER 138KV CKT 1
OKGE	CLEO CORNER - GLASS MOUNTAIN 138KV CKT 1
OKGE	DIVISION AVE - HAYMAKER 138KV CKT 1
OKGE	EL RENO - ROMAN NOSE 138KV CKT 1
OKGE	IMO TAP - SOUTH 4TH ST 138KV CKT 1
OKGE	ROMAN NOSE - SOUTHARD 138KV CKT 1
OKGE	SOONER (SOONER5) 345/138/13.8KV TRANSFORMER CKT 1
OKGE/WFEC	DEWEY - TALOGA 138KV CKT 1
OKGE/WFEC	GLASS MOUNTAIN - MOORELAND 138KV CKT 1
OKGE/WFEC	KNOBHILL - MOORELAND 138KV CKT 1
SPS	HITCHLAND7 345.00 (HITCHLN7) 345/230/13.2KV TRANSFORMER CKT 1
SPS	2005-02 115115.00 - RIVERVIEW INTERCHANGE 115KV CKT 1
SPS	CARLISLE INTERCHANGE - DOUD SUB 115KV CKT 1
SPS	DOUD SUB - SOUTH PLAINS REC-YUMA 115KV CKT 1
SPS	GRAPEVINE INTERCHANGE 230/115KV TRANSFORMER CKT 1
SPS	HALE CO INTERCHANGE - TUCO INTERCHANGE 115KV CKT 1
SPS	HANSFORD 3 115.00 - HITCHLAND3 115.00 115KV CKT 1
SPS	HANSFORD 3 115.00 - SPEARMAN INTERCHANGE 115KV CKT 1
SPS	HAPPY INTERCHANGE - PALO DURO SUB 115KV CKT 1
SPS	HAPPY INTERCHANGE - TULIA TAP 115KV CKT 1
SPS	HARRINGTON STATION - NICHOLS STATION 230KV CKT 1
SPS	HARRNG_MID6 230.00 - NICHOLS STATION 230KV CKT 2
SPS	HITCHLAND6 230.00 230/115KV TRANSFORMER 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-WADSWORTH 230/69KV TRANSFORMER CKT 1
SPS	PALO DURO SUB - RANDALL COUNTY INTERCHANGE 115KV CKT 1
SPS	RANDALL COUNTY INTERCHANGE 230/115KV TRANSFORMER CKT 1
SPS	SHERMAN COUNTY TAP 115/0.0KV TRANSFORMER CKT 1
SPS	SOUTH PLAINS REC-YUMA - WOLFFORTH INTERCHANGE 115KV CKT 1
SPS	SWISHER COUNTY INTERCHANGE 230/115KV TRANSFORMER CKT 1
SPS	TOLK STATION EAST - TUCO INTERCHANGE 230KV CKT 1
SPS	TUCO INTERCHANGE (TUCO XX4) 345/230/13.2KV TRANSFORMER CKT 1
SPS/AEPW	MCCLELLAN SUB - MCLEAN RURAL SUB 115KV CKT 1
SPS/AEPW	MCLEAN RURAL SUB - SHAMROCK 115KV CKT 1
SUNC	BEELER - DIGHTON TAP 115KV CKT 1
SUNC	BEELER - NESS CITY 115KV CKT 1
SUNC	DIGHTON TAP - MANNING TAP 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	MULLERGREN - SPEARVILLE 230KV CKT 1
WEPL	SEWARD - ST JOHN 115KV CKT 1

AREA	OVERLOADED ELEMENT
WEPL/MIDW	MULLERGREN - S HAYS6 230.00 230KV CKT 1
WEPL/MIDW	ST JOHN - ST_JOHN 115KV CKT 1
WEPL/SUNC	SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1
WERE	CIRCLE - RENO COUNTY 115KV CKT 2
WERE	DAVIS - RENO COUNTY 115KV CKT 1
WFEC	CARTER JCT - LAKE CREEK 69KV CKT 1
WFEC	CEDARDALE - MOORELAND 138KV CKT 1
WFEC	CEDARDALE - OKEENE 138KV CKT 1
WFEC	DOVER SW - OKEENE 138KV CKT 1
WFEC	FPL SWITCH - WOODWARD 138KV CKT 1
WFEC	MOORELAND - TALOGA 138KV CKT 1
WFEC	MOORELAND 138/69KV TRANSFORMER CKT 1
WFEC	MOORLND 345.00 345/138KV TRANSFORMER CKT 1
AEPW	American Electric Power West
MIDW	Midwest Energy
OKGE	Oklahoma Gas and Electric
SPS	Southwestern Public Service Company
SUNC	Sunflower Electric Power Corporation
WEPL	West Plains
WFEC	Western Farmers Electric Cooperative

**Table 4: Network Constraints (Including Texas Panhandle – Oklahoma City 345kV line)**

AREA	OVERLOADED ELEMENT
AEPW	ARSENAL HILL (ARSHILL1) 138/69/12.47KV TRANSFORMER CKT 1
AEPW	ARSENAL HILL (ARSHILL2) 138/69/14.5KV TRANSFORMER CKT 2
AEPW	CLINTON JUNCTION - ELK CITY 138KV CKT 1
AEPW	ELDORADO - LAKE PAULINE 69KV CKT 1
AEPW	ELK CITY 230KV (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1
AEPW/SPS	ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1
OKGE	CLEO CORNER - GLASS MOUNTAIN 138KV CKT 1
OKGE/WFEC	GLASS MOUNTAIN - MOORELAND 138KV CKT 1
SPS	CONWAY SUB - YARNELL SUB 115KV CKT 1
SPS	GRAPEVINE INTERCHANGE 230/115KV TRANSFORMER CKT 1
SPS	HANSFORD 3 115.00 - HITCHLAND3 115.00 115KV CKT 1
SPS	HANSFORD 3 115.00 - SPEARMAN INTERCHANGE 115KV CKT 1
SPS	HAPPY INTERCHANGE - PALO DURO SUB 115KV CKT 1
SPS	HAPPY INTERCHANGE - TULIA TAP 115KV CKT 1
SPS	HITCHLAND6 230.00 230/115KV TRANSFORMER CKT 1
SPS	KIRBY SWITCHING STATION - MCCLELLAN SUB 115KV CKT 1
SPS	KRESS INTERCHANGE - TULIA TAP 115KV CKT 1
SPS	MCCLELLAN SUB - MCLEAN RURAL SUB 115KV CKT 1
SPS	NICHOLS STATION - YARNELL SUB 115KV CKT 1
SPS	PALO DURO SUB - RANDALL COUNTY INTERCHANGE 115KV CKT 1
SPS	RANDALL COUNTY INTERCHANGE 230/115KV TRANSFORMER CKT 1
SPS	TEXAS COUNTY INTERCHANGE 115/69KV TRANSFORMER CKT 1
SPS/AEPW	MCLEAN RURAL SUB - SHAMROCK 115KV CKT 1
SUNC	DIGHTON TAP - MANNING TAP 115KV CKT 1
SUNC	HOLCOMB - PLYMELL 115KV CKT 1
SUNC	PIONEER TAP - PLYMELL 115KV CKT 1
WELP	MULLERGREN - SPEARVILLE 230KV CKT 1
WEPL	MEDICINE LODGE - SUN CITY 115KV CKT 1
WEPL/MIDW	MULLERGREN - S HAYS6 230.00 230KV CKT 1
WEPL/SUNC	SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1
WFEC	CEDARDALE - MOORELAND 138KV CKT 1
WFEC	DOVER SW - OKEENE 138KV CKT 1
WFEC	MOORLND 345.00 345/138KV TRANSFORMER CKT 1
WFEC/OKGE	MOORLND 345.00 - NORTHWEST 345KV CKT 1
AEPW	American Electric Power West
MIDW	Midwest Energy
OKGE	Oklahoma Gas and Electric
SPS	Southwestern Public Service Company
SUNC	Sunflower Electric Power Corporation
WEPL	West Plains
WFEC	Western Farmers Electric Cooperative

