



**Feasibility Study
For
Generation Interconnection
Request
GEN-2007-026**

SPP Tariff Studies
(#GEN-2007-026)

January, 2008

Executive Summary

<OMITTED TEXT> (Customer) has requested a Feasibility Study for the purpose of interconnecting 130 MW of wind generation within the control area of Southwestern Public Service Company (SPS) located in Deaf Smith County, Texas. The proposed interconnection point is in the existing Deaf Smith – Bushland 230 kV transmission line, owned by SPS. The proposed in-service date is December, 2009.

Power flow analysis has indicated that for the powerflow cases studied, it is possible to interconnect the 130 MW of generation with transmission system reinforcements within the local transmission system. In order to maintain acceptable reactive power compensation, the customer will be required to pay for the installation of a combined total of at least 30 Mvar of 34.5 kV capacitor bank(s) to be installed 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).

The requirement to interconnect the 130 MW of wind generation on the existing Deaf Smith – Bushland 230 kV transmission line consists of adding a 230kV line terminal to new 230kV switching station that is proposed to be built as a collecting station for three previous queued interconnection requests. The new station will be constructed and maintained by SPS. The Customer did not propose a specific route for the 230 kV line extending to serve its 230/34.5 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 130 MW of generation is approximately \$1,200,000. These costs are shown in Tables 1 and 2. This cost does not include building the 230 kV line from the Customer 230/34.5 kV collector substation into the point of interconnection. This cost also does not include the Customer's 230/34.5 kV collector substation or the 34.5 kV, 30 Mvar capacitor bank(s). Network constraints in the American Electric Power West (AEPW), Midwest Energy (MIDW), Oklahoma Gas and Electric (OKGE), Sunflower Electric Power Corporation (SUNC), West Plains (WEPL), Westar Energy (WERE), Western Farmers Electric Cooperative (WFEC) and 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 SPS 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 130 MW of wind generation within the control area of Southwestern Public Service Company (SPS) located in Deaf Smith County, Texas. The proposed interconnection point is in the existing Deaf Smith – Bushland 230 kV transmission line, 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 130 MW of wind generation on the existing Deaf Smith – Bushland 230 kV transmission line consists of adding a 230kV line terminal to the new 230kV switching station that is proposed to be built as a collecting station for three previous queued interconnection requests. Before the interconnection of GEN-2007-026, the station is set up to have twelve (12) 230kV circuit breakers in a breaker-and-a-half configuration with terminals to Potter County, Plant X, Bushland, Deaf Smith, GEN-2006-039, GEN-2006-045, GEN-2006-047, and GEN-2007-010. After the addition of GEN-2007-026, an additional two (2) 230kV circuit breakers will be added to the station. The new station will be constructed and maintained by SPS. The Customer did not propose a specific route for the 230 kV line extending to serve its 230/34.5 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 American Electric Power West (AEPW), Midwest Energy (MIDW), Oklahoma Gas and Electric (OKGE), Sunflower Electric Power Corporation (SUNC), West Plains (WEPL), Westar Energy (WERE), Western Farmers Electric Cooperative (WFEC) and SPS 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.

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

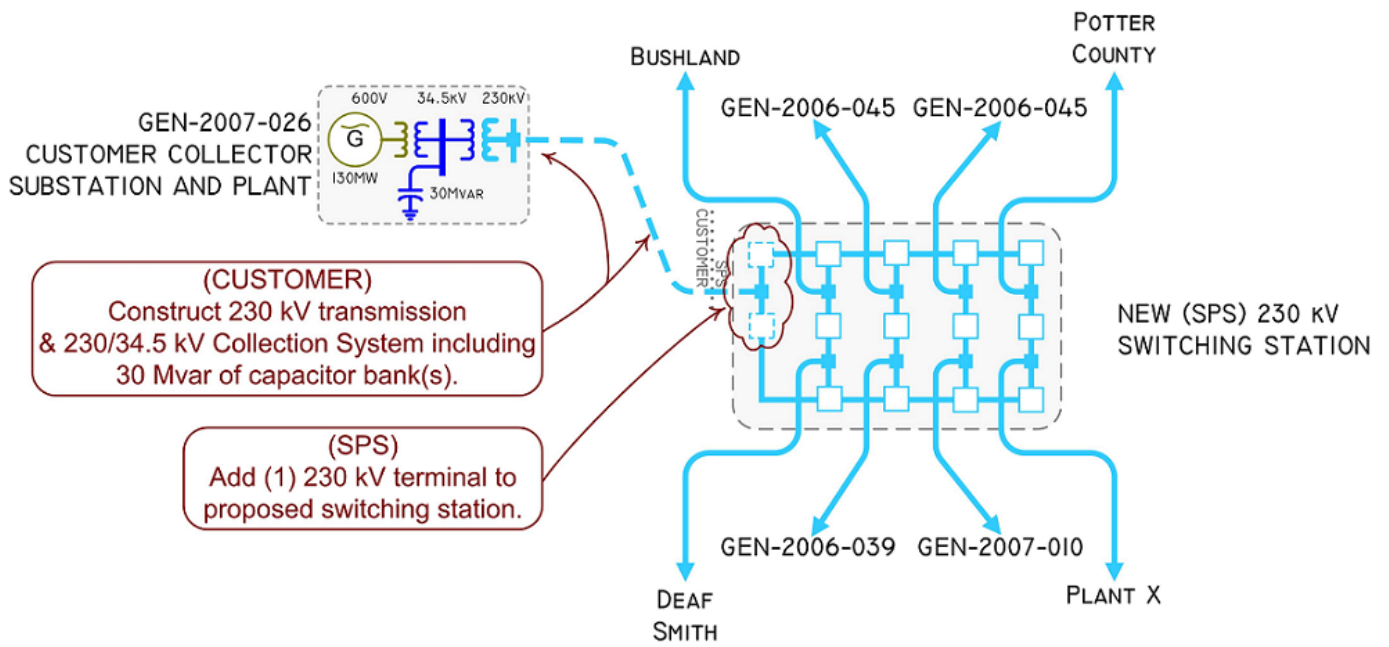


Figure 1: Proposed Method of Interconnection

(Final design to be determined)

Interconnection Estimated Costs

The minimum cost for adding a new 230 kV line terminal to the previously proposed 230kV switching station to serve GEN-2007-026 is estimated at \$1,200,000. 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 230 kV transmission line extending from the point of interconnection to serve its 230/34.5 kV collection facilities. This cost also does not include the Customer's 230/34.5 kV collector substation or the 30 Mvar of capacitor bank(s), all of which should be determined by the Customer. The Customer is responsible for these 230 kV – 34.5 kV facilities up to the point of interconnection.

