



**FEASIBILITY STUDY
FOR
SOUTHWEST POWER POOL
GENERATION INTERCONNECT STUDY**

**SPP-GEN-2001-27
AND
SPP-GEN-2001-28**

**520 MW Generating Plant
161kV and 345kV Interconnections
in KCPL Control Area**

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Kansas City, MO

Executive Summary

A Feasibility Study to determine the impact of installing a 520MW generating plant on the KCPL transmission system was requested by Customer. The plant is planned to interconnect to the 161kV or 345kV transmission system and is expected to be operational in summer 2004.

The proposed plant facilities are to be located in Kansas City Power & Light Control Area. Configurations on the 345kV and 161kV systems were both requested. The configurations were assigned different request numbers by Southwest Power Pool. However, both requests are analyzed in this study. The sink area for the generation is not specified but is assumed to be the Entergy control area (EES) for the purpose of this study.

This study consists of the 2004 summer peak load flow and contingency analysis for each of the proposed configurations. Single contingency outages were applied to the base case model without the Customer generation in order to determine pre-existing constraints. Contingency analysis of the study case, which includes the Customer plant, was performed to compare the effects of the proposed generation with the base case constraints.

The results indicate that for the 161kV configuration, a new 21.6 mi. Paola-Springhill 161kV circuit and reconductoring of the Paola-Stilwell transmission path is necessary for the interconnection in addition to expanding a 161kV bus at an existing KCPL substation for the plant terminal. The cost of the interconnection is estimated to be \$15,720,000, not including CIAC costs. The system upgrades include the reconductoring of the W. Gardner-Moonlight 161kV circuit and the Stilwell-Redel 161kV circuit. The estimated cost of the system upgrades is \$3,060,000 less CIAC adders.

The 345kV interconnection option requires a new switchyard constructed on an existing KCPL 345kV circuit with facilities for two line terminals and a terminal for the Customer plant. The cost of the interconnection is estimated to be \$3,472,000 less CIAC. The system improvements associated with this proposal include the construction of a new Raymore 345kV substation with a 345/161kV transformer on the Stilwell-Pleasant Hill circuit, a 34.5 mi. LaCygne-Raymore 345kV circuit and a Nashua 345kV substation with a 345/161kV transformer, and reconductoring of the W. Gardner-Moonlight 161kV circuit. The estimated cost of the system improvements is \$35,856,000 without the CIAC adders.

1. Introduction

1.1 Project Description

Customer has requested a Feasibility study to determine the impacts of the installation of a 520MW combined cycle generating plant in KCPL control area with an in-service date of June, 2004. The request is for either a 161kV interconnection or a 345kV interconnection. The study was requested on August 7, 2001.

This study addresses both the 161kV and 345kV interconnection proposals and identifies interconnection facility requirements and system improvements needed to relieve constraints caused by the new generation. The sink for the proposed generation is not specified, but for the purpose of this study is assumed to be the Entergy (EES) control area.

1.2 Study Methodology

This Feasibility Study consists of a load flow and contingency analysis of the 2004 summer peak case including transmission system upgrades and generation proposed for that time. The study includes approximately 231MW of additional generation that has been proposed for service in the KCPL control area prior to the service date of the proposed plant. Information pertaining to the proposed facilities has been provided by Customer. Where data is not available, reasonable assumptions have been made to complete the analysis. Additional plant data is required for further study.

The two proposed configurations incorporate a 520MW combined cycle plant connected to either the 161kV or 345kV transmission system. The plant will be located in the Kansas City Power & Light (KCPL) control area and transfers are made to the Entergy sink area to balance the area interchange. Generation reductions are made in the sink area to accommodate the transfer. Table 1 shows the inter-area transfers between KCPL and Entergy control areas.

Table 1 – Transfers from KCPL to Entergy control areas for 2004 summer peak study case	
Transfers are same for either 161kV or 345kV configuration	
	Generation Share /Transfer
Entergy - EES (151)	520MW
Total	520MW

The normal operating conditions are evaluated by performing load flow analysis on the base case with all lines in service. Full AC contingency analysis is used to determine the limiting constraints of the transmission system during outage events. Analysis results with and without the Customer generation in service are compared to identify the severity and

cause of the overload conditions. All branches in the KCPL and surrounding control areas above 100kV and all ties to KCPL are monitored for overloads exceeding 100% of normal rating. Buses are monitored for voltage deviations exceeding +/-5% of nominal.

1.3 Plant Details and Modeling

The Customer plant net output is expected to be 520MW, and the plant will be configured as a combined cycle plant with two GE 7FH2 - 201.2MVA gas turbines and one GE 7FH2 - 201.2MVA steam turbine with either 161kV or 345kV interconnections. The 161kV proposal is to be connected to an existing KCPL substation located approximately .25 mi. from the Customer site. The 345kV site is located adjacent to an existing KCPL 345kV line and will interconnect to the line via a new 345kV switchyard.

Changes to the 2004 summer peak base case have been included in this analysis for improvements in progress or planned for service by summer 2004. The projects include circuit reconductoring and equipment upgrades that increase the capability of the transmission system, and a list of these improvements is included below.

- Stilwell-Antioch 161kV line rebuild 2003
- Antioch-Oxford 161kV line rebuild 2003
- Olathe wave trap upgrade 2003
- Paola-S. Ottawa 161kV line improvements 2004

2. Load Flow Analysis - 161kV

2004 Summer Peak

The sink area for the Customer generation facilities is assumed to be the Entergy control area. The load forecast for that control area for the summer 2004 peak period is 24,290MW. The base case analysis includes generation and normal transfers without the Customer generation facilities. The study case includes 520MW additional generation from the Customer plant. Generation scaling and additional inter-area transfers are included for the sink control area. Table 2 lists the specific generation dispatch in the KCPL control area and the transfers to the control area supplied by the new plant.

Table 2 – Generation Dispatch and Area Interchange Schedule					
Comparison of base case and Customer plant addition for 2004 summer peak					
GENERATION DISPATCH (for KCPL control area)			INTERCHANGE		
Plant/Unit	Base	Study	Area	Base	Study
	w/o Customer plant	w/ Customer plant			
Hawthorn 5	560	560	EES	0	520
Hawthorn 6	141	141	AECI	-150	-150
Hawthorn 7	77	77	SWPA	-5	-5
Hawthorn 8	77	77	GRRD	-15	-15
Hawthorn 9	140	140	WERE	141	141
Montrose #1	170	170	MIPU	7	7
Montrose #2	164	164	KACY	-15	-15
Montrose #3	155	176	EMDE	80	80
LaCygne#1	688	688	INDN	90	90
LaCygne#2	674	674	SPRM	51	51
Iatan#1	670	670	STJO	121	121
Northeast N.	120	120			
Northeast S.	0	0			
Grand Ave	0	0			
Gardner	2	2			
Higginsville	34	34			
Proposed #1	231	231			
Customer	0	520			

Load flow analysis with the Customer generation at full output and all lines in service reveals base case overload conditions resulting from the added generation. Overloading occurs on several 161kV transmission lines including Paola-Centennial, Centennial-Wagstaff, Wagstaff-Bucyrus, and Bucyrus-Stilwell circuits. Contingency analysis indicates additional facility overloading in the KCPL area during outage conditions.

Loss of the W. Gardner-Craig 345kV circuit causes the W. Gardner-Moonlight 161kV line to reach 121% of normal rated capacity and the Moonlight-Murlen 161kV line to reach

108% of normal rated capacity. With the W. Gardner-LaCygne 345kV line out of service, the S. Ottawa-Richland 161kV line is loaded to 113% of normal rated capacity and the Olathe-Oxford 161kV circuit reaches 106% of normal rated capacity. Loss of the Stilwell-Pleasant Hill 345kV circuit causes overloading of the Stilwell-Redel 161kV line (105%).

The Stilwell-Redel 161kV circuit loading reaches 104% for loss of the Stilwell-Hickman circuit and 102% for loss of the Stilwell-Antioch 161kV line. With the Stilwell-Bucyrus 161kV circuit out of service, overloading occurs on the W. Gardner-S. Richland 161kV line (119%), the Paola-S. Ottawa 161kV circuit (139%), and the S. Ottawa-S. Richland 161kV line (207%). Loss of the Bucyrus-Wagstaff 161kV line causes loading of the W. Gardner-S. Richland line to reach 126%, the Paola-S. Ottawa line to reach 146%, and the S. Ottawa-S. Richland 161kV line to reach 219%. Loss of the Paola-Centerville 161kV line causes the S. Ottawa-S. Richland line loading to reach 106%. With the Centennial-Wagstaff 161kV line out of service, the W. Gardner-S. Richland line loading is 127%, the Paola-S. Ottawa line loading is 148% and the S. Ottawa-S. Richland line loading is 221%. An outage of the Paola-Centennial 161kV circuit causes overloading on the Paola-Centerville circuit (102%), the W. Gardner-S. Richland circuit (134%), the Paola-S. Ottawa circuit (154%), and the S. Ottawa-S. Richland circuit (232%). All of the above overloads are based on the facility's normal rated capacity.

Interconnection Facilities

The addition of a new 161kV circuit from the Paola substation is necessary for the plant interconnection due to the base case overloading that occurs with the new generation at full output. The analysis indicates that a new line from the Paola substation to the Springhill 161kV substation will alleviate base case overloads as well as the contingency overloading that results from a loss of the other Paola circuits. In addition, the Stilwell to Paola transmission corridor is a direct path of delivery for generation at Paola, and reconductoring of all circuits along this path would be necessary to eliminate contingency overloading for loss of the Paola-Spring Hill line. Interconnection facilities to access the KCPL transmission system include expansion of an existing substation bus and installation of two circuit breakers for a new line terminal that would serve the Customer plant. Customer will be responsible for the construction of the transmission line from the substation to the Customer plant site.

Table 4 below summarizes the proposed facilities that are necessary for the plant interconnection. A general cost estimate is included in the table. Contribution in Aid to Construction costs, which are the responsibility of the requestor, are not included.

Table 4 – 2004 Recommended Interconnection Facilities for the 161kV Customer interconnection

* Costs do not include any adders for CIAC

Description	Cost
161kV substation expansion	\$2,340,000
Paola-Springhill 161kV circuit construction (21.6mi.)	\$6,480,000
Paola-Centennial-Wagstaff-Bucyrus-Stilwell corridor rec. (23mi.)	\$6,900,000
Total Plant Interconnection Cost	\$15,720,000

A project schedule and timeline is included in Table 5 for the interconnection facilities and direct-assigned upgrades showing the approximate start and end dates for the various phases of the project.