Table 5: Contingency Analysis

SEASON	OVERLOADED ELEMENT	RATING (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
09WP	CLINTON JUNCTION - ELK CITY 138KV CKT 1	143	190	0	CLINTON AIR FORCE BASE TAP - ELK CITY 138KV CKT 1
09WP	GLASS MOUNTAIN - MOORELAND 138KV CKT 1	124	169	0	CEDARDALE - MOORELAND 138KV CKT 1
09WP	ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1	351	150	0	CHILDRESS - LAKE PAULINE 138KV CKT 1
09WP	ELK CITY 230KV (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1	287	149	0	CHILDRESS - LAKE PAULINE 138KV CKT 1
09WP	DOVER SW - OKEENE 138KV CKT 1	122	148	0	CLEO CORNER - MEN TAP 138KV CKT 1
09WP	GRAPEVINE INTERCHANGE 230/115KV TRANSFORMER CKT 1	140	147	0	CHILDRESS - LAKE PAULINE 138KV CKT 1
09WP	ALVA - KNOBHILL 69KV CKT 1	48	144	0	GLASS MOUNTAIN - MOORELAND 138KV CKT 1
09WP	MEDICINE LODGE - SUN CITY 115KV CKT 1	80	144	0	GR ISLD3 345.00 - SWEET W3 345.00 345KV CKT 1
09WP	MOORLND 345.00 345/138KV TRANSFORMER CKT 1	448	142	0	CHILDRESS - LAKE PAULINE 138KV CKT 1
09WP	MULLERGREN - S HAYS6 230.00 230KV CKT 1	147	142	0	CIRCLE - MULLERGREN 230KV CKT 1
09WP	KIRBY SWITCHING STATION - MCCLELLAN SUB 115KV CKT 1	107	135	0	JERICO (JERIC2WT) 115/69/14.4KV TRANSFORMER CKT 1
09WP	MCCLELLAN SUB - MCLEAN RURAL SUB 115KV CKT 1	107	134	0	JERICO (JERIC2WT) 115/69/14.4KV TRANSFORMER CKT 1
09WP	KNOBHILL - MOORELAND 138KV CKT 1	96	131	0	GLASS MOUNTAIN - MOORELAND 138KV CKT 1
09WP	CLINTON AIR FORCE BASE TAP - ELK CITY 138KV CKT 1	192	126	0	CLINTON JUNCTION - ELK CITY 138KV CKT 1
09WP	CLINTON AIR FORCE BASE TAP - HOBART JUNCTION 138KV CKT 1	192	125	0	CLINTON JUNCTION - ELK CITY 138KV CKT 1
09WP	SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1	336	124	0	HITCHLAND3 115.00 - TEXAS COUNTY INTERCHANGE 115KV CKT 1
09WP	HARPER - MEDICINE LODGE 138KV CKT 1	72	122	0	CIRCLE - MULLERGREN 230KV CKT 1
09WP	ALTUS JCT TAP - RUSSELL 138KV CKT 1	72	114	0	CLINTON AIR FORCE BASE TAP - HOBART JUNCTION 138KV CKT 1
09WP	CEDARDALE - MOORELAND 138KV CKT 1	170	114	0	GLASS MOUNTAIN - MOORELAND 138KV CKT 1
09WP	CEDARDALE - OKEENE 138KV CKT 1	170	112	0	GLASS MOUNTAIN - MOORELAND 138KV CKT 1
09WP	DIGHTON TAP - MANNING TAP 115KV CKT 1	98	112	0	MINGO (MINGO) 345/115/13.8KV TRANSFORMER CKT 1
09WP	CLEO CORNER - GLASS MOUNTAIN 138KV CKT 1	185	112	0	CEDARDALE - MOORELAND 138KV CKT 1
09WP	DEWEY - TALOGA 138KV CKT 1	143	112	0	IODINE - WOODWARD 138KV CKT 1
09WP	MOORELAND - TALOGA 138KV CKT 1	154	112	0	IODINE - WOODWARD 138KV CKT 1
09WP	ST JOHN - ST_JOHN 115KV CKT 1	88	110	0	CIRCLE - MULLERGREN 230KV CKT 1
09WP	BEELER - DIGHTON TAP 115KV CKT 1	98	106	0	MINGO (MINGO) 345/115/13.8KV TRANSFORMER CKT 1
09WP	HITCHLAND6 230.00 230/115KV TRANSFORMER CKT 1	252	111	56	SHERMAN COUNTY TAP 115/0.0KV TRANSFORMER CKT 1
09WP	DIVISION AVE - HAYMAKER 138KV CKT 1	308	101	60	CIMARRON - CZECH HALL 138KV CKT 1
09WP	TUCO INTERCHANGE (TUCO XX4) 345/230/13.2KV TRANSFORMER CKT 1	560	102	78	HITCHLAND7 345.00 - G05-017 345.00 345KV CKT 1
09WP	MULLERGREN - SPEARVILLE 230KV CKT 1	471	102	80	GREENSBURG - SUN CITY 115KV CKT 1
09WP	IMO TAP - SOUTH 4TH ST 138KV CKT 1	158	101	91	GLENWOOD - IMO TAP 138KV CKT 1
09WP	CIRCLE - RENO COUNTY 115KV CKT 2	92	100	115	CIRCLE - RENO COUNTY 115KV CKT 1
12SP	CLINTON JUNCTION - ELK CITY 138KV CKT 1	143	174	0	CLINTON AIR FORCE BASE TAP - ELK CITY 138KV CKT 1
12SP	GLASS MOUNTAIN - MOORELAND 138KV CKT 1	124	170	0	CEDARDALE - MOORELAND 138KV CKT 1
12SP	KIRBY SWITCHING STATION - MCCLELLAN SUB 115KV CKT 1	90	161	0	JERICO (JERIC2WT) 115/69/14.4KV TRANSFORMER CKT 1
12SP	PALO DURO SUB - RANDALL COUNTY INTERCHANGE 115KV CKT 1	99	153	0	AMARILLO SOUTH INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1
12SP	HAPPY INTERCHANGE - PALO DURO SUB 115KV CKT 1	99	152	0	AMARILLO SOUTH INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1
12SP	MCLEAN RURAL SUB - SHAMROCK 115KV CKT 1	90	146	0	CLARENDON - CLARENDON REC 69KV CKT 1
12SP	MULLERGREN - SPEARVILLE 230KV CKT 1	355	145	0	GREENSBURG - JUDSON LARGE 115KV CKT 1

