



SPP *Southwest Power Pool*

***System Impact Study SPP-2001-305
For Transmission Service
Requested By
Aquila Energy Marketing Corp.***

From MPS To KACY

***For a Reserved Amount Of 200MW
From 1/1/03
To 1/1/05***

SPP Coordinated Planning

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1. Executive Summary

Aquila Energy Marketing Corp. has requested a system impact study for long-term Firm Point-to-Point transmission service from MPS to KACY. The period of the transaction is from 1/1/03 to 1/1/05. The request is for OASIS reservations 303472 and 303473 for a total amount of 200 MW.

The principal objective of this study is to identify system problems and potential system modifications necessary to facilitate the additional 200 MW transfer while maintaining system reliability. Analysis was conducted for the requested service period above and for the remaining planning horizon from 1/1/05 to 4/1/09. The additional evaluation of the planning horizon was conducted to determine any future constraints that may limit the renewal of service.

New overloads caused by the 200 MW transfer were identified along with determining the impact of the transfer on any previously assigned and identified facilities.

The MPS to KACY 200 MW transfer causes new facility overloads on the SPP transmission system, as well as increasing the loading on previously identified facilities. To provide the 200MW of service requested, upgrades must be completed for those facilities that limit the ATC to less than 200MW.

2. Introduction

Aquila Energy Marketing Corp. has requested an impact study for transmission service from MPS to KACY.

The principal objective of this study is to identify the restraints on the SPP Regional Tariff System that may limit the transfer to less than 200 MW. This study includes steady-state contingency analyses (PSS/E function ACCC) and Available Transfer Capability (ATC) analyses for the requested service period and the remaining planning horizon.

The steady-state analyses consider the impact of the 200 MW transfer on transmission line loading and transmission bus voltages for outages of single and selected multiple transmission lines and transformers on the SPP system.

3. Study Methodology

A. Description

Two analyses were conducted to determine the impact of the 200 MW transfer on the system. The first analysis was conducted to identify any new overloads caused by the 200 MW transfer. The second analysis was done to ensure that available capacity exists on previously identified circuits. Both analyses were performed on the models available for the requested service period and all remaining models available from the 2002-planning horizon.

The first analysis was to study the steady-state analysis impact of the 200 MW transfer on the SPP system. The second step was to study Available Transfer Capability (ATC) of the facilities identified in the steady-state analysis impact. The steady-state analysis was done to ensure current SPP Criteria and NERC Planning Standards requirements are fulfilled. The Southwest Power Pool (SPP) conforms to the NERC Planning Standards, which provide the strictest requirements, related to thermal overloads with a contingency. It requires that all facilities be within emergency ratings after a contingency.

The second analysis was done to determine the impact of the transfer on previously assigned and identified facilities.

B. Model Updates

SPP used eleven seasonal models to study the MPS to KACY 200 MW transfers for their requested service periods and the remaining planning horizon. The SPP 2002 Series Cases 2002/03 Winter Peak, 2003 April Minimum, 2003 Spring Peak, 2003 Summer Peak, 2003 Fall Peak, 2003/04 Winter Peak and 2004 Spring Peak were used to study the impact of the 200 MW transfer on the SPP system during the requested service period of 1/1/03 to 1/1/05. The SPP 2002 Series 2005 Summer Peak, 2005/06 Winter Peak, 2008 Summer Peak and 2008/09 Winter Peak were used to study the impact of the 200 MW transfer on the SPP system during the remaining planning horizon from 1/1/05 to 4/1/09. The Spring Peak models apply to April and May, the Summer Peak models apply to June through September, the Fall Peak models apply to October and November, and the Winter Peak models apply to December through March.

The chosen base case models were modified to reflect the most current modeling information. The cases were modified to reflect future firm transfers during the requested service period that were not already included in the January 2002 base case series models.

C. Transfer Analysis

Using the created models and the ACCC function of PSS/E, single and select double contingency outages were analyzed. Then full AC solution was used to obtain the most accurate results possible. Any facility overloaded, using MVA ratings, in the transfer case and not overloaded in the base case was flagged. The PSS/E options chosen to conduct the Impact Study analysis can be found in Appendix A.

4. Study Results

A. Study Analysis Results

Tables 1, 2, and 3 contain the analysis results of the System Impact Study. The tables identify the seasonal case in which the event occurred; the emergency rating of the overloaded circuit (Rate B), the contingent loading percentage of circuit with and without the studied transfer, the estimated ATC value using interpolation if calculated, any SPP identification or assignment of the event, and any solutions received from the transmission owners.

Table 1 shows the new SPP facility overloads caused by the 200 MW transfer. Available solutions are given in the table.

Table 2 documents overloads on Non SPP Regional Tariff participants' transmission systems caused by the 200 MW transfer.

Table 3 documents the 200 MW transfer impact on previously assigned and identified SPP facilities. Available solutions are given in the table.

Tables 1a and 3a of Appendix B documents the modeling representation of the events identified in Tables 1 and 3 respectively to include bus numbers and bus names.

Table 1 – SPP Facility Overloads caused by the MPS to KACY 200 MW Transfer

Study Year	From Area - To Area	Branch Over 100% Rate B	Rate B	BC % Loading	TC % Loading	Outaged Branch Causing Overload	ATC (MW)	Comment
02WP		None				None	200	
03AP		None				None	200	
03G		None				None	200	
03SP	KACP-KACP	Hawthorne - Randolph 161kV	335	98.7	106.0	Chouteau - Hawthorne 161kV	35	Solution Undetermined, 05SP Rate B = 588MVA
03SP	KACP-KACP	Hawthorne - Randolph 161kV	335	97.3	104.6	Chouteau - Neast 161kV	73	Solution Undetermined, 05SP Rate B = 588MVA
03SP	KACY-KACY	Levee - Owens Corning 69kV	82	95.5	102.3	Everett - Quindaro 69kV	132	Solution Undetermined
03SP	KACP-KACP	Avondale - Randolph 161kV	335	93.4	100.9	Levee - Neast 161kV	175	Solution Undetermined, 05SP Rate B = 588MVA
03FA		None				None	200	
03WP		None				None	200	
04G		None				None	200	
05SP		None				None	200	
05WP		None				None	200	
08SP		None				None	200	
08WP		None				None	200	

Table 2 – Non - SPP Facility Overloads caused by the MPS to KACY 200 MW Transfer

Study Year	From Area - To Area	Branch Over 100% Rate B	Rate B	BC % Loading	TC % Loading	Outaged Branch Causing Overload
02WP		None				None
03AP		None				None
03G		None				None
03SP	AECI-AECI	96096 5MARIES 161 to 97184 2MARIES 69.0 CKT 2	25	99.0	100.5	96096 5MARIES 161 to 97184 2MARIES 69.0 CKT1
03SP	AECI-AECI	96096 5MARIES 161 to 97184 2MARIES 69.0 CKT 3	25	99.1	100.6	96096 5MARIES 161 to 97184 2MARIES 69.0 CKT1
03FA		None				None
03WP		None				None
04G		None				None
05SP		None				None
05WP		None				None
08SP	AECI-AECI	96108 5OSCEOL 161 to 96811 2OSCEOL 69.0 CKT 1	56	99.0	100.3	52698 STOCKTN5 161 to 96108 5OSCEOL 161 CKT1
08SP	MIPU-MIPU	59239 HSNVL 5 161 to 59295 HSNVL 2 69.0 CKT 1	63	108.4	109.6	59225 PHILL 5 161 to 59280 PHILL 2 69.0 CKT1
08SP	MIPU-MIPU	59288 RGAFB 2 69.0 to 59284 GRD/VWTP269.0 CKT 1	53	110.0	110.4	59225 PHILL 5 161 to 59280 PHILL 2 69.0 CKT1
08WP	MIPU-MIPU	59239 HSNVL 5 161 to 59295 HSNVL 2 69.0 CKT 1	63	106.6	107.4	59225 PHILL 5 161 to 59280 PHILL 2 69.0 CKT1

Table 3 – Previously Identified SPP Facilities Impacted by the MPS to KACY 200 MW Transfer

Study Year	From Area - To Area	Branch Over 100% Rate B	Rate B Loading	BC % Loading	TC % Loading	Outaged Branch Causing Overload	ATC (MW)	Comment
02WP	WERE-WERE	Auburn Road - Jeffrey Energy Center 230kV	565	101.1	101.2	Hoyt - Jeffrey Energy Center 345kV	200	Westar Transmission Operating Directive 400
02WP	WERE-WERE	Auburn Road - South Gage 115KV #1	75	114.3	115.1	Hoyt - Jeffrey Energy Center 345kV	200	"
02WP	WERE-WERE	Auburn Road - South Gage 115KV #2	97	104.4	105.2	Hoyt - Jeffrey Energy Center 345kV	200	"
02WP	WERE-WERE	Auburn Road - Indian Hills 115kV	118	107.1	107.9	Hoyt - Jeffrey Energy Center 345kV	200	"
03AP	SWPA-SWPA	Springfield 161/69kV Transformer #3	25	99.7	103.6	Springfield 161/69kV Transformer #1	15	Replace 25MVA transformer #3 with 80MVA transformer, \$1,300,000
03FA	WERE-WERE	Circleville - Hoyt HTI Switching JCT 115kV	97	99.8	100.1	Hoyt - Stranger Creek 345kV	200	Westar Transmission Operating Directive 803
03G	WERE-WERE	East Street - West Emporia 115kV	92	103.3	103.5	Morris County 230/115/13.8kV Transformer	200	Westar Transmission Operating Directive 625
03SP	KACP-KACP	Hawthorne - Randolph 161kV	335	100.5	108.0	Levee - Neast 161kV	0	Solution Undetermined, 05SP Rate B = 588MVA
03SP	WERE-WERE	Auburn Road - Jeffrey Energy Center 230kV	565	107.3	107.5	Hoyt - Jeffrey Energy Center 345kV	200	Westar Transmission Operating Directive 400
03SP	WERE-WERE	Auburn Road - South Gage 115KV #2	97	111.0	111.7	Hoyt - Jeffrey Energy Center 345kV	200	"
03SP	WERE-WERE	Circleville - Hoyt HTI Switching JCT 115kV	97	101.6	102.0	Hoyt - Stranger Creek 345kV	200	Westar Transmission Operating Directive 803
03SP	WERE-WERE	Jarbalo Jct Sw. Sta. - 166th Street 115kV	97	98.5	101.6	Craig - Stranger Creek 345kV	200	Westar Transmission Operating Directive 1202
03SP	WERE-WERE	Jarbalo Jct Sw. Sta. - 166th Street 115kV	97	99.0	102.7	Midland Junction - Pentagon 115kV	200	"
03SP	WERE-WERE	Lawrence Hill 230/