Table 5 – 2004 Project Schedule for 161kV Plant Interconnection

Project timeline does not include right of way acquisition and zoning approvals

Task	Description of Work	Start	End
1	Evaluation and budgetary approvals	5/27/03	6/14/03
2	Initial engineering	6/17/03	7/26/03
3	Materials ordering & procurement	7/15/03	3/21/04
4	Final engineering & design	9/9/03	10/18/03
5	Foundation, structural work	10/21/03	12/13/03
6	Transmission line & terminal work	12/9/03	2/28/04
7	Equipment, relay, metering installation	12/16/03	5/2/04
8	Testing and inspection	5/5/04	5/30/04
	Total Project Completion	5/27/03	5/30/04

Proposed System Improvements

In some cases, transmission circuit loading is reduced by the shifts in generation sources on the system. The overloading on the LaCygne-Stilwell 345kV circuit is substantially reduced and pre-existing overloads in the Hawthorn area are reduced by the addition of the new generation. However, system upgrades on the 161kV transmission system are necessary to relieve the contingency overloading. The W. Gardner-Moonlight 161kV circuit would need to be rebuilt with 2-795kcmil conductor to increase the capability beyond the contingency loading, and rebuild of the Stilwell-Redel 161kV circuit with 2-795kcmil conductor would be necessary. Further study is needed to determine the upgrades necessary in the neighboring control areas.

Table 6 summarizes the system improvements that are necessary to alleviate contingency overloading that results from the proposed Customer generation. Estimated costs are shown but do not include amounts for CIAC adders.

Table 6 – 2004 Recommended System Improvements for the 161kV Customer generation

** Costs do not include any adders for CIAC*

Description	Cost
W. Gardner-Moonlight 161kV circuit reconductor (5.8 mi.)	\$1,740,000
Stilwell-Redel 161kV circuit reconductor (4.4 mi.)	\$1,320,000
Total System Improvements Cost	\$3,060,000

3. Load Flow Analysis - 345kV

2004 Summer Peak

For study purposes, the Entergy control area is assumed to be the sink area for the Customer generation facilities. The load forecast for that control area for the summer 2004 peak period is 24,290MW. Existing generation and normal transfers without the Customer generation facilities are included in the base case with an additional 231MW of proposed generation in the KCPL control area expected prior to the study period. The study case includes 520MW additional generation from the Customer plant. Sink area generation is adjusted by scaling, and additional inter-area transfers to the sink area are included. Table 7 lists the specific generation dispatch in the KCPL control area and the transfers to the control area supplied by the new plant.

Table 7 – Generation Dispatch and Area Interchange Schedule					
Comparison of base case and Customer plant addition for 2004 summer peak					
GENERATION DISPATCH (for KCPL control area)			INTERCHANGE		
Plant/Unit	Base	Study	Area	Base	Study
	w/o Customer plant	w/ Customer plant			
Hawthorn 5	560	560	EES	0	520
Hawthorn 6	141	141	AECI	-150	-150
Hawthorn 7	77	77	SWPA	-5	-5
Hawthorn 8	77	77	GRRD	-15	-15
Hawthorn 9	140	140	WERE	141	141
Montrose #1	170	170	MIPU	7	7
Montrose #2	164	164	KACY	-15	-15
Montrose #3	155	161	EMDE	80	80
LaCygne#1	688	688	INDN	90	90
LaCygne#2	674	674	SPRM	51	51
Iatan#1	670	670	STJO	121	121
Northeast N.	120	120			
Northeast S.	0	0			
Grand Ave	0	0			
Gardner	2	2			
Higginsville	34	34			
Proposed #1	231	231			
Customer	0	520			

Analysis indicates no base case overloads for the 345kV plant interconnection configuration. During contingency events the 345kV and 161kV transmission systems are subject to significant overloading due to the additional generation. Table 8 lists the significant 345kV contingency constraints.

interconnect has sufficient capability to deliver the plant output under normal conditions and for loss of either line and require no upgrades for the interconnection.

Table 9 below summarizes the proposed facilities that are necessary for the plant interconnection. A general cost estimate is included in the table. The cost figures do not include contribution in aid to construction (CIAC) fees that are the responsibility of the requestor.

Table 9 – 2004 Recommended Interconnection Facilities for the 345kV interconnection	
<i>* Costs do not include any adders for CIAC</i>	
Description	Cost
Customer 345kV Switchyard facilities	\$3,472,000
Total Plant Interconnection Cost	\$3,472,000

A project schedule and timeline is included in Table 10 for the interconnection facilities showing the approximate start and end dates for the various phases of the project.

Table 10 – 2004 Project Schedule for 345kV Plant Interconnection			
<i>Project timeline does not include right of way acquisition and zoning approvals</i>			
Task	Description of Work	Start	End
1	Evaluation and budgetary approvals	5/27/03	6/14/03
2	Initial engineering	6/17/03	7/26/03
3	Materials ordering & procurement	7/15/03	3/21/04
4	Final engineering & design	9/9/03	10/18/03
5	Foundation, structural work	10/21/03	12/13/03
6	Transmission line & terminal work	12/9/03	2/28/04
7	Equipment, relay, metering installation	12/16/03	5/2/04
8	Testing and inspection	5/5/04	5/30/04
	Total Project Completion	5/27/03	5/30/04

Proposed System Improvements

The analysis of the 345kV Customer plant configuration indicates that additional 345kV system upgrades are needed to improve system reliability under contingency situations. The addition of a new 345kV circuit from LaCygne substation to a proposed Raymore facility on the Stilwell-Pleasant Hill 345kV line will provide relief for the constraint imposed by the LaCygne-Stilwell contingency overloading. The additional transmission path would provide an alternate path for power flow from the Customer and LaCygne generating plants. The Raymore substation would include a 345/161kV 400MVA transformer which

would interface with the Montrose-Loma Vista E. and Montrose-Loma Vista W. 161kV circuits. The additional 345/161kV interface provides a new source for power into the 161kV system and avoids the potential overloading of facilities at Stilwell substation. Further recommendation for system upgrades include the construction of a 345kV/161kV substation at Nashua that ties into the Hawthorn-St. Joseph 345kV line with a 550MVA 345/161kV transformer to interface with the existing Nashua 161kV bus. This facility would introduce a new point of power injection into the 161kV system from the north of the Kansas City area, relieving contingency overloads in the Hawthorn area that are worsened by the Customer generation additions. Reconductoring of the W. Gardner-Moonlight 161kV circuit with 2-795kcmil conductor will eliminate the overloading that results from an outage of the W. Gardner-Craig circuit.

Table 11 lists the proposed system improvements that will alleviate contingency constraints on the 161kV and 345kV KCPL system. Costs do not include CIAC adders that will be charged to the requestor.

Table 11 – 2004 Recommended System Improvements for the 345kV Customer interconnection	
<i>* Costs do not include any adders for CIAC</i>	
Description	Cost
LaCygne-Raymore 345kV transmission line (34.5 mi.)	\$17,250,000
Raymore Substation including 400MVA 345/161kV xfmr.	\$9,592,000
Nashua 345kV circuit substation exits	\$3,824,000
Nashua 345kV substation including 550MVA 345/161kV xfmr.	\$3,450,000
W. Gardner-Moonlight 161kV circuit reconductor (5.8 mi.)	\$1,740,000
Total System Improvements Cost	\$35,856,000

4. Conclusion

This feasibility study was requested to determine the impact of installing 520MW of new generation on the KCPL transmission system. The analysis evaluates system constraints under normal and contingency conditions and provides a general estimate of the costs of providing an interconnection and upgrading facilities to remove the constraints caused by the proposed generation. The study was conducted using information provided by Customer where available and is intended to provide a reasonable assessment of system conditions. Any changes in customer-supplied information may yield significantly different results.

The addition of the Customer 520MW facility on the 161kV system causes loading problems on the 161kV transmission system in the Paola area. A 161kV interconnection requires the construction of a new 21.6 mi. Paola-Springhill 161kV circuit in order to inject power from the new plant in to the 161kV system. In addition, the contingency overloading of circuits on the Paola-Stilwell transmission path requires the reconductoring of the Paola-Centennial, Centennial-Wagstaff, Wagstaff-Bucyrus, and Stilwell-Bucyrus 161kV circuits. The interconnection facilities include expansion of an existing KCPL 161kV bus with the installation of two circuit breakers and line terminal for the Customer plant. The estimated cost of the interconnection facilities is \$15,720,000 less CIAC adders. Construction of the plant interconnection facilities is expected to require 13 months provided right-of-way and zoning permits are acquired. System improvements included reconductoring of the W. Gardner-Moonlight 161kV circuit and the Stilwell-Redel 161kV circuit. The cost estimate for these upgrades is \$3,060,000 less CIAC adders.

The Customer 520MW facility on the 345kV system requires the construction of a 345kV switchyard that ties into an existing KCPL 345kV line. The installation of two 345kV circuit breakers with three terminals for the transmission lines and the Customer unit is required for the plant interconnection. The cost of the interconnection facilities is estimated to be \$3,472,000 less CIAC adders. The project timeline is approximately 13 months provided any right-of-way and zoning issues are resolved. System improvements are necessary to alleviate overloading during contingency events. The addition of a 34.5 mi. LaCygne-Raymore 345kV circuit and Raymore substation with a 345/161kV transformer is needed to alleviate the severe constraints imposed by the overloading of the LaCygne-Stilwell, and LaCygne-W. Gardner circuits with either of those lines out of service. The Nashua 345kV substation and transformer will provide relief for the Hawthorn area overloading that results from the injection of power into the 161kV system at the Raymore site. Reconductoring of the W. Gardner-Moonlight 161kV circuit with 2-795kcmil conductor increases the capability of the circuit beyond the contingency loading levels. The estimated cost of system improvements is expected to be \$35,856,000 less CIAC adders.