**TABLE 5: Contingency Analysis (continued)**

SEASON	OVERLOADED ELEMENT	RATING (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
12SP	ELK CITY 230KV (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1	287	141	0	KIRBY SWITCHING STATION - MCCLELLAN SUB 115KV CKT 1
12SP	DOVER SW - OKEENE 138KV CKT 1	122	140	0	CLEO CORNER - MEN TAP 138KV CKT 1
12SP	KNOBHILL - MOORELAND 138KV CKT 1	96	140	0	GLASS MOUNTAIN - MOORELAND 138KV CKT 1
12SP	ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1	351	139	0	AMARILLO SOUTH INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1
12SP	GRAPEVINE INTERCHANGE 230/115KV TRANSFORMER CKT 1	129	138	0	KIRBY SWITCHING STATION - MCCLELLAN SUB 115KV CKT 1
12SP	MEDICINE LODGE - SUN CITY 115KV CKT 1	80	137	0	SEWARD - ST JOHN 115KV CKT 1
12SP	CLEO CORNER - GLASS MOUNTAIN 138KV CKT 1	153	135	0	CEDARDALE - MOORELAND 138KV CKT 1
12SP	HAPPY INTERCHANGE - TULIA TAP 115KV CKT 1	99	134	0	AMARILLO SOUTH INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1
12SP	CLINTON AIR FORCE BASE TAP - ELK CITY 138KV CKT 1	170	131	0	CLINTON JUNCTION - ELK CITY 138KV CKT 1
12SP	MOORLND 345.00 345/138KV TRANSFORMER CKT 1	448	130	0	AMARILLO SOUTH INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1
12SP	FPL SWITCH - WOODWARD 138KV CKT 1	153	130	0	MOORELAND - TALOGA 138KV CKT 1
12SP	MULLERGREY - S HAYS6 230.00 230KV CKT 1	147	129	0	COLBY - MINGO 115KV CKT 1
12SP	KRESS INTERCHANGE - TULIA TAP 115KV CKT 1	99	129	0	AMARILLO SOUTH INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1
12SP	CLINTON AIR FORCE BASE TAP - HOBART JUNCTION 138KV CKT 1	170	129	0	CLINTON JUNCTION - ELK CITY 138KV CKT 1
12SP	ST JOHN - ST JOHN 115KV CKT 1	88	121	0	CIRCLE - HUTCHINSON ENERGY CENTER 115KV CKT 1
12SP	MOORELAND - TALOGA 138KV CKT 1	154	117	0	FPL SWITCH - WOODWARD 138KV CKT 1
12SP	CEDARDALE - MOORELAND 138KV CKT 1	170	116	0	GLASS MOUNTAIN - MOORELAND 138KV CKT 1
12SP	CEDARDALE - OKEENE 138KV CKT 1	170	113	0	GLASS MOUNTAIN - MOORELAND 138KV CKT 1
12SP	RANDALL COUNTY INTERCHANGE 230/115KV TRANSFORMER CKT 1	259	112	0	AMARILLO SOUTH INTERCHANGE - NICHOLS STATION 230KV CKT 1
12SP	DAVIS - RENO COUNTY 115KV CKT 1	194	111	0	CIRCLE - HUTCHINSON ENERGY CENTER 115KV CKT 1
12SP	HALE CO INTERCHANGE - TUCO INTERCHANGE 115KV CKT 1	99	111	0	SWISHER COUNTY INTERCHANGE - TUCO INTERCHANGE 230KV CKT 1
12SP	HARRINGTON STATION - NICHOLS STATION 230KV CKT 1	635	111	0	HARRNG_MID6 230.00 - NICHOLS STATION 230KV CKT 2
12SP	ROMAN NOSE - SOUTHWARD 138KV CKT 1	153	111	0	CLEO CORNER - MEN TAP 138KV CKT 1
12SP	DEWEY - TALOGA 138KV CKT 1	143	111	0	IODINE - WOODWARD 138KV CKT 1
12SP	HARRNG_MID6 230.00 - NICHOLS STATION 230KV CKT 2	635	110	0	HARRINGTON STATION - NICHOLS STATION 230KV CKT 1
12SP	MEDICINE LODGE (MED-LDG4) 138/115/2.72KV TRANSFORMER CKT 1	65	109	0	MEDICINE LODGE - PRATT 115KV CKT 1
12SP	DIGHTON TAP - MANNING TAP 115KV CKT 1	98	109	0	MINGO - PHEASANT RUN 115KV CKT 1
12SP	DOUD SUB - SOUTH PLAINS REC-YUMA 115KV CKT 1	161	109	0	TOLK STATION EAST - TUCO INTERCHANGE 230KV CKT 1
12SP	SWISHER COUNTY INTERCHANGE 230/115KV TRANSFORMER CKT 1	150	108	0	SWISHER COUNTY INTERCHANGE - TUCO INTERCHANGE 230KV CKT 1
12SP	SOONER (SOONER5) 345/138/13.8KV TRANSFORMER CKT 1	448	107	0	GEN514805 1
12SP	COLBY - HOXIE 115KV CKT 1	101	105	0	MULLERGREY - S HAYS6 230.00 230KV CKT 1
12SP	CIMARRON - HAYMAKER 138KV CKT 1	308	104	0	CIMARRON - CZECH HALL 138KV CKT 1
12SP	ALTUS JCT TAP - RUSSELL 138KV CKT 1	72	108	10	ANADARKO - PARADISE 138KV CKT 1
12SP	2005-02 115115.00 - RIVERVIEW INTERCHANGE 115KV CKT 1	161	109	11	2007-33T 230.00 - HARRNG_EST6 230.00 230KV CKT 1
12SP	EL RENO - ROMAN NOSE 138KV CKT 1	153	104	50	CLEO CORNER - MEN TAP 138KV CKT 1
12SP	DIVISION AVE - HAYMAKER 138KV CKT 1	308	101	78	CIMARRON - CZECH HALL 138KV CKT 1
12SP	HARPER - MEDICINE LODGE 138KV CKT 1	72	103	79	MEDICINE LODGE - PRATT 115KV CKT 1
12SP	HANSFORD 3 115.00 - HITCHLAND3 115.00 115KV CKT 1	180	108	103	HANSFORD 3 115.00 - SPEARMAN INTERCHANGE 115KV CKT 1
12SP	HITCHLAND6 230.00 230/115KV TRANSFORMER CKT 1	252	102	109	SHERMAN COUNTY TAP 115/0.0KV TRANSFORMER CKT 1

