



***Feasibility Study
For
Generation Interconnection
Request
GEN-2004-014***

***SPP Tariff Studies
(#GEN-2004-014)***

April 12, 2005

Executive Summary

<OMITTED TEXT> (Customer) has requested a Feasibility Study for the purpose of interconnecting 154.5MW of wind generation in Ford County Kansas within the service territory of Aquila (WEPL). The Customer proposed a point of interconnection at the existing North Kinsley 115kV Substation within the service territory of Midwest Energy (MIDW) in Edwards County Kansas. This 115kV substation is owned by MIDW. The Customer's proposed in-service date is November 15, 2005. This proposed in-service date seems very optimistic.

Power flow analysis has indicated that for the powerflow cases studied, it is possible to interconnect the 154.5MW of generation with transmission system reinforcements within the local transmission systems. The requirements for interconnection consist of adding a new 230-115kV 340MVA transmission substation including 2 auto-transformers with primary and secondary ring buses adjacent to the North Kinsley Substation. This facility would be tied to the Aquila system in the Mullergren – Spearville line with 6 miles of two 230kV lines.

This transmission substation addition shall be constructed and maintained by MIDW. Additional arrangements would be required to interconnect with Aquila in this line. The Customer proposed a specific 115kV line extending to serve its 115-34.5kV facilities. It is assumed that obtaining all necessary right-of-way for the necessary substation additions at the North Kinsley facility will not be a significant expense.

The total cost for adding a new 230-115kV 340MVA transmission substation, the required interconnection facility, and 6 miles of two 230kV lines is estimated at \$13,543,000. Other Network Constraints in the MIDW and Westar Energy systems that may be verified with a transmission service request and associated studies are listed in Table 3. These Network Constraints are in the local area of the new generation when this generation is sunk throughout the SPP footprint. 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 115kV line from the Customer substation into a new MIDW transmission substation. This cost does not include the Customer's 115-34.5kV substation. Also, additional Network Constraints that exist in Aquila's system are listed in Table 3.

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. Network Constraints in Aquila's system that exist are included in Table 4, and only the results with the 10 highest loadings are included.

There are several other proposed generation additions in the general area of the Customer's facility. It was assumed in this preliminary analysis that these other

projects within the MIDW and Westar Energy service territories will be in service. Those previously queued projects that have advanced to nearly complete phases were included in this Feasibility Study. In the event that another request for a generation interconnection with a higher priority withdraws, then this request may have to be re-evaluated to determine the local Network Constraints.

Introduction

<OMITTED TEXT> (Customer) has requested a Feasibility Study for the purpose of interconnecting 154.5MW of wind generation located in Ford County Kansas within the service territory of Aquila. The proposed point of interconnection is at the existing North Kinsley 115kV Substation within the service territory of Midwest Energy in Edwards County Kansas. This 115kV substation is owned by MIDW. The proposed in-service date is November 15, 2005.

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 requirements for interconnection consist of adding a new 230-115kV 340MVA transmission substation including 2 auto-transformers with primary and secondary ring buses adjacent to the existing North Kinsley Substation. This addition shall be constructed and maintained by MIDW. The Customer proposed a route of its 115kV line to serve its 115-34.5kV facilities. It is assumed that obtaining all necessary right-of-way for the new MIDW 230-115kV transmission substation as well as the new 230kV lines tapping Aquila's Mullergren – Spearville line will not be a significant expense.

The total cost for MIDW to add a new 230-115kV 340MVA transmission substation, the interconnection facility, adjacent to the North Kinsley Substation and add 6 miles of two 230kV lines is estimated at \$13,543,000. Other Network Constraints in the MIDW, WEPL and WERE systems that were identified are listed in Table 3. These estimates will be refined during the development of the impact study based on the final designs. This cost does not include building 115kV line from the Customer substation into the new MIDW transmission substation. The Customer is responsible for this 115kV line up to the point of interconnection. This cost does not include the Customer's 115-34.5kV substation and the cost estimate should be determined by the Customer.

The costs of interconnecting the facility to the MIDW transmission system are listed in Table 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. However, it was determined that 7.2MVAR of reactive compensation will be required in the Customer's 115-34.5kV Substation to maintain adequate voltage regulation at this facility.

Table 1: Direct Assignment Facilities

Facility	ESTIMATED COST (2005 DOLLARS)
Customer – 115-34.5 kV Substation facilities.	*
Customer – 115kV line between Customer substation and new MIDW 230-115kV transmission substation at N. Kinsley.	*
Customer - Right-of-Way for Customer Substation & Line.	*
Customer – 7.2MVAR 34.5 kV switched capacitor bank.	*
Total	*

Note: *Estimates of cost to be determined by Customer.