The costs of interconnecting the facility to the SPS 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 – 230/34.5 kV substation facilities.	*
CUSTOMER – 230 kV line between Customer substation and new SPS 230 kV switching station.	*
CUSTOMER – 34.5 kV, 30 Mvar capacitor bank(s) to be installed in the Customer 230/34.5 kV collector substation.	*
CUSTOMER – Right-of-Way for all Customer facilities.	*
TOTAL	*

* Estimates of cost to be determined.

Table 2: Required Interconnection Network Upgrade Facilities

FACILITY	ESTIMATED COST (2008 DOLLARS)
SPS – Add a 230kV line terminal to the new 230kV switching station that is proposed to be built for GEN-2006-039, GEN-2006-045, GEN-2006-047, and GEN-2007-010. Work to include the addition of two (2) 230kV circuit breakers, associated switches, control relaying, high speed communications, metering and related equipment and all related structures.	\$1,200,000
TOTAL	\$1,200,000

* 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. The analysis of the Customer's project indicates that, given the requested generation level of 130 MW and location, additional criteria violations will occur on the existing AEPW, OKGE, MIDW, SUNC, WERE, WEPL, WFEC and 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.

In order to maintain a zero reactive power flow exchanged at the point of interconnection, additional reactive compensation is required. The Customer will be required to install a combined total of 30 Mvar of capacitor bank(s) in the Customer's 230/34.5 kV collector substation on the 34.5 kV bus. 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	CHILDRESS - LAKE PAULINE 138KV CKT 1
AEPW	CLINTON JUNCTION - ELK CITY 138KV CKT 1
AEPW	ELDORADO JCT - ELDORADO 69KV CKT 1
AEPW	ELDORADO JCT - GYPSUM 69KV CKT 1
AEPW	ELK CITY - MOREWOOD SW 138KV CKT 1
AEPW	ELK CITY (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1
AEPW	GYPSUM - RUSSELL 69KV CKT 1
AEPW	JERICHO (JERIC2WT) 115/69/14.4KV TRANSFORMER CKT 1
AEPW	LAWTON EASTSIDE - OKLAUNION 345KV 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	OKLAUNION - TUCO INTERCHANGE 345KV CKT 1
AEPW/WFEC	ALTUS JCT TAP - RUSSELL 138KV CKT 1
AEPW/WFEC	LAKE PAULINE - ELDORADO 69KV CKT 1
AEPW/WFEC	LAKE PAULINE - RUSSELL 138KV CKT 1
MIDW	ALEXANDER - NEKOMA 115KV CKT 1
MIDW	ALEXANDER - NESS CITY 115KV CKT 1
MIDW	COLBY - HOXIE 115KV CKT 1
MIDW	HOXIE - BEACH STATION 115KV CKT 1
MIDW/SUNC	COLBY - MINGO 115KV CKT 1
MIDW/WEPL	ST JOHN - ST_JOHN 115KV CKT 1
OKGE	SUNNYSIDE (SUNNYS3) 345/138/13.8KV TRANSFORMER CKT 1
SPS	BOWERS INTERCHANGE 115/69KV TRANSFORMER CKT 1
SPS	BUSHLAND INTERCHANGE - COULTER INTERCHANGE 115KV CKT 1
SPS	BUSHLAND INTERCHANGE - G06-47TAP 230.00 230KV CKT 1
SPS	BUSHLAND INTERCHANGE - HILLSIDE SUB 115KV CKT 1
SPS	BUSHLAND INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1
SPS	BUSHLAND INTERCHANGE 230/115KV TRANSFORMER CKT 1
SPS	CANYON EAST SUB - CANYON WEST SUB 115KV CKT 1
SPS	CANYON EAST SUB - OSAGE SWITCHING STATION 115KV CKT 1
SPS	CANYON WEST SUB - DAWN SUB 115KV CKT 1
SPS	CARLISLE INTERCHANGE - DOUD SUB 115KV CKT 1
SPS	CONWAY SUB - KIRBY SWITCHING STATION 115KV CKT 1
SPS	COULTER INTERCHANGE - HILLSIDE SUB 115KV CKT 1
SPS	DAWN SUB - PNDAHFD3 115.00 115KV CKT 1
SPS	DEAF SMITH COUNTY INTERCHANGE - HEREFORD INTERCHANGE 115KV CKT 1
SPS	DEAF SMITH COUNTY INTERCHANGE 230/115KV TRANSFORMER CKT 1
SPS	DEAF SMITH COUNTY INTERCHANGE 230/115KV TRANSFORMER CKT 2
SPS	DOUD SUB - SOUTH PLAINS REC-YUMA 115KV CKT 1
SPS	G06-39T 230.00 - POTTER COUNTY INTERCHANGE 230KV CKT 1
SPS	GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1
SPS	GRAPEVINE INTERCHANGE 230/115KV TRANSFORMER CKT 1
SPS	HALE CO INTERCHANGE - TUCO INTERCHANGE 115KV CKT 1
SPS	HANSFORD 3 115.00 - TEXAS COUNTY INTERCHANGE 115KV CKT 1
SPS	HARRINGTON STATION - NICHOLS STATION 230KV CKT 1
SPS	HARRNG_MID6 230.00 - NICHOLS STATION 230KV CKT 2
SPS	HEREFORD INTERCHANGE - PNDAHFD3 115.00 115KV CKT 1
SPS	JONES STATION - TUCO INTERCHANGE 230KV CKT 1
SPS	KINGSMILL INTERCHANGE - MCCULLOUGH SUB 69KV CKT 1
SPS	LAMB COUNTY REC-SOUTH OLTON - PLANT X STATION 115KV CKT 1
SPS	MCCLELLAN SUB - KIRBY SWITCHING STATION 115KV CKT 1
SPS	MCCLELLAN SUB - MCLEAN RURAL SUB 115KV CKT 1
SPS	NICHOLS STATION - YARNELL SUB 115KV CKT 1
SPS	NORTHEAST HEREFORD INTERCHANGE 115/69KV TRANSFORMER CKT 1
SPS	POTTER COUNTY INTERCHANGE (POTTR CO) 345/230/13.2KV TRANSFORMER CKT 1