**TABLE 5: Contingency Analysis (continued)**

SEASON	OVERLOADED ELEMENT	RATING (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
12SP	TOLK STATION EAST - TUCO INTERCHANGE 230KV CKT 1	497	100	111	AMARILLO SOUTH INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1
12SP	SOUTH PLAINS REC-YUMA - WOLFFORTH INTERCHANGE 115KV CKT 1	197	100	115	TOLK STATION EAST - TUCO INTERCHANGE 230KV CKT 1
12SP	BEELER - DIGHTON TAP 115KV CKT 1	98	100	118	MINGO - PHEASANT RUN 115KV CKT 1
12WP	CLINTON JUNCTION - ELK CITY 138KV CKT 1	143	197	0	CLINTON AIR FORCE BASE TAP - ELK CITY 138KV CKT 1
12WP	GLASS MOUNTAIN - MOORELAND 138KV CKT 1	124	165	0	CEDARDALE - MOORELAND 138KV CKT 1
12WP	ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1	319	158	0	BASE CASE
12WP	MULLERGREN - S HAYS6 230.00 230KV CKT 1	147	151	0	CIRCLE - MULLERGREN 230KV CKT 1
12WP	ELK CITY 230KV (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1	287	147	0	GREENSBURG - JUDSON LARGE 115KV CKT 1
12WP	ALVA - KNOBHILL 69KV CKT 1	48	145	0	GLASS MOUNTAIN - MOORELAND 138KV CKT 1
12WP	GRAPEVINE INTERCHANGE 230/115KV TRANSFORMER CKT 1	140	143	0	KIRBY SWITCHING STATION - MCCLELLAN SUB 115KV CKT 1
12WP	DOVER SW - OKEENE 138KV CKT 1	122	142	0	CLEO CORNER - MEN TAP 138KV CKT 1
12WP	MOORLND 345.00 345/138KV TRANSFORMER CKT 1	448	141	0	GEN520997 1
12WP	CLINTON AIR FORCE BASE TAP - ELK CITY 138KV CKT 1	192	134	0	CLINTON JUNCTION - ELK CITY 138KV CKT 1
12WP	SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1	336	133	0	GEN539670 4
12WP	CLINTON AIR FORCE BASE TAP - HOBART JUNCTION 138KV CKT 1	192	133	0	CLINTON JUNCTION - ELK CITY 138KV CKT 1
12WP	MEDICINE LODGE - SUN CITY 115KV CKT 1	80	131	0	SEWARD - ST JOHN 115KV CKT 1
12WP	MCLEAN RURAL SUB - SHAMROCK 115KV CKT 1	107	130	0	CLARENDON REC - HEDLEY 69KV CKT 1
12WP	KNOBHILL - MOORELAND 138KV CKT 1	96	130	0	GLASS MOUNTAIN - MOORELAND 138KV CKT 1
12WP	PALO DURO SUB - RANDALL COUNTY INTERCHANGE 115KV CKT 1	118	129	0	AMARILLO SOUTH INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1
12WP	HAPPY INTERCHANGE - PALO DURO SUB 115KV CKT 1	118	129	0	AMARILLO SOUTH INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1
12WP	SEWARD - ST JOHN 115KV CKT 1	80	125	0	CIRCLE - MULLERGREN 230KV CKT 1
12WP	HALE CO INTERCHANGE - TUCO INTERCHANGE 115KV CKT 1	118	122	0	SWISHER COUNTY INTERCHANGE - TUCO INTERCHANGE 230KV CKT 1
12WP	HAPPY INTERCHANGE - TULIA TAP 115KV CKT 1	118	122	0	AMARILLO SOUTH INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1
12WP	ALTUS JCT TAP - RUSSELL 138KV CKT 1	72	121	0	CLINTON AIR FORCE BASE TAP - ELK CITY 138KV CKT 1
12WP	KRESS INTERCHANGE - TULIA TAP 115KV CKT 1	118	119	0	AMARILLO SOUTH INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1
12WP	MEDICINE LODGE (MED-LDG4) 138/115/2.72KV TRANSFORMER CKT 1	65	114	0	MEDICINE LODGE - PRATT 115KV CKT 1
12WP	CEDARDALE - MOORELAND 138KV CKT 1	170	112	0	GLASS MOUNTAIN - MOORELAND 138KV CKT 1
12WP	MOORELAND - TALOGA 138KV CKT 1	154	112	0	IODINE - WOODWARD 138KV CKT 1
12WP	DIGHTON TAP - MANNING TAP 115KV CKT 1	98	112	0	MINGO (MINGO) 345/115/13.8KV TRANSFORMER CKT 1
12WP	DEWEY - TALOGA 138KV CKT 1	143	111	0	IODINE - WOODWARD 138KV CKT 1
12WP	CEDARDALE - OKEENE 138KV CKT 1	170	111	0	GLASS MOUNTAIN - MOORELAND 138KV CKT 1
12WP	CLEO CORNER - GLASS MOUNTAIN 138KV CKT 1	185	109	0	CEDARDALE - MOORELAND 138KV CKT 1
12WP	HARPER - MEDICINE LODGE 138KV CKT 1	72	109	5	CIRCLE - MULLERGREN 230KV CKT 1
12WP	BEELER - DIGHTON TAP 115KV CKT 1	98	105	5	MINGO (MINGO) 345/115/13.8KV TRANSFORMER CKT 1
12WP	CARTER JCT - LAKE CREEK 69KV CKT 1	61	104	54	CLINTON AIR FORCE BASE TAP - ELK CITY 138KV CKT 1
12WP	CARNEGIE - HOBART JUNCTION 138KV CKT 1	143	103	68	CLINTON JUNCTION - ELK CITY 138KV CKT 1
12WP	HITCHLAND6 230.00 230/115KV TRANSFORMER CKT 1	252	106	82	SHERMAN COUNTY TAP 115/0.0KV TRANSFORMER CKT 1

