



**Feasibility Study
For
Generation Interconnection
Request
GEN-2007-023**

SPP Tariff Studies
(#GEN-2007-023)

November, 2007

Executive Summary

<OMITTED TEXT> (Customer) has requested a Feasibility Study for the purpose of interconnecting 800 MW of coal fired generation within the control area of Westar Energy (WERE) located in Pottawatomie County, Kansas. The proposed method of interconnection is a new 345 kV breaker and line terminal at the existing Jeffrey Energy Center 345 kV bus owned by WERE. The proposed in-service date is May 1, 2015.

Power flow analysis has indicated that for the powerflow cases studied, it is possible to interconnect the 800 MW of generation with transmission system reinforcements within the local transmission system.

The requirement to interconnect the 800 MW of coal fired generation at the Jeffrey Energy Center 345 kV bus consists of constructing a new 345 kV breaker and terminal. The new terminal will be constructed and maintained by WERE.

The total minimum cost for building the required facilities for this 800 MW of generation is \$1,250,000. These costs are shown in Tables 1 and 2. Network constraints in the Kansas City Power & Light (KACP), Missouri Public Service (MIPU), West Plains (WEPL) and WERE 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. This cost does not include building the 345 kV line from the Customer's GSU substation into the point of interconnection.

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 KACP, MIPU, WEPL and WERE 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 800 MW of coal fired generation within the control area of Westar Energy (WERE) located in Pottawatomie County, Kansas. The proposed method of interconnection is a new 345 kV breaker and line terminal at the existing Jeffrey Energy Center 345 kV bus owned by WERE. The proposed in-service date is May 1, 2015.

Interconnection Facilities

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

The requirement to interconnect the 800 MW of coal fired generation at the existing Jeffrey Energy Center 345 kV bus consists of constructing a new 345 kV breaker and terminal. The new terminal will be constructed and maintained by WERE.

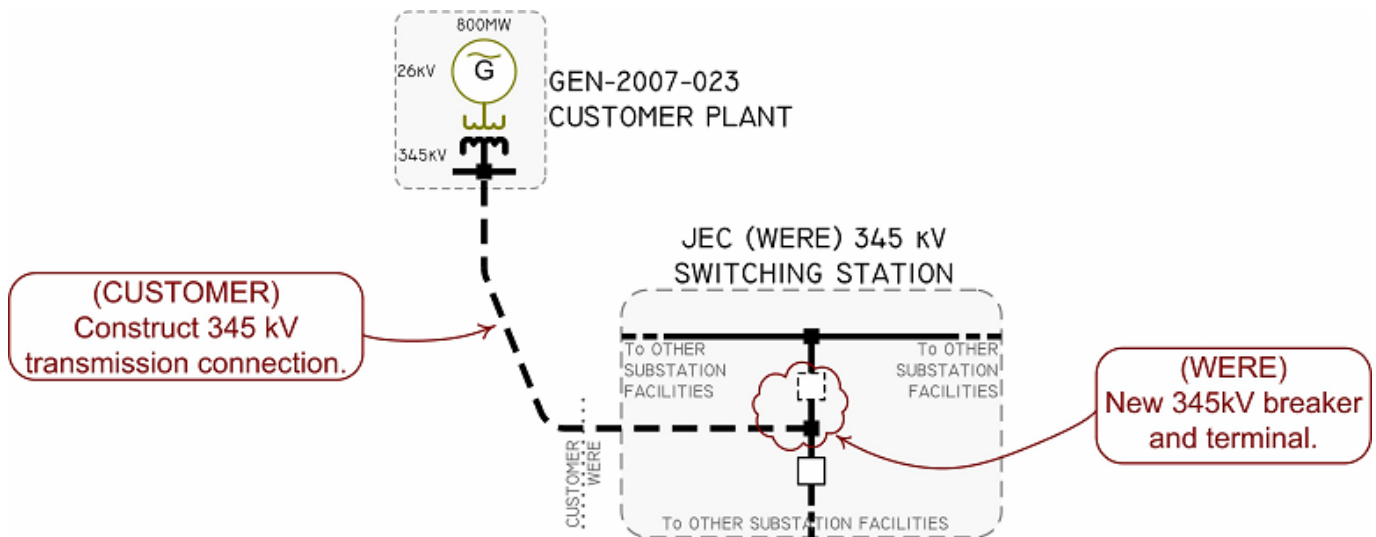


Figure 1: Proposed Method of Interconnection

(Final design to be determined)