SPS	SOUTH PLAINS REC-YUMA - WOLFFORTH INTERCHANGE 115KV CKT 1
SPS	TOLK STATION EAST - TUCO INTERCHANGE 230KV CKT 1
SPS	TUCO INTERCHANGE (TUCO XX4) 345/230/13.2KV TRANSFORMER CKT 1
SPS	YARNELL - CONWAY 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	CTU SUBLETTE - HASKELL 115KV CKT 1
SUNC	CTU SUBLETTE - PIONEER TAP 115KV CKT 1
SUNC	DIGHTON TAP - MANNING TAP 115KV CKT 1
SUNC	HASKELL - SEWARD-3 115KV CKT 1
SUNC	HOLCOMB - PLYMELL 115KV CKT 1
SUNC	HOLCOMB (HOLCOMB) 345/115/13.8KV TRANSFORMER CKT 1
SUNC	MANNING TAP - SCOTT CITY 115KV CKT 1
SUNC	PIONEER TAP - PLYMELL 115KV CKT 1
SUNC/MIDW	NESS CITY - NESS CITY 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	GREENSBURG - JUDSON LARGE 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
WEPL/MIDW	MULLERGREN - S HAYS 230KV CKT 1
WEPL/SUNC	CIMARRON RIVER PLANT - NORTH CIMARRON 115KV CKT 1
WERE	166TH STREET - JARBALO JUNCTION SWITCHING STATION 115KV CKT 1
WFEC	ANADARKO - BLANCHARD 69KV 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
WERE	Westar Energy
WFEC	Western Farmers Electric Cooperative

Table 4: Contingency Analysis

SEASON	OVERLOADED ELEMENT	RATING (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
09WP	NO SOLUTION OBTAINED			0	FINNEY SWITCHING STATION – HOLCOMB 345KV CKT 1
09WP	NO SOLUTION OBTAINED			0	ELK CITY 230KV – GRAPEVINE INTERCHANGE 230KV CKT 1
09WP	NO SOLUTION OBTAINED			0	TUCO INTERCHANGE (TUCOXX4) 345/230/13.2KV CKT 1
09WP	NO SOLUTION OBTAINED			0	OKLAUNION – TUCO INTERCHANGE 345KV CKT 1
09WP	NO SOLUTION OBTAINED			0	OKLAUNION – TUCO INTERCHANGE 345KV CKT 1; TUCO INTERCHANGE (TUCO XX4) 345/230/13.2KV TRANSFORMER CKT 1
09WP	NO SOLUTION OBTAINED			0	ELK CITY (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1; ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1
09WP	NO SOLUTION OBTAINED			0	ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1; GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1
09WP	NO SOLUTION OBTAINED			0	LAMAR – FINNEY 345KV CKT 1; FINNEY – POTTER 345KV CKT 1
09WP	TUCO INTERCHANGE (TUCO XX4) 345/230/13.2KV TRANSFORMER CKT 1	560	235	0	G06-39T 230.00 - POTTER COUNTY INTERCHANGE 230KV CKT 1
09WP	ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1	319	207	0	BASE CASE
09WP	ELK CITY (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1	287	202	0	MULLERGREN - SPEARVILLE 230KV CKT 1
09WP	SHAMROCK (SHAMRCK1) 115/69/14.4KV TRANSFORMER CKT 1	69	188	0	JERICHO - KIRBY SWITCHING STATION 115KV CKT 1
09WP	BUSHLAND INTERCHANGE 230/115KV TRANSFORMER CKT 1	188	187	0	BUSHLAND INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1
09WP	SHAMROCK (SHAMRCK2) 138/69/14.4KV TRANSFORMER CKT 1	69	179	0	JERICHO - KIRBY SWITCHING STATION 115KV CKT 1
09WP	BUSHLAND INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1	606	173	0	G06-39T 230.00 – POTTER COUNTY INTERCHANGE 230KV CKT 1
09WP	G06-39T 230.00 - POTTER COUNTY INTERCHANGE 230KV CKT 1	606	168	0	BUSHLAND INTERCHANGE - G06-47TAP 230.00 230KV CKT 1
09WP	POTTER COUNTY INTERCHANGE (POTTR CO) 345/230/13.2KV TRANSFORMER CKT 1	560	168	0	TOLK STATION EAST – TUCO INTERCHANGE 230KV CKT 1
09WP	BUSHLAND INTERCHANGE - G06-47TAP 230.00 230KV CKT 1	606	167	0	G06-39T 230.00 – POTTER COUNTY INTERCHANGE 230KV CKT 1
09WP	CLINTON JUNCTION - ELK CITY 138KV CKT 1	143	166	0	TOLK STATION EAST – TUCO INTERCHANGE 230KV CKT 1
09WP	SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1	336	154	0	HOLCOMB - SETAB 345KV CKT 1
09WP	MCCLELLAN SUB - KIRBY SWITCHING STATION 115KV CKT 1	107	153	0	GRAPEVINE INTERCHANGE 230/115KV TRANSFORMER CKT 1
09WP	MCCLELLAN SUB - MCLEAN RURAL SUB 115KV CKT 1	107	153	0	GRAPEVINE INTERCHANGE 230/115KV TRANSFORMER CKT 1
09WP	HEREFORD INTERCHANGE - PNDAHFD3 115.00 115KV CKT 1	118	150	0	G06-39T 230.00 – POTTER COUNTY INTERCHANGE 230KV CKT 1
09WP	MULLERGREN - S HAYS 230KV CKT 1	147	143	0	CIRCLE - MULLERGREN 230KV CKT 1
09WP	OKLAUNION - TUCO INTERCHANGE 345KV CKT 1	956	142	0	BASE CASE
09WP	LAKE PAULINE - RUSSELL 138KV CKT 1	72	141	0	BASE CASE
09WP	DAWN SUB - PNDAHFD3 115.00 115KV CKT 1	118	139	0	G06-39T 230.00 – POTTER COUNTY INTERCHANGE 230KV CKT 1
09WP	SEWARD - ST JOHN 115KV CKT 1	80	138	0	CIRCLE - MULLERGREN 230KV CKT 1
09WP	CANYON WEST SUB - DAWN SUB 115KV CKT 1	118	137	0	G06-39T 230.00 – POTTER COUNTY INTERCHANGE 230KV CKT 1
09WP	MCLEAN RURAL SUB - SHAMROCK 115KV CKT 1	107	132	0	CHILDRESS – AMOCO TAP 69KV CKT 1; AMOCO TAP – AMOCO 69KV CKT 1; AMOCO TAP – AIRPORT 69KV CKT 1; AIRPORT – CAREY 69KV CKT 1; CAREY – ESTELENE 69KV CKT 1; ESTELENE – RED RIVER ARSENAL 69KV CKT 1; RED RIVER ARSENAL – MEMPHIS 69KV CKT 1; MEMPHIS – NW MEMPHIS 69KV CKT 1; CHILDRESS (CHLDR2WT) 138/69/12.47KV CKT 1
09WP	ELK CITY - MOREWOOD SW 138KV CKT 1	130	129	0	BASE CASE
09WP	DOUD SUB - SOUTH PLAINS REC-YUMA 115KV CKT 1	195	127	0	TOLK STATION EAST – TUCO INTERCHANGE 230KV CKT 1
09WP	JERICHO (JERIC2WT) 115/69/14.4KV TRANSFORMER CKT 1	46	127	0	MULLERGREN - SPEARVILLE 230KV CKT 1
09WP	CANYON EAST SUB - CANYON WEST SUB 115KV CKT 1	118	126	0	G06-39T 230.00 – POTTER COUNTY INTERCHANGE 230KV CKT 1
09WP	HARPER - MEDICINE LODGE 138KV CKT 1	72	122	0	CIRCLE - MULLERGREN 230KV CKT 1