**TABLE 5: Contingency Analysis (continued)**

SEASON	OVERLOADED ELEMENT	RATING (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
12WP	MULLERGREN - SPEARVILLE 230KV CKT 1	471	102	83	GREENSBURG - JUDSON LARGE 115KV CKT 1
12WP	ST JOHN - ST_JOHN 115KV CKT 1	88	102	84	CIRCLE - MULLERGREN 230KV CKT 1
12WP	BEELER - NESS CITY 115KV CKT 1	98	101	89	MINGO (MINGO) 345/115/13.8KV TRANSFORMER CKT 1
17SP	LUBBOCK POWER & LIGHT-HOLLY PLANT 230/69KV TRANSFORMER CKT 1	100	177	0	LUBBOCK POWER & LIGHT-SOUTHEAST 230/69KV TRANSFORMER CKT 1
17SP	CLINTON JUNCTION - ELK CITY 138KV CKT 1	143	166	0	CLINTON AIR FORCE BASE TAP - ELK CITY 138KV CKT 1
17SP	LUBBOCK POWER & LIGHT-WADSWORTH 230/69KV TRANSFORMER CKT 1	100	162	0	LUBBOCK POWER & LIGHT-SOUTHEAST 230/69KV TRANSFORMER CKT 1
17SP	GLASS MOUNTAIN - MOORELAND 138KV CKT 1	124	159	0	CEDARDALE - MOORELAND 138KV CKT 1
17SP	PALO DURO SUB - RANDALL COUNTY INTERCHANGE 115KV CKT 1	99	154	0	AMARILLO SOUTH INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1
17SP	HAPPY INTERCHANGE - PALO DURO SUB 115KV CKT 1	99	152	0	AMARILLO SOUTH INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1
17SP	MCLEAN RURAL SUB - SHAMROCK 115KV CKT 1	90	144	0	CLARENDON - CLARENDON REC 69KV CKT 1
17SP	MULLERGREN - S HAYS6 230.00 230KV CKT 1	147	144	0	CIRCLE - MULLERGREN 230KV CKT 1
17SP	ELK CITY 230KV (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1	287	137	0	KIRBY SWITCHING STATION - MCCLELLAN SUB 115KV CKT 1
17SP	ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1	351	135	0	KIRBY SWITCHING STATION - MCCLELLAN SUB 115KV CKT 1
17SP	MOORELAND 138/69KV TRANSFORMER CKT 1	65	135	0	FPL SWITCH - WOODWARD 138KV CKT 1
17SP	HAPPY INTERCHANGE - TULIA TAP 115KV CKT 1	99	135	0	AMARILLO SOUTH INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1
17SP	KNOBHILL - MOORELAND 138KV CKT 1	96	133	0	GLASS MOUNTAIN - MOORELAND 138KV CKT 1
17SP	MOORLND 345.00 345/138KV TRANSFORMER CKT 1	448	130	0	GEN520997 1
17SP	KRESS INTERCHANGE - TULIA TAP 115KV CKT 1	99	129	0	AMARILLO SOUTH INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1
17SP	DOVER SW - OKEENE 138KV CKT 1	122	128	0	CLEO CORNER - MEN TAP 138KV CKT 1
17SP	MULLERGREN - SPEARVILLE 230KV CKT 1	355	127	0	GREENSBURG - JUDSON LARGE 115KV CKT 1
17SP	SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1	336	126	0	CIMARRON RIVER PLANT - NORTH CIMARRON 115KV CKT 1
17SP	CLEO CORNER - GLASS MOUNTAIN 138KV CKT 1	153	126	0	CEDARDALE - MOORELAND 138KV CKT 1
17SP	CLINTON AIR FORCE BASE TAP - ELK CITY 138KV CKT 1	170	125	0	CLINTON JUNCTION - ELK CITY 138KV CKT 1
17SP	FPL SWITCH - WOODWARD 138KV CKT 1	153	123	0	MOORELAND - TALOGA 138KV CKT 1
17SP	CLINTON AIR FORCE BASE TAP - HOBART JUNCTION 138KV CKT 1	170	123	0	CLINTON JUNCTION - ELK CITY 138KV CKT 1
17SP	DOUD SUB - SOUTH PLAINS REC-YUMA 115KV CKT 1	161	123	0	LUBBOCK SOUTH INTERCHANGE - WOLFFORTH INTERCHANGE 230KV CKT 1
17SP	DAVIS - RENO COUNTY 115KV CKT 1	194	119	0	CIRCLE - HUTCHINSON ENERGY CENTER 115KV CKT 1
17SP	RANDALL COUNTY INTERCHANGE 230/115KV TRANSFORMER CKT 1	259	117	0	AMARILLO SOUTH INTERCHANGE - NICHOLS STATION 230KV CKT 1
17SP	SOUTH PLAINS REC-YUMA - WOLFFORTH INTERCHANGE 115KV CKT 1	197	113	0	LUBBOCK SOUTH INTERCHANGE - WOLFFORTH INTERCHANGE 230KV CKT 1
17SP	MOORELAND - TALOGA 138KV CKT 1	154	112	0	FPL SWITCH - WOODWARD 138KV CKT 1
17SP	DIGHTON TAP - MANNING TAP 115KV CKT 1	98	111	0	MINGO (MINGO) 345/115/13.8KV TRANSFORMER CKT 1
17SP	CEDARDALE - MOORELAND 138KV CKT 1	170	109	0	GLASS MOUNTAIN - MOORELAND 138KV CKT 1
17SP	HALE CO INTERCHANGE - TUCO INTERCHANGE 115KV CKT 1	99	109	0	SWISHER COUNTY INTERCHANGE - TUCO INTERCHANGE 230KV CKT 1
17SP	CEDARDALE - OKEENE 138KV CKT 1	170	107	0	GLASS MOUNTAIN - MOORELAND 138KV CKT 1
17SP	CIMARRON - HAYMAKER 138KV CKT 1	308	106	0	CIMARRON - CZECH HALL 138KV CKT 1
17SP	DEWEY - TALOGA 138KV CKT 1	143	106	0	IODINE - WOODWARD 138KV CKT 1