Branch Violations

Table C-2 Base Case vs Customer 161k V with 520MW

*** MUST 4.00 *** THU, SEP 06 2001 8:35 ***
 1-2001 SOUTHWEST POWER POOL POWER FLOW MODEL
 2004 SUMMER PEAK (04SP) BASE CASE -- UPDATE 5

start: 8:37:50 AM
 end: 8:38:03 AM
 elapsed: 0:00:13

Notes:

04 Summer Base Case vs Customer 161kV plant with 520MW generation

*****Comparison of Base case flows to Contingency flows*****

Contingency	Monitored Element	Rating	Base Case		Study Case			
			Normal	Contingency Flow	Normal	Contingency Flow		
				% of Rating		% of Rating		
56765 HOYT 7 345 56766 JEC N 7 345 1	57151 AUBURN 3 115 57179 S GAGEW3 115 2 LN	108.0	67.0	120.7	111.8	66.0	119.5	110.7
	57151 AUBURN 3 115 57179 S GAGEW3 115 1 LN	84.0	56.0	102.1	121.6	56.0	101.1	120.4
	57151 AUBURN 3 115 57166 INDIANH3 115 1 LN	118.0	87.0	158.3	134.2	87.0	157.0	133.1
56765 HOYT 7 345 56772 STRANGR7 345 1	57182 TECHILE3 115 57270 STULL T3 115 1 LN	92.0	47.0	93.0	101.1	45.0		
	57153 COLINE 3 115 57201 COLINE3X1.00 1 TR	60.0	47.0	66.8	111.4	46.0	66.1	110.2
	57152 CIRCLVL3 115 57165 HTI JCT3 115 1 LN	92.0	74.0	108.6	118.0	77.0	111.5	121.1
56853 LAWHILL6 230 56855 MIDLAND6 230 1	56853 LAWHILL6 230 57250 LWRNCHL3 115 1 TR	280.0	229.0	343.3	122.6	228.0	341.7	122.0
56853 LAWHILL6 230 57250 LWRNCHL3 115 1	56855 MIDLAND6 230 57252 MIDLAND3 115 1 TR	280.0	165.0	306.7	109.5	164.0	305.2	109.0
56855 MIDLAND6 230 57252 MIDLAND3 115 1	56853 LAWHILL6 230 57250 LWRNCHL3 115 1 TR	280.0	229.0	343.3	122.6	228.0	341.8	122.1
57011 HALSTDN4 138 57012 HALSTDS4 138 1	57012 HALSTDS4 138 57736 HALSTED269.0 1 TR	50.0	35.0	86.7	173.4	35.0	86.7	173.4
57011 HALSTDN4 138 57013 MOUND 4 138 1	57012 HALSTDS4 138 57736 HALSTED269.0 1 TR	50.0	35.0	51.3	102.6	35.0	51.3	102.6
57012 HALSTDS4 138 57065 SG12COL4 138 1	57035 CHISHLM4 138 57786 CHISHLM269.0 1 TR	150.0	112.0	155.8	103.8	112.0	155.9	104.0
57035 CHISHLM4 138 57064 17TH 4 138 1	57035 CHISHLM4 138 57786 CHISHLM269.0 1 TR	150.0	112.0	151.8	101.2	112.0	152.2	101.5
57040 EVANS N4 138 57065 SG12COL4 138 1	57035 CHISHLM4 138 57786 CHISHLM269.0 1 TR	150.0	112.0	157.5	105.0	112.0	157.7	105.1
57151 AUBURN 3 115 57166 INDIANH3 115 1	57151 AUBURN 3 115 57179 S GAGEW3 115 1 LN	84.0	56.0	85.7	102.0	56.0	85.4	101.6
57151 AUBURN 3 115 57179 S GAGEW3 115 2	57151 AUBURN 3 115 57179 S GAGEW3 115 1 LN	84.0	56.0	89.6	106.7	56.0	89.2	106.2
57179 S GAGEW3 115 57185 29EVENG3 115 1	57151 AUBURN 3 115 57166 INDIANH3 115 1 LN	118.0	87.0	123.1	104.3	87.0	123.0	104.2
57182 TECHILE3 115 57187 27CROCO3 115 2	57182 TECHILE3 115 57187 27CROCO3 115 1 LN	68.0	39.0	71.3	104.9	39.0	71.7	105.5
57211 ARNOLD 3 115 57268 STRANGR3 115 1	57153 COLINE 3 115 57201 COLINE3X1.00 1 TR	60.0	47.0	71.8	119.6	46.0	71.5	119.2

KCPL Transmission Planning

Feasibility Study – Customer

					57216	KERFORD3	115	57259	NW LEAV3	115	1	LN	68.0	14.0	83.4	122.6	14.0	83.6	123.0				
57234	BISMARCK3	115	57236	COOP	3	115	1	57250	LWRNCHL3	115	57280	WREN	3	115	1	LN	141.0	112.0	151.3	107.3	112.0	150.0	106.4
57235	CAPTAIN3	115	57240	EUDORA	3	115	1	57237	CRAIG J3	115	57273	TIMBRLN3	115	1	LN	92.0	56.0	105.2	114.4	52.0	99.0	107.6	
					57237	CRAIG J3	115	57261	PENTAGN3	115	1	LN	92.0	56.0	105.5	114.6	52.0	99.2	107.8				
57235	CAPTAIN3	115	57278	WAVERLY3	115	1	57237	CRAIG J3	115	57273	TIMBRLN3	115	1	LN	92.0	56.0	105.3	114.4	52.0	99.1	107.7		
					57237	CRAIG J3	115	57261	PENTAGN3	115	1	LN	92.0	56.0	105.5	114.7	52.0	99.3	107.9				
57239	ESAAPJ	3	115	57255	MOONLTJ3	115	1	57237	CRAIG J3	115	57261	PENTAGN3	115	1	LN	92.0	56.0	92.5	100.6	52.0			
57239	ESAAPJ	3	115	57278	WAVERLY3	115	1	57237	CRAIG J3	115	57261	PENTAGN3	115	1	LN	92.0	56.0	92.5	100.5	52.0			
57240	EUDORA	3	115	57277	WAKARUS3	115	1	57237	CRAIG J3	115	57273	TIMBRLN3	115	1	LN	92.0	56.0	114.4	124.3	52.0	108.2	117.6	
					57237	CRAIG J3	115	57261	PENTAGN3	115	1	LN	92.0	56.0	114.7	124.6	52.0	108.5	118.0				
57250	LWRNCHL3	115	57280	WREN	3	115	1	57234	BISMARCK3	115	57236	COOP	3	115	1	LN	118.0	68.0	119.1	100.9	67.0		
57253	MOCKBRD3	115	57271	SWLWRNC3	115	1	57250	LWRNCHL3	115	57280	WREN	3	115	1	LN	141.0	112.0	159.3	113.0	112.0	157.8	111.9	
57267	SPRINGH3	115	58042	SPRGHL	5	161	1	57237	CRAIG J3	115	57273	TIMBRLN3	115	1	LN	92.0	56.0	119.2	129.6	52.0	120.6	131.0	
					57237	CRAIG J3	115	57261	PENTAGN3	115	1	LN	92.0	56.0	119.7	130.1	52.0	121.1	131.6				
57413	CIRCLE	3	115	57415	DAVIS	3	115	1	57412	ARKVALJ3	115	57435	3 VANBU3	115	1	LN	68.0	44.0	80.3	118.0	44.0	80.3	118.0
					57412	ARKVALJ3	115	57413	CIRCLE	3	115	1	LN	68.0	48.0	84.1	123.7	48.0	84.1	123.7			
57965	W.GRDNR7	345	57977	CRAIG	7	345	1	57966	WGARDNR5	161	58044	MOONLT	5	161	1	LN	293.0	171.0	311.1	106.2	201.0	354.9	121.1
					58043	MURLEN	5	161	58044	MOONLT	5	161	1	LN	293.0	130.0			161.0	316.6	108.1		
57965	W.GRDNR7	345	57981	LACYGNE7	345	1	57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	869.0	1354.4	123.2	819.0	1269.3	115.5		
					58036	OLATHEE5	161	58046	OXFORD	5	161	1	LN	224.0	153.0	295.8	132.0	175.0	309.3	138.1			
					58066	S.OTTWA5	161	58077	SRICHLN5	161	1	LN	174.0	30.0			146.0	196.0	112.6				
57968	STILWEL7	345	57981	LACYGNE7	345	1	57965	W.GRDNR7	345	57981	LACYGNE7	345	1	LN	1099.0	693.0	1209.6	110.1	648.0	1130.3	102.8		
					58067	CENTENL5	161	58069	PAOLA	5	161	1	LN	174.0	131.0	197.2	113.3	412.0					
57969	STILWEL5	161	58042	SPRGHL	5	161	1	57237	CRAIG J3	115	57273	TIMBRLN3	115	1	LN	92.0	56.0	119.1	129.5	52.0	120.5	130.9	
					57237	CRAIG J3	115	57261	PENTAGN3	115	1	LN	92.0	56.0	119.7	130.1	52.0	121.1	131.6				
57969	STILWEL5	161	58053	REDEL	5	161	1	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	48.0	50.8	101.7	48.0	51.3	102.5
57973	HAWTHRN5	161	58011	CHOUTEU5	161	1	57973	HAWTHRN5	161	58027	RANDLPH5	161	1	LN	293.0	259.0	309.2	105.5	257.0	305.6	104.3		
					57976	LEVEE	5	161	57985	NEAST	5	161	1	LN	293.0	224.0	326.0	111.3	218.0	316.9	108.2		
57973	HAWTHRN5	161	58027	RANDLPH5	161	1	57973	HAWTHRN5	161	58011	CHOUTEU5	161	1	LN	293.0	214.0	299.0	102.0	208.0				
					57976	LEVEE	5	161	57985	NEAST	5	161	1	LN	293.0	224.0	314.9	107.5	218.0	307.9	105.1		
57976	LEVEE	5	161	57985	NEAST	5	161	1	57985	NEAST	5	161	1	LN	293.0	192.0	296.9	101.3	186.0				
					57973	HAWTHRN5	161	58027	RANDLPH5	161	1	LN	293.0	259.0	313.8	107.1	257.0	310.0	105.8				