TABLE 4: Contingency Analysis (continued)

SEASON	OVERLOADED ELEMENT	RATING (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
09WP	GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1	606	122	0	MULLERGREN - SPEARVILLE 230KV CKT 1
09WP	CANYON EAST SUB - OSAGE SWITCHING STATION 115KV CKT 1	118	120	0	G06-39T 230.00 – POTTER COUNTY INTERCHANGE 230KV CKT 1
09WP	HALE CO INTERCHANGE - TUCO INTERCHANGE 115KV CKT 1	118	119	0	TOLK STATION EAST – TUCO INTERCHANGE 230KV CKT 1
09WP	CARLISLE INTERCHANGE - DOUD SUB 115KV CKT 1	195	118	0	TOLK STATION EAST – TUCO INTERCHANGE 230KV CKT 1
09WP	LAWTON EASTSIDE - OKLAUNION 345KV CKT 1	1195	111	0	CIRCLE - MULLERGREN 230KV CKT 1
09WP	SOUTH PLAINS REC-YUMA - WOLFFORTH INTERCHANGE 115KV CKT 1	235	110	0	TOLK STATION EAST – TUCO INTERCHANGE 230KV CKT 1
09WP	JONES STATION - TUCO INTERCHANGE 230KV CKT 1	497	109	0	TOLK STATION EAST – TUCO INTERCHANGE 230KV CKT 1
09WP	ST JOHN - ST_JOHN 115KV CKT 1	88	109	0	CIRCLE - MULLERGREN 230KV CKT 1
09WP	KINGSMILL INTERCHANGE - MCCULLOUGH SUB 69KV CKT 1	117	109	0	NICHOLS STATION - YARNELL SUB 115KV CKT 1
09WP	BUSHLAND INTERCHANGE - COULTER INTERCHANGE 115KV CKT 1	303	108	0	BUSHLAND INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1
09WP	MEDICINE LODGE (MED-LDG4) 138/115/2.72KV TRANSFORMER CKT 1	65	130	25	MULLERGREN - SPEARVILLE 230KV CKT 1
09WP	ALEXANDER - NESS CITY 115KV CKT 1	101	151	42	MULLERGREN - SPEARVILLE 230KV CKT 1
09WP	DIGHTON TAP - MANNING TAP 115KV CKT 1	98	140	47	MULLERGREN - SPEARVILLE 230KV CKT 1
09WP	MULLERGREN - SPEARVILLE 230KV CKT 1	471	105	49	MINGO - SETAB 345KV CKT 1
09WP	ALEXANDER - NEKOMA 115KV CKT 1	101	146	52	MULLERGREN - SPEARVILLE 230KV CKT 1
09WP	BEELER - DIGHTON TAP 115KV CKT 1	98	133	60	MULLERGREN - SPEARVILLE 230KV CKT 1
09WP	BEELER - NESS CITY 115KV CKT 1	98	130	67	MULLERGREN - SPEARVILLE 230KV CKT 1
09WP	DEAF SMITH COUNTY INTERCHANGE - HEREFORD INTERCHANGE 115KV CKT 1	195	104	68	G06-39T 230.00 – POTTER COUNTY INTERCHANGE 230KV CKT 1
09WP	COLBY - HOXIE 115KV CKT 1	101	124	71	MULLERGREN - SPEARVILLE 230KV CKT 1
09WP	ALTUS JCT TAP - RUSSELL 138KV CKT 1	72	107	74	TOLK STATION EAST – TUCO INTERCHANGE 230KV CKT 1
09WP	TOLK STATION EAST - TUCO INTERCHANGE 230KV CKT 1	606	103	83	JONES STATION - TUCO INTERCHANGE 230KV CKT 1
09WP	MEDICINE LODGE - SUN CITY 115KV CKT 1	130	118	86	MULLERGREN - SPEARVILLE 230KV CKT 1
09WP	HOXIE - BEACH STATION 115KV CKT 1	101	117	88	MULLERGREN - SPEARVILLE 230KV CKT 1
09WP	NESS CITY - NESS CITY 115KV CKT 1	143	110	106	MULLERGREN - SPEARVILLE 230KV CKT 1
12SP	NO SOLUTION OBTAINED			0	FINNEY SWITCHING STATION – HOLCOMB 345KV CKT 1
12SP	NO SOLUTION OBTAINED			0	TUCO INTERCHANGE (TUCOXX4) 345/230/13.2KV TRANSFORMER CKT 1
12SP	NO SOLUTION OBTAINED			0	OKLAUNION – TUCO INTERCHANGE 345KV CKT 1
12SP	NO SOLUTION OBTAINED			0	OKLAUNION – TUCO INTERCHANGE 345KV CKT 1; TUCO INTERCHANGE (TUCO XX4) 345/230/13.2KV TRANSFORMER CKT 1
12SP	ELK CITY (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1	287	157	0	LAMAR – FINNEY 345KV CKT 1; FINNEY – POTTER 345KV CKT 1
12SP	MCCLELLAN SUB - KIRBY SWITCHING STATION 115KV CKT 1	90	157	0	ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1
12SP	BUSHLAND INTERCHANGE 230/115KV TRANSFORMER CKT 1	173	156	0	BUSHLAND INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1
12SP	MCCLELLAN SUB - MCLEAN RURAL SUB 115KV CKT 1	90	155	0	ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1
12SP	ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1	351	153	0	LAMAR – FINNEY 345KV CKT 1; FINNEY – POTTER 345KV CKT 1
12SP	SHAMROCK (SHAMRCK1) 115/69/14.4KV TRANSFORMER CKT 1	69	152	0	ELK CITY (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1; ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1
12SP	SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1	336	146	0	HOLCOMB - SETAB 345KV CKT 1
12SP	TUCO INTERCHANGE (TUCO XX4) 345/230/13.2KV TRANSFORMER CKT 1	560	144	0	LAMAR – FINNEY 345KV CKT 1; FINNEY – POTTER 345KV CKT 1
12SP	HOLCOMB - PLYMELL 115KV CKT 1	143	141	0	SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1
12SP	SHAMROCK (SHAMRCK2) 138/69/14.4KV TRANSFORMER CKT 1	69	139	0	ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1
12SP	PIONEER TAP - PLYMELL 115KV CKT 1	143	137	0	SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1