Table 2: Required Interconnection Network Upgrade Facilities

Facility	ESTIMATED COST (2005 DOLLARS)
MIDW - Add 230-115kV 340MVA transmission substation including 2 auto-transformers with primary and secondary ring buses adjacent to the existing North Kinsley 115kV Substation.	\$11,323,000
MIDW - Add two 230kV lines from this new transmission substation to Aquila's Spearville – Mullergren 230kV line, 6 miles each.	2,220,000
Total	\$13,543,000

Table 3: Network Constraints

Facility
MIDW - SEWARD 115-69kV
WERE - CIRCLE - MOUNDRIDGE 115kV
WERE - GATZ - GOLDEN PLAINS JUNCTION 69kV
WERE - GOLDEN PLAINS JUNCTION - HESSTON 69kV
WERE - MOUNDRIDGE - MOUND10X 115-()kV
WEPL - SEWARD 115-69kV
WEPL - Harper - Medicine Lodge 138kV
WEPL - Medicine Lodge 138-115kV
WEPL - Pratt - St John 115kV

Table 4: Contingency Analysis Results

Facility	Model & Contingency	Facility Loading (% Rate B) Or Voltage (PU)	ATC (MW)	Date Required (M/D/Y)
SEWARD 115-69kV	07SP, 56601-58779, MIDW REG E-IL - WEPL , HEIZER - Mullergren 230-115kV	103.5	115	6/1/2006
SEWARD 115-69kV	10SP, 56601-58779, MIDW REG E-IL - WEPL , HEIZER - Mullergren 230-115kV	103.3	116	
CIRCLE - MOUNDRIDGE 115kV	05AP, 56796-99942, WERE SCENTRAL - , WICHITA - 2003-2TP 345-()kV	116.6	17	4/1/2006
GATZ - GOLDEN PLAINS JUNCTION 69kV	05AP, 57011-57013, WERE SCENTRAL, HALSTEAD NORTH - MOUNDRIDGE 138kV	114.1	36	4/1/2006
GOLDEN PLAINS JUNCTION - HESSTON 69kV	05AP, 57011-57013, WERE SCENTRAL, HALSTEAD NORTH - MOUNDRIDGE 138kV	114.8	30	4/1/2006

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 4: Contingency Analysis Results

Facility	Model & Contingency	Facility Loading (% Rate B) Or Voltage (PU)	ATC (MW)	Date Required (M/D/Y)
MOUNDRIDGE - MOUND10X 115- ()kV	05AP, 56796-99942, WERE SCENTRAL - , WICHITA - 2003-2TP 345-()kV	140.5	0	4/1/2006
MOUNDRIDGE - MOUND10X 115- ()kV	05AP, 56769-99942, WERE NCENTRAL - , LANG - 2003-2TP 345-()kV	117.0	0	
MOUNDRIDGE - MOUND10X 138- ()kV	05AP, 56796-99942, WERE SCENTRAL - , WICHITA - 2003-2TP 345-()kV	142.3	0	
MOUNDRIDGE - MOUND10X 138- ()kV	05AP, 56769-99942, WERE NCENTRAL - , LANG - 2003-2TP 345-()kV	118.4	0	
MOUNDRIDGE - MOUND10X 138- ()kV	05AP, 56797-57981, WERE SEAST - KACP KACP, WOLF CREEK - LACYGNE 345kV	100.7	146	

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 4: Contingency Analysis Results