**TABLE 5: Contingency Analysis (continued)**

SEASON	OVERLOADED ELEMENT	RATING (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
17SP	SHERMAN COUNTY TAP 115/0.0KV TRANSFORMER CKT 1	161	105	1	MOORE COUNTY INTERCHANGE 230/115KV TRANSFORMER CKT 1
17SP	ALTUS JCT TAP - RUSSELL 138KV CKT 1	72	110	4	ANADARKO - PARADISE 138KV CKT 1
17SP	DIVISION AVE - HAYMAKER 138KV CKT 1	308	102	18	CIMARRON - CZECH HALL 138KV CKT 1
17SP	TOLK STATION EAST - TUCO INTERCHANGE 230KV CKT 1	497	103	34	SUNDOWN INTERCHANGE - WOLFFORTH INTERCHANGE 230KV CKT 1
17SP	CARLISLE INTERCHANGE - DOUD SUB 115KV CKT 1	161	102	56	LUBBOCK SOUTH INTERCHANGE - WOLFFORTH INTERCHANGE 230KV CKT 1
17SP	2005-02 115115.00 - RIVERVIEW INTERCHANGE 115KV CKT 1	161	104	64	2007-33T 230.00 - HARRNG_EST6 230.00 230KV CKT 1
17SP	ROMAN NOSE - SOUTHARD 138KV CKT 1	153	102	70	CLEO CORNER - MEN TAP 138KV CKT 1
17SP	ARSENAL HILL (ARSHILL2) 138/69/14.5KV TRANSFORMER CKT 2	220	101	88	ARSENAL HILL (ARSHILL1) 138/69/12.47KV TRANSFORMER CKT 1
17SP	BEELER - DIGHTON TAP 115KV CKT 1	98	101	90	MINGO (MINGO) 345/115/13.8KV TRANSFORMER CKT 1
17SP	ARSENAL HILL (ARSHILL1) 138/69/12.47KV TRANSFORMER CKT 1	220	101	93	ARSENAL HILL (ARSHILL2) 138/69/14.5KV TRANSFORMER CKT 2
17SP	HANSFORD 3 115.00 - HITCHLAND3 115.00 115KV CKT 1	180	108	103	HANSFORD 3 115.00 - SPEARMAN INTERCHANGE 115KV CKT 1
17SP	HANSFORD 3 115.00 - SPEARMAN INTERCHANGE 115KV CKT 1	180	101	117	HANSFORD 3 115.00 - HITCHLAND3 115.00 115KV 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.*

**Table 6: Contingency Analysis (Including Texas Panhandle – Oklahoma City 345kV line)**

SEASON	OVERLOADED ELEMENT	RATING (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
09WP	ELDORADO - LAKE PAULINE 69KV CKT 1	20	255	0	LAKE PAULINE - RUSSELL 138KV CKT 1
09WP	CLINTON JUNCTION - ELK CITY 138KV CKT 1	143	142	0	MOORLND 345.00 - NORTHWEST 345KV CKT 1
09WP	ELK CITY 230KV (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1	287	128	0	CHILDRESS - LAKE PAULINE 138KV CKT 1
09WP	MEDICINE LODGE - SUN CITY 115KV CKT 1	80	125	0	MULLERGREN - SPEARVILLE 230KV CKT 1
09WP	ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1	351	123	0	CHILDRESS - LAKE PAULINE 138KV CKT 1
09WP	MOORLND 345.00 - NORTHWEST 345KV CKT 1	1052	109	0	MOORLND 345.00 345/138KV TRANSFORMER CKT 1
09WP	SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1	336	104	0	GEN532751 1
09WP	TEXAS COUNTY INTERCHANGE 115/69KV TRANSFORMER CKT 1	84	146	32	HITCHLAND3 115.00 - TEXAS COUNTY INTERCHANGE 115KV CKT 1
09WP	HITCHLAND6 230.00 230/115KV TRANSFORMER CKT 1	252	110	48	SHERMAN COUNTY TAP 115/0.0KV TRANSFORMER CKT 1
09WP	MOORLND 345.00 345/138KV TRANSFORMER CKT 1	448	150	115	MOORLND 345.00 - NORTHWEST 345KV CKT 1
12SP	GLASS MOUNTAIN - MOORELAND 138KV CKT 1	124	152	0	MOORLND 345.00 - NORTHWEST 345KV CKT 1
12SP	MOORLND 345.00 345/138KV TRANSFORMER CKT 1	448	137	0	MOORLND 345.00 - NORTHWEST 345KV CKT 1
12SP	CLINTON JUNCTION - ELK CITY 138KV CKT 1	143	129	0	MOORLND 345.00 - NORTHWEST 345KV CKT 1
12SP	CONWAY SUB - YARNELL SUB 115KV CKT 1	180	127	0	CONWAY SUB - KIRBY SWITCHING STATION 115KV CKT 1
12SP	NICHOLS STATION - YARNELL SUB 115KV CKT 1	180	126	0	CONWAY SUB - KIRBY SWITCHING STATION 115KV CKT 1
12SP	SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1	336	126	0	MOORLND 345.00 - NORTHWEST 345KV CKT 1
12SP	ELK CITY 230KV (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1	287	125	0	MOORLND 345.00 - NORTHWEST 345KV CKT 1
SEASON	OVERLOADED ELEMENT	RATING	LOADING	ATC	CONTINGENCY