Interconnection Estimated Costs

The minimum cost for adding a new breaker and terminating the transmission line serving GEN-2007-023 facilities is estimated at \$1,250,000. 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 345 kV transmission line extending from the point of interconnection to serve its GSU collection facilities. Other Network Constraints in the Kansas City Power & Light (KACP), Missouri Public Service (MIPU), West Plains (WEPL) and WERE transmission systems that were identified are shown in Table 3.

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 (2007 DOLLARS)
CUSTOMER – (1) 345 kV transmission connection from new generator to the Jeffrey Energy Center 345 kV bus.	*
WERE – Termination and interconnection of CUSTOMER 345 kV transmission connection into the Jeffrey Energy Center 345 kV bus.	\$750,000
CUSTOMER – (1) 345/26 kV Customer GSU substation facilities.	*
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)
WERE – Construct 345 kV terminal at Jeffrey Energy Center including one (1) 345 kV circuit breaker and associated equipment.	\$500,000
TOTAL	\$1,250,000

* Estimates of cost to be determined.

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 May 1, 2015. 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 800 MW and location, additional criteria violations will occur on the existing KACP, MIPU, WEPL and WERE 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.

Voltage violations for load serving buses within the SPP footprint were also observed for some of the contingencies listed in Table 3. These voltage violations have not been listed in this report.

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 (KACP), 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
KACP/MIPU	IATAN - ST JOE 345KV CKT 1
WEPL	CONCORDIA (CONCORD6) 230/115/13.8KV TRANSFORMER CKT 1
WERE	29TH & EVENINGSIDE JUNCTION - 29TH & GAGE 115KV CKT 1
WERE	54TH & MERIDEN - HOYT 115KV CKT 1
WERE	ANZIO - FORT JUNCTION SWITCHING STATION 115KV CKT 1
WERE	AUBURN ROAD - JEFFERY ENERGY CENTER 230KV CKT 1
WERE	AUBURN ROAD - SHERWOD 115KV CKT 1
WERE	AUBURN ROAD - SWISSVALE 230KV CKT 1
WERE	AUBURN ROAD (AUBRN77X) 230/115/13.8KV TRANSFORMER CKT 1
WERE	CHAPMAN - WEST JUNCTION CITY JUNCTION (WEST) 115KV CKT 2
WERE	EAST MANHATTAN (EMANHT3X) 230/115/18.0KV TRANSFORMER CKT 1
WERE	GOODYEAR JUNCTION - NORTHLAND 115KV CKT 1
WERE	HOYT - JEFFERY ENERGY CENTER 345KV CKT 1
WERE	HOYT - NORTHLAND 115KV CKT 1
WERE	LAWRENCE ENERGY CENTER UNIT 5 - LAWRENCE HILL 230KV CKT 1
WERE	LAWRENCE HILL - LAWRENCE ENERGY CENTER UNIT 5 230KV CKT 1
WERE	LAWRENCE HILL - MIDLAND JUNCTION 230KV CKT 1
WERE	LAWRENCE HILL (LAWHL29X) 230/115/13.8KV TRANSFORMER CKT 1
WERE	MIDLAND JUNCTION (MIDJ126X) 230/115/18.0KV TRANSFORMER CKT 1
WERE	WEST JUNCTION CITY - WEST JUNCTION CITY JUNCTION (EAST) 115KV CKT 1
WERE	WEST JUNCTION CITY - WEST JUNCTION CITY JUNCTION (WEST) 115KV CKT 1
WERE/KACP	CRAIG - STRANGER CREEK 345KV CKT 1
KACP	Kansas City Power & Light
WEPL	West Plains
MIPU	Missouri Public Service
WERE	Westar Energy