Facility	Model & Contingency	Facility Loading (% Rate B) Or Voltage (PU)	ATC (MW)	Date Required (M/D/Y)
Harper - Medicine Lodge 138kV	10SP, 56796-99942, WERE SCENTRAL - , WICHITA - 2003-2TP 345-()kV	145.5	0	6/1/2008
Harper - Medicine Lodge 138kV	10SP, 56769-99942, WERE NCENTRAL - , LANG - 2003-2TP 345-()kV	131.0	0	6/1/2008
Harper - Medicine Lodge 138kV	07SP, 56796-99942, WERE SCENTRAL - , WICHITA - 2003-2TP 345-()kV	124.5	0	6/1/2006
Harper - Medicine Lodge 138kV	10SP, 57040-57041, WERE SCENTRAL, EVANS ENERGY CENTER NORTH - EVANS ENERGY CENTER SOUTH 138kV	122.8	0	6/1/2008
Harper - Medicine Lodge 138kV	10SP, 57040-56722, WERE SCENTRAL, EVANS ENERGY CENTER NORTH - EVANS ENERGY CENTER UNIT 2 138-24kV	121.9	0	6/1/2008
Harper - Medicine Lodge 138kV	07SP, 57040-57041, WERE SCENTRAL, EVANS ENERGY CENTER NORTH - EVANS ENERGY CENTER SOUTH 138kV	119.1	17	6/1/2006
Harper - Medicine Lodge 138kV	10WP, 56796-99942, WERE SCENTRAL - , WICHITA - 2003-2TP 345kV	116.0	41	12/1/2008
Harper - Medicine Lodge 138kV	10SP, 56765-56766, WERE NEAST, HOYT - JEFFREY ENERGY CENTER 345kV	115.0	49	6/1/2008
Harper - Medicine Lodge 138kV	10SP, 56791-56797, WERE SCENTRAL - WERE SEAST, BENTON - WOLF CREEK 345kV	114.7	46	6/1/2008
Harper - Medicine Lodge 138kV	10SP, 56769-56770, WERE NCENTRAL, LANG - MORRIS COUNTY 345kV	114.1	53	6/1/2008

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 4: Contingency Analysis Results

Facility	Model & Contingency	Facility Loading (% Rate B) Or Voltage (PU)	ATC (MW)	Date Required (M/D/Y)
Medicine Lodge 138-115kV	10SP, 56796-99942, WERE SCENTRAL - , WICHITA - 2003-2TP 345-()kV	154.8	0	6/1/2008
Medicine Lodge 138-115kV	10SP, 56769-99942, WERE NCENTRAL - , LANG - 2003-2TP 345-()kV	141.0	0	6/1/2008
Medicine Lodge 138-115kV	07SP, 56796-99942, WERE SCENTRAL - , WICHITA - 2003-2TP 345-()kV	134.5	0	6/1/2006
Medicine Lodge 138-115kV	10SP, 57040-57041, WERE SCENTRAL, EVANS ENERGY CENTER NORTH - EVANS ENERGY CENTER SOUTH 138kV	133.1	0	6/1/2008
Medicine Lodge 138-115kV	10SP, 57040-56722, WERE SCENTRAL, EVANS ENERGY CENTER NORTH - EVANS ENERGY CENTER UNIT 2 138-24kV	132.0	0	6/1/2008
Medicine Lodge 138-115kV	07SP, 57040-57041, WERE SCENTRAL, EVANS ENERGY CENTER NORTH - EVANS ENERGY CENTER SOUTH 138kV	129.2	0	6/1/2006
Medicine Lodge 138-115kV	10WP, 56796-99942, WERE SCENTRAL - , WICHITA - 2003-2TP 345kV	128.1	0	12/1/2008
Medicine Lodge 138-115kV	10SP, 56791-56797, WERE SCENTRAL - WERE SEAST, BENTON - WOLF CREEK 345kV	124.9	0	6/1/2008
Medicine Lodge 138-115kV	10SP, 56765-56766, WERE NEAST, HOYT - JEFFREY ENERGY CENTER 345kV	124.8	0	6/1/2008
Medicine Lodge 138-115kV	10SP, 56769-56770, WERE NCENTRAL, LANG - MORRIS COUNTY 345kV	124.2	0	6/1/2008

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 4: Contingency Analysis Results

Facility	Model & Contingency	Facility Loading (% Rate B) Or Voltage (PU)	ATC (MW)	Date Required (M/D/Y)
Pratt - St John 115kV	10SP, 58764-99977, WEPL - , Greensburg - AQUIMULN 115kV	109.1	70	6/1/2008
Pratt - St John 115kV	07SP, 58764-99977, WEPL - , Greensburg - AQUIMULN 115kV	104.5	108	6/1/2006
Pratt - St John 115kV	10SP, 58764-58797, WEPL , Greensburg - Sun City 115kV	102.3	133	6/1/2008

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.

Powerflow Analysis

A powerflow analysis was conducted for the facility using modified versions of the 2005 April, 2005 Winter Peak, 2007 and 2010 Summer and Winter Peak models. The output of the Customer's facility was offset in each model by a reduction in output of existing online SPP generation. The proposed in-service date of the generator is November 15, 2005. The available seasonal models used were the 2005 April, 2005 Winter, and 2007 through 2010 peak models. This is the end of the current SPP planning horizon.

The analysis of the Customer's project indicates that, given the requested generation level of 154.5MW and location, additional criteria violations will occur on the existing MIDW and Westar Energy facilities under steady state conditions in the peak seasons. Also, additional Network Constraints that exist in Aquila's system are listed in Table 3.