TABLE 4: Contingency Analysis (continued)

SEASON	OVERLOADED ELEMENT	RATING (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
12SP	DEAF SMITH COUNTY INTERCHANGE 230/115KV TRANSFORMER CKT 1	173	136	0	DEAF SMITH COUNTY INTERCHANGE 230/115KV TRANSFORMER CKT 2
12SP	DEAF SMITH COUNTY INTERCHANGE 230/115KV TRANSFORMER CKT 2	173	136	0	DEAF SMITH COUNTY INTERCHANGE 230/115KV TRANSFORMER CKT 1
12SP	MULLERGREN - SPEARVILLE 230KV CKT 1	355	133	0	MINGO - SETAB 345KV CKT 1
12SP	LAKE PAULINE - RUSSELL 138KV CKT 1	72	131	0	ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1
12SP	MCLEAN RURAL SUB - SHAMROCK 115KV CKT 1	90	130	0	ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1
12SP	CIMARRON RIVER PLANT - NORTH CIMARRON 115KV CKT 1	143	129	0	SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1
12SP	CLINTON JUNCTION - ELK CITY 138KV CKT 1	143	129	0	LAMAR – FINNEY 345KV CKT 1; FINNEY – POTTER 345KV CKT 1
12SP	DIGHTON TAP - MANNING TAP 115KV CKT 1	98	124	0	SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1
12SP	GRAPEVINE INTERCHANGE 230/115KV TRANSFORMER CKT 1	129	124	0	ELK CITY (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1; ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1
12SP	HARRINGTON STATION - NICHOLS STATION 230KV CKT 1	635	123	0	HARRNG_MID6 230.00 - NICHOLS STATION 230KV CKT 2
12SP	HARRNG_MID6 230.00 - NICHOLS STATION 230KV CKT 2	635	123	0	HARRINGTON STATION - NICHOLS STATION 230KV CKT 1
12SP	ALEXANDER - NESS CITY 115KV CKT 1	101	123	0	SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1
12SP	MULLERGREN - S HAYS 230KV CKT 1	147	120	0	CIRCLE - MULLERGREN 230KV CKT 1
12SP	DEAF SMITH COUNTY INTERCHANGE - HEREFORD INTERCHANGE 115KV CKT 1	161	119	0	NORTHEAST HEREFORD INTERCHANGE 115/69KV TRANSFORMER CKT 1
12SP	BEELER - DIGHTON TAP 115KV CKT 1	98	116	0	SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1
12SP	ALEXANDER - NEKOMA 115KV CKT 1	101	116	0	SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1
12SP	BUSHLAND INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1	497	113	0	G06-39T 230.00 – POTTER COUNTY INTERCHANGE 230KV CKT 1
12SP	BEELER - NESS CITY 115KV CKT 1	98	112	0	SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1
12SP	GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1	497	111	0	LAMAR – FINNEY 345KV CKT 1; FINNEY – POTTER 345KV CKT 1
12SP	CIMARRON RIVER PLANT - CIMARRON RIVER TAP 115KV CKT 1	90	110	0	SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1
12SP	YARNELL SUB - CONWAY SUB 115KV CKT 1	180	110	0	ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1; GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1
12SP	NICHOLS STATION - YARNELL SUB 115KV CKT 1	180	110	0	ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1; GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1
12SP	COLBY - HOXIE 115KV CKT 1	101	109	0	MULLERGREN - SPEARVILLE 230KV CKT 1
12SP	GREENSBURG - JUDSON LARGE 115KV CKT 1	130	107	0	MULLERGREN - SPEARVILLE 230KV CKT 1
12SP	CTU SUBLETTE - PIONEER TAP 115KV CKT 1	143	107	0	SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1
12SP	HOLCOMB (HOLCOMB) 345/115/13.8KV TRANSFORMER CKT 1	336	103	0	GEN531447 1
12SP	DOUD SUB - SOUTH PLAINS REC-YUMA 115KV CKT 1	161	104	44	TOLK STATION EAST – TUCO INTERCHANGE 230KV CKT 1
12SP	BUSHLAND INTERCHANGE - COULTER INTERCHANGE 115KV CKT 1	249	103	63	BUSHLAND INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1
12SP	CTU SUBLETTE - HASKELL 115KV CKT 1	143	101	90	SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1
12SP	CONWAY SUB - KIRBY SWITCHING STATION 115KV CKT 1	180	101	97	ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1; GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1
12SP	POTTER COUNTY INTERCHANGE (POTTR CO) 345/230/13.2KV TRANSFORMER CKT 1	560	101	109	ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1; GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1
12SP	HASKELL - SEWARD-3 115KV CKT 1	143	100	125	SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1
12WP	NO SOLUTION OBTAINED			0	HOLCOMB – SPEARVILLE 345KV CKT 1
12WP	NO SOLUTION OBTAINED			0	FINNEY SWITCHING STATION – HOLCOMB 345KV CKT 1
12WP	NO SOLUTION OBTAINED			0	ELK CITY 230KV – GRAPEVINE INTERCHANGE 230KV CKT 1

TABLE 4: Contingency Analysis (continued)