KCPL Transmission Planning

Feasibility Study – Customer

						57973	HAWTHRN5	161	58011	CHOUTEU5	161	1	LN	293.0	214.0	317.6	108.4	208.0	308.8	105.4		
57985	NEAST	5	161	58011	CHOUTEU5	161	1	LN	293.0	259.0	303.6	103.6	257.0	299.9	102.4							
						57976	LEVEE	5	161	57985	NEAST	5	161	1	LN	293.0	224.0	315.3	107.6	218.0	306.3	104.5
57985	NEAST	5	161	58018	NKANCTY5	161	1	LN	293.0	259.0	300.4	102.5	257.0	301.7	103.0							
58002	MARTCIT5	161	58053	REDEL	5	161	1	TR	50.0	48.0	50.5	100.9	48.0	50.9	101.8							
58015	AVONDAL5	161	58027	RANDLPH5	161	1	LN	293.0	224.0	307.1	104.8	218.0	300.2	102.5								
58066	S.OTTWA5	161	58069	PAOLA	5	161	1	LN	174.0	131.0	182.3	104.7	412.0									
59207	ARCHIE	5	161	59240	ADRIAN	5	161	1	TR	50.0	48.0	52.3	104.6	48.0	52.8	105.7						
59216	BUTLER_5	161	59240	ADRIAN	5	161	1	TR	50.0	48.0	51.7	103.3	48.0	52.2	104.4							
59224	LNGVW	5	161	59249	HOOKRD	5	161	1	TR	50.0	48.0	50.6	101.2	48.0	50.8	101.6						
						57969	STILWEL5	161	58053	REDEL	5	161	1	LN	293.0	216.0		251.0	301.6	102.9		
59225	PHILL	5	161	59243	LKWINGB5	161	1	TR	50.0	48.0	50.9	101.8	48.0	51.1	102.2							
						57969	STILWEL5	161	58053	REDEL	5	161	1	LN	293.0	216.0		251.0	308.7	105.3		
59243	LKWINGB5	161	59249	HOOKRD	5	161	1	TR	50.0	48.0	50.7	101.4	48.0	50.9	101.8							
						57969	STILWEL5	161	58053	REDEL	5	161	1	LN	293.0	216.0		251.0	304.3	103.9		
96071	5CLINTN	161	57995	MONTROS5	161	1	TR	50.0	48.0	51.7	103.3	48.0	52.3	104.6								
56934	MARMTNE5	161	58065	CNTRVIL5	161	1	LN	174.0	30.0			146.0	175.5	100.9								
57966	WGARDNR5	161	58044	MOONLT	5	161	1	LN	224.0	153.0			175.0	233.0	104.0							
57968	STILWEL7	345	59200	PHILL	7	345	1	LN	293.0	216.0			251.0	308.3	105.2							
57969	STILWEL5	161	57994	HICKMAN5	161	1	LN	293.0	216.0			251.0	304.4	103.9								
57969	STILWEL5	161	58050	ANTIOCH5	161	1	LN	293.0	216.0			251.0	299.2	102.1								
57969	STILWEL5	161	58057	BUCYRUS5	161	1	LN	293.0	23.0			137.0	348.0	118.8								
						58066	S.OTTWA5	161	58069	PAOLA	5	161	1	LN	293.0	66.0		189.0	407.3	139.0		
						58066	S.OTTWA5	161	58077	SRICHLN5	161	1	LN	174.0	30.0		146.0	360.0	206.9			
69702	ST JOE	3	345	57982	IATAN	7	345	1	LN	92.0	74.0			77.0	95.4	103.7						
58002	MARTCIT5	161	59210	MARTCTY5	161	1	TR	50.0	48.0			48.0	50.5	100.9								
58057	BUCYRUS5	161	58068	WAGSTAF5	161	1	LN	293.0	23.0			137.0	368.2	125.7								
						58066	S.OTTWA5	161	58069	PAOLA	5	161	1	LN	293.0	66.0		189.0	428.1	146.1		
						58066	S.OTTWA5	161	58077	SRICHLN5	161	1	LN	174.0	30.0		146.0	380.1	218.5			
58062	SALSBRY5	161	58064	NORTON-5	161	1	LN	123.0	88.0			99.0	128.9	104.8								

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Feasibility Study – Customer

58065	CNTRVIL5	161	58069	PAOLA	5	161	1	58066	S.OTTWA5	161	58077	SRICHLN5	161	1	LN	174.0	30.0	146.0	184.3	105.9	
58067	CENTENL5	161	58068	WAGSTAF5	161	1		57966	WGARDNR5	161	58077	SRICHLN5	161	1	LN	293.0	23.0	137.0	372.4	127.1	
								58066	S.OTTWA5	161	58069	PAOLA	5	161	1	LN	293.0	66.0	189.0	432.4	147.6
								58066	S.OTTWA5	161	58077	SRICHLN5	161	1	LN	174.0	30.0	146.0	384.3	220.9	
58067	CENTENL5	161	58069	PAOLA	5	161	1	58065	CNTRVIL5	161	58069	PAOLA	5	161	1	LN	293.0	14.0	116.0	299.2	102.1
								57966	WGARDNR5	161	58077	SRICHLN5	161	1	LN	293.0	23.0	137.0	391.2	133.5	
								58066	S.OTTWA5	161	58069	PAOLA	5	161	1	LN	293.0	66.0	189.0	451.7	154.2
								58066	S.OTTWA5	161	58077	SRICHLN5	161	1	LN	174.0	30.0	146.0	403.0	231.6	
59208	NEVADA	5	161	59216	BUTLER_5	161	1	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	48.0	48.0	50.6	101.1
**	Base Case			**				58057	BUCYRUS5	161	58068	WAGSTAF5	161	1	LN	293.0	101.0	383.0	380.3	129.8	
								58067	CENTENL5	161	58068	WAGSTAF5	161	1	LN	293.0	106.0	384.0	386.5	131.9	
								57969	STILWEL5	161	58057	BUCYRUS5	161	1	LN	224.0	77.0	358.0	352.3	157.3	
								58067	CENTENL5	161	58069	PAOLA	5	161	1	LN	174.0	131.0	412.0	414.7	238.3

Branch Violations

Table C-2 Base Case vs Customer 161kV plant additions of 520MW w/ Paola-Spr Hill improvements

*** MUST 4.00 *** THU, SEP 06 2001 7:15 ***
 1-2001 SOUTHWEST POWER POOL POWER FLOW MODEL
 2004 SUMMER PEAK (04SP) BASE CASE -- UPDATE 5

start: 11:23:18 AM
 end: 11:23:30 AM
 elapsed: 0:00:12

Notes:

04 Summer Base Case vs Customer 161kV plant with 520MW generation and system improvements - Paola to Spring Hill

*****Comparison of Base case flows to Contingency flows*****

Contingency	Monitored Element	Rating	Base Case		Study Case			
			Normal	Contingency Flow % of Rating	Normal	Contingency Flow % of Rating		
56765 HOYT 7 345 56766 JEC N 7 345 1	57151 AUBURN 3 115 57179 S GAGEW3 115 2 LN	108.0	67.0	120.7	111.8	66.0	119.3	110.4
	57151 AUBURN 3 115 57179 S GAGEW3 115 1 LN	84.0	56.0	102.1	121.6	56.0	100.9	120.1
	57151 AUBURN 3 115 57166 INDIANH3 115 1 LN	118.0	87.0	158.3	134.2	87.0	156.9	132.9
	58036 OLATHEE5 161 58046 OXFORD 5 161 1 LN	224.0	153.0			192.0	233.1	104.0
56765 HOYT 7 345 56772 STRANGR7 345 1	57182 TECHILE3 115 57270 STULL T3 115 1 LN	92.0	47.0	93.0	101.1	43.0		
	57153 COLINE 3 115 57201 COLINE3X1.00 1 TR	60.0	47.0	66.8	111.4	46.0	66.0	110.0
	57152 CIRCLVL3 115 57165 HTI JCT3 115 1 LN	92.0	74.0	108.6	118.0	77.0	111.6	121.3
	58036 OLATHEE5 161 58046 OXFORD 5 161 1 LN	224.0	153.0			192.0	227.1	101.4
56853 LAWHILL6 230 56855 MIDLAND6 230 1	56853 LAWHILL6 230 57250 LWRNCHL3 115 1 TR	280.0	229.0	343.3	122.6	226.0	337.9	120.7
56853 LAWHILL6 230 57250 LWRNCHL3 115 1	56855 MIDLAND6 230 57252 MIDLAND3 115 1 TR	280.0	165.0	306.7	109.5	163.0	301.9	107.8
56855 MIDLAND6 230 57252 MIDLAND3 115 1	56853 LAWHILL6 230 57250 LWRNCHL3 115 1 TR	280.0	229.0	343.3	122.6	226.0	338.0	120.7
57011 HALSTDN4 138 57012 HALSTDS4 138 1	57012 HALSTDS4 138 57736 HALSTED269.0 1 TR	50.0	35.0	86.7	173.4	35.0	86.7	173.4
57011 HALSTDN4 138 57013 MOUND 4 138 1	57012 HALSTDS4 138 57736 HALSTED269.0 1 TR	50.0	35.0	51.3	102.6	35.0	51.3	102.6
57012 HALSTDS4 138 57065 SG12COL4 138 1	57035 CHISHLM4 138 57786 CHISHLM269.0 1 TR	150.0	112.0	155.8	103.8	112.0	156.0	104.0
57035 CHISHLM4 138 57064 17 TH 4 138 1	57035 CHISHLM4 138 57786 CHISHLM269.0 1 TR	150.0	112.0	151.8	101.2	112.0	152.2	101.5
57040 EVANS N4 138 57065 SG12COL4 138 1	57035 CHISHLM4 138 57786 CHISHLM269.0 1 TR	150.0	112.0	157.5	105.0	112.0	157.7	105.1
57151 AUBURN 3 115 57166 INDIANH3 115 1	57151 AUBURN 3 115 57179 S GAGEW3 115 1 LN	84.0	56.0	85.7	102.0	56.0	85.2	101.4
57151 AUBURN 3 115 57179 S GAGEW3 115 2	57151 AUBURN 3 115 57179 S GAGEW3 115 1 LN	84.0	56.0	89.6	106.7	56.0	88.9	105.9
57179 S GAGEW3 115 57185 29EVENG3 115 1	57151 AUBURN 3 115 57166 INDIANH3 115 1 LN	118.0	87.0	123.1	104.3	87.0	122.8	104.1
57182 TECHILE3 115 57187 27CROCO3 115 2	57182 TECHILE3 115 57187 27CROCO3 115 1 LN	68.0	39.0	71.3	104.9	39.0	72.0	105.8