There are several other proposed generation additions in the general area of the Customer's facility. Local projects that were previously queued were assumed to be in service in this Feasibility Study. Those local projects that were previously queued and have advanced to nearly complete phases were included in this Feasibility Study.

Powerflow Analysis Methodology

The Southwest Power Pool (SPP) criteria states that: "The transmission system of the SPP region shall be planned and constructed so that the contingencies as set forth in the Criteria will meet the applicable *NERC Planning Standards* for System Adequacy and Security – Transmission System Table I hereafter referred to as NERC Table I) and its applicable standards and measurements".

Using the created models and the ACCC function of PSS\E, single contingencies in portions or all of the modeled control areas of Aquila, Midwest Energy and Westar Energy were applied and the resulting scenarios analyzed. This satisfies the 'more probable' contingency testing criteria mandated by NERC and the SPP criteria.

Conclusion

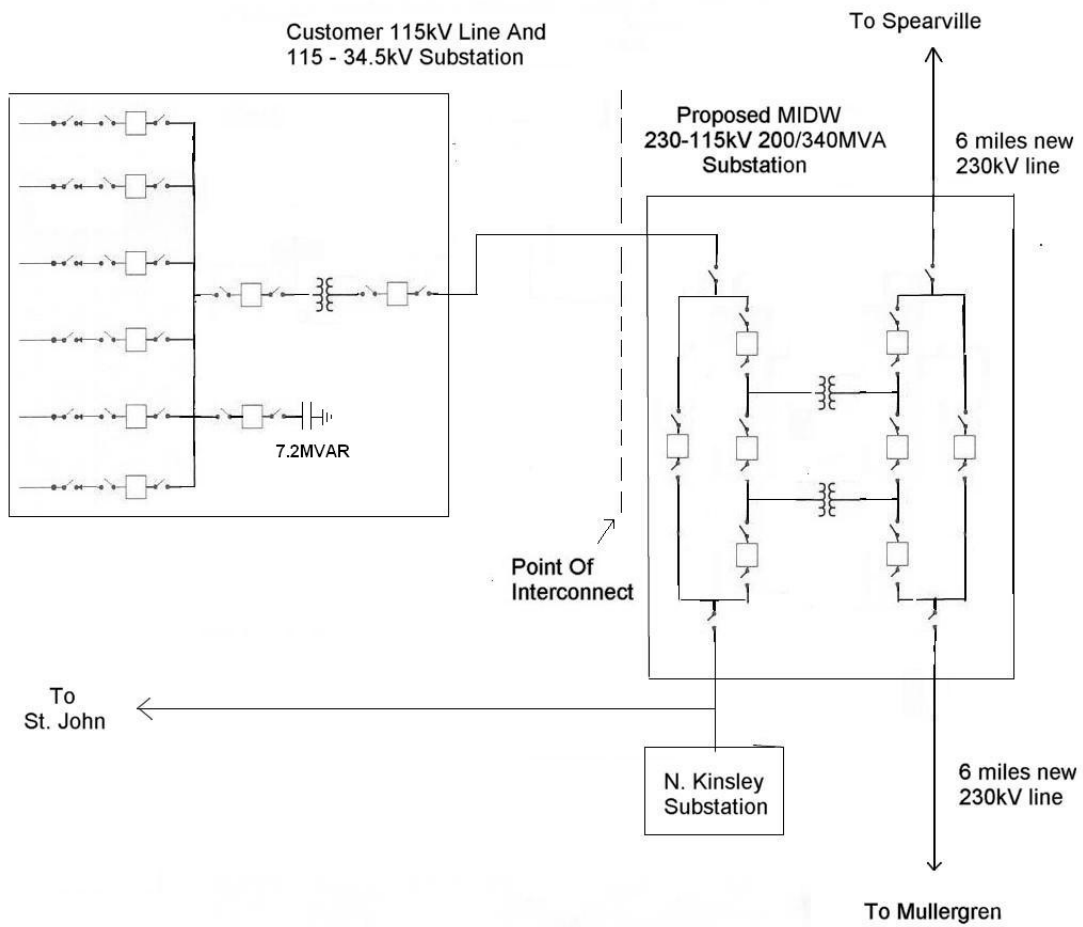
The minimum cost of interconnecting the Customer project is estimated at \$13,543,000 for MIDW's interconnection Network Upgrade facilities listed in Table 2 excluding upgrades of other transmission facilities by MIDW and Westar Energy listed in Table 3 of which are Network Constraints. At this time, the cost estimates for other Direct Assignment facilities including those in Table 1 have not been defined by the Customer. As stated earlier, local projects that were previously queued are assumed to be in service in this Feasibility Study.