SEASON	OVERLOADED ELEMENT	RATING (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
12WP	NO SOLUTION OBTAINED			0	TUCO INTERCHANGE (TUCOXX4) 345/230/13.2KV TRANSFORMER CKT 1
12WP	NO SOLUTION OBTAINED			0	OKLAUNION – TUCO INTERCHANGE 345KV CKT 1; TUCO INTERCHANGE (TUCO XX4) 345/230/13.2KV TRANSFORMER CKT 1
12WP	NO SOLUTION OBTAINED			0	ELK CITY (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1; ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1
12WP	NO SOLUTION OBTAINED			0	ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1; GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1
12WP	NO SOLUTION OBTAINED			0	LAMAR – FINNEY 345KV CKT 1; FINNEY – POTTER 345KV CKT 1
12WP	NO SOLUTION OBTAINED			0	OKLAUNION – TUCO INTERCHANGE 345KV CKT 1
12WP	TUCO INTERCHANGE (TUCO XX4) 345/230/13.2KV TRANSFORMER CKT 1	560	228	0	GREENSBURG - SUN CITY 115KV CKT 1
12WP	ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1	351	226	0	MULLERGREN - SPEARVILLE 230KV CKT 1
12WP	ELK CITY (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1	287	205	0	MULLERGREN - SPEARVILLE 230KV CKT 1
12WP	ALEXANDER - NESS CITY 115KV CKT 1	101	204	0	MULLERGREN - SPEARVILLE 230KV CKT 1
12WP	DIGHTON TAP - MANNING TAP 115KV CKT 1	83	193	0	MULLERGREN - SPEARVILLE 230KV CKT 1
12WP	SHAMROCK (SHAMRCK1) 115/69/14.4KV TRANSFORMER CKT 1	69	192	0	JERICHO - KIRBY SWITCHING STATION 115KV CKT 1
12WP	BEELER - DIGHTON TAP 115KV CKT 1	83	186	0	MULLERGREN - SPEARVILLE 230KV CKT 1
12WP	SHAMROCK (SHAMRCK2) 138/69/14.4KV TRANSFORMER CKT 1	69	183	0	MULLERGREN - SPEARVILLE 230KV CKT 1
12WP	BEELER - NESS CITY 115KV CKT 1	83	182	0	MULLERGREN - SPEARVILLE 230KV CKT 1
12WP	CLINTON JUNCTION - ELK CITY 138KV CKT 1	143	173	0	ALTUS JUNCTION (ALTUSJCT) 138/69/13.8KV TRANSFORMER CKT 1; ALTUS JUNCTION – ALTUS JCT TAP 138KV CKT 1; ALTUS JCT TAP – TAMARAC TAP 138KV CKT 1; ALTUS JCT TAP – RUSSELL 138KV CKT 1; TAMARAC TAP – HOBART JUNCTION 138KV CKT 1; TAMARAC TAP – OMPA-ALTUS TAMARACK 138KV CKT 1
12WP	SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1	336	172	0	MINGO - SETAB 345KV CKT 1
12WP	BUSHLAND INTERCHANGE 230/115KV TRANSFORMER CKT 1	188	167	0	BUSHLAND INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1
12WP	MCCLELLAN SUB - KIRBY SWITCHING STATION 115KV CKT 1	107	163	0	GRAPEVINE INTERCHANGE 230/115KV TRANSFORMER CKT 1
12WP	MCCLELLAN SUB - MCLEAN RURAL SUB 115KV CKT 1	107	162	0	GRAPEVINE INTERCHANGE 230/115KV TRANSFORMER CKT 1
12WP	NESS CITY - NESS CITY 115KV CKT 1	143	157	0	MULLERGREN - SPEARVILLE 230KV CKT 1
12WP	POTTER COUNTY INTERCHANGE (POTTR CO) 345/230/13.2KV TRANSFORMER CKT 1	560	156	0	ROOSEVL 345.00 345/230KV TRANSFORMER CKT 1
12WP	LAKE PAULINE - RUSSELL 138KV CKT 1	72	155	0	GREENSBURG - SUN CITY 115KV CKT 1
12WP	COLBY - HOXIE 115KV CKT 1	101	149	0	SPEARVILLE (SPERAVL) 345/230/13.8KV TRANSFORMER CKT 1
12WP	JERICHO (JERIC2WT) 115/69/14.4KV TRANSFORMER CKT 1	46	143	0	MULLERGREN - SPEARVILLE 230KV CKT 1
12WP	MULLERGREN - S HAYS 230KV CKT 1	147	142	0	CIRCLE - MULLERGREN 230KV CKT 1
12WP	ALEXANDER - NEKOMA 115KV CKT 1	101	142	0	SPEARVILLE (SPERAVL) 345/230/13.8KV TRANSFORMER CKT 1
12WP	HARRINGTON STATION - NICHOLS STATION 230KV CKT 1	706	140	0	HARRNG_MID6 230.00 - NICHOLS STATION 230KV CKT 2
12WP	HARRNG_MID6 230.00 - NICHOLS STATION 230KV CKT 2	706	140	0	HARRINGTON STATION - NICHOLS STATION 230KV CKT 1
12WP	OKLAUNION - TUCO INTERCHANGE 345KV CKT 1	956	140	0	BASE CASE
12WP	MEDICINE LODGE (MED-LDG4) 138/115/2.72KV TRANSFORMER CKT 1	56	138	0	MULLERGREN - SPEARVILLE 230KV CKT 1
12WP	LAKE PAULINE - ELDORADO 69KV CKT 1	20	137	0	MULLERGREN - SPEARVILLE 230KV CKT 1
12WP	GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1	551	137	0	MULLERGREN - SPEARVILLE 230KV CKT 1
12WP	MANNING TAP - SCOTT CITY 115KV CKT 1	120	136	0	MULLERGREN - SPEARVILLE 230KV CKT 1
12WP	BUSHLAND INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1	606	134	0	G06-39T 230.00 - POTTER COUNTY INTERCHANGE 230KV CKT 1
12WP	G06-39T 230.00 - POTTER COUNTY INTERCHANGE 230KV CKT 1	606	133	0	BUSHLAND INTERCHANGE - G06-47TAP 230.00 230KV CKT 1

TABLE 4: Contingency Analysis (continued)