**TABLE 5: Contingency Analysis (continued)**

		(MVA)	(%)	(MW)	
12SP	CLEO CORNER - GLASS MOUNTAIN 138KV CKT 1	153	121	0	MOORLND 345.00 - NORTHWEST 345KV CKT 1
12SP	MULLERGREN - SPEARVILLE 230KV CKT 1	355	120	0	MOORLND 345.00 - NORTHWEST 345KV CKT 1
12SP	ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1	351	119	0	MOORLND 345.00 - NORTHWEST 345KV CKT 1
12SP	MEDICINE LODGE - SUN CITY 115KV CKT 1	80	115	0	MOORLND 345.00 - NORTHWEST 345KV CKT 1
12SP	DOVER SW - OKEENE 138KV CKT 1	122	114	0	MOORLND 345.00 - NORTHWEST 345KV CKT 1
12SP	MULLERGREN - S HAYS6 230.00 230KV CKT 1	147	106	0	CIRCLE - MULLERGREN 230KV CKT 1
12SP	RANDALL COUNTY INTERCHANGE 230/115KV TRANSFORMER CKT 1	259	102	9	AMARILLO SOUTH INTERCHANGE - NICHOLS STATION 230KV CKT 1
12SP	HITCHLAND6 230.00 230/115KV TRANSFORMER CKT 1	252	106	84	SHERMAN COUNTY TAP 115/0.0KV TRANSFORMER CKT 1
12SP	HANSFORD 3 115.00 - HITCHLAND3 115.00 115KV CKT 1	180	108	99	HANSFORD 3 115.00 - SPEARMAN INTERCHANGE 115KV CKT 1
12SP	CEDARDALE - MOORELAND 138KV CKT 1	170	100	111	MOORLND 345.00 - NORTHWEST 345KV CKT 1
12SP	HANSFORD 3 115.00 - SPEARMAN INTERCHANGE 115KV CKT 1	180	102	116	HANSFORD 3 115.00 - HITCHLAND3 115.00 115KV CKT 1
12WP	GRAPEVINE INTERCHANGE 230/115KV TRANSFORMER CKT 1	140	138	0	CHILDRESS - LAKE PAULINE 138KV CKT 1
12WP	ELK CITY 230KV (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1	287	135	0	CHILDRESS - LAKE PAULINE 138KV CKT 1
12WP	ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1	319	132	0	BASE CASE
12WP	CLINTON JUNCTION - ELK CITY 138KV CKT 1	143	132	0	CLINTON AIR FORCE BASE TAP - ELK CITY 138KV CKT 1
12WP	KIRBY SWITCHING STATION - MCCLELLAN SUB 115KV CKT 1	107	125	0	JERICO (JERIC2WT) 115/69/14.4KV TRANSFORMER CKT 1
12WP	MCCLELLAN SUB - MCLEAN RURAL SUB 115KV CKT 1	107	124	0	JERICO (JERIC2WT) 115/69/14.4KV TRANSFORMER CKT 1
12WP	MEDICINE LODGE - SUN CITY 115KV CKT 1	80	118	0	MULLERGREN - SPEARVILLE 230KV CKT 1
12WP	MCLEAN RURAL SUB - SHAMROCK 115KV CKT 1	107	117	0	JERICO (JERIC2WT) 115/69/14.4KV TRANSFORMER CKT 1
12WP	MOORLND 345.00 - NORTHWEST 345KV CKT 1	1052	110	0	MOORLND 345.00 345/138KV TRANSFORMER CKT 1
12WP	PALO DURO SUB - RANDALL COUNTY INTERCHANGE 115KV CKT 1	118	110	0	AMARILLO SOUTH INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1
12WP	HAPPY INTERCHANGE - PALO DURO SUB 115KV CKT 1	118	109	0	AMARILLO SOUTH INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1
12WP	CONWAY SUB - YARNELL SUB 115KV CKT 1	218	108	0	GRAPEVINE INTERCHANGE 230/115KV TRANSFORMER CKT 1
12WP	NICHOLS STATION - YARNELL SUB 115KV CKT 1	218	108	0	GRAPEVINE INTERCHANGE 230/115KV TRANSFORMER CKT 1
12WP	SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1	336	103	0	GEN539670 4
12WP	HAPPY INTERCHANGE - TULIA TAP 115KV CKT 1	118	103	61	AMARILLO SOUTH INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1
12WP	HITCHLAND6 230.00 230/115KV TRANSFORMER CKT 1	252	105	84	SHERMAN COUNTY TAP 115/0.0KV TRANSFORMER CKT 1
17SP	GLASS MOUNTAIN - MOORELAND 138KV CKT 1	124	142	0	MOORLND 345.00 - NORTHWEST 345KV CKT 1
17SP	CONWAY SUB - YARNELL SUB 115KV CKT 1	180	137	0	GRAPEVINE INTERCHANGE - KIRBY SWITCHING STATION 115KV CKT 1
17SP	NICHOLS STATION - YARNELL SUB 115KV CKT 1	180	137	0	GRAPEVINE INTERCHANGE - KIRBY SWITCHING STATION 115KV CKT 1
17SP	PALO DURO SUB - RANDALL COUNTY INTERCHANGE 115KV CKT 1	99	132	0	AMARILLO SOUTH INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1
17SP	MOORLND 345.00 345/138KV TRANSFORMER CKT 1	448	131	0	MOORLND 345.00 - NORTHWEST 345KV CKT 1
17SP	HAPPY INTERCHANGE - PALO DURO SUB 115KV CKT 1	99	130	0	AMARILLO SOUTH INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1
17SP	CLINTON JUNCTION - ELK CITY 138KV CKT 1	143	125	0	MOORLND 345.00 - NORTHWEST 345KV CKT 1
17SP	HOLCOMB - PLYMELL 115KV CKT 1	143	125	0	FLETCHER - HOLCOMB 115KV CKT 1
17SP	ELK CITY 230KV (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1	287	123	0	MOORLND 345.00 - NORTHWEST 345KV CKT 1
17SP	PIONEER TAP - PLYMELL 115KV CKT 1	143	121	0	FLETCHER - HOLCOMB 115KV CKT 1
SEASON	OVERLOADED ELEMENT	RATING	LOADING	ATC	CONTINGENCY