Table 4: Contingency Analysis

SEASON	OVERLOADED ELEMENT	RATING (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
12SP	ANZIO - FORT JUNCTION SWITCHING STATION 115KV CKT 1	92	171	0	WR-DOUBLE12:
12SP	LAWRENCE HILL (LAWHL29X) 230/115/13.8KV TRANSFORMER CKT 1	308	126	0	MIDLAND JUNCTION (MIDJ126X) 230/115/18.0KV TRANSFORMER CKT 1
12SP	AUBURN ROAD (AUBRN77X) 230/115/13.8KV TRANSFORMER CKT 1	308	121	0	HOYT - JEFFERY ENERGY CENTER 345KV CKT 1
12SP	LAWRENCE ENERGY CENTER UNIT 5 - LAWRENCE HILL 230KV CKT 1	478	116	89	HOYT - JEFFERY ENERGY CENTER 345KV CKT 1
12SP	AUBURN ROAD - JEFFREY ENERGY CENTER 230KV CKT 1	565	131	144	HOYT - JEFFERY ENERGY CENTER 345KV CKT 1
12SP	WEST JUNCTION CITY - WEST JUNCTION CITY JUNCTION (WEST) 115KV CKT 1	141	124	340	JEFFERY ENERGY CENTER - SUMMIT 345KV CKT 1
12SP	54TH & MERIDEN - HOYT 115KV CKT 1	179	117	385	HOYT - STRANGER CREEK 345KV CKT 1
12SP	GOODYEAR JUNCTION - NORTHLAND 115KV CKT 1	175	114	414	HOYT - STRANGER CREEK 345KV CKT 1
12SP	EAST MANHATTAN (EMANHT3X) 230/115/18.0KV TRANSFORMER CKT 1	308	106	467	HOYT - JEFFERY ENERGY CENTER 345KV CKT 1
12SP	HOYT - JEFFERY ENERGY CENTER 345KV CKT 1	1076	115	472	JEFFERY ENERGY CENTER - MORRIS COUNTY 345KV CKT 1
12SP	WEST JUNCTION CITY - WEST JUNCTION CITY JUNCTION (EAST) 115KV CKT 1	194	110	496	JEFFERY ENERGY CENTER - SUMMIT 345KV CKT 1
12SP	CRAIG - STRANGER CREEK 345KV CKT 1	1195	102	701	IATAN - ST JOE 345KV CKT 1
12SP	CHAPMAN - WEST JUNCTION CITY JUNCTION (WEST) 115KV CKT 2	92	103	738	JEFFERY ENERGY CENTER - SUMMIT 345KV CKT 1
12SP	CONCORDIA (CONCORD6) 230/115/13.8KV TRANSFORMER CKT 1	205	100	786	HOYT - JEFFERY ENERGY CENTER 345KV CKT 1
12WP	WEST JUNCTION CITY - WEST JUNCTION CITY JUNCTION (WEST) 115KV CKT 1	141	127	0	JEFFERY ENERGY CENTER - SUMMIT 345KV CKT 1
12WP	AUBURN ROAD - JEFFERY ENERGY CENTER 230KV CKT 1	565	123	274	HOYT - JEFFERY ENERGY CENTER 345KV CKT 1
12WP	HOYT - JEFFERY ENERGY CENTER 345KV CKT 1	1076	116	479	JEFFERY ENERGY CENTER - MORRIS COUNTY 345KV CKT 1
12WP	LAWRENCE HILL - LAWRENCE ENERGY CENTER UNIT 5 230KV CKT 1	478	109	513	HOYT - JEFFERY ENERGY CENTER 345KV CKT 1
12WP	CONCORDIA (CONCORD6) 230/115/13.8KV TRANSFORMER CKT 1	205	107	518	HOYT - JEFFERY ENERGY CENTER 345KV CKT 1
12WP	WEST JUNCTION CITY - WEST JUNCTION CITY JUNCTION (EAST) 115KV CKT 1	194	105	547	JEFFERY ENERGY CENTER - SUMMIT 345KV CKT 1
12WP	AUBURN ROAD (AUBRN77X) 230/115/13.8KV TRANSFORMER CKT 1	308	107	548	HOYT - JEFFERY ENERGY CENTER 345KV CKT 1
12WP	LAWRENCE ENERGY CENTER UNIT 5 - LAWRENCE HILL 230KV CKT 1	478	106	578	JEFFERY ENERGY CENTER - SUMMIT 345KV CKT 1