In Table 4, a value of Available Transfer Capability (ATC) associated with each overloaded facility is included. Additional Network Constraints that exist in Aquila's system are listed in Tables 3 & 4. 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.

These interconnection costs do not include any cost that may be associated with short circuit or transient stability analysis. These studies will be performed if the Customer signs a System Impact Study Agreement.

The required interconnection costs listed in Table 2 and other upgrades associated with Network Constraints listed in Table 3 do not include all costs associated with the deliverability of the energy to final customers. These costs are determined by separate studies if the Customer requests transmission service through Southwest Power Pool's OASIS.



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

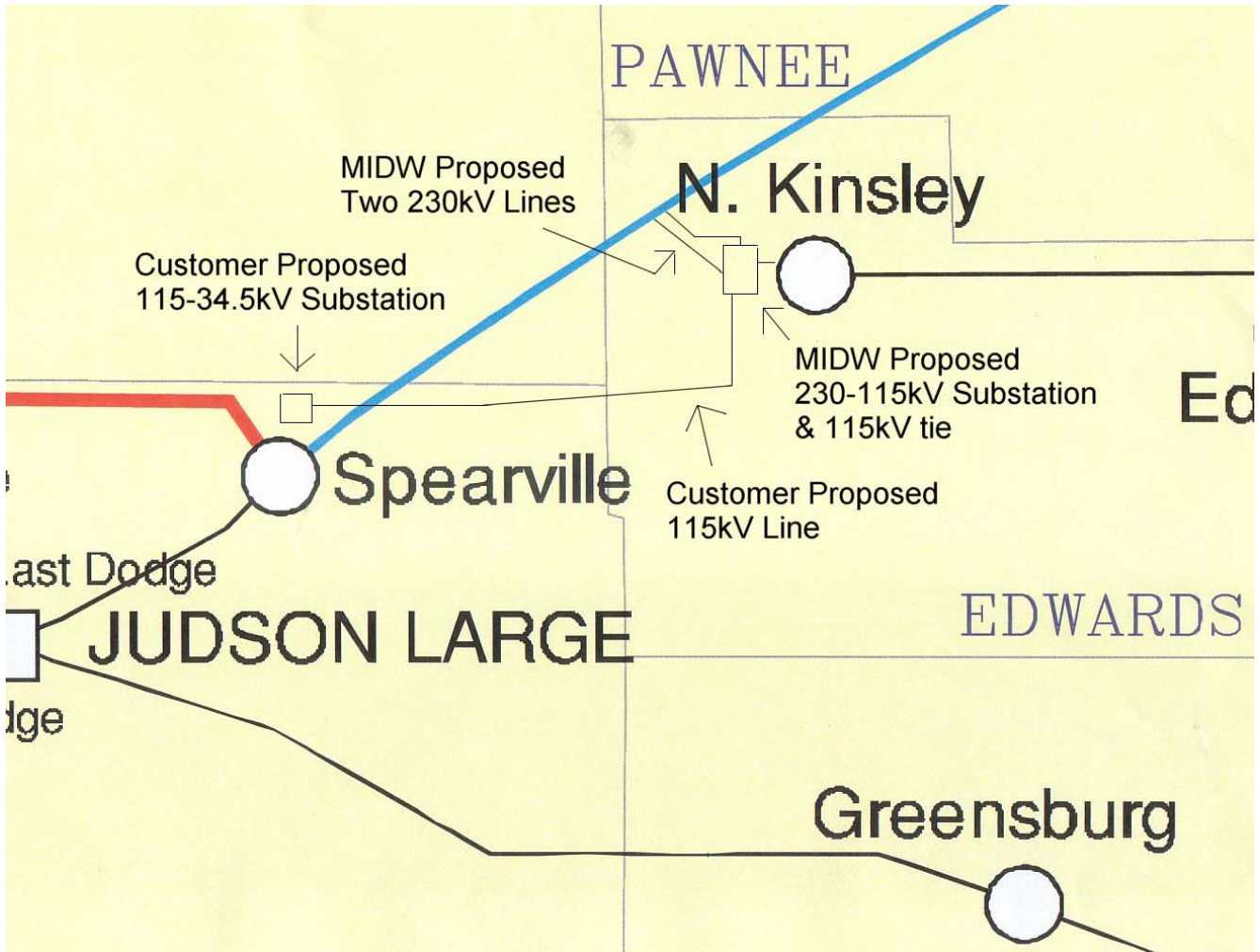


Figure 2: Map Of The Surrounding Area