**TABLE 5: Contingency Analysis (continued)**

		(MVA)	(%)	(MW)	
17SP	ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1	351	118	0	MOORLND 345.00 - NORTHWEST 345KV CKT 1
17SP	SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1	336	117	0	HOLCOMB - SETAB 345KV CKT 1
17SP	HAPPY INTERCHANGE - TULIA TAP 115KV CKT 1	99	113	0	AMARILLO SOUTH INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1
17SP	CLEO CORNER - GLASS MOUNTAIN 138KV CKT 1	153	112	0	MOORLND 345.00 - NORTHWEST 345KV CKT 1
17SP	RANDALL COUNTY INTERCHANGE 230/115KV TRANSFORMER CKT 1	259	110	0	AMARILLO SOUTH INTERCHANGE - NICHOLS STATION 230KV CKT 1
17SP	KRESS INTERCHANGE - TULIA TAP 115KV CKT 1	99	108	0	AMARILLO SOUTH INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1
17SP	MULLERGREN - SPEARVILLE 230KV CKT 1	355	107	0	MOORLND 345.00 - NORTHWEST 345KV CKT 1
17SP	MULLERGREN - S HAYS6 230.00 230KV CKT 1	147	106	0	MINGO - SETAB 345KV CKT 1
17SP	DOVER SW - OKEENE 138KV CKT 1	122	104	27	MOORLND 345.00 - NORTHWEST 345KV CKT 1
17SP	DIGHTON TAP - MANNING TAP 115KV CKT 1	98	103	50	MINGO - SETAB 345KV CKT 1
17SP	ARSENAL HILL (ARSHILL2) 138/69/14.5KV TRANSFORMER CKT 2	220	101	89	ARSENAL HILL (ARSHILL1) 138/69/12.47KV TRANSFORMER CKT 1
17SP	ARSENAL HILL (ARSHILL1) 138/69/12.47KV TRANSFORMER CKT 1	220	101	93	ARSENAL HILL (ARSHILL2) 138/69/14.5KV TRANSFORMER CKT 2
17SP	HANSFORD 3 115.00 - HITCHLAND3 115.00 115KV CKT 1	180	108	98	HANSFORD 3 115.00 - SPEARMAN INTERCHANGE 115KV CKT 1
17SP	HITCHLAND6 230.00 230/115KV TRANSFORMER CKT 1	252	103	105	SHERMAN COUNTY TAP 115/0.0KV TRANSFORMER CKT 1
17SP	HANSFORD 3 115.00 - SPEARMAN INTERCHANGE 115KV CKT 1	180	102	116	HANSFORD 3 115.00 - HITCHLAND3 115.00 115KV CKT 1
17SP	TEXAS COUNTY INTERCHANGE 115/69KV TRANSFORMER CKT 1	84	101	116	HITCHLAND3 115.00 - TEXAS COUNTY INTERCHANGE 115KV 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 \$800,000 for Direct Assignment Facilities and Network Upgrades. At this time, the cost estimates for other Direct Assignment facilities including those in Tables 1 and 2 have not been defined by the Customer. In addition to the Customer's proposed interconnection facilities, the Customer may be responsible for installing reactive compensation in the Customer's substation for reactive support. As stated earlier, some but not all of the local projects that were previously queued are assumed to be in service in this Feasibility Study. These costs exclude upgrades of other transmission facilities that were listed in Table 3 of which are Network Constraints.

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. At the time of the System Impact Study, a better determination of the interconnection facilities may be available.

The required interconnection costs listed in Tables 1 and 2 and other upgrades associated with Network Constraints 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 submits a Transmission Service Request through Southwest Power Pool's OASIS.

## Appendix A: Point of Interconnection Area Map

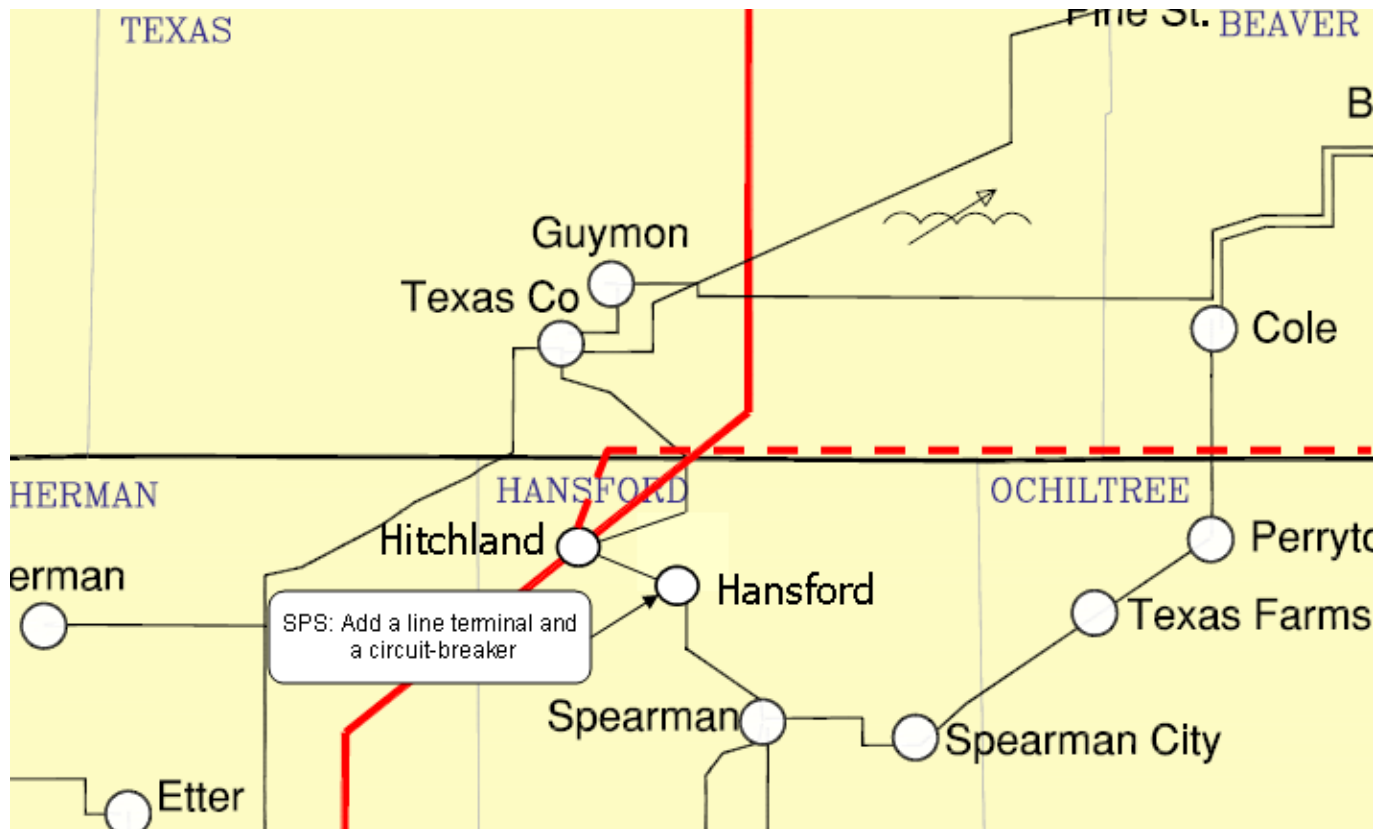


Figure 2: Point of Interconnection Area Map