TABLE 4: Contingency Analysis (continued)

SEASON	OVERLOADED ELEMENT	RATING (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
12WP	IATAN - ST JOE 345KV CKT 1	1073	103	649	CRAIG - STRANGER CREEK 345KV CKT 1
12WP	54TH & MERIDEN - HOYT 115KV CKT 1	179	105	672	HOYT - STRANGER CREEK 345 CKT 1
12WP	GOODYEAR JUNCTION - NORTHLAND 115KV CKT 1	175	102	753	HOYT - STRANGER CREEK 345 CKT 1
12WP	AUBURN ROAD - SWISSVALE 230KV CKT 1	363	102	754	HOYT - JEFFERY ENERGY CENTER 345KV CKT 1
17SP	LAWRENCE ENERGY CENTER UNIT 5 - LAWRENCE HILL 230KV CKT 1	478	143	0	SPP-WERE-77
17SP	LAWRENCE HILL (LAWHL29X) 230/115/13.8KV TRANSFORMER CKT 1	308	139	0	MIDLAND JUNCTION (MIDJ126X) 230/115/18.0KV TRANSFORMER CKT 1
17SP	AUBURN ROAD (AUBRN77X) 230/115/13.8KV TRANSFORMER CKT 1	308	132	0	HOYT - JEFFERY ENERGY CENTER 345KV CKT 1
17SP	MIDLAND JUNCTION (MIDJ126X) 230/115/18.0KV TRANSFORMER CKT 1	308	126	0	LAWRENCE HILL (LAWHL29X) 230/115/13.8KV TRANSFORMER CKT 1
17SP	AUBURN ROAD - JEFFREY ENERGY CENTER 230KV CKT 1	565	136	63	HOYT - JEFFERY ENERGY CENTER 345KV CKT 1
17SP	EAST MANHATTAN (EMANHT3X) 230/115/18.0KV TRANSFORMER CKT 1	308	109	253	HOYT - JEFFERY ENERGY CENTER 345KV CKT 1
17SP	LAWRENCE HILL - MIDLAND JUNCTION 230KV CKT 1	359	109	269	LAWRENCE HILL (LAWHL29X) 230/115/13.8KV TRANSFORMER CKT 1
17SP	54TH & MERIDEN - HOYT 115KV CKT 1	179	125	270	HOYT - STRANGER CREEK 345KV CKT 1
17SP	GOODYEAR JUNCTION - NORTHLAND 115KV CKT 1	175	121	294	HOYT - STRANGER CREEK 345KV CKT 1
17SP	HOYT - JEFFERY ENERGY CENTER 345KV CKT 1	1076	121	383	JEFFERY ENERGY CENTER - MORRIS COUNTY 345KV CKT 1
17SP	AUBURN ROAD - SHERWOD 115KV CKT 1	240	106	606	HOYT - JEFFERY ENERGY CENTER 345KV CKT 1
17SP	HOYT - NORTHLAND 115KV CKT 1	223	106	615	HOYT - STRANGER CREEK 345KV CKT 1
17SP	IATAN - ST JOE 345KV CKT 1	1073	102	707	CRAIG - STRANGER CREEK 345KV CKT 1
17SP	29TH & EVENINGSIDE JUNCTION - 29TH & GAGE 115KV CKT 1	141	102	737	HOYT - JEFFERY ENERGY CENTER 345KV CKT 1
17SP	HOYT - JEFFERY ENERGY CENTER 345KV CKT 1	1076	101	784	CLIFTON - GREENLEAF 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 \$1,250,000 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. 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