KCPL Transmission Planning

Feasibility Study – Customer

57211	ARNOLD	3	115	57268	STRANGR3	115	1	57153	COLINE	3	115	57201	COLINE3X1.00	1	TR	60.0	47.0	71.8	119.6	46.0	71.3	118.9		
								57216	KERFORD3	115	57259	NW LEAV3	115	1	LN	68.0	14.0	83.4	122.6	14.0	83.7	123.2		
57234	BISMARCK3	115	57236	COOP	3	115	1	57250	LWRNCHL3	115	57280	WREN	3	115	1	LN	141.0	112.0	151.3	107.3	109.0	145.7	103.4	
57235	CAPTAIN3	115	57240	EUDORA	3	115	1	57237	CRAIG J3	115	57273	TIMBRLN3	115	1	LN	92.0	56.0	105.2	114.4	31.0				
								57237	CRAIG J3	115	57261	PENTAGN3	115	1	LN	92.0	56.0	105.5	114.6	31.0				
57235	CAPTAIN3	115	57278	WAVERLY3	115	1		57237	CRAIG J3	115	57273	TIMBRLN3	115	1	LN	92.0	56.0	105.3	114.4	31.0				
								57237	CRAIG J3	115	57261	PENTAGN3	115	1	LN	92.0	56.0	105.5	114.7	31.0				
57239	ESAAPJ	3	115	57255	MOONLTJ3	115	1	57237	CRAIG J3	115	57261	PENTAGN3	115	1	LN	92.0	56.0	92.5	100.6	31.0				
57239	ESAAPJ	3	115	57278	WAVERLY3	115	1	57237	CRAIG J3	115	57261	PENTAGN3	115	1	LN	92.0	56.0	92.5	100.5	31.0				
57240	EUDORA	3	115	57277	WAKARUS3	115	1	57237	CRAIG J3	115	57273	TIMBRLN3	115	1	LN	92.0	56.0	114.4	124.3	31.0				
								57237	CRAIG J3	115	57261	PENTAGN3	115	1	LN	92.0	56.0	114.7	124.6	31.0				
57250	LWRNCHL3	115	57280	WREN	3	115	1	57234	BISMARCK3	115	57236	COOP	3	115	1	LN	118.0	68.0	119.1	100.9	64.0			
57253	MOCKBRD3	115	57271	SWLWRNC3	115	1		57250	LWRNCHL3	115	57280	WREN	3	115	1	LN	141.0	112.0	159.3	113.0	109.0	153.6	109.0	
57267	SPRINGH3	115	58042	SPRGHL	5	161	1	57237	CRAIG J3	115	57273	TIMBRLN3	115	1	LN	92.0	56.0	119.2	129.6	31.0	120.4	130.9		
								57237	CRAIG J3	115	57261	PENTAGN3	115	1	LN	92.0	56.0	119.7	130.1	31.0	121.1	131.6		
57413	CIRCLE	3	115	57415	DAVIS	3	115	1	57412	ARKVALJ3	115	57435	3 VANBU3	115	1	LN	68.0	44.0	80.3	118.0	44.0	80.3	118.0	
								57412	ARKVALJ3	115	57413	CIRCLE	3	115	1	LN	68.0	48.0	84.1	123.7	48.0	84.1	123.7	
57965	W.GRDNR7	345	57977	CRAIG	7	345	1	57966	WGARDNR5	161	58044	MOONLT	5	161	1	LN	293.0	171.0	311.1	106.2	181.0	324.2	110.6	
								58036	OLATHEE5	161	58046	OXFORD	5	161	1	LN	224.0	153.0			192.0	239.5	106.9	
57965	W.GRDNR7	345	57981	LACYGNE7	345	1		57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	869.0	1354.4	123.2	796.0	1250.7	113.8		
								58036	OLATHEE5	161	58046	OXFORD	5	161	1	LN	224.0	153.0	295.8	132.0	192.0	326.4	145.7	
57968	STILWEL7	345	57981	LACYGNE7	345	1		57965	W.GRDNR7	345	57981	LACYGNE7	345	1	LN	1099.0	693.0	1209.6	110.1	656.0	1122.1	102.1		
								58067	CENTENL5	161	58069	PAOLA	5	161	1	LN	174.0	131.0	197.2	113.3	263.0			
								57969	STILWEL5	161	58057	BUCYRUS5	161	1	LN	224.0	77.0			206.0	241.8	108.0		
57969	STILWEL5	161	58042	SPRGHL	5	161	1	57237	CRAIG J3	115	57273	TIMBRLN3	115	1	LN	92.0	56.0	119.1	129.5	31.0				
								57237	CRAIG J3	115	57261	PENTAGN3	115	1	LN	92.0	56.0	119.7	130.1	31.0				
								57969	STILWEL5	161	58057	BUCYRUS5	161	1	LN	224.0	77.0			206.0	268.6	119.9		
								58057	BUCYRUS5	161	58068	WAGSTAF5	161	1	LN	293.0	101.0			233.0	295.8	101.0		
								58067	CENTENL5	161	58068	WAGSTAF5	161	1	LN	293.0	106.0			236.0	301.8	103.0		
57969	STILWEL5	161	58053	REDEL	5	161	1	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	48.0	50.8	101.7	49.0			
								58036	OLATHEE5	161	58046	OXFORD	5	161	1	LN	224.0	153.0			192.0	235.3	105.1	
57973	HAWTHRN5	161	58011	CHOUTEU5	161	1		57973	HAWTHRN5	161	58027	RANDLPH5	161	1	LN	293.0	259.0	309.2	105.5	257.0	305.1	104.1		
								57976	LEVEE	5	161	57985	NEAST	5	161	1	LN	293.0	224.0	326.0	111.3	217.0	315.9	107.8
57973	HAWTHRN5	161	58027	RANDLPH5	161	1		57973	HAWTHRN5	161	58011	CHOUTEU5	161	1	LN	293.0	214.0	299.0	102.0	208.0				

KCPL Transmission Planning

Feasibility Study – Customer

						57976	LEVEE	5	161	57985	NEAST	5	161	1	LN	293.0	224.0	314.9	107.5	217.0	307.1	104.8				
57976	LEVEE	5	161	57985	NEAST	5	161	1		57985	NEAST	5	161	1	LN	293.0	192.0	296.9	101.3	185.0						
						57973	HAWTHRN5	161	58027	RANDLPH5	161	1	LN			293.0	259.0	313.8	107.1	257.0	309.5	105.6				
						57973	HAWTHRN5	161	58011	CHOUTEU5	161	1	LN			293.0	214.0	317.6	108.4	208.0	307.8	105.1				
57985	NEAST	5	161	58011	CHOUTEU5	161	1			57973	HAWTHRN5	161	58027	RANDLPH5	161	1	LN	293.0	259.0	303.6	103.6	257.0	299.5	102.2		
						57976	LEVEE	5	161	57985	NEAST	5	161	1	LN	293.0	224.0	315.3	107.6	217.0	305.2	104.2				
57985	NEAST	5	161	58018	NKANCTY5	161	1			57973	HAWTHRN5	161	58027	RANDLPH5	161	1	LN	293.0	259.0	300.4	102.5	257.0	301.8	103.0		
58002	MARTCIT5	161	58053	REDEL	5	161	1			59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	48.0	50.5	100.9	49.0			
						58036	OLATHEE5	161	58046	OXFORD	5	161	1	LN			224.0	153.0			192.0	229.3	102.4			
58015	AVONDAL5	161	58027	RANDLPH5	161	1				57976	LEVEE	5	161	57985	NEAST	5	161	1	LN	293.0	224.0	307.1	104.8	217.0	299.4	102.2
58066	S.OTTWA5	161	58069	PAOLA	5	161	1			58067	CENTENL5	161	58069	PAOLA	5	161	1	LN	174.0	131.0	182.3	104.7	263.0			
						57969	STILWEL5	161	58057	BUCYRUS5	161	1	LN			224.0	77.0			206.0	260.9	116.5				
						58036	OLATHEE5	161	58046	OXFORD	5	161	1	LN			224.0	153.0			192.0	225.9	100.8			
						58067	CENTENL5	161	58068	WAGSTAF5	161	1	LN			293.0	106.0			236.0	295.1	100.7				
59207	ARCHIE	5	161	59240	ADRIAN	5	161	1		59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	48.0	52.3	104.6	49.0			
59216	BUTLER_5	161	59240	ADRIAN	5	161	1			59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	48.0	51.7	103.3	49.0			
59224	LNGVW	5	161	59249	HOOKRD	5	161	1		59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	48.0	50.6	101.2	49.0			
59225	PHILL	5	161	59243	LKWINGB5	161	1			59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	48.0	50.9	101.8	49.0			
59243	LKWINGB5	161	59249	HOOKRD	5	161	1			59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	48.0	50.7	101.4	49.0			
96071	5CLINTN	161	57995	MONTROS5	161	1				59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	48.0	51.7	103.3	49.0			
56772	STRANGR7	345	57977	CRAIG	7	345	1			58036	OLATHEE5	161	58046	OXFORD	5	161	1	LN	224.0	153.0			192.0	227.8	101.7	
57038	COWSKIN4	138	57041	EVANS S4	138	1				57041	EVANS S4	138	57053	LAKERDG4	138	1	LN	371.0	280.0			280.0	372.8	100.5		
57966	WGARDNR5	161	58044	MOONLT	5	161	1			58036	OLATHEE5	161	58046	OXFORD	5	161	1	LN	224.0	153.0			192.0	244.5	109.2	
57966	WGARDNR5	161	58077	SRICHLN5	161	1				57969	STILWEL5	161	58057	BUCYRUS5	161	1	LN	224.0	77.0			206.0	235.8	105.3		
57969	STILWEL5	161	57994	HICKMAN5	161	1				57969	STILWEL5	161	58053	REDEL	5	161	1	LN	293.0	216.0			260.0	314.0	107.2	
						58036	OLATHEE5	161	58046	OXFORD	5	161	1	LN			224.0	153.0			192.0	229.9	102.6			
57969	STILWEL5	161	58050	ANTIOCH5	161	1				57969	STILWEL5	161	58053	REDEL	5	161	1	LN	293.0	216.0			260.0	309.7	105.7	
57978	CRAIG	5	161	58048	COLLEGE5	161	1			58036	OLATHEE5	161	58046	OXFORD	5	161	1	LN	224.0	153.0			192.0	230.4	102.9	
69702	ST JOE	3	345	57982	IATAN	7	345	1		57152	CIRCLVL3	115	57165	HTI JCT3	115	1	LN	92.0	74.0			77.0	95.4	103.6		
57993	STHTOWN5	161	57994	HICKMAN5	161	1				57969	STILWEL5	161	58053	REDEL	5	161	1	LN	293.0	216.0			260.0	297.2	101.4	