SEASON	OVERLOADED ELEMENT	RATING (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
12WP	HOXIE - BEACH STATION 115KV CKT 1	101	132	0	MULLERGREN - SPEARVILLE 230KV CKT 1
12WP	ELK CITY - MOREWOOD SW 138KV CKT 1	130	131	0	BASE CASE
12WP	BUSHLAND INTERCHANGE - G06-47TAP 230.00 230KV CKT 1	606	128	0	G06-39T 230.00 - POTTER COUNTY INTERCHANGE 230KV CKT 1
12WP	MEDICINE LODGE - SUN CITY 115KV CKT 1	120	128	0	MULLERGREN - SPEARVILLE 230KV CKT 1
12WP	MCLEAN RURAL SUB - SHAMROCK 115KV CKT 1	107	124	0	JERICO - KIRBY SWITCHING STATION 115KV CKT 1
12WP	SEWARD - ST JOHN 115KV CKT 1	80	123	0	GREENSBURG - SUN CITY 115KV CKT 1
12WP	MULLERGREN - SPEARVILLE 230KV CKT 1	471	122	0	MINGO - SETAB 345KV CKT 1
12WP	HARPER - MEDICINE LODGE 138KV CKT 1	72	117	0	MINGO - SETAB 345KV CKT 1
12WP	HEREFORD INTERCHANGE - PNDAHFD3 115.00 115KV CKT 1	118	116	0	G06-39T 230.00 - POTTER COUNTY INTERCHANGE 230KV CKT 1
12WP	DOUD SUB - SOUTH PLAINS REC-YUMA 115KV CKT 1	195	114	0	LUBBOCK SOUTH INTERCHANGE - WOLFFORTH INTERCHANGE 230KV CKT 1
12WP	LAWTON EASTSIDE - OKLAUNION 345KV CKT 1	1195	112	0	GREENSBURG - SUN CITY 115KV CKT 1
12WP	GRAPEVINE INTERCHANGE 230/115KV TRANSFORMER CKT 1	140	105	29	NICHOLS STATION - YARNELL SUB 115KV CKT 1
12WP	HALE CO INTERCHANGE - TUCO INTERCHANGE 115KV CKT 1	118	104	57	TOLK STATION EAST - TUCO INTERCHANGE 230KV CKT 1
12WP	ALTUS JCT TAP - RUSSELL 138KV CKT 1	72	112	60	GREENSBURG - SUN CITY 115KV CKT 1
12WP	ELDORADO JCT - ELDORADO 69KV CKT 1	20	116	66	MULLERGREN - SPEARVILLE 230KV CKT 1
12WP	DAWN SUB - PNDAHFD3 115.00 115KV CKT 1	118	105	70	G06-39T 230.00 - POTTER COUNTY INTERCHANGE 230KV CKT 1
12WP	COLBY - MINGO 115KV CKT 1	143	108	72	MULLERGREN - SPEARVILLE 230KV CKT 1
12WP	NORTHEAST HEREFORD INTERCHANGE 115/69KV TRANSFORMER CKT 1	84	102	74	DEAF SMITH COUNTY INTERCHANGE - HEREFORD INTERCHANGE 115KV CKT 1
12WP	YARNELL SUB - CONWAY SUB 115KV CKT 1	218	103	87	GRAPEVINE INTERCHANGE - KIRBY SWITCHING STATION 115KV CKT 1
12WP	NICHOLS STATION - YARNELL SUB 115KV CKT 1	218	103	87	GRAPEVINE INTERCHANGE - KIRBY SWITCHING STATION 115KV CKT 1
12WP	CARLISLE INTERCHANGE - DOUD SUB 115KV CKT 1	195	103	89	LUBBOCK SOUTH INTERCHANGE - WOLFFORTH INTERCHANGE 230KV CKT 1
12WP	GYPSUM - RUSSELL 69KV CKT 1	20	110	90	MULLERGREN - SPEARVILLE 230KV CKT 1
12WP	CANYON WEST SUB - DAWN SUB 115KV CKT 1	118	103	94	G06-39T 230.00 - POTTER COUNTY INTERCHANGE 230KV CKT 1
12WP	SUNNYSIDE (SUNNYS3) 345/138/13.8KV TRANSFORMER CKT 1	330	100	107	GREENSBURG - SUN CITY 115KV CKT 1
12WP	ELDORADO JCT - GYPSUM 69KV CKT 1	20	104	114	MULLERGREN - SPEARVILLE 230KV CKT 1
12WP	ANADARKO - BLANCHARD 69KV CKT 1	27	102	117	MULLERGREN - SPEARVILLE 230KV CKT 1
12WP	CHILDRESS - LAKE PAULINE 138KV CKT 1	141	101	118	GREENSBURG - SUN CITY 115KV CKT 1
12WP	DEAF SMITH COUNTY INTERCHANGE - HEREFORD INTERCHANGE 115KV CKT 1	195	100	121	G06-39T 230.00 - POTTER COUNTY INTERCHANGE 230KV CKT 1
12WP	GREENSBURG - JUDSON LARGE 115KV CKT 1	165	101	121	MULLERGREN - SPEARVILLE 230KV CKT 1
12WP	166TH STREET - JARBALO JUNCTION SWITCHING STATION 115KV CKT 1	97	104	130	NORTHWEST LEAVENWORTH – SPRUCE STREET 115KV CKT 1; SPRUCE STREET – THORNTON STREET 115KV CKT 1
17SP	BUSHLAND INTERCHANGE 230/115KV TRANSFORMER CKT 1	173	166	0	BUSHLAND INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1
17SP	ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1	351	159	0	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
17SP	TUCO INTERCHANGE (TUCO XX4) 345/230/13.2KV TRANSFORMER CKT 1	560	152	0	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
17SP	MCCLELLAN SUB - KIRBY SWITCHING STATION 115KV CKT 1	90	149	0	TUCO INTERCHANGE (TUCO XX4) 345/230/13.2KV TRANSFORMER CKT 1

TABLE 4: Contingency Analysis (continued)

SEASON	OVERLOADED ELEMENT	RATING (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
17SP	MCCLELLAN SUB - MCLEAN RURAL SUB 115KV CKT 1	90	148	0	TUCO INTERCHANGE (TUCO XX4) 345/230/13.2KV TRANSFORMER CKT 1
17SP	DEAF SMITH COUNTY INTERCHANGE 230/115KV TRANSFORMER CKT 1	173	146	0	DEAF SMITH COUNTY INTERCHANGE 230/115KV TRANSFORMER CKT 2
17SP	DEAF SMITH COUNTY INTERCHANGE 230/115KV TRANSFORMER CKT 2	173	146	0	DEAF SMITH COUNTY INTERCHANGE 230/115KV TRANSFORMER CKT 1
17SP	SHAMROCK (SHAMRCK1) 115/69/14.4KV TRANSFORMER CKT 1	69	137	0	OKLAUNION - TUCO INTERCHANGE 345KV CKT 1
17SP	CLINTON JUNCTION - ELK CITY 138KV CKT 1	143	133	0	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
17SP	SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1	336	131	0	HOLCOMB - SETAB 345KV CKT 1
17SP	DEAF SMITH COUNTY INTERCHANGE - HEREFORD INTERCHANGE 115KV CKT 1	161	127	0	NORTHEAST HEREFORD INTERCHANGE 115/69KV TRANSFORMER CKT 1
17SP	HARRINGTON STATION - NICHOLS STATION 230KV CKT 1	635	127	0	HARRNG_MID6 230.00 - NICHOLS STATION 230KV CKT 2
17SP	HARRNG_MID6 230.00 - NICHOLS STATION 230KV CKT 2	635	126	0	HARRINGTON STATION - NICHOLS STATION 230KV CKT 1
17SP	GRAPEVINE INTERCHANGE 230/115KV TRANSFORMER CKT 1	129	125	0	ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1
17SP	SHAMROCK (SHAMRCK2) 138/69/14.4KV TRANSFORMER CKT 1	69	124	0	OKLAUNION - TUCO INTERCHANGE 345KV CKT 1
17SP	GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1	497	119	0	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
17SP	ELK CITY (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1	287	119	0	ETTER RURAL SUB - MOORE COUNTY INTERCHANGE E. 115KV CKT 1
17SP	BUSHLAND INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1	497	117	0	G06-39T 230.00 - POTTER COUNTY INTERCHANGE 230KV CKT 1
17SP	TOLK STATION EAST - TUCO INTERCHANGE 230KV CKT 1	497	117	0	FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1
17SP	MCLEAN RURAL SUB - SHAMROCK 115KV CKT 1	90	115	0	OKLAUNION - TUCO INTERCHANGE 345KV CKT 1; TUCO INTERCHANGE (TUCO XX4) 345/230/13.2KV TRANSFORMER CKT 1
17SP	MULLERGREN - S HAYS 230KV CKT 1	147	115	0	MINGO - SETAB 345KV CKT 1
17SP	MULLERGREN - SPEARVILLE 230KV CKT 1	355	113	0	MINGO - SETAB 345KV CKT 1
17SP	BUSHLAND INTERCHANGE - HILLSIDE SUB 115KV CKT 1	249	109	0	BUSHLAND INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1
17SP	COULTER INTERCHANGE - HILLSIDE SUB 115KV CKT 1	249	109	0	BUSHLAND INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1
17SP	HOLCOMB (HOLCOMB) 345/115/13.8KV TRANSFORMER CKT 1	336	108	0	GEN531447 1
17SP	YARNELL SUB - CONWAY SUB 115KV CKT 1	180	106	0	ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1; GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1
17SP	NICHOLS STATION - YARNELL SUB 115KV CKT 1	180	106	0	ELK CITY 230KV - GRAPEVINE INTERCHANGE 230KV CKT 1; GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1
17SP	CIMARRON RIVER PLANT - NORTH CIMARRON 115KV CKT 1	143	105	3	HOLCOMB - SPEARVILLE 345KV CKT 1
17SP	DIGHTON TAP - MANNING TAP 115KV CKT 1	98	106	21	MINGO - SETAB 345KV CKT 1
17SP	LAMB COUNTY REC-SOUTH OLTON - PLANT X STATION 115KV CKT 1	161	103	27	TOLK STATION EAST - TUCO INTERCHANGE 230KV CKT 1
17SP	LAKE PAULINE - RUSSELL 138KV CKT 1	72	109	47	TUCO INTERCHANGE (TUCO XX4) 345/230/13.2KV TRANSFORMER CKT 1
17SP	DOUD SUB - SOUTH PLAINS REC-YUMA 115KV CKT 1	161	103	59	TOLK STATION EAST - TUCO INTERCHANGE 230KV CKT 1
17SP	BOWERS INTERCHANGE 115/69KV TRANSFORMER CKT 1	97	108	129	KINGSMILL INTERCHANGE - MCCULLOUGH SUB 69KV CKT 1
17SP	HANSFORD 3 115.00 - TEXAS COUNTY INTERCHANGE 115KV CKT 1	180	100	130	SPEARMAN INTERCHANGE - SPEARMAN SUB 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 \$1,200,000 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 will be responsible for installing a total of 30 Mvar of capacitor bank(s) 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

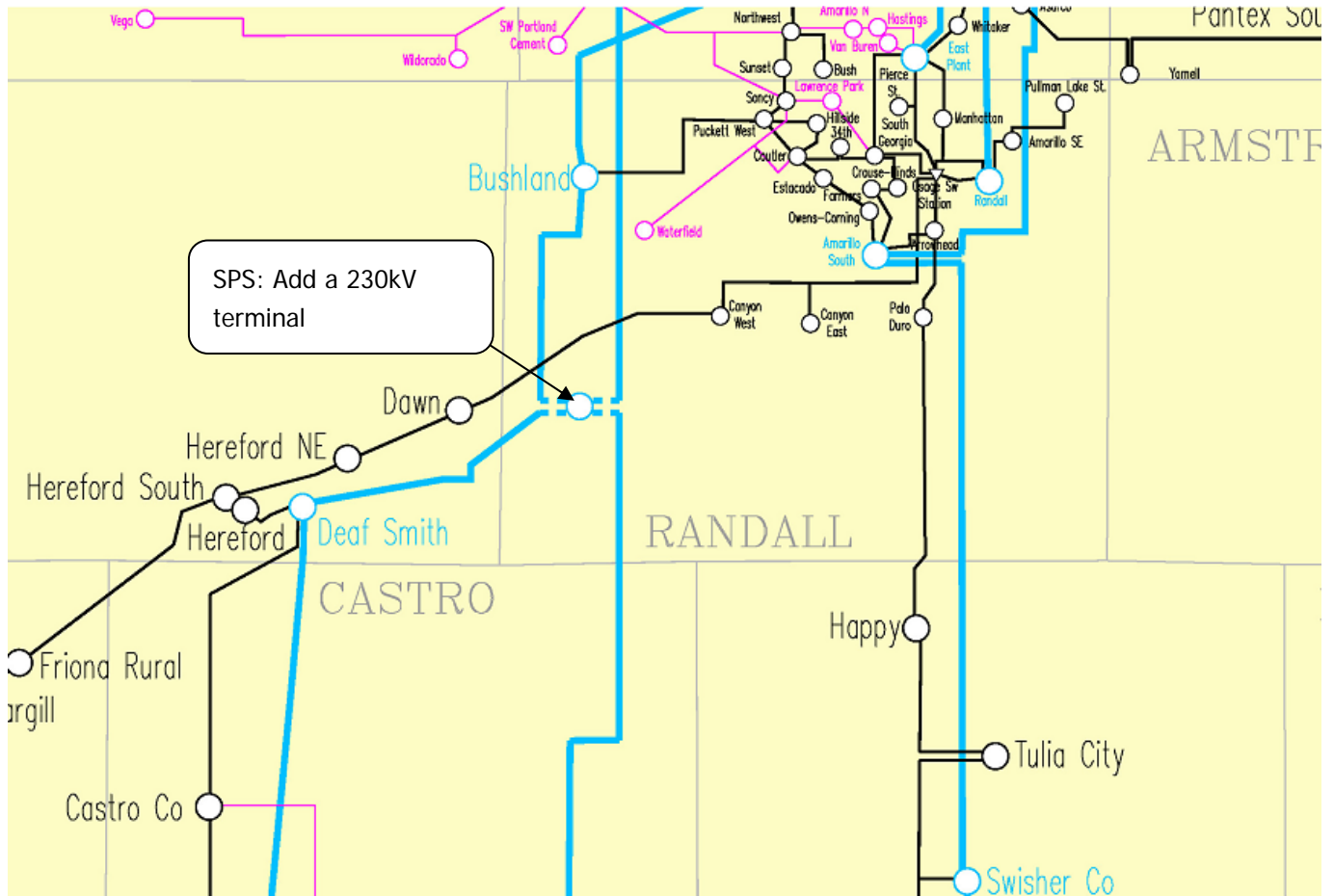


Figure 2: Point of Interconnection Area Map