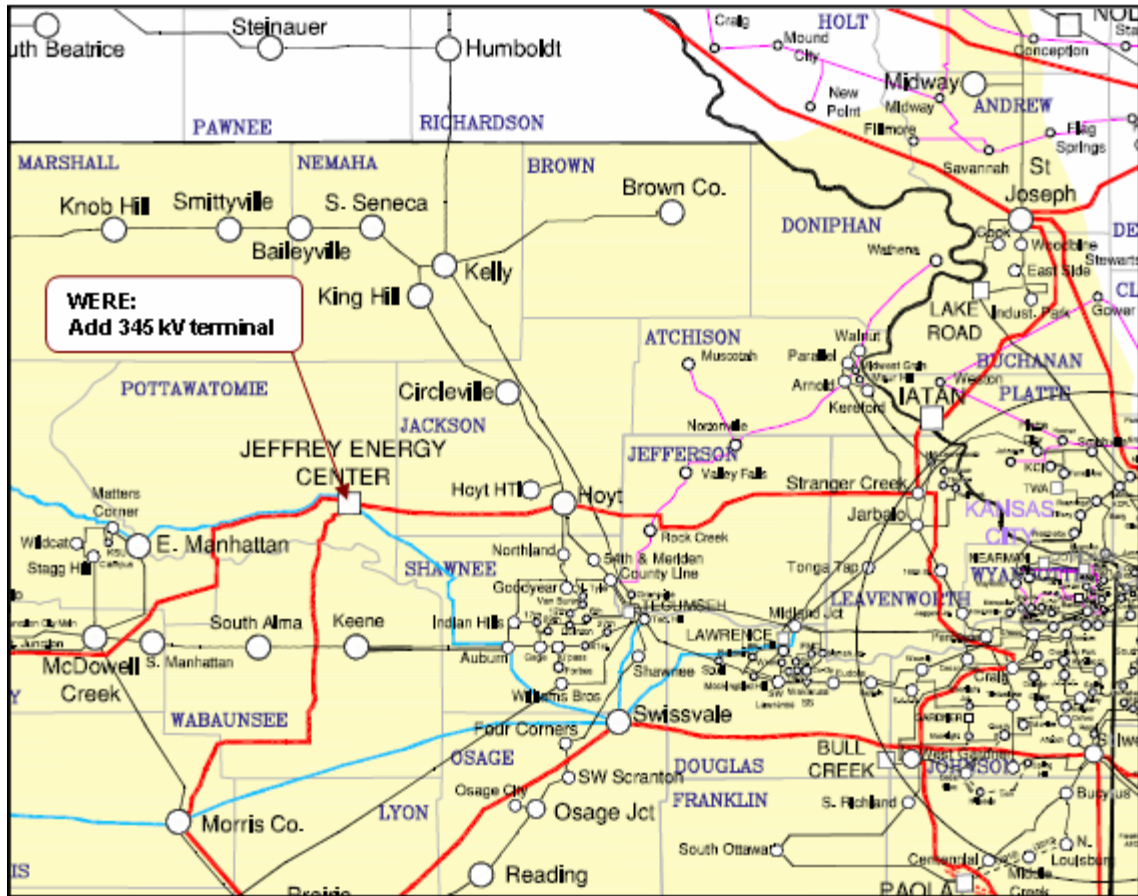


Figure 2: Point of Interconnection Area Map