KCPL Transmission Planning

Feasibility Study – Customer

58033	BRKRIDG5	161	58047	OVERLPK5	161	1	58036	OLATHEE5	161	58046	OXFORD	5	161	1	LN	224.0	153.0	192.0	226.6	101.1		
58042	SPRGHL	5	161	58069	PAOLA	5	161	1	57969	STILWEL5	161	58057	BUCYRUS5	161	1	LN	224.0	77.0	206.0	352.4	157.3	
									58057	BUCYRUS5	161	58068	WAGSTAF5	161	1	LN	293.0	101.0	233.0	380.4	129.8	
									58067	CENTENL5	161	58068	WAGSTAF5	161	1	LN	293.0	106.0	236.0	386.4	131.9	
58043	MURLEN	5	161	58044	MOONLT	5	161	1	58036	OLATHEE5	161	58046	OXFORD	5	161	1	LN	224.0	153.0	192.0	233.0	104.0
58046	OXFORD	5	161	58050	ANTIOCH5	161	1	57969	STILWEL5	161	58053	REDEL	5	161	1	LN	293.0	216.0	260.0	303.6	103.6	
58065	CNTRVIL5	161	58069	PAOLA	5	161	1	57969	STILWEL5	161	58057	BUCYRUS5	161	1	LN	224.0	77.0	206.0	234.2	104.6		
58066	S.OTTWA5	161	58077	SRICHLN5	161	1	57969	STILWEL5	161	58057	BUCYRUS5	161	1	LN	224.0	77.0	206.0	241.3	107.7			
56765	HOYT	7	345	56804	HOYT	7X1.00	1	57151	AUBURN	3	115	57166	INDIANH3	115	1	LN	118.0	87.0	87.0	131.0	111.0	
56772	STRANGR7	345	56811	STRANG7X1.00	1	57153	COLINE	3	115	57201	COLINE3X1.00	1	TR				60.0	47.0	46.0	70.8	118.0	
56804	HOYT	7X1.00	57163	HOYT	3	115	1	57151	AUBURN	3	115	57166	INDIANH3	115	1	LN	118.0	87.0	87.0	131.0	111.0	
56811	STRANG7X1.00	57268	STRANGR3	115	1	57153	COLINE	3	115	57201	COLINE3X1.00	1	TR				60.0	47.0	46.0	70.8	118.0	
56861	EMANHAT6	230	58758	CONCORD6	230	1	57152	CIRCLVL3	115	57165	HTI	JCT3	115	1	LN	92.0	74.0	77.0	95.6	103.9		
56949	TECHIL5X1.00	57182	TECHILE3	115	1	57182	TECHILE3	115	57884	UCB	114.0	1	TR				9.0	3.0	3.0	10.9	121.3	
57011	HALSTDN4	138	57736	HALSTED269.0	2	57012	HALSTDS4	138	57736	HALSTED269.0	1	TR				50.0	35.0	35.0	54.3	108.6		
57013	MOUND	4	138	57742	MOUND	269.0	1	57012	HALSTDS4	138	57736	HALSTED269.0	1	TR			50.0	35.0	35.0	51.3	102.7	
57049	HOOVERN4	138	57806	HOOVERS269.0	1	57049	HOOVERN4	138	57805	HOOVERN269.0	3	TR				150.0	114.0	114.0	158.2	105.4		
57968	STILWEL7	345	59200	PHILL	7	345	1	57969	STILWEL5	161	58053	REDEL	5	161	1	LN	293.0	216.0	260.0	316.8	108.1	
**	Base Case	**					58067	CENTENL5	161	58069	PAOLA	5	161	1	LN	174.0	131.0	263.0	263.6	151.5		

Branch Violations

Table D-1 Base Case vs Customer 345kV w/520MW

*** MUST 4.00 *** THU, SEP 06 2001 7:44 ***
 1-2001 SOUTHWEST POWER POOL POWER FLOW MODEL
 2004 SUMMER PEAK (04SP) BASE CASE -- UPDATE 5

start: 7:59:22 AM
 end: 7:59:32 AM
 elapsed: 0:00:10

Notes:

04 Summer Base Case vs Customer 345kV plant with 520MW generation

*****Comparison of Base case flows to Contingency flows*****

Contingency	Monitored Element	Rating	Base Case		Study Case			
			Normal	Contingency Flow % of Rating	Normal	Contingency Flow % of Rating		
56765 HOYT 7 345 56766 JEC N 7 345 1	57151 AUBURN 3 115 57179 S GAGEW3 115 2 LN	108.0	67.0	120.7	111.8	66.0	118.8	110.0
	57151 AUBURN 3 115 57179 S GAGEW3 115 1 LN	84.0	56.0	102.1	121.6	56.0	100.5	119.7
	57151 AUBURN 3 115 57166 INDIANH3 115 1 LN	118.0	87.0	158.3	134.2	87.0	156.0	132.2
56765 HOYT 7 345 56772 STRANGR7 345 1	57182 TECHILE3 115 57270 STULL T3 115 1 LN	92.0	47.0	93.0	101.1	45.0		
	57153 COLINE 3 115 57201 COLINE3X1.00 1 TR	60.0	47.0	66.8	111.4	46.0	65.4	108.9
	57152 CIRCLVL3 115 57165 HTI JCT3 115 1 LN	92.0	74.0	108.6	118.0	78.0	111.4	121.1
56853 LAWHILL6 230 56855 MIDLAND6 230 1	56853 LAWHILL6 230 57250 LWRNCHL3 115 1 TR	280.0	229.0	343.3	122.6	229.0	342.6	122.4
56853 LAWHILL6 230 57250 LWRNCHL3 115 1	56855 MIDLAND6 230 57252 MIDLAND3 115 1 TR	280.0	165.0	306.7	109.5	165.0	306.2	109.4
56855 MIDLAND6 230 57252 MIDLAND3 115 1	56853 LAWHILL6 230 57250 LWRNCHL3 115 1 TR	280.0	229.0	343.3	122.6	229.0	342.7	122.4
57011 HALSTDN4 138 57012 HALSTDS4 138 1	57012 HALSTDS4 138 57736 HALSTED269.0 1 TR	50.0	35.0	86.7	173.4	35.0	86.7	173.4
57011 HALSTDN4 138 57013 MOUND 4 138 1	57012 HALSTDS4 138 57736 HALSTED269.0 1 TR	50.0	35.0	51.3	102.6	35.0	51.3	102.6
57012 HALSTDS4 138 57065 SG12COL4 138 1	57035 CHISHLM4 138 57786 CHISHLM269.0 1 TR	150.0	112.0	155.8	103.8	112.0	156.0	104.0
57035 CHISHLM4 138 57064 17TH 4 138 1	57035 CHISHLM4 138 57786 CHISHLM269.0 1 TR	150.0	112.0	151.8	101.2	112.0	152.3	101.5
57040 EVANS N4 138 57065 SG12COL4 138 1	57035 CHISHLM4 138 57786 CHISHLM269.0 1 TR	150.0	112.0	157.5	105.0	112.0	157.7	105.2
57151 AUBURN 3 115 57166 INDIANH3 115 1	57151 AUBURN 3 115 57179 S GAGEW3 115 1 LN	84.0	56.0	85.7	102.0	56.0	85.1	101.3
57151 AUBURN 3 115 57179 S GAGEW3 115 2	57151 AUBURN 3 115 57179 S GAGEW3 115 1 LN	84.0	56.0	89.6	106.7	56.0	89.0	105.9
57179 S GAGEW3 115 57185 29EVENG3 115 1	57151 AUBURN 3 115 57166 INDIANH3 115 1 LN	118.0	87.0	123.1	104.3	87.0	122.5	103.8
57182 TECHILE3 115 57187 27CROCO3 115 2	57182 TECHILE3 115 57187 27CROCO3 115 1 LN	68.0	39.0	71.3	104.9	39.0	71.7	105.5
57211 ARNOLD 3 115 57268 STRANGR3 115 1	57153 COLINE 3 115 57201 COLINE3X1.00 1 TR	60.0	47.0	71.8	119.6	46.0	71.3	118.9
	57216 KERFORD3 115 57259 NW LEAV3 115 1 LN	68.0	14.0	83.4	122.6	14.0	83.6	123.0
57234 BISMARCK3 115 57236 COOP 3 115 1	57250 LWRNCHL3 115 57280 WREN 3 115 1 LN	141.0	112.0	151.3	107.3	112.0	151.2	107.2

