



***Feasibility Study  
For  
Generation Interconnection  
Request  
GEN-2006-006***

***SPP Tariff Studies  
(#GEN-2006-006)***

**September, 2006**

## **Executive Summary**

<OMITTED TEXT> (Customer) has requested a Feasibility Study for the purpose of interconnecting 205.5MW of wind generation within the service territory of West Plains Energy (WEPL) (d/b/a Aquila, Inc.) in Ford County Kansas. The Customer's proposed point of interconnection is in the existing Spearville 345–230-115kV Substation on the 230kV bus. These facilities are owned by West Plains Energy. The proposed in-service date is December 1, 2008.

There are several prior queued (proposed) projects in the Southwest Power Pool (SPP) Generation Interconnection queue in the area of the Spearville substation ahead of the requested study project. In the counties of Ford, Kiowa, Gray, and Edwards of Kansas there are over 1,124 MW of in-service and proposed wind generation in addition to the existing fossil fueled units in the area. The only transmission outlet for generation in this area is the transmission leading from Spearville and Judson Large substation for a total of four outlets. These outlets are not large enough for the existing and proposed generation, under contingency or under steady state conditions.

Analysis has indicated that for the powerflow cases studied, it is not possible to conduct powerflow analysis to interconnect the 205.5 MW of generation without transmission reinforcements that connect the Spearville area to distant areas that have a more concentrated transmission network. Power flow solutions cannot be obtained for contingency analysis for the Spearville 230kV bus and for several other buses in the immediate area. A 345kV line to the Wichita or possibly Oklahoma City area would be the minimum requirement to perform a powerflow contingency analysis to indicate the full array of network constraints that would be present for the 205.5MW of generation to be delivered into the SPP transmission system. It would be a fair statement to say that this generation addition request is not feasible without this new 345kV line.

It is possible to interconnect the 205.5MW of generation with transmission system reinforcements. The minimum requirements for interconnection consist of expanding the existing 230kV ring bus with applicable breakers. The existing ring bus does not have any open positions so additional construction is required. This 230kV addition shall be constructed and maintained by West Plains. The Customer did not propose a specific 230kV line extending to serve its 230-34.5kV facilities. It is assumed that obtaining all necessary right-of-way for the necessary substation additions in the Spearville Substation will not be a significant expense.

In order to maintain acceptable bus voltages in the local area for steady state conditions, the Customer will have to install 60MVAR of reactive compensation in the Customer's substation. Dynamic Stability studies performed as part of the impact study will provide additional guidance as to whether the reactive compensation can in part be static or must be dynamic (such as a SVC). With this reactive compensation installed, additional transmission facilities are required to increase the ATC above 0MW for this contingency.

The cost for adding the 230kV breaker, line terminal, and expansion of the 230kV bus in the Spearville Substation, the interconnection facility, is estimated at \$2,890,000. A partial list of other Network Constraints in the Midwest Energy (MIDW), Westar Energy (WERE) and WEPL system that may be verified with a transmission service request and associated studies are listed in Table 3. Once new transmission reinforcements have been added, a full list of Network Constraints can be compiled. These Network Constraints are in the local area of the new generation when this generation is sunk throughout the SPP footprint for the Energy Resource 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 230kV line from the Customer substation into the Spearville Substation. This cost does not include the Customer's 230-34.5kV substation.

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 a significant number of overloaded facilities associated with this request. There are also a significant number of contingencies that have no power flow solutions. While there are low voltage conditions associated with this request, none are included given the lack of transmission facilities that must be addressed for transmission service. Therefore, the reactive compensation requirements in the Customer's substation may be re-evaluated in a subsequent transmission study.

As a sensitivity analysis and purely for Customer information, a new 345kV line was modeled from Spearville substation to Mooreland power station in the Western Farmers control area. This 345kV line has not been authorized for construction. This line is estimated to cost approximately \$51,000,000. This contingency analysis is shown in Figure 5. The contingency analysis shows that even with this new line, a significant number of network constraints still exist and the ATC for this request would be 0MW.

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 WEPL, SUNC, and MIDW 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 205.5MW of wind generation within the service territory of West Plains Energy in Ford County Kansas. The existing Spearville 345–230-115kV Substation facilities are owned by both SUNC and WEPL, and the proposed generation interconnection is with WEPL. The evaluated point of interconnection is at the 230kV bus owned by WEPL. The proposed in-service date is December 1, 2008.

## 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 230kV bus, breakers, etc. in the Spearville Substation. This 230kV addition shall be constructed and maintained by West Plains. The Customer did not propose a route of its 230kV line to serve its 230-34.5kV facilities. It is assumed that obtaining all necessary right-of-way for the additions in the WEPL 230kV facilities will not be a significant expense.

The cost for WEPL to add 230kV facilities in its Spearville Substation, the interconnection facility, is estimated at \$2,300,000 for bus and a breaker, interconnection metering and related equipment. Other Network Constraints in the MIDW, WERE, SUNC, and WEPL 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 230kV line from the Customer substation into the WEPL facilities. The Customer is responsible for this 230kV line up to the point of interconnection. This cost does not include the Customer's 230-34.5kV substation and the cost estimate should be determined by the Customer.

The costs of interconnecting the facility to the WEPL 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.

**Table 1: Direct Assignment Facilities**

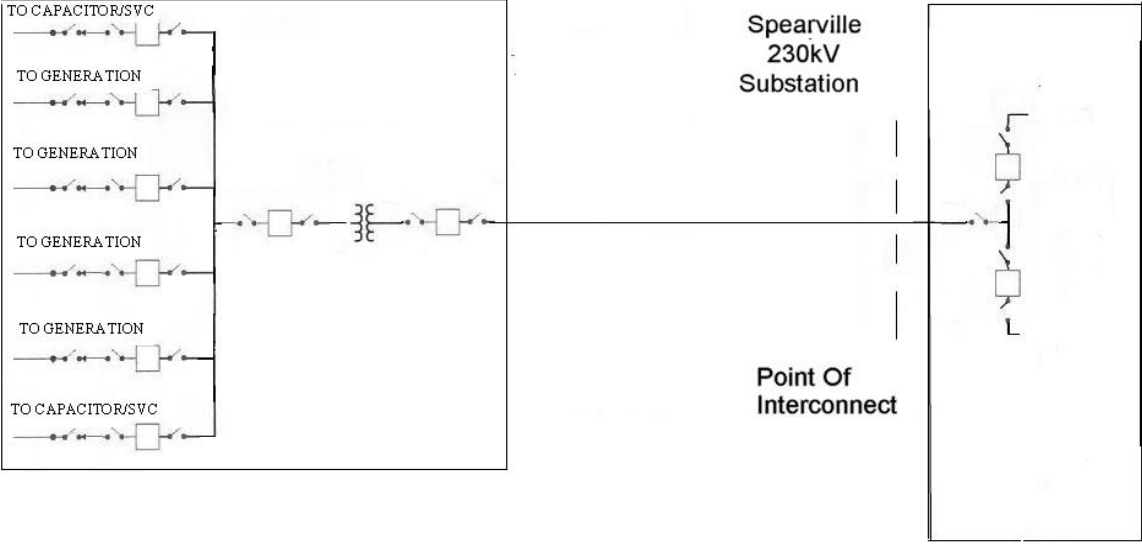
Facility	ESTIMATED COST (2006 DOLLARS)
Customer – 230-34.5 kV Substation facilities including 60MVAR 34.5kV capacitor banks.	*
Customer – 230kV line between Customer substation and upgraded WEPL 230kV Spearville Substation facilities.	*
Customer - Right-of-Way for Customer Substation & Line.	*
<b>Total</b>	*

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

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

Facility	ESTIMATED COST (2006 DOLLARS)
West Plains - Add 230kV bus, breaker, etc. in the Spearville Substation.	\$2,890,000
<b>Total</b>	<b>\$2,890,000</b>

Customer 230kV Line And  
230-34.5kV



**FIGURE 1. ONE-LINE OF THE INTERCONNECTION**

## **Powerflow Analysis**

A powerflow analysis was conducted for the facility using modified versions of the 2008 Winter Peak, 2010 Summer and Winter Peak, and 2016 Summer 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 generation is December 1, 2008. The available seasonal models used were through the 2016 Summer Peak of which is the end of the current SPP planning horizon.

The analysis of the Customer's project indicates that, given the requested generation level of 205.5MW and location, additional criteria violations will occur on the existing MIDW, SUNC, WERE and WEPL facilities under steady state conditions in the peak seasons. 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.

There are several prior queued (proposed) projects in the Southwest Power Pool (SPP) Generation Interconnection queue in the area of the Spearville substation ahead of the requested study project. In the counties of Ford, Kiowa, Gray, and Edwards of Kansas there are over 1,124 MW of in-service and proposed wind generation in addition to the existing fossil fueled units in the area. The only transmission outlet for generation in this area is the transmission leading from Spearville and Judson Large substations for a total of four outlets. These outlets are not large enough for the existing and proposed generation, under contingency or under steady state conditions.

Analysis has indicated that for the powerflow cases studied, it is not possible to conduct powerflow analysis to interconnect the 205.5 MW of generation without transmission reinforcements that connect the Spearville area to distant areas that have a more concentrated transmission network. Power flow solutions cannot be obtained for contingency analysis for the Spearville 230kV bus and for several other buses in the immediate area. A 345kV line to the Wichita or possibly Oklahoma City area would be the minimum requirement to perform a powerflow contingency analysis to indicate the full array of network constraints that would be present for the 205.5MW of generation to be delivered into the SPP transmission system. It would be a fair statement to say that this generation addition request is not feasible without this new 345kV line.

For the analysis that was able to be conducted, a list of Network Constraints in the MIDW, WERE, and WEPL control area are listed in Table 3. The contingency analysis and available ATC is listed in Table 4. The ATC for this request is 0MW. There are a significant number of overloaded facilities associated with this request. There are also a significant number of contingency that have no power flow solutions. While there are low voltage conditions associated with this request, none are included given the lack of transmission facilities that must be addressed for transmission service. Therefore, the

reactive compensation requirements in the Customer's substation may be re-evaluated in a subsequent transmission study.

As a sensitivity analysis and purely for Customer informational purposes only, a 345kV line was modeled from Spearville to Mooreland power station in the Western Farmers Electric control area. This line has not been authorized for construction. The approximate cost of this line is \$51,000,000. The sensitivity shows that if this line is constructed that a number of network constraints will still exist in the area. The contingency analysis is listed in Table 5 and shows that if this line is constructed the ATC for this request would equal 0MW.

In order to maintain acceptable bus voltages in the local area under steady state conditions, the Customer will need to install additional reactive compensation in the WEPL area. 60MVAR switched compensation is required in the Customer substation. Dynamic Stability studies performed as part of the impact study will provide additional guidance as to how much of the reactive compensation can be static or a portion must be dynamic (such as a SVC).

### **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 Midwest Energy, Sunflower Electric Power Corporation, West Plains 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.



**Table 3: Network Constraints**

Facility
MIDW - EDWARDS - PAWNEE-EDWARDS_JCT 115kV, 56617 - 56622
MIDW - EDWARDS - ST_JOHN 115kV, 56617 – 56624
WEPL - Greensburg - 2001-39A 115kV, 58764 – 99977
WEPL - Greensburg - Sun City 115kV, 58764 – 58797
WEPL - Harper - Medicine Lodge 138kV, 58768 – 58774
WEPL - Harper - Milan Tap 138kV, 58768 – 58775
MIDW - KINSLEY_115 - PAWNEE-EDWARDS_JCT 115kV, 56619 - 56622
WEPL - Medicine Lodge - Sun City 115kV, 58773 – 58797
WEPL - Medicine Lodge 138-115kV, 58773 – 58774
Customer - Customer Substation Reactive Compensation, Capacitor Banks and SVC.
WEPL - Cimarron River Tap - Cudahy 115kV, 58752 – 58759
WERE - CLEARWT - GILL ENERGY CENTER WEST 138kV, 57036 - 57045
WERE - CLEARWT - Milan Tap 138kV, 57036 – 58775
WEPL - CLEARWT - Milan Tap 138kV, 57036 – 58775
WEPL - Cudahy - Judson Large 115kV, 58759 – 58771
MIDW - EDWARDS - PAWNEE-EDWARDS_JCT 115kV, 56617 - 56622
MIDW - HUNTSVILLE - ST_JOHN 115kV, 56618 – 56624
WEPL - Judson Large - 2001-39A 115kV, 58771 – 99977
MIDW - KINSLEY_115 - 2004-14 115kV, 56619 – 99973
MIDW - KINSLEY_115 - PAWNEE-EDWARDS_JCT 115kV, 56619 - 56622
WEPL - Mullergren - 2004-14T 230kV, 58779 – 99976
WERE - NORTH AMERICAN PHILIPS - NORTH AMERICAN PHILIPS JUNCTION (SOUTH) 115kV, 57372 – 57374
WERE - NORTH AMERICAN PHILIPS JUNCTION (SOUTH) - WEST MCPHERSON 115kV, 57374 - 57438
WERE - NORTH AMERICAN PHILIPS JUNCTION (SOUTH) - WEST MCPHERSON 115kV CKT 2, 57374 – 57438
WEPL - Pratt - St John 115kV, 58787 – 58796
WEPL - Spearville - 2004-14T 230kV, 58795 – 99976
WEPL - Spearville - North Judson Large 115kV, 58794 – 58871

**Table 3: Network Constraints**

Facility
WERE - SPRING CREEK JUNCTION - MOUNDRIDGE 115kV, 57380 - 57429
MIDW - ST_JOHN - St John 115kV, 56624 – 58796
WEPL - ST_JOHN - St John 115kV, 56624 – 58796

**TABLE 4: CONTINGENCY ANALYSIS**

ELEMENT	Season	RATE (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
<b>2008 Winter Peak</b>					
'2001-39A 115 - GREENSBURG 115KV CKT 1'	08wp	79.7	216.0299	0	'SPEARVILLE (SPEARVL6) 230/115/13.8KV TRANSFORMER CKT 1'
'EDWARDS - PAWNEE EDWARDS JUNCTION 115KV CKT 1'	08wp	92	155.3473	0	'2001-39A 115 - GREENSBURG 115KV CKT 1'
'EDWARDS - ST JOHN 115KV CKT 1'	08wp	92	149.4926	0	'2001-39A 115 - GREENSBURG 115KV CKT 1'
'HARPER - MEDICINE LODGE 138KV CKT 1'	08wp	71.7	197.9784	0	'LANG - WICHITA 345KV CKT 1'
'HARPER - MILAN TAP 138KV CKT 1'	08wp	95.6	136.0478	0	'LANG - WICHITA 345KV CKT 1'
'KINSLEY - PAWNEE EDWARDS JUNCTION 115KV CKT 1'	08wp	92	167.0087	0	'2001-39A 115 - GREENSBURG 115KV CKT 1'
'MEDICINE LODGE - SUN CITY 115KV CKT 1'	08wp	79.7	202.239	0	'SPEARVILLE (SPEARVL6) 230/115/13.8KV TRANSFORMER CKT 1'
'MEDICINE LODGE (MED-LDG4) 138/115/2.72KV TRANSFORMER CKT 1'	08wp	56	211.9009	0	'BASE CASE'
'MEDICINE LODGE (MED-LDG4) 138/115/2.72KV TRANSFORMER CKT 1'	08wp	65	201.8024	0	'LANG - WICHITA 345KV CKT 1'
'PRATT - ST JOHN 115KV CKT 1'	08wp	79.7	126.3749	0	'2001-39A 115 - GREENSBURG 115KV CKT 1'
No Solution	08wp			0	BUS 56619 [KINSLEY3115.00] TO BUS 99976 [2004-14T230.00] CKT 1
No Solution	08wp			0	BUS 99976 [2004-14T230.00] TO BUS 58779 [MULGREN6230.00] CKT 1
No Solution	08wp			0	BUS 99976 [2004-14T230.00] TO BUS 58795 [SPEARVL6230.00] CKT 1
No Solution	08wp			0	BUS 56449 [HOLCOMB7345.00] TO BUS 56469 [SPERVIL7345.00] CKT 1
No Solution	08wp			0	BUS 56449 [HOLCOMB7345.00] TO BUS 50858 [FINNEY7 345.00] CKT 1
No Solution	08wp			0	BUS 56765 [HOYT 7345.00] TO BUS 56766 [JEC N 7345.00] CKT 1

**TABLE 4: CONTINGENCY ANALYSIS**

ELEMENT	Season	RATE (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
No Solution	08wp			0	BUS 57217 [KELLY 3115.00] TO BUS 57337 [SENECA 3115.00] CKT 1
No Solution	08wp			0	BUS 57322 [BAILEYV3115.00] TO BUS 57337 [SENECA 3115.00] CKT 1
No Solution	08wp			0	BUS 57322 [BAILEYV3115.00] TO BUS 57338 [SMITTYV3115.00] CKT 1
No Solution	08wp			0	BUS 57332 [KNOB HL3115.00] TO BUS 57338 [SMITTYV3115.00] CKT 1
No Solution	08wp			0	BUS 58795 [SPEARVL6230.00] TO BUS 99981 [G06-06 34.500] CKT 1
No Solution	08wp			0	BUS 50826 [GRAPEVN3115.00] TO BUS 50932 [KIRBY3 115.00] CKT 1
No Solution	08wp			0	BUS 50838 [MCLELLN3115.00] TO BUS 50840 [MCLEAR3 115.00] CKT 1
No Solution	08wp			0	BUS 50838 [MCLELLN3115.00] TO BUS 50932 [KIRBY3 115.00] CKT 1
No Solution	08wp			0	BUS 50858 [FINNEY7 345.00] TO BUS 50888 [POTTRC7 345.00] CKT 1
No Solution	08wp			0	BUS 50887 [POTTRC6 230.00] TO BUS 50888 [POTTRC7 345.00] TO BUS 50886 [POTTRCO113.200] CKT 1
No Solution	08wp			0	BUS 55948 [HUGO PP4138.00] TO BUS 55947 [HUGO1 23.400] CKT 1
'HUNTSVILLE - ST JOHN 115KV CKT 1'	08wp	88	119.3735	18	'CIRCLE - MULLERGREN 230KV CKT 1'
'HUNTSVILLE - HUTCHINSON ENERGY CENTER 115KV CKT 1'	08wp	92	111.2692	91	'CIRCLE - MULLERGREN 230KV CKT 1'
'MEDICINE LODGE - PRATT 115KV CKT 1'	08wp	79.7	105.9494	122	'2001-39A 115 - GREENSBURG 115KV CKT 1'
'CLEARWT - MILAN TAP 138KV CKT 1'	08wp	110	106.9535	125	'LANG - WICHITA 345KV CKT 1'
'CLEARWT - GILL ENERGY CENTER WEST 138KV CKT 1'	08wp	110	103.5386	165	'LANG - WICHITA 345KV CKT 1'
'2004-14T 230 - MULLERGREN 230KV CKT 1'	08wp	470.5	103.2753	168	'KINSLEY - PAWNEE EDWARDS JUNCTION 115KV CKT 1'

**TABLE 4: CONTINGENCY ANALYSIS**

ELEMENT	Season	RATE (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
<b>2011 Summer Peak</b>					
'2001-39A 115 - GREENSBURG 115KV CKT 1'	11sp	79.7	198.5863	0	'FINNEY STATION - HOLCOMB 345KV CKT 1'
'2001-39A 115 - JUDSON LARGE 115KV CKT 1'	11sp	79.7	120.8369	0	'GEN:99979 1'
'2004-14T 230 - MULLERGRENN 230KV CKT 1'	11sp	355.3	134.1504	0	'MINGO - SETAB 345KV CKT 1'
'EDWARDS - PAWNEE EDWARDS JUNCTION 115KV CKT 1'	11sp	92	150.7283	0	'2001-39A 115 - GREENSBURG 115KV CKT 1'
'EDWARDS - ST JOHN 115KV CKT 1'	11sp	92	141.3464	0	'2001-39A 115 - GREENSBURG 115KV CKT 1'
'HAPPY INTERCHANGE - PALODU 115KV CKT 1'	11sp	99	108.4697	0	'AMARILLO S INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1'
'HARPER - MEDICINE LODGE 138KV CKT 1'	11sp	71.7	197.8913	0	'FINNEY STATION - HOLCOMB 345KV CKT 1'
'HAYS PLANT - VINE STREET 115KV CKT 1'	11sp	88	121.4148	0	'KNOLL - S HAYS6 230 230KV CKT 1'
'KINSLEY - PAWNEE EDWARDS JUNCTION 115KV CKT 1'	11sp	92	169.0239	0	'2001-39A 115 - GREENSBURG 115KV CKT 1'
'LAWRENCE ENERGY CENTER UNIT 5 - LAWRENCE HILL 230KV CKT 1'	11sp	478	102.1032	0	'GILL ENERGY CENTER EAST (GEC3 GSU) 138/69/14.4KV TRANSFORMER CKT 1'
'MEDICINE LODGE - SUN CITY 115KV CKT 1'	11sp	79.7	177.9523	0	'FINNEY STATION - HOLCOMB 345KV CKT 1'
'MEDICINE LODGE (MED-LDG4) 138/115/2.72KV TRANSFORMER CKT 1'	11sp	65	198.2866	0	'SPP-SWPS-04A'
'MEDICINE LODGE (MED-LDG4) 138/115/2.72KV TRANSFORMER CKT 1'	11sp	56	200.3981	0	'BASE CASE'
'PALODU - RANDALL COUNTY INTERCHANGE 115KV CKT 1'	11sp	99	110.611	0	'AMARILLO S INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1'
'POTTER COUNTY INTERCHANGE (POTTR CO) 345/230/13.2KV TRANSFORMER CKT 1'	11sp	560	122.6654	0	'GEN:51442 1'

**TABLE 4: CONTINGENCY ANALYSIS**

ELEMENT	Season	RATE (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
'PRATT - ST JOHN 115KV CKT 1'	11sp	79.7	138.2984	0	'2001-39A 115 - GREENSBURG 115KV CKT 1'
'WEBRERICHARD'	11sp	1250	113.0152	0	'BASE CASE'
No Solution	11sp			0	BUS 56619 [KINSLEY3115.00] TO BUS 99976 [2004-14T230.00] CKT 1
No Solution	11sp			0	BUS 99976 [2004-14T230.00] TO BUS 58779 [MULGREN6230.00] CKT 1
No Solution	11sp			0	BUS 99976 [2004-14T230.00] TO BUS 58795 [SPEARVL6230.00] CKT 1
No Solution	11sp			0	BUS 56449 [HOLCOMB7345.00] TO BUS 56465 [SETAB 7345.00] CKT 1
No Solution	11sp			0	BUS 56449 [HOLCOMB7345.00] TO BUS 56469 [SPERVIL7345.00] CKT 1
No Solution	11sp			0	BUS 56451 [MINGO 7345.00] TO BUS 64943 [REDWILO3345.00] CKT 1
No Solution	11sp			0	BUS 58795 [SPEARVL6230.00] TO BUS 99981 [G06-06 34.500] CKT 1
No Solution	11sp			0	BUS 58059 [MALTABN5161.00] TO BUS 58063 [SWAVRLY5161.00] CKT 1
No Solution	11sp			0	BUS 58059 [MALTABN5161.00] TO BUS 58064 [NORTON-5161.00] CKT 1
No Solution	11sp			0	BUS 50668 [MOOREE3 115.00] TO BUS 50669 [MOORE6 230.00] CKT 1
No Solution	11sp			0	BUS 50858 [FINNEY7 345.00] TO BUS 50888 [POTTRC7 345.00] CKT 1
No Solution	11sp			0	BUS 50887 [POTTRC6 230.00] TO BUS 50888 [POTTRC7 345.00] TO BUS 50886 [POTTRCO113.200] CKT 1
No Solution	11sp			0	BUS 50932 [KIRBY3 115.00] TO BUS 54276 [JERICHO3115.00] CKT 1
No Solution	11sp			0	BUS 51437 [TOLKW6 230.00] TO BUS 51442 [TOLK2 124.000] CKT 1
No Solution	11sp			0	BUS 51534 [TUCO7 345.00] TO BUS 54119 [O.K.U.-7345.00] CKT 1

**TABLE 4: CONTINGENCY ANALYSIS**

ELEMENT	Season	RATE (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
'GREENSBURG - SUN CITY 115KV CKT 1'	11sp	129.5	113.821	8	'FINNEY STATION - HOLCOMB 345KV CKT 1'
'2004-14T 230 - SPEARVILLE 230KV CKT 1'	11sp	355.3	132.1033	8	'MINGO - SETAB 345KV CKT 1'
'EAST LIBERAL - TEXAS COUNTY INTERCHANGE PHSF 115KV CKT 1'	11sp	119	119.1653	15	'SPP-SWPS-04A'
'HARPER - MILAN TAP 138KV CKT 1'	11sp	95.6	120.5436	15	'FINNEY STATION - HOLCOMB 345KV CKT 1'
'ST JOHN - ST JOHN 115KV CKT 1'	11sp	88	107.6158	23	'2001-39A 115 - GREENSBURG 115KV CKT 1'
'2004-14T 230 - MULLERGRENN 230KV CKT 1'	11sp	330.3	114.6021	58	'BASE CASE'
'KNOLL - VINE STREET 115KV CKT 1'	11sp	88	111.6368	69	'KNOLL - S HAYS6 230 230KV CKT 1'
'MEDICINE LODGE - PRATT 115KV CKT 1'	11sp	79.7	106.1327	107	'2001-39A 115 - GREENSBURG 115KV CKT 1'
'GREENSBURG - SUN CITY 115KV CKT 1'	11sp	120.7	104.3276	119	'BASE CASE'
'2004-14T 230 - SPEARVILLE 230KV CKT 1'	11sp	330.3	108.033	140	'BASE CASE'
'NORTH AMERICAN PHILIPS JUNCTION (SOUTH) - WEST MCPHERSON 115KV CKT 1'	11sp	68	104.4084	147	'EAST MCPHERSON - SUMMIT 230KV CKT 1'
'SPEARVILLE 230/34.5KV TRANSFORMER CKT 1'	11sp	210	110.6415	185	'KINSLEY - PAWNEE EDWARDS JUNCTION 115KV CKT 1'
<b>2011 Winter Peak</b>					
'2001-39A 115 - GREENSBURG 115KV CKT 1'	11wp	79.7	250.0965	0	'2004-14T 230 - SPEARVILLE 230KV CKT 1'
'2001-39A 115 - JUDSON LARGE 115KV CKT 1'	11wp	79.7	120.804	0	'GEN:99979 1'
'EDWARDS - PAWNEE EDWARDS JUNCTION 115KV CKT 1'	11wp	92	150.1684	0	'2001-39A 115 - GREENSBURG 115KV CKT 1'
'EDWARDS - ST JOHN 115KV CKT 1'	11wp	92	143.9087	0	'2001-39A 115 - GREENSBURG 115KV CKT 1'
'HARPER - MEDICINE LODGE 138KV CKT 1'	11wp	71.7	199.8496	0	'LANG - WICHITA 345KV CKT 1'
'HARPER - MILAN TAP 138KV CKT 1'	11wp	95.6	126.6317	0	'LANG - WICHITA 345KV CKT 1'

**TABLE 4: CONTINGENCY ANALYSIS**

ELEMENT	Season	RATE (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
'KINSLEY - PAWNEE EDWARDS JUNCTION 115KV CKT 1'	11wp	92	162.4366	0	'2001-39A 115 - GREENSBURG 115KV CKT 1'
'MEDICINE LODGE - SUN CITY 115KV CKT 1'	11wp	79.7	235.2617	0	'2004-14T 230 - SPEARVILLE 230KV CKT 1'
'MEDICINE LODGE (MED-LDG4) 138/115/2.72KV TRANSFORMER CKT 1'	11wp	56	218.0354	0	'BASE CASE'
'MEDICINE LODGE (MED-LDG4) 138/115/2.72KV TRANSFORMER CKT 1'	11wp	65	208.935	0	'LANG - WICHITA 345KV CKT 1'
'PRATT - ST JOHN 115KV CKT 1'	11wp	79.7	128.6374	0	'2001-39A 115 - GREENSBURG 115KV CKT 1'
No Solution	11wp			0	BUS 56619 [KINSLEY3115.00] TO BUS 99976 [2004-14T230.00] CKT 1
No Solution	11wp			0	BUS 99976 [2004-14T230.00] TO BUS 58779 [MULGREN6230.00] CKT 1
No Solution	11wp			0	BUS 56393 [PLYMELL3115.00] TO BUS 56448 [HOLCOMB3115.00] CKT 1
No Solution	11wp			0	BUS 56449 [HOLCOMB7345.00] TO BUS 56469 [SPERVIL7345.00] CKT 1
No Solution	11wp			0	BUS 56449 [HOLCOMB7345.00] TO BUS 50858 [FINNEY7 345.00] CKT 1
No Solution	11wp			0	BUS 56469 [SPERVIL7345.00] TO BUS 58795 [SPEARVL6230.00] TO BUS 56468 [SPERTER113.800] CKT 1
No Solution	11wp			0	BUS 56765 [HOYT 7345.00] TO BUS 56766 [JEC N 7345.00] CKT 1
No Solution	11wp			0	BUS 57217 [KELLY 3115.00] TO BUS 57337 [SENECA 3115.00] CKT 1
No Solution	11wp			0	BUS 57322 [BAILEYV3115.00] TO BUS 57337 [SENECA 3115.00] CKT 1
No Solution	11wp			0	BUS 57322 [BAILEYV3115.00] TO BUS 57338 [SMITTYV3115.00] CKT 1
No Solution	11wp			0	BUS 57332 [KNOB HL3115.00] TO BUS 57338 [SMITTYV3115.00] CKT 1
No Solution	11wp			0	BUS 59341 [S.HARP 5161.00] TO BUS 59342 [PECULR 5161.00] CKT 1



**TABLE 4: CONTINGENCY ANALYSIS**

ELEMENT	Season	RATE (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
'GREENSBURG - SUN CITY 115KV CKT 1'	11wp	170.7	112.2275	72	'2004-14T 230 - SPEARVILLE 230KV CKT 1'
'MEDICINE LODGE - PRATT 115KV CKT 1'	11wp	79.7	108.5498	89	'2001-39A 115 - GREENSBURG 115KV CKT 1'
'NICHOLS STATION 230/115KV TRANSFORMER CKT 1'	11wp	150	101.4821	119	'NICHOLS STATION 230/115KV TRANSFORMER CKT 2'
'HUNTSVILLE - ST JOHN 115KV CKT 1'	11wp	88	103.9023	167	'CIRCLE - MULLERGREN 230KV CKT 1'
'SPEARVILLE 230/34.5KV TRANSFORMER CKT 1'	11wp	210	108.9833	188	'GREENSBURG - SUN CITY 115KV CKT 1'
'SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1'	11wp	336	101.2897	200	'2004-14T 230 - SPEARVILLE 230KV CKT 1'
<b>2016 Summer Peak</b>					
'2001-39A 115 - GREENSBURG 115KV CKT 1'	16sp	79.7	180.8359	0	'PRATT - ST JOHN 115KV CKT 1'
'CIMARRON RIVER PLANT - NORTH LIBERAL TAP 115KV CKT 1'	16sp	115.3	120.6089	0	'CIMARRON RIVER TAP - EAST LIBERAL 115KV CKT 1'
'CIMARRON RIVER TAP - EAST LIBERAL 115KV CKT 1'	16sp	119.5	115.9093	0	'CIMARRON RIVER PLANT - NORTH LIBERAL TAP 115KV CKT 1'
'EDWARDS - PAWNEE EDWARDS JUNCTION 115KV CKT 1'	16sp	92	141.4119	0	'2001-39A 115 - GREENSBURG 115KV CKT 1'
'EDWARDS - ST JOHN 115KV CKT 1'	16sp	92	131.2388	0	'2001-39A 115 - GREENSBURG 115KV CKT 1'
'HAPPY INTERCHANGE - PALODU 115KV CKT 1'	16sp	99	114.9047	0	'AMARILLO S INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1'
'HARPER - MEDICINE LODGE 138KV CKT 1'	16sp	71.7	166.8828	0	'GEN:56751 1'
'KINSLEY - PAWNEE EDWARDS JUNCTION 115KV CKT 1'	16sp	92	160.6777	0	'2001-39A 115 - GREENSBURG 115KV CKT 1'
'LAWRENCE ENERGY CENTER UNIT 5 - LAWRENCE HILL 230KV CKT 1'	16sp	478	103.2584	0	'GILL ENERGY CENTER EAST (GEC3 GSU) 138/69/14.4KV TRANSFORMER CKT 1'
'LAWRENCE HILL (LAWHL29X) 230/115/13.8KV TRANSFORMER CKT 1'	16sp	308	123.0634	0	'MIDLAND JUNCTION (MIDJ126X) 230/115/18.0KV TRANSFORMER CKT 1'

**TABLE 4: CONTINGENCY ANALYSIS**

ELEMENT	Season	RATE (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
'MEDICINE LODGE - SUN CITY 115KV CKT 1'	16sp	79.7	159.6073	0	'PRATT - ST JOHN 115KV CKT 1'
'MEDICINE LODGE (MED-LDG4) 138/115/2.72KV TRANSFORMER CKT 1'	16sp	56	183.1837	0	'BASE CASE'
'MEDICINE LODGE (MED-LDG4) 138/115/2.72KV TRANSFORMER CKT 1'	16sp	65	176.0239	0	'GEN:56751 1'
No Solution	16sp			0	BUS 56619 [KINSLEY3115.00] TO BUS 99976 [2004-14T230.00] CKT 1
No Solution	16sp			0	BUS 99976 [2004-14T230.00] TO BUS 58779 [MULGREN6230.00] CKT 1
No Solution	16sp			0	BUS 99976 [2004-14T230.00] TO BUS 58795 [SPEARVL6230.00] CKT 1
No Solution	16sp			0	BUS 56449 [HOLCOMB7345.00] TO BUS 56465 [SETAB 7345.00] CKT 1
No Solution	16sp			0	BUS 56449 [HOLCOMB7345.00] TO BUS 56469 [SPERVIL7345.00] CKT 1
No Solution	16sp			0	BUS 56451 [MINGO 7345.00] TO BUS 56465 [SETAB 7345.00] CKT 1
No Solution	16sp			0	BUS 56448 [HOLCOMB3115.00] TO BUS 56449 [HOLCOMB7345.00] TO BUS 56450 [HOLCTER113.800] CKT 1
No Solution	16sp			0	BUS 56449 [HOLCOMB7345.00] TO BUS 50858 [FINNEY7 345.00] CKT 1
No Solution	16sp			0	BUS 56451 [MINGO 7345.00] TO BUS 64943 [REDWILO3345.00] CKT 1
No Solution	16sp			0	BUS 57738 [MAHANNA269.000] TO BUS 57745 [NEWTON 269.000] CKT 1
No Solution	16sp			0	BUS 56766 [JEC N 7345.00] TO BUS 56652 [JEC U2 26.000] CKT 1
No Solution	16sp			0	BUS 58772 [E-LIBER3115.00] TO BUS 50600 [TXPHSF3 115.00] CKT 1
No Solution	16sp			0	BUS 58795 [SPEARVL6230.00] TO BUS 99981 [G06-06 34.500] CKT 1
No Solution	16sp			0	BUS 58059 [MALTABN5161.00] TO BUS 58063 [SWAVRLY5161.00] CKT 1

**TABLE 4: CONTINGENCY ANALYSIS**

ELEMENT	Season	RATE (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
No Solution	16sp			0	BUS 58059 [MALTABN5161.00] TO BUS 58064 [NORTON-5161.00] CKT 1
No Solution	16sp			0	BUS 57973 [HAWTHRN5161.00] TO BUS 57951 [HAW G5 122.000] CKT 1
No Solution	16sp			0	BUS 58096 [MAYVWTP269.000] TO BUS 59265 [LEXNTON269.000] CKT 1
No Solution	16sp			0	BUS 59341 [S.HARP 5161.00] TO BUS 59342 [PECULR 5161.00] CKT 1
No Solution	16sp			0	BUS 50596 [TEXCO3 115.00] TO BUS 50600 [TXPHSF3 115.00] CKT 1
No Solution	16sp			0	BUS 50668 [MOOREE3 115.00] TO BUS 50669 [MOORE6 230.00] CKT 1
No Solution	16sp			0	BUS 50669 [MOORE6 230.00] TO BUS 50887 [POTTRC6 230.00] CKT 1
No Solution	16sp			0	BUS 50858 [FINNEY7 345.00] TO BUS 50888 [POTTRC7 345.00] CKT 1
No Solution	16sp			0	BUS 51440 [TOLK7 345.00] TO BUS 52186 [EDDYCO7 345.00] CKT 1
No Solution	16sp			0	BUS 50887 [POTTRC6 230.00] TO BUS 50888 [POTTRC7 345.00] TO BUS 50886 [POTTRCO113.200] CKT 1
No Solution	16sp			0	BUS 50907 [HARRNG6 230.00] TO BUS 50891 [HARRNG1124.000] CKT 1
No Solution	16sp			0	BUS 50907 [HARRNG6 230.00] TO BUS 50892 [HARRNG2124.000] CKT 1
No Solution	16sp			0	BUS 50907 [HARRNG6 230.00] TO BUS 50893 [HARRNG3124.000] CKT 1
No Solution	16sp			0	BUS 50915 [NICHOL6 230.00] TO BUS 50913 [NICHOL3122.000] CKT 1
No Solution	16sp			0	BUS 51419 [PLANTX6 230.00] TO BUS 51424 [PLNTX4 120.000] CKT 1
No Solution	16sp			0	BUS 51435 [TOLKE6 230.00] TO BUS 51441 [TOLK1 124.000] CKT 1
No Solution	16sp			0	BUS 51437 [TOLKW6 230.00] TO BUS 51442 [TOLK2 124.000] CKT 1

**TABLE 4: CONTINGENCY ANALYSIS**

ELEMENT	Season	RATE (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
No Solution	16sp			0	BUS 51533 [TUCO6 230.00] TO BUS 51534 [TUCO7 345.00] TO BUS 51535 [TUCO 113.200] CKT 1
No Solution	16sp			0	BUS 51534 [TUCO7 345.00] TO BUS 54119 [O.K.U.-7345.00] CKT 1
No Solution	16sp			0	BUS 51699 [JONES6 230.00] TO BUS 51701 [JONES1 122.000] CKT 1
No Solution	16sp			0	BUS 51699 [JONES6 230.00] TO BUS 51702 [JONES2 121.000] CKT 1
No Solution	16sp			0	BUS 51966 [MUSTGN3 115.00] TO BUS 51971 [MUSTG1 113.800] CKT 1
No Solution	16sp			0	BUS 51968 [MUSTGS3 115.00] TO BUS 51972 [MUSTG2 113.800] CKT 1
No Solution	16sp			0	BUS 51969 [MUSTANG6230.00] TO BUS 51973 [MUSTG3 122.000] CKT 1
No Solution	16sp			0	BUS 51969 [MUSTANG6230.00] TO BUS 51974 [MUSTG4 118.000] CKT 1
No Solution	16sp			0	BUS 52185 [EDDYCO 6230.00] TO BUS 52186 [EDDYCO7 345.00] TO BUS 52187 [EDDYCO 113.200] CKT 1
No Solution	16sp			0	BUS 52209 [CUNNINH6230.00] TO BUS 52212 [CUNN2 120.000] CKT 1
'PALODU - RANDALL COUNTY INTERCHANGE 115KV CKT 1'	16sp	99	117.1708	0	'AMARILLO S INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1'
'POTTER COUNTY INTERCHANGE (POTTR CO) 345/230/13.2KV TRANSFORMER CKT 1'	16sp	560	116.2141	0	'GEN:50721 1'
'POTTER COUNTY INTERCHANGE (POTTR CO) 345/230/13.2KV TRANSFORMER CKT 1'	16sp	560	116.2141	0	'GEN:50722 1'
'PRATT - ST JOHN 115KV CKT 1'	16sp	79.7	135.135	0	'2001-39A 115 - GREENSBURG 115KV CKT 1'
'SPSNORTH_STH'	16sp	800	111.774	0	'BASE CASE'
'ST JOHN - ST JOHN 115KV CKT 1'	16sp	88	111.3217	0	'2001-39A 115 - GREENSBURG 115KV CKT 1'

**TABLE 4: CONTINGENCY ANALYSIS**

ELEMENT	Season	RATE (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
'PECAN CREEK (PECANCK1) 345/161/13.8KV TRANSFORMER CKT 1'	16sp	370	101.3927	15	'CLARKSVILLE - MUSKOGEE 345KV CKT 1'
'NORTH AMERICAN PHILIPS JUNCTION (SOUTH) - WEST MCPHERSON 115KV CKT 1'	16sp	68	112.8265	36	'EAST MCPHERSON - SUMMIT 230KV CKT 1'
'2004-14T 230 - MULLERGRENN 230KV CKT 1'	16sp	355.3	117.5584	46	'KINSLEY - PAWNEE EDWARDS JUNCTION 115KV CKT 1'
'2004-14T 230 - SPEARVILLE 230KV CKT 1'	16sp	355.3	109.901	133	'2001-39A 115 - GREENSBURG 115KV CKT 1'
'NORTH AMERICAN PHILIPS - NORTH AMERICAN PHILIPS JUNCTION (SOUTH) 115KV CKT 1'	16sp	160	103.9136	149	'EAST MCPHERSON - SUMMIT 230KV CKT 1'
'GREENSBURG - SUN CITY 115KV CKT 1'	16sp	129.5	102.6061	158	'PRATT - ST JOHN 115KV CKT 1'
'SPEARVILLE 230/34.5KV TRANSFORMER CKT 1'	16sp	210	110.6014	185	'EDWARDS - ST JOHN 115KV CKT 1'
'2004-14T 230 - MULLERGRENN 230KV CKT 1'	16sp	330.3	101.9544	186	'BASE CASE'
'MEDICINE LODGE - PRATT 115KV CKT 1'	16sp	79.7	100.9993	190	'2001-39A 115 - GREENSBURG 115KV CKT 1'
'STULL SWITCHING STATION - TECUMSEH HILL 115KV CKT 1'	16sp	92	109.4604	203	'GEN:56663 1'
'MOCKINGBIRD HILL SWITCHING STATION - STULL SWITCHING STATION 115KV CKT 1'	16sp	92	102.0636	205	'GEN:56663 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 low

**TABLE 5: CONTINGENCY ANALYSIS (WITH NEW SPEARVILLE-MOORELAND 345Kv  
THIS LINE HAS NOT BEEN AUTHORIZED FOR CONSTRUCTION)**

ELEMENT	Season	RATE (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
<b>2008 Winter Peak</b>					
'2001-39A 115 - GREENSBURG 115KV CKT 1'	08wp	79.7	183.4284	0	'SPEARVILLE (SPEARVL6) 230/115/13.8KV TRANSFORMER CKT 1'
'EDWARDS - PAWNEE EDWARDS JUNCTION 115KV CKT 1'	08wp	92	181.6308	0	'2004-14T 230 - MULLERGREN 230KV CKT 1'
'EDWARDS - ST JOHN 115KV CKT 1'	08wp	92	175.8687	0	'2004-14T 230 - MULLERGREN 230KV CKT 1'
'HARPER - MEDICINE LODGE 138KV CKT 1'	08wp	71.7	175.4529	0	'MOORLND 345 - SPEARVILLE 345KV CKT 1'
'KINSLEY - PAWNEE EDWARDS JUNCTION 115KV CKT 1'	08wp	92	193.0876	0	'2004-14T 230 - MULLERGREN 230KV CKT 1'
'MEDICINE LODGE - SUN CITY 115KV CKT 1'	08wp	79.7	169.4193	0	'SPEARVILLE (SPEARVL6) 230/115/13.8KV TRANSFORMER CKT 1'
'MEDICINE LODGE (MED-LDG4) 138/115/2.72KV TRANSFORMER CKT 1'	08wp	56	168.131	0	'BASE CASE'
'MEDICINE LODGE (MED-LDG4) 138/115/2.72KV TRANSFORMER CKT 1'	08wp	65	182.5728	0	'MOORLND 345 - SPEARVILLE 345KV CKT 1'
'HARPER - MILAN TAP 138KV CKT 1'	08wp	95.6	119.2252	3	'MOORLND 345 - SPEARVILLE 345KV CKT 1'
'HAMON BUTLER - MOREWOOD 69KV CKT 1'	08wp	26	106.7263	81	'MOORELAND - MOREWOOD SW 138KV CKT 1'
'SEWARD - ST JOHN 115KV CKT 1'	08wp	79.7	108.7267	111	'2004-14T 230 - MULLERGREN 230KV CKT 1'
'MOORLND 345 345/138KV TRANSFORMER CKT 1'	08wp	448	103.0857	163	'FINNEY STATION - HOLCOMB 345KV CKT 1'
'SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1'	08wp	336	110.3355	166	'2004-14T 230 - SPEARVILLE 230KV CKT 1'
'KNOBHILL (KNOBHIL4) 138/69/13.2KV TRANSFORMER CKT 1'	08wp	67	100.8421	185	'GLASS MOUNTAIN - MOORELAND 138KV CKT 1'

**TABLE 5: CONTINGENCY ANALYSIS (WITH NEW SPEARVILLE-MOORELAND 345Kv  
THIS LINE HAS NOT BEEN AUTHORIZED FOR CONSTRUCTION)**

ELEMENT	Season	RATE (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
<b>2011 Summer Peak</b>					
'166TH STREET - JARBALO JUNCTION SWITCHING STATION 115KV CKT 1'	11sp	97	131.513	0	'CRAIG - STRANGER CREEK 345KV CKT 1'
'2001-39A 115 - GREENSBURG 115KV CKT 1'	11sp	79.7	177.4432	0	'2004-14T 230 - SPEARVILLE 230KV CKT 1'
'CANYON EAST - OSAGE SWITCHING STATION 115KV CKT 1'	11sp	99	114.7613	0	'BUSHLAND INTERCHANGE - DEAF SMITH INTERCHANGE 230KV CKT 1'
'EDWARDS - PAWNEE EDWARDS JUNCTION 115KV CKT 1'	11sp	92	168.948	0	'2004-14T 230 - MULLERGREN 230KV CKT 1'
'EDWARDS - ST JOHN 115KV CKT 1'	11sp	92	159.8185	0	'2004-14T 230 - MULLERGREN 230KV CKT 1'
'ELK CITY - MOREWOOD SW 138KV CKT 1'	11sp	158	113.3529	0	'SPP-SWPS-04A'
'FARMERS CONSUMER CO-OP - WAKARUSA JUNCTION SWITCHING STATION 115KV CKT 1'	11sp	92	103.4285	0	'SOUTHWEST LAWRENCE - WAKARUSA JUNCTION SWITCHING STATION 115KV CKT 1'
'FPL SWITCH - MOORELAND 138KV CKT 1'	11sp	93	150.0298	0	'MOORELAND - TALOGA 138KV CKT 1'
'HAMON BUTLER - MOREWOOD 69KV CKT 1'	11sp	26	160.4587	0	'MOORELAND - MOREWOOD SW 138KV CKT 1'
'HARPER - MEDICINE LODGE 138KV CKT 1'	11sp	71.7	162.6187	0	'MOORLND 345 - SPEARVILLE 345KV CKT 1'
'HAYS PLANT - VINE STREET 115KV CKT 1'	11sp	88	115.4817	0	'KNOLL 230/115KV TRANSFORMER CKT 1'
'KINSLEY - PAWNEE EDWARDS JUNCTION 115KV CKT 1'	11sp	92	186.7877	0	'2004-14T 230 - MULLERGREN 230KV CKT 1'
'KNOBHILL (KNOBHIL4) 138/69/13.2KV TRANSFORMER CKT 1'	11sp	67	116.8061	0	'GLASS MOUNTAIN - MOORELAND 138KV CKT 1'
'KNOLL - VINE STREET 115KV CKT 1'	11sp	88	102.8541	0	'KNOLL 230/115KV TRANSFORMER CKT 1'

**TABLE 5: CONTINGENCY ANALYSIS (WITH NEW SPEARVILLE-MOORELAND 345Kv  
THIS LINE HAS NOT BEEN AUTHORIZED FOR CONSTRUCTION)**

ELEMENT	Season	RATE (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
'MEDICINE LODGE - SUN CITY 115KV CKT 1'	11sp	79.7	157.2777	0	'2004-14T 230 - SPEARVILLE 230KV CKT 1'
'MEDICINE LODGE (MED-LDG4) 138/115/2.72KV TRANSFORMER CKT 1'	11sp	56	154.1786	0	'BASE CASE'
'MEDICINE LODGE (MED-LDG4) 138/115/2.72KV TRANSFORMER CKT 1'	11sp	65	172.3214	0	'MOORLND 345 - SPEARVILLE 345KV CKT 1'
'MOORELAND - MOREWOOD SW 138KV CKT 1'	11sp	170	108.8428	0	'SPP-SWPS-04A'
'MOORELAND 138/69KV TRANSFORMER CKT 1'	11sp	65	108.9613	0	'FPL SWITCH - WOODWARD 138KV CKT 1'
'PALODU - RANDALL COUNTY INTERCHANGE 115KV CKT 1'	11sp	99	104.3905	0	'AMARILLO S INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1'
'POTTER COUNTY INTERCHANGE (POTTR CO) 345/230/13.2KV TRANSFORMER CKT 1'	11sp	560	106.7431	0	'GEN:51442 1'
'PRATT - ST JOHN 115KV CKT 1'	11sp	79.7	110.9949	0	'2001-39A 115 - GREENSBURG 115KV CKT 1'
'RANDALL COUNTY INTERCHANGE 230/115KV TRANSFORMER CKT 1'	11sp	258.75	102.2533	0	'AMARILLO S INTERCHANGE - NICHOLS STATION 230KV CKT 1'
'WEBRERICHARD'	11sp	1250	112.3299	0	'BASE CASE'
'MOORELAND - MOREWOOD SW 138KV CKT 1'	11sp	130	107.3343	5	'BASE CASE'
'MOORELAND - WOODWARD 69KV CKT 1'	11sp	61	103.5802	47	'FPL SWITCH - WOODWARD 138KV CKT 1'
'ST JOHN - ST JOHN 115KV CKT 1'	11sp	88	109.1395	69	'2004-14T 230 - MULLERGREN 230KV CKT 1'
'HAPPY INTERCHANGE - PALODU 115KV CKT 1'	11sp	99	102.2468	91	'AMARILLO S INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1'
'SOUTHWEST LAWRENCE - WAKARUSA JUNCTION SWITCHING STATION 115KV CKT 1'	11sp	92	100.8837	98	'FARMERS CONSUMER CO-OP - WAKARUSA JUNCTION SWITCHING STATION 115KV CKT 1'



**TABLE 5: CONTINGENCY ANALYSIS (WITH NEW SPEARVILLE-MOORELAND 345Kv  
THIS LINE HAS NOT BEEN AUTHORIZED FOR CONSTRUCTION)**

ELEMENT	Season	RATE (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
'CANYON EAST - CANYON WEST 115KV CKT 1'	11sp	99	101.2004	119	'BUSHLAND INTERCHANGE - DEAF SMITH INTERCHANGE 230KV CKT 1'
'2004-14T 230 - MULLERGREN 230KV CKT 1'	11sp	355.3	106.3378	138	'MOORLND 345 - SPEARVILLE 345KV CKT 1'
'SEWARD - ST JOHN 115KV CKT 1'	11sp	79.7	101.6144	183	'2004-14T 230 - MULLERGREN 230KV CKT 1'
'95TH & WAVERLY - CAPTAIN JUNCTION 115KV CKT 1'	11sp	118	100.1879	183	'MONTICELLO - PENTAGON 115KV CKT 1'
'GREENSBURG - SUN CITY 115KV CKT 1'	11sp	129.5	100.9594	189	'2004-14T 230 - SPEARVILLE 230KV CKT 1'
'SPEARVILLE 230/34.5KV TRANSFORMER CKT 1'	11sp	210	107.9075	190	'MOORLND 345 - SPEARVILLE 345KV CKT 1'
'ALVA - KNOBHILL 69KV CKT 1'	11sp	48	100.3202	193	'GLASS MOUNTAIN - MOORELAND 138KV CKT 1'
'SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1'	11sp	336	102.6668	194	'2004-14T 230 - SPEARVILLE 230KV CKT 1'
'2004-14T 230 - SPEARVILLE 230KV CKT 1'	11sp	355.3	100.2082	203	'MOORLND 345 - SPEARVILLE 345KV CKT 1'
'KNOBHILL (KNOBHIL4) 138/69/13.2KV TRANSFORMER CKT 1'	11sp	62	100.0509	203	'BASE CASE'
<b>2011 Winter Peak</b>					
'166TH STREET - JARBALO JUNCTION SWITCHING STATION 115KV CKT 1'	11wp	97	102.8248	0	'MIDLAND JUNCTION - PENTAGON 115KV CKT 1'
'2001-39A 115 - GREENSBURG 115KV CKT 1'	11wp	79.7	178.4151	0	'2004-14T 230 - SPEARVILLE 230KV CKT 1'
'EDWARDS - PAWNEE EDWARDS JUNCTION 115KV CKT 1'	11wp	92	173.5319	0	'2004-14T 230 - MULLERGREN 230KV CKT 1'
'EDWARDS - ST JOHN 115KV CKT 1'	11wp	92	167.328	0	'2004-14T 230 - MULLERGREN 230KV CKT 1'

**TABLE 5: CONTINGENCY ANALYSIS (WITH NEW SPEARVILLE-MOORELAND 345Kv  
THIS LINE HAS NOT BEEN AUTHORIZED FOR CONSTRUCTION)**

ELEMENT	Season	RATE (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
'HAMON BUTLER - MOREWOOD 69KV CKT 1'	11wp	26	110.9316	0	'MOORELAND - MOREWOOD SW 138KV CKT 1'
'HARPER - MEDICINE LODGE 138KV CKT 1'	11wp	71.7	175.1955	0	'MOORLND 345 - SPEARVILLE 345KV CKT 1'
'KINSLEY - PAWNEE EDWARDS JUNCTION 115KV CKT 1'	11wp	92	185.6339	0	'2004-14T 230 - MULLERGREN 230KV CKT 1'
'MEDICINE LODGE - SUN CITY 115KV CKT 1'	11wp	79.7	163.8507	0	'2004-14T 230 - SPEARVILLE 230KV CKT 1'
'MEDICINE LODGE (MED-LDG4) 138/115/2.72KV TRANSFORMER CKT 1'	11wp	56	173.641	0	'BASE CASE'
'MEDICINE LODGE (MED-LDG4) 138/115/2.72KV TRANSFORMER CKT 1'	11wp	65	187.1276	0	'MOORLND 345 - SPEARVILLE 345KV CKT 1'
'FPL SWITCH - MOORELAND 138KV CKT 1'	11wp	93	106.3791	70	'MOORELAND - TALOGA 138KV CKT 1'
'HARPER - MILAN TAP 138KV CKT 1'	11wp	95.6	108.214	105	'MOORLND 345 - SPEARVILLE 345KV CKT 1'
'PRATT - ST JOHN 115KV CKT 1'	11wp	79.7	103.2376	146	'2001-39A 115 - GREENSBURG 115KV CKT 1'
'KNOBHILL (KNOBHIL4) 138/69/13.2KV TRANSFORMER CKT 1'	11wp	67	102.1186	153	'GLASS MOUNTAIN - MOORELAND 138KV CKT 1'
'SEWARD - ST JOHN 115KV CKT 1'	11wp	79.7	103.2265	167	'2004-14T 230 - MULLERGREN 230KV CKT 1'
'SPEARVILLE (SPEARVL) 345/230/13.8KV TRANSFORMER CKT 1'	11wp	336	109.5624	169	'2004-14T 230 - SPEARVILLE 230KV CKT 1'
'SPEARVILLE 230/34.5KV TRANSFORMER CKT 1'	11wp	210	104.2702	197	'MOORLND 345 - SPEARVILLE 345KV CKT 1'
'ST JOHN - ST JOHN 115KV CKT 1'	11wp	88	100.1955	202	'2004-14T 230 - MULLERGREN 230KV CKT 1'

**TABLE 5: CONTINGENCY ANALYSIS (WITH NEW SPEARVILLE-MOORELAND 345Kv  
THIS LINE HAS NOT BEEN AUTHORIZED FOR CONSTRUCTION)**

ELEMENT	Season	RATE (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
<b>2016 Summer Peak</b>					
'2001-39A 115 - GREENSBURG 115KV CKT 1'	16sp	79.7	163.7607	0	'2004-14T 230 - SPEARVILLE 230KV CKT 1'
'CANADIAN - CEDAR LANE 138KV CKT 1'	16sp	191	102.8879	0	'FRANKLIN SW - MIDWEST TAP 138KV CKT 1'
'CANYON EAST - CANYON WEST 115KV CKT 1'	16sp	99	123.9418	0	'BUSHLAND INTERCHANGE - DEAF SMITH INTERCHANGE 230KV CKT 1'
'CANYON EAST - OSAGE SWITCHING STATION 115KV CKT 1'	16sp	99	138.627	0	'BUSHLAND INTERCHANGE - DEAF SMITH INTERCHANGE 230KV CKT 1'
'DEAF SMITH INTERCHANGE - DS-213 115KV CKT 1'	16sp	161	103.8316	0	'BC-EARTH INTERCHANGE - PLANT X INTERCHANGE 115KV CKT 1'
'EAST PLANT INTERCHANGE 230/115KV TRANSFORMER CKT 1'	16sp	252	102.8266	0	'AMARILLO S INTERCHANGE - NICHOLS STATION 230KV CKT 1'
'EDWARDS - PAWNEE EDWARDS JUNCTION 115KV CKT 1'	16sp	92	155.5733	0	'2004-14T 230 - MULLERGREN 230KV CKT 1'
'EDWARDS - ST JOHN 115KV CKT 1'	16sp	92	145.7506	0	'2004-14T 230 - MULLERGREN 230KV CKT 1'
'ELK CITY - ELK CITY 69KV CKT 1'	16sp	39	128.232	0	'MOREWOOD - MORWOOD 69KV CKT 1'
'ELK CITY - MOREWOOD SW 138KV CKT 1'	16sp	130	113.1823	0	'BASE CASE'
'ELK CITY - MOREWOOD SW 138KV CKT 1'	16sp	158	127.9328	0	'FINNEY STATION - HOLCOMB 345KV CKT 1'
'FPL SWITCH - MOORELAND 138KV CKT 1'	16sp	93	119.9153	0	'MOORELAND - TALOGA 138KV CKT 1'
'HAMON BUTLER - MOREWOOD 69KV CKT 1'	16sp	26	193.9525	0	'MOORELAND - MOREWOOD SW 138KV CKT 1'
'HAPPY INTERCHANGE - PALODU 115KV CKT 1'	16sp	99	110.7991	0	'AMARILLO S INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1'
'HARPER - MEDICINE LODGE 138KV CKT 1'	16sp	71.7	147.8493	0	'MOORLND 345 - SPEARVILLE 345KV CKT 1'

**TABLE 5: CONTINGENCY ANALYSIS (WITH NEW SPEARVILLE-MOORELAND 345Kv  
THIS LINE HAS NOT BEEN AUTHORIZED FOR CONSTRUCTION)**

ELEMENT	Season	RATE (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
'JARBALO JUNCTION SWITCHING STATION - STRANGER CREEK 115KV CKT 1'	16sp	240	112.6662	0	'CRAIG - STRANGER CREEK 345KV CKT 1'
'KINSLEY - PAWNEE EDWARDS JUNCTION 115KV CKT 1'	16sp	92	174.1076	0	'2004-14T 230 - MULLERGREN 230KV CKT 1'
'LAWRENCE HILL (LAWHL29X) 230/115/13.8KV TRANSFORMER CKT 1'	16sp	308	121.0627	0	'MIDLAND JUNCTION (MIDJ126X) 230/115/18.0KV TRANSFORMER CKT 1'
'MANHTP3 - OSAGE SWITCHING STATION 115KV CKT 1'	16sp	161	105.6078	0	'AMARILLO S INTERCHANGE - NICHOLS STATION 230KV CKT 1'
'MEDICINE LODGE - SUN CITY 115KV CKT 1'	16sp	79.7	142.8564	0	'2004-14T 230 - SPEARVILLE 230KV CKT 1'
'MEDICINE LODGE (MED-LDG4) 138/115/2.72KV TRANSFORMER CKT 1'	16sp	56	142.1646	0	'BASE CASE'
'MEDICINE LODGE (MED-LDG4) 138/115/2.72KV TRANSFORMER CKT 1'	16sp	65	157.766	0	'MOORLND 345 - SPEARVILLE 345KV CKT 1'
'MOORELAND - MOREWOOD SW 138KV CKT 1'	16sp	130	120.5227	0	'BASE CASE'
'MOORELAND - MOREWOOD SW 138KV CKT 1'	16sp	170	120.6598	0	'FINNEY STATION - HOLCOMB 345KV CKT 1'
'MOORELAND 138/69KV TRANSFORMER CKT 1'	16sp	65	105.7656	0	'FPL SWITCH - WOODWARD 138KV CKT 1'
'PALODU - RANDALL COUNTY INTERCHANGE 115KV CKT 1'	16sp	99	113.0692	0	'AMARILLO S INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1'
'PECAN CREEK (PECANCK1) 345/161/13.8KV TRANSFORMER CKT 1'	16sp	370	101.969	0	'CLARKSVILLE - MUSKOGEE 345KV CKT 1'
'POTTER COUNTY INTERCHANGE (POTTR CO) 345/230/13.2KV TRANSFORMER CKT 1'	16sp	560	109.9485	0	'MOORLND 345 - SPEARVILLE 345KV CKT 1'

**TABLE 5: CONTINGENCY ANALYSIS (WITH NEW SPEARVILLE-MOORELAND 345Kv  
THIS LINE HAS NOT BEEN AUTHORIZED FOR CONSTRUCTION)**

ELEMENT	Season	RATE (MVA)	LOADING (%)	ATC (MW)	CONTINGENCY
'RANDALL COUNTY INTERCHANGE 230/115KV TRANSFORMER CKT 1'	16sp	258.75	112.1392	0	'AMARILLO S INTERCHANGE - NICHOLS STATION 230KV CKT 1'
'SPSNORTH_STH'	16sp	800	109.7927	0	'BASE CASE'
'TUCO INTERCHANGE (TUCO XX4) 345/230/13.2KV TRANSFORMER CKT 1'	16sp	560	115.8739	0	'FINNEY STATION - HOLCOMB 345KV CKT 1'
'KNOBHILL (KNOBHIL4) 138/69/13.2KV TRANSFORMER CKT 1'	16sp	67	105.9641	3	'OKGEMTL-5'
'ST JOHN - ST JOHN 115KV CKT 1'	16sp	88	110.6696	44	'2004-14T 230 - MULLERGREN 230KV CKT 1'
'LAWRENCE ENERGY CENTER UNIT 5 - LAWRENCE HILL 230KV CKT 1'	16sp	478	100.2407	141	'GILL ENERGY CENTER EAST (GEC3 GSU) 138/69/14.4KV TRANSFORMER CKT 1'
'PRATT - ST JOHN 115KV CKT 1'	16sp	79.7	102.2862	154	'GREENSBURG - SUN CITY 115KV CKT 1'
'CIMARRON RIVER PLANT - NORTH LIBERAL TAP 115KV CKT 1'	16sp	115.3	100.7349	181	'CIMARRON RIVER TAP - EAST LIBERAL 115KV CKT 1'
'SPEARVILLE 230/34.5KV TRANSFORMER CKT 1'	16sp	210	109.074	188	'MOORLND 345 - SPEARVILLE 345KV 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 project is estimated at \$2,890,000 for West Plains interconnection Network Upgrade facilities listed in Tables 1 & 2 excluding upgrades of other transmission facilities by MIDW, WEPL and WERE 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 order to aid in maintaining adequate voltages, the Customer will need to install 60MVAR of reactive compensation in its new substation. Dynamic Stability studies performed as part of the impact study will provide guidance as to how much reactive compensation can be static or must be dynamic (such as a SVC).

Powerflow analysis has indicated that this generation addition is not feasible without the addition of a 345kV line from the Spearville area to distant area such as Wichita or Oklahoma City. 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. Table 5 shows that once a 345kV line has been built into the area, significant network constraints will still exist.

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.

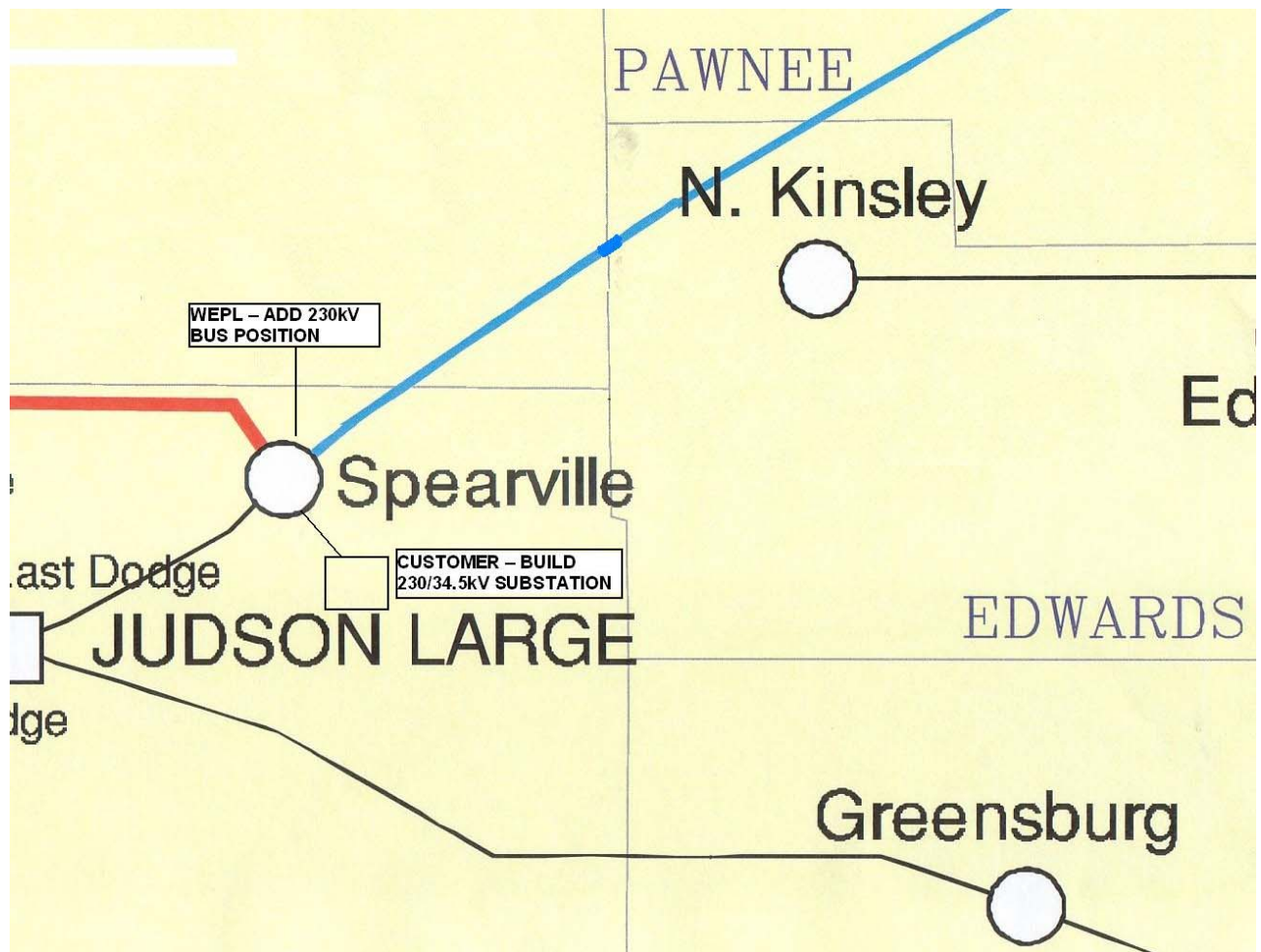


FIGURE 2. MAP OF THE LOCAL AREA