



**Feasibility Study
For
Generation Interconnection
Request
GEN-2007-037**

SPP Tariff Studies
(#GEN-2007-037)

March, 2008

Executive Summary

<OMITTED TEXT> (Customer) has requested a Feasibility Study for the purpose of interconnecting 200 MW of wind generation within the control area of Sunflower Electric Power Corporation (SUNC) located in Ford County, Kansas. The proposed interconnection point is at the existing Spearville (SUNC) 345 kV substation, owned by SUNC. The proposed in-service date is October, 2012.

Power flow analysis has indicated that for the powerflow cases studied, it is possible to interconnect the 200 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 Feasibility Study for GEN-2007-036 proposed to add a line terminal and two 345 kV circuit breakers on the existing Spearville (SUNC) substation. An addition of 200 MW interconnected at the GEN-2007-036 substation does not require an additional line terminal on the Spearville (SUNC) 345 kV substation.

There are no additional costs to interconnect this 200MW at the same point as GEN-2007-036. These costs are shown in Tables 1 and 2. This cost does not include building the 345 kV line from the Customer 345/34.5 kV collector substation into the point of interconnection. This cost also does not include the Customer's 345/34.5 kV collector substation or possible need for reactive compensation. Network constraints in the Sunflower Electric Power Corporation (SUNC) 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.

The proposed 345kV line from Spearville – Commanche – Wichita was included in this study. This 345kV line has been assigned to the Customer for GEN-2005-012 as a stability requirement, since SPP has not issued a Notice to Construct to a transmission owner for this line. In the event that GEN-2005-012 withdraws from the queue, the cost of this 345kV line could be assigned to the Customer. In the Impact Study and subsequent restudies, it will be determined if the Customer can be interconnected along this proposed 345kV line in lieu of an interconnection at Spearville.

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 200 MW of wind generation within the control area of Sunflower Electric Power Electric (SUNC) located in Ford County, Kansas. The proposed interconnection point is at the existing Spearville (SUNC) 345 kV substation, owned by SUNC. The proposed in-service date is October, 2012.

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 Feasibility Study for GEN-2007-036 proposed to add a line terminal and two 345 kV circuit breakers on the existing Spearville (SUNC) substation. An addition of 200 MW interconnected at the GEN-2007-036 substation does not require an additional line terminal on the Spearville (SUNC) 345 kV substation.

Other Network Constraints in the Sunflower Electric Power Corporation (SUNC) 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.

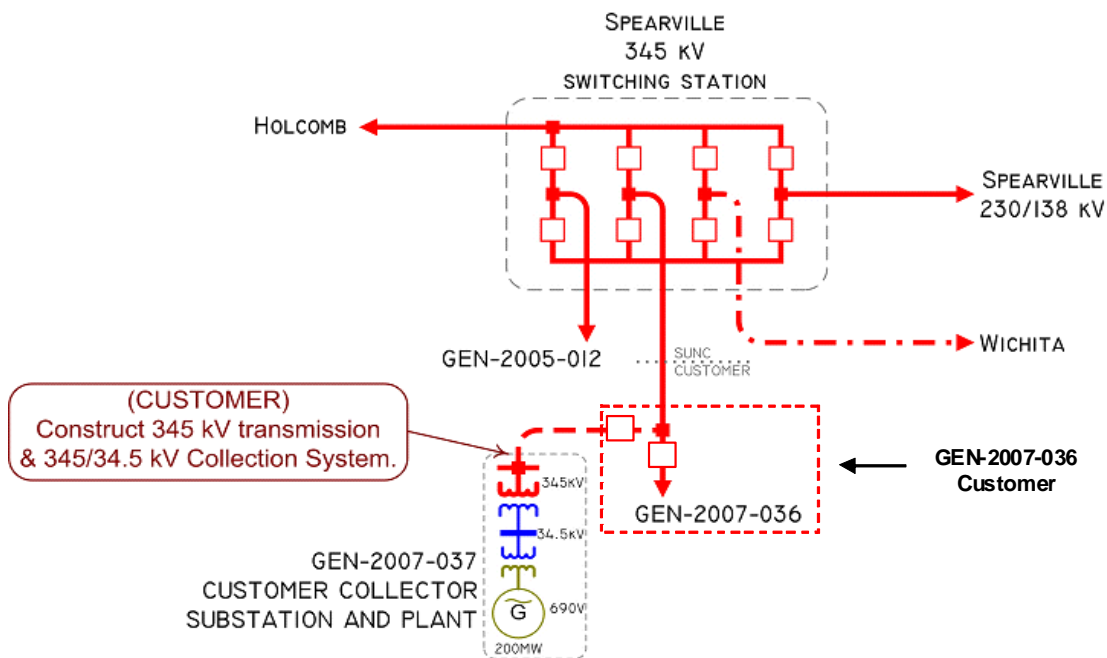


Figure 1: Proposed Method of Interconnection

(Final design to be determined)

Interconnection Estimated Costs

There are no additional costs to interconnect this 200MW at the same point as GEN-2007-036. 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 345 kV transmission line extending from the point of interconnection to serve its 345/34.5 kV collection facilities. This cost also does not include the Customer's 345/34.5 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 345 kV – 34.5 kV facilities up to the point of interconnection.

The Customer has indicated a preference for interconnecting into the proposed Spearville – Comanche – Wichita 345kV line. Presently, this line is included in the SPP Expansion Plan as an economic upgrade. Since no formal Notice to Construct exists for the construction of this line, the line has been assigned to GEN-2005-012 as a upgrade required for stability. In the event that GEN-2005-012 withdraws from the queue, this line could be assigned to the Customer.

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 – 345/34.5 kV substation facilities.	*
CUSTOMER – 345 kV line between Customer substation and GEN-2007-036 Substation.	*
CUSTOMER – Possible reactive compensation to be determined during Impact Study	*
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 (2007 DOLLARS)
SUNC – add a new line terminal and one 345 kV circuit breaker to be built for generation request #GEN-2007-036 at the existing Spearville 345 kV substation. Work to include associated switches, control relaying, high speed communications, metering and related equipment and all related structures.	Responsibility of GEN-2007-036**
TOTAL	\$0.00

* Estimates of cost to be determined.

** Responsibility of Customer if GEN-2007-036 withdraws

Powerflow Analysis

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

This analysis was conducted assuming that previous queued requests in the immediate area of this interconnect request were in service. This analysis was conducted assuming the proposed Spearville – Comanche – Wichita 345kV line is in service. There is no Notice to Construct between SPP and any other party to build this line. Presently, this line has been assigned to GEN-2005-012 interconnection customer. In the event that GEN-2005-012 withdraws from the queue, the Customer could be responsible for the cost of this line. The analysis of the Customer's project indicates that, given the requested generation level of 200 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. 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.

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
MIDW/WEPL	ST JOHN - ST-JOHN 115KV CKT 1
OKGE	WOODRING (WOODRNG2) 345/138/13.8KV TRANSFORMER CKT 1
SPS	HARRINGTON STATION - NICHOLS STATION 230KV CKT 1
SPS	HARRNG_MID6 230.00 - NICHOLS STATION 230KV CKT 2
SPS	POTTER COUNTY INTERCHANGE (POTTR CO) 345/230/13.2KV TRANSFORMER CKT 1
SUNC/WEPL	SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1
WEPL	CIMARRON RIVER PLANT - NORTH LIBERAL TAP 115KV CKT 1
WEPL	CIMARRON RIVER TAP - CIMARRON RIVER PLANT 115KV CKT 1
WEPL	CIMARRON RIVER TAP - CUDAHY 115KV CKT 1
WEPL	CUDAHY - JUDSON LARGE 115KV CKT 1
WEPL	GREENSBURG - 2001-39A 115KV CKT 1
WEPL	GREENSBURG - SUN CITY 115KV CKT 1
WEPL	HARPER - 2006-21T 138KV CKT 1
WEPL	HARPER - MILAN TAP 138KV CKT 1
WEPL	MEDICINE LODGE - 2006-21T 115KV CKT 1
WEPL	MEDICINE LODGE - PRATT 115KV 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	PRATT - ST JOHN 115KV CKT 1
WEPL/MIDW	MULLERGREN - S HAYS6 230KV CKT 1
WERE	CHISHOLM - EVANS ENERGY CENTER NORTH 138KV CKT 1
WERE	CLEARWATER - GILL ENERGY CENTER WEST 138KV CKT 1
WERE/WEPL	CIRCLE - MULLERGREN 230KV CKT 1
WERE/WEPL	CLEARWATER - MILAN TAP 138KV CKT 1
MIDW	Midwest Energy
OKGE	Oklahoma Gas and Electric
SPS	Southwestern Public Service Company
SUNC	Sunflower Electric Power Corporation
WEPL	West Plains
WERE	Westar Energy

Table 4: Contingency Analysis

SEASON	OVERLOADED ELEMENT	RATING (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
12SP	MEDICINE LODGE - SUN CITY 115KV CKT 1	80	247	0	WICHITA - SPEARVILLE 345KV CKT 1
12SP	MULLERGREIN - SPEARVILLE 230KV CKT 1	355	236	0	WICHITA - SPEARVILLE 345KV CKT 1
12SP	HARPER - 2006-21T 138KV CKT 1	72	233	0	WICHITA - SPEARVILLE 345KV CKT 1
12SP	MEDICINE LODGE - PRATT 115KV CKT 1	80	187	0	MEDICINE LODGE -2006-21T 138KV CKT 1
12SP	MEDICINE LODGE -2006-21T 138KV CKT 1	72	172	0	MEDICINE LODGE -2006-21T 138KV CKT 1
12SP	GREENSBURG - 2001-39A 115KV CKT 1	130	165	0	WICHITA - SPEARVILLE 345KV CKT 1
12SP	HARPER - MILAN TAP 138KV CKT 1	96	160	0	WICHITA - SPEARVILLE 345KV CKT 1
12SP	MULLERGREIN - S HAYS6 230KV CKT 1	147	159	0	WICHITA - SPEARVILLE 345KV CKT 1
12SP	GREENSBURG - SUN CITY 115KV CKT 1	130	156	0	WICHITA - SPEARVILLE 345KV CKT 1
12SP	PRATT - ST JOHN 115KV CKT 1	80	145	0	HARPER - 2006-21T 138KV CKT 1
12SP	SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1	336	131	0	MULLERGREIN - SPEARVILLE 230KV CKT 1
12SP	POTTER COUNTY INTERCHANGE (POTTR CO) 345/230/13.2KV TRANSFORMER CKT 1	560	123	0	WICHITA - SPEARVILLE 345KV CKT 1
12SP	ST JOHN - ST-JOHN 115KV CKT 1	88	123	0	WICHITA - SPEARVILLE 345KV CKT 1
12SP	HARRINGTON STATION - NICHOLS STATION 230KV CKT 1	635	114	0	HARRNG_MID6 230.00 - NICHOLS STATION 230KV CKT 2
12SP	HARRNG_MID6 230.00 - NICHOLS STATION 230KV CKT 2	635	114	0	HARRINGTON STATION - NICHOLS STATION 230KV CKT 1
12SP	CLEARWATER - MILAN TAP 138KV CKT 1	110	127	1	WICHITA - SPEARVILLE 345KV CKT 1
12SP	CUDAHY - JUDSON LARGE 115KV CKT 1	130	111	64	HOLCOMB - SPEARVILLE 345KV CKT 1
12SP	CIMARRON RIVER TAP - CUDAHY 115KV CKT 1	130	105	135	HOLCOMB - SPEARVILLE 345KV CKT 1
12SP	CIRCLE - MULLERGREIN 230KV CKT 1	319	103	161	WICHITA - SPEARVILLE 345KV CKT 1
12SP	MEDICINE LODGE (MED-LDG4) 138/115/2.72KV TRANSFORMER CKT 1	65	105	167	WICHITA - SPEARVILLE 345KV CKT 1
12SP	WOODRING (WOODRNG2) 345/138/13.8KV TRANSFORMER CKT 1	360	100	172	CIMARRON - WOODRING 345KV CKT 1
12SP	CLEARWATER - GILL ENERGY CENTER WEST 138KV CKT 1	110	101	191	WICHITA - SPEARVILLE 345KV CKT 1
12WP	HARPER - 2006-21T 138KV CKT 1	72	244	0	WICHITA - SPEARVILLE 345KV CKT 1
12WP	MEDICINE LODGE - SUN CITY 115KV CKT 1	80	236	0	WICHITA - SPEARVILLE 345KV CKT 1
12WP	MEDICINE LODGE - PRATT 115KV CKT 1	80	176	0	HARPER - 2006-21T 138KV CKT 1
12WP	HARPER - MILAN TAP 138KV CKT 1	96	169	0	WICHITA - SPEARVILLE 345KV CKT 1
12WP	MULLERGREIN - SPEARVILLE 230KV CKT 1	471	165	0	WICHITA - SPEARVILLE 345KV CKT 1
12WP	MULLERGREIN - S HAYS6 230KV CKT 1	147	152	0	WICHITA - SPEARVILLE 345KV CKT 1
12WP	PRATT - ST JOHN 115KV CKT 1	80	147	0	HARPER - 2006-21T 138KV CKT 1
12WP	CLEARWATER - MILAN TAP 138KV CKT 1	110	136	0	WICHITA - SPEARVILLE 345KV CKT 1
12WP	CLEARWATER - GILL ENERGY CENTER WEST 138KV CKT 1	110	124	0	WICHITA - SPEARVILLE 345KV CKT 1
12WP	GREENSBURG - 2001-39A 115KV CKT 1	130	118	0	WICHITA - SPEARVILLE 345KV CKT 1
12WP	ST JOHN - ST_JOHN 115KV CKT 1	88	109	22	HARPER - 2006-21T 138KV CKT 1
12WP	GREENSBURG - SUN CITY 115KV CKT 1	130	113	23	WICHITA - SPEARVILLE 345KV CKT 1
12WP	MEDICINE LODGE - 2006-21T 115KV CKT 1	72	106	120	WICHITA - SPEARVILLE 345KV CKT 1
12WP	MEDICINE LODGE (MED-LDG4) 138/115/2.72KV TRANSFORMER CKT 1	65	106	147	WICHITA - SPEARVILLE 345KV CKT 1
17SP	MEDICINE LODGE - SUN CITY 115KV CKT 1	80	233	0	WICHITA - SPEARVILLE 345KV CKT 1
17SP	HARPER - 2006-21T 138KV CKT 1	72	225	0	WICHITA - SPEARVILLE 345KV CKT 1

TABLE 4: Contingency Analysis (continued)

SEASON	OVERLOADED ELEMENT	RATING (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
17SP	MULLERGRENN - SPEARVILLE 230KV CKT 1	355	218	0	WICHITA - SPEARVILLE 345KV CKT 1
17SP	MEDICINE LODGE - PRATT 115KV CKT 1	80	179	0	HARPER - 2006-21T 138KV CKT 1
17SP	MULLERGRENN - S HAYS6 230KV CKT 1	147	158	0	WICHITA - SPEARVILLE 345KV CKT 1
17SP	GREENSBURG - 2001-39A 115KV CKT 1	130	156	0	WICHITA - SPEARVILLE 345KV CKT 1
17SP	HARPER - MILAN TAP 138KV CKT 1	96	150	0	WICHITA - SPEARVILLE 345KV CKT 1
17SP	GREENSBURG - SUN CITY 115KV CKT 1	130	148	0	WICHITA - SPEARVILLE 345KV CKT 1
17SP	CUDAHY - JUDSON LARGE 115KV CKT 1	130	139	0	HOLCOMB - SPEARVILLE 345KV CKT 1
17SP	PRATT - ST JOHN 115KV CKT 1	80	136	0	HARPER - 2006-21T 138KV CKT 1
17SP	CIMARRON RIVER TAP - CUDAHY 115KV CKT 1	130	133	0	HOLCOMB - SPEARVILLE 345KV CKT 1
17SP	CLEARWATER - GILL ENERGY CENTER WEST 138KV CKT 1	110	131	0	WICHITA - SPEARVILLE 345KV CKT 1
17SP	CLEARWATER - MILAN TAP 138KV CKT 1	110	116	0	WICHITA - SPEARVILLE 345KV CKT 1
17SP	POTTER COUNTY INTERCHANGE (POTTR CO) 345/230/13.2KV TRANSFORMER CKT 1	560	116	0	WICHITA - SPEARVILLE 345KV CKT 1
17SP	CHISHOLM - EVANS ENERGY CENTER NORTH 138KV CKT 1	382	107	0	BENTON - WICHITA 345KV CKT 1
17SP	CIMARRON RIVER TAP - CIMARRON RIVER PLANT 115KV CKT 1	90	114	62	HOLCOMB - SPEARVILLE 345KV CKT 1
17SP	ST JOHN - ST-JOHN 115KV CKT 1	88	108	67	WICHITA - SPEARVILLE 345KV CKT 1
17SP	WOODRING (WOODRNG2) 345/138/13.8KV TRANSFORMER CKT 1	360	101	92	CIMARRON - WOODRING 345KV CKT 1
17SP	CIMARRON RIVER PLANT - NORTH LIBERAL TAP 115KV CKT 1	115	101	162	CIMARRON RIVER TAP - EAST LIBERAL 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

There are no additional costs to interconnect this 200MW at the same point as GEN-2007-036. 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 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. The proposed Spearville-Comanche-Wichita 345kV line was included in this analysis. This line could eventually be the cost responsibility of the Customer. 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

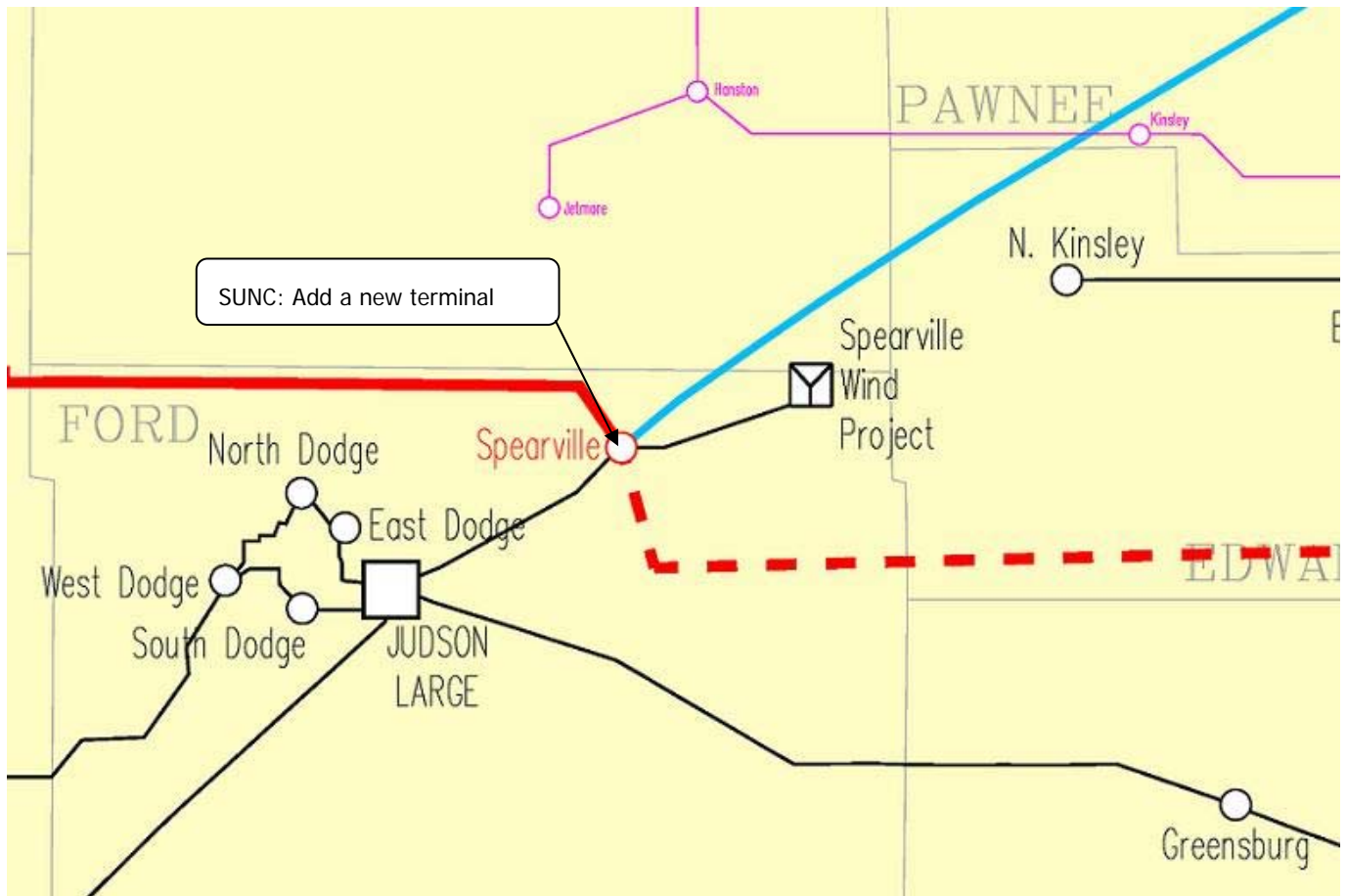


Figure 2: Point of Interconnection Area Map