KCPL Transmission Planning

Feasibility Study – Customer

57235	CAPTAIN3	115	57240	EUDORA	3	115	1	57237	CRAIG	J3	115	57273	TIMBRLN3	115	1	LN	92.0	56.0	105.2	114.4	57.0	105.3	114.5	
								57237	CRAIG	J3	115	57261	PENTAGN3	115	1	LN	92.0	56.0	105.5	114.6	57.0	105.5	114.7	
57235	CAPTAIN3	115	57278	WAVERLY3	115	1	57237	CRAIG	J3	115	57273	TIMBRLN3	115	1	LN	92.0	56.0	105.3	114.4	57.0	105.4	114.5		
								57237	CRAIG	J3	115	57261	PENTAGN3	115	1	LN	92.0	56.0	105.5	114.7	57.0	105.6	114.8	
57239	ESAAPJ	3	115	57255	MOONLTJ3	115	1	57237	CRAIG	J3	115	57261	PENTAGN3	115	1	LN	92.0	56.0	92.5	100.6	57.0	92.6	100.6	
								57237	CRAIG	J3	115	57273	TIMBRLN3	115	1	LN	92.0	56.0			57.0	92.5	100.5	
57239	ESAAPJ	3	115	57278	WAVERLY3	115	1	57237	CRAIG	J3	115	57261	PENTAGN3	115	1	LN	92.0	56.0	92.5	100.5	57.0	92.6	100.6	
								57237	CRAIG	J3	115	57273	TIMBRLN3	115	1	LN	92.0	56.0			57.0	92.4	100.5	
57240	EUDORA	3	115	57277	WAKARUS3	115	1	57237	CRAIG	J3	115	57273	TIMBRLN3	115	1	LN	92.0	56.0	114.4	124.3	57.0	114.4	124.4	
								57237	CRAIG	J3	115	57261	PENTAGN3	115	1	LN	92.0	56.0	114.7	124.6	57.0	114.7	124.7	
57250	LWRNCHL3	115	57280	WREN	3	115	1	57234	BISMARCK3	115	57236	COOP	3	115	1	LN	118.0	68.0	119.1	100.9	68.0	118.8	100.7	
57253	MOCKBRD3	115	57271	SWLWRNC3	115	1	57250	LWRNCHL3	115	57280	WREN	3	115	1	LN	141.0	112.0	159.3	113.0	112.0	158.7	112.5		
57267	SPRINGH3	115	58042	SPRGHL	5	161	1	57237	CRAIG	J3	115	57273	TIMBRLN3	115	1	LN	92.0	56.0	119.2	129.6	57.0	120.2	130.6	
								57237	CRAIG	J3	115	57261	PENTAGN3	115	1	LN	92.0	56.0	119.7	130.1	57.0	120.7	131.2	
57413	CIRCLE	3	115	57415	DAVIS	3	115	1	57412	ARKVALJ3	115	57435	3	VANBU3	115	1	LN	68.0	44.0	80.3	118.0	44.0	80.3	118.0
								57412	ARKVALJ3	115	57413	CIRCLE	3	115	1	LN	68.0	48.0	84.1	123.7	48.0	84.1	123.7	
57965	W.GRDNR7	345	57977	CRAIG	7	345	1	57966	WGARDNR5	161	58044	MOONLT	5	161	1	LN	293.0	171.0	311.1	106.2	193.0	382.4	130.5	
								57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	869.0			971.0	1287.0	117.1		
								58043	MURLEN	5	161	58044	MOONLT	5	161	1	LN	293.0	130.0			153.0	344.2	117.5
								57965	W.GRDNR7	345	57966	WGARDNR5	161	11	TR	400.0	191.0			228.0	478.8	119.7		
57965	W.GRDNR7	345	57981	LACYGNE7	345	1	57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	869.0	1354.4	123.2	971.0					
								58036	OLATHEE5	161	58046	OXFORD	5	161	1	LN	224.0	153.0	295.8	132.0	132.0			
57968	STILWEL7	345	57981	LACYGNE7	345	1	57965	W.GRDNR7	345	57981	LACYGNE7	345	1	LN	1099.0	693.0	1209.6	110.1						
								58067	CENTENL5	161	58069	PAOLA	5	161	1	LN	174.0	131.0	197.2	113.3	129.0	202.7	116.5	
								57965	W.GRDNR7	345	57977	CRAIG	7	345	1	LN	1099.0	507.0			687.0	1151.2	104.7	
								57965	W.GRDNR7	345	58105	WESPWR	5	345	1	LN	1099.0				912.0	1494.1	135.9	
57969	STILWEL5	161	58042	SPRGHL	5	161	1	57237	CRAIG	J3	115	57273	TIMBRLN3	115	1	LN	92.0	56.0	119.1	129.5	57.0	120.1	130.5	
								57237	CRAIG	J3	115	57261	PENTAGN3	115	1	LN	92.0	56.0	119.7	130.1	57.0	120.7	131.1	
57969	STILWEL5	161	58053	REDEL	5	161	1	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	48.0	50.8	101.7	48.0	50.9	101.8	
57973	HAWTHRN5	161	58011	CHOUTEU5	161	1	57973	HAWTHRN5	161	58027	RANDLPH5	161	1	LN	293.0	259.0	309.2	105.5	254.0	300.6	102.6			
								57976	LEVEE	5	161	57985	NEAST	5	161	1	LN	293.0	224.0	326.0	111.3	213.0	309.7	105.7
57973	HAWTHRN5	161	58027	RANDLPH5	161	1	57973	HAWTHRN5	161	58011	CHOUTEU5	161	1	LN	293.0	214.0	299.0	102.0	204.0					
								57976	LEVEE	5	161	57985	NEAST	5	161	1	LN	293.0	224.0	314.9	107.5	213.0	301.7	103.0
57976	LEVEE	5	161	57985	NEAST	5	161	1	57985	NEAST	5	161	58011	CHOUTEU5	161	1	LN	293.0	192.0	296.9	101.3	182.0		

KCPL Transmission Planning

Feasibility Study – Customer

					57973 HAWTHRN5 161 58027 RANDLPH5 161 1 LN	293.0	259.0	313.8	107.1	254.0	304.9	104.1
					57973 HAWTHRN5 161 58011 CHOUTEU5 161 1 LN	293.0	214.0	317.6	108.4	204.0	301.9	103.0
57985 NEAST	5	161	58011	CHOUTEU5 161 1	57973 HAWTHRN5 161 58027 RANDLPH5 161 1 LN	293.0	259.0	303.6	103.6	254.0	295.0	100.7
					57976 LEVEE 5 161 57985 NEAST 5 161 1 LN	293.0	224.0	315.3	107.6	213.0	299.1	102.1
57985 NEAST	5	161	58018	NKANCTY5 161 1	57973 HAWTHRN5 161 58027 RANDLPH5 161 1 LN	293.0	259.0	300.4	102.5	254.0	299.1	102.1
58002 MARTCIT5	161	58053	REDEL	5 161 1	59239 HSNVL 5 161 59295 HSNVL 269.0 1 TR	50.0	48.0	50.5	100.9	48.0	50.5	101.0
58015 AVONDAL5	161	58027	RANDLPH5	161 1	57976 LEVEE 5 161 57985 NEAST 5 161 1 LN	293.0	224.0	307.1	104.8	213.0		
58066 S.OTTWA5	161	58069	PAOLA	5 161 1	58067 CENTENL5 161 58069 PAOLA 5 161 1 LN	174.0	131.0	182.3	104.7	129.0		
59207 ARCHIE	5	161	59240	ADRIAN 5 161 1	59239 HSNVL 5 161 59295 HSNVL 269.0 1 TR	50.0	48.0	52.3	104.6	48.0	52.6	105.2
59216 BUTLER_5	161	59240	ADRIAN	5 161 1	59239 HSNVL 5 161 59295 HSNVL 269.0 1 TR	50.0	48.0	51.7	103.3	48.0	52.0	103.9
59224 LNGVW	5	161	59249	HOOKRD 5 161 1	59239 HSNVL 5 161 59295 HSNVL 269.0 1 TR	50.0	48.0	50.6	101.2	48.0	50.5	101.1
59225 PHILL	5	161	59243	LKWINGB5 161 1	59239 HSNVL 5 161 59295 HSNVL 269.0 1 TR	50.0	48.0	50.9	101.8	48.0	50.9	101.7
59243 LKWINGB5	161	59249	HOOKRD	5 161 1	59239 HSNVL 5 161 59295 HSNVL 269.0 1 TR	50.0	48.0	50.7	101.4	48.0	50.7	101.3
96071 5CLINTN	161	57995	MONTROS5	161 1	59239 HSNVL 5 161 59295 HSNVL 269.0 1 TR	50.0	48.0	51.7	103.3	48.0	52.0	104.0
57965 W.GRDNR7	345	58105	WESPWR	5 345 1	58036 OLATHEE5 161 58046 OXFORD 5 161 1 LN	224.0	153.0			132.0	318.3	142.1
					57968 STILWEL7 345 57981 LACYGNE7 345 1 LN	1099.0	869.0			971.0	1608.8	146.4
57981 LACYGNE7	345	58105	WESPWR	5 345 1	57968 STILWEL7 345 57981 LACYGNE7 345 1 LN	1099.0	869.0			971.0	1248.1	113.6
69702 ST JOE	3	345	57982	IATAN 7 345 1	57152 CIRCLVL3 115 57165 HTI JCT3 115 1 LN	92.0	74.0			78.0	96.7	105.1
58062 SALSBRY5	161	58064	NORTON-5	161 1	59217 WINDSR 5 161 96071 5CLINTN 161 1 LN	123.0	88.0			96.0	126.3	102.7
59208 NEVADA	5	161	59216	BUTLER_5 161 1	59239 HSNVL 5 161 59295 HSNVL 269.0 1 TR	50.0	48.0			48.0	50.3	100.7

Branch Violations

Table D-2 Base Case vs Customer 345kV plant with 520 MW and LaCygne-Raymore, Nashua XF additions.

*** MUST 4.00 *** THU, SEP 06 2001 7:44 ***
 1-2001 SOUTHWEST POWER POOL POWER FLOW MODEL
 2004 SUMMER PEAK (04SP) BASE CASE -- UPDATE 5

start: 9:11:51 AM
 end: 9:12:01 AM
 elapsed: 0:00:10

Notes:

04 Summer Base Case vs Customer 345kV plant with 520MW generation and system improvements - LaCygne to Raymore 345kV + Nashua xf

*****Comparison of Base case flows to Contingency flows*****

Contingency	Monitored Element	Rating	Base Case		Study Case			
			Normal	Contingency Flow % of Rating	Normal	Contingency Flow % of Rating		
56765 HOYT 7 345 56766 JEC N 7 345 1	57151 AUBURN 3 115 57179 S GAGEW3 115 2 LN	108.0	67.0	120.7	111.8	66.0	117.7	109.0
	57151 AUBURN 3 115 57179 S GAGEW3 115 1 LN	84.0	56.0	102.1	121.6	56.0	99.6	118.5
	57151 AUBURN 3 115 57166 INDIANH3 115 1 LN	118.0	87.0	158.3	134.2	86.0	154.6	131.0
56765 HOYT 7 345 56772 STRANGR7 345 1	57182 TECHILE3 115 57270 STULL T3 115 1 LN	92.0	47.0	93.0	101.1	43.0		
	57153 COLINE 3 115 57201 COLINE3X1.00 1 TR	60.0	47.0	66.8	111.4	46.0	64.6	107.7
	57152 CIRCLVL3 115 57165 HTI JCT3 115 1 LN	92.0	74.0	108.6	118.0	78.0	110.5	120.1
56853 LAWHILL6 230 56855 MIDLAND6 230 1	56853 LAWHILL6 230 57250 LWRNCHL3 115 1 TR	280.0	229.0	343.3	122.6	225.0	336.4	120.1
56853 LAWHILL6 230 57250 LWRNCHL3 115 1	56855 MIDLAND6 230 57252 MIDLAND3 115 1 TR	280.0	165.0	306.7	109.5	162.0	300.4	107.3
56855 MIDLAND6 230 57252 MIDLAND3 115 1	56853 LAWHILL6 230 57250 LWRNCHL3 115 1 TR	280.0	229.0	343.3	122.6	225.0	336.4	120.2
57011 HALSTDN4 138 57012 HALSTDS4 138 1	57012 HALSTDS4 138 57736 HALSTED269.0 1 TR	50.0	35.0	86.7	173.4	35.0	86.7	173.5
57011 HALSTDN4 138 57013 MOUND 4 138 1	57012 HALSTDS4 138 57736 HALSTED269.0 1 TR	50.0	35.0	51.3	102.6	35.0	51.3	102.7
57012 HALSTDS4 138 57065 SG12COL4 138 1	57035 CHISHLM4 138 57786 CHISHLM269.0 1 TR	150.0	112.0	155.8	103.8	112.0	155.9	103.9
57035 CHISHLM4 138 57064 17TH 4 138 1	57035 CHISHLM4 138 57786 CHISHLM269.0 1 TR	150.0	112.0	151.8	101.2	112.0	152.2	101.5
57040 EVANS N4 138 57065 SG12COL4 138 1	57035 CHISHLM4 138 57786 CHISHLM269.0 1 TR	150.0	112.0	157.5	105.0	112.0	157.6	105.1
57151 AUBURN 3 115 57166 INDIANH3 115 1	57151 AUBURN 3 115 57179 S GAGEW3 115 1 LN	84.0	56.0	85.7	102.0	56.0	84.6	100.7
57151 AUBURN 3 115 57179 S GAGEW3 115 2	57151 AUBURN 3 115 57179 S GAGEW3 115 1 LN	84.0	56.0	89.6	106.7	56.0	88.4	105.2
57179 S GAGEW3 115 57185 29EVENG3 115 1	57151 AUBURN 3 115 57166 INDIANH3 115 1 LN	118.0	87.0	123.1	104.3	86.0	121.8	103.3
57182 TECHILE3 115 57187 27CROCO3 115 2	57182 TECHILE3 115 57187 27CROCO3 115 1 LN	68.0	39.0	71.3	104.9	39.0	71.9	105.7
57211 ARNOLD 3 115 57268 STRANGR3 115 1	57153 COLINE 3 115 57201 COLINE3X1.00 1 TR	60.0	47.0	71.8	119.6	46.0	70.8	118.1
	57216 KERFORD3 115 57259 NW LEAV3 115 1 LN	68.0	14.0	83.4	122.6	14.0	83.7	123.1

KCPL Transmission Planning

Feasibility Study – Customer

57234	BISMAR3	115	57236	COOP	3	115	1	57250	LWRNCHL3	115	57280	WREN	3	115	1	LN	141.0	112.0	151.3	107.3	111.0	149.7	106.2	
57235	CAPTAIN3	115	57240	EUDORA	3	115	1	57237	CRAIG J3	115	57273	TIMBRLN3	115	1	LN	92.0	56.0	105.2	114.4	58.0	104.3	113.4		
								57237	CRAIG J3	115	57261	PENTAGN3	115	1	LN	92.0	56.0	105.5	114.6	58.0	104.5	113.6		
57235	CAPTAIN3	115	57278	WAVERLY3	115	1		57237	CRAIG J3	115	57273	TIMBRLN3	115	1	LN	92.0	56.0	105.3	114.4	58.0	104.4	113.5		
								57237	CRAIG J3	115	57261	PENTAGN3	115	1	LN	92.0	56.0	105.5	114.7	58.0	104.6	113.7		
57239	ESAAPJ	3	115	57255	MOONLTJ3	115	1	57237	CRAIG J3	115	57261	PENTAGN3	115	1	LN	92.0	56.0	92.5	100.6	58.0				
57239	ESAAPJ	3	115	57278	WAVERLY3	115	1	57237	CRAIG J3	115	57261	PENTAGN3	115	1	LN	92.0	56.0	92.5	100.5	58.0				
57240	EUDORA	3	115	57277	WAKARUS3	115	1	57237	CRAIG J3	115	57273	TIMBRLN3	115	1	LN	92.0	56.0	114.4	124.3	58.0	113.4	123.3		
								57237	CRAIG J3	115	57261	PENTAGN3	115	1	LN	92.0	56.0	114.7	124.6	58.0	113.7	123.6		
57250	LWRNCHL3	115	57280	WREN	3	115	1	57234	BISMAR3	115	57236	COOP	3	115	1	LN	118.0	68.0	119.1	100.9	67.0			
57253	MOCKBRD3	115	57271	SWLWRNC3	115	1		57250	LWRNCHL3	115	57280	WREN	3	115	1	LN	141.0	112.0	159.3	113.0	111.0	156.7	111.1	
57267	SPRINGH3	115	58042	SPRGHL	5	161	1	57237	CRAIG J3	115	57273	TIMBRLN3	115	1	LN	92.0	56.0	119.2	129.6	58.0	122.1	132.7		
								57237	CRAIG J3	115	57261	PENTAGN3	115	1	LN	92.0	56.0	119.7	130.1	58.0	122.6	133.2		
57413	CIRCLE	3	115	57415	DAVIS	3	115	1	57412	ARKVALJ3	115	57435	3	VANBU3	115	1	LN	68.0	44.0	80.3	118.0	44.0	80.3	118.0
								57412	ARKVALJ3	115	57413	CIRCLE	3	115	1	LN	68.0	48.0	84.1	123.7	48.0	84.1	123.7	
57965	W.GRDNR7	345	57977	CRAIG	7	345	1	57966	WGARDNR5	161	58044	MOONLT	5	161	1	LN	293.0	171.0	311.1	106.2	173.0	313.3	106.9	
57965	W.GRDNR7	345	57981	LACYGNE7	345	1		57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	869.0	1354.4	123.2	653.0				
								58036	OLATHEE5	161	58046	OXFORD	5	161	1	LN	224.0	153.0	295.8	132.0	146.0			
57968	STILWEL7	345	57981	LACYGNE7	345	1		57965	W.GRDNR7	345	57981	LACYGNE7	345	1	LN	1099.0	693.0	1209.6	110.1					
								58067	CENTENL5	161	58069	PAOLA	5	161	1	LN	174.0	131.0	197.2	113.3	117.0			
57969	STILWEL5	161	58042	SPRGHL	5	161	1	57237	CRAIG J3	115	57273	TIMBRLN3	115	1	LN	92.0	56.0	119.1	129.5	58.0	122.0	132.6		
								57237	CRAIG J3	115	57261	PENTAGN3	115	1	LN	92.0	56.0	119.7	130.1	58.0	122.6	133.2		
57969	STILWEL5	161	58053	REDEL	5	161	1	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	48.0	50.8	101.7	48.0			
57973	HAWTHRN5	161	58011	CHOUTEU5	161	1		57973	HAWTHRN5	161	58027	RANDLPH5	161	1	LN	293.0	259.0	309.2	105.5	231.0				
								57976	LEVEE	5	161	57985	NEAST	5	161	1	LN	293.0	224.0	326.0	111.3	206.0	295.6	100.9
57973	HAWTHRN5	161	58027	RANDLPH5	161	1		57973	HAWTHRN5	161	58011	CHOUTEU5	161	1	LN	293.0	214.0	299.0	102.0	197.0				
								57976	LEVEE	5	161	57985	NEAST	5	161	1	LN	293.0	224.0	314.9	107.5	206.0		
57976	LEVEE	5	161	57985	NEAST	5	161	1	57985	NEAST	5	161	58011	CHOUTEU5	161	1	LN	293.0	192.0	296.9	101.3	175.0		
								57973	HAWTHRN5	161	58027	RANDLPH5	161	1	LN	293.0	259.0	313.8	107.1	231.0				
								57973	HAWTHRN5	161	58011	CHOUTEU5	161	1	LN	293.0	214.0	317.6	108.4	197.0				
57985	NEAST	5	161	58011	CHOUTEU5	161	1	57973	HAWTHRN5	161	58027	RANDLPH5	161	1	LN	293.0	259.0	303.6	103.6	231.0				
								57976	LEVEE	5	161	57985	NEAST	5	161	1	LN	293.0	224.0	315.3	107.6	206.0		

KCPL Transmission Planning

Feasibility Study – Customer

57985	NEAST	5	161	58018	NKANCTY5	161	1	57973	HAWTHRN5	161	58027	RANDLPH5	161	1	LN	293.0	259.0	300.4	102.5	231.0		
58002	MARTCIT5	161	58053	REDEL	5	161	1	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	48.0	50.5	100.9	48.0	
58015	AVONDAL5	161	58027	RANDLPH5	161	1	57976	LEVEE	5	161	57985	NEAST	5	161	1	LN	293.0	224.0	307.1	104.8	206.0	
58066	S.OTTWA5	161	58069	PAOLA	5	161	1	58067	CENTENL5	161	58069	PAOLA	5	161	1	LN	174.0	131.0	182.3	104.7	117.0	
59207	ARCHIE	5	161	59240	ADRIAN	5	161	1	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	48.0	52.3	104.6	48.0
59216	BUTLER_5	161	59240	ADRIAN	5	161	1	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	48.0	51.7	103.3	48.0	
59224	LNGVW	5	161	59249	HOOKRD	5	161	1	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	48.0	50.6	101.2	48.0
59225	PHILL	5	161	59243	LKWINGB5	161	1	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	48.0	50.9	101.8	48.0	
59243	LKWINGB5	161	59249	HOOKRD	5	161	1	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	48.0	50.7	101.4	48.0	
96071	5CLINTN	161	57995	MONTROS5	161	1	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	48.0	51.7	103.3	48.0		
57038	COWSKIN4	138	57041	EVANS	S4	138	1	57041	EVANS	S4	138	57053	LAKERDG4	138	1	LN	371.0	280.0		280.0	373.3	100.6
57965	W.GRDNR7	345	58105	WESPWR	5	345	1	58036	OLATHEE5	161	58046	OXFORD	5	161	1	LN	224.0	153.0		146.0	295.8	132.0
69702	ST JOE	3	345	57982	IATAN	7	345	1	57152	CIRCLVL3	115	57165	HTI JCT3	115	1	LN	92.0	74.0		78.0	95.0	103.3
56765	HOYT	7	345	56804	HOYT	7X1.00	1	57151	AUBURN	3	115	57166	INDIANH3	115	1	LN	118.0	87.0		86.0	130.8	110.9
56772	STRANGR7	345	56811	STRANG7X1.00	1	57153	COLINE	3	115	57201	COLINE3X1.00	1	TR	60.0	47.0		46.0	70.5	117.5			
56804	HOYT	7X1.00	57163	HOYT	3	115	1	57151	AUBURN	3	115	57166	INDIANH3	115	1	LN	118.0	87.0		86.0	130.8	110.9
56811	STRANG7X1.00	57268	STRANGR3	115	1	57153	COLINE	3	115	57201	COLINE3X1.00	1	TR	60.0	47.0		46.0	70.5	117.5			
56861	EMANHAT6	230	58758	CONCORD6	230	1	57152	CIRCLVL3	115	57165	HTI JCT3	115	1	LN	92.0	74.0		78.0	95.8	104.2		
56949	TECHIL5X1.00	57182	TECHILE3	115	1	57182	TECHILE3	115	57884	UCB	114.0	1	TR	9.0	3.0		3.0	10.9	121.4			
57011	HALSTDN4	138	57736	HALSTED269.0	2	57012	HALSTDS4	138	57736	HALSTED269.0	1	TR	50.0	35.0		35.0	54.4	108.7				
57013	MOUND	4	138	57742	MOUND	269.0	1	57012	HALSTDS4	138	57736	HALSTED269.0	1	TR	50.0	35.0		35.0	51.4	102.7		
57049	HOOVERN4	138	57806	HOOVERS269.0	1	57049	HOOVERN4	138	57805	HOOVERN269.0	3	TR	150.0	114.0		115.0	158.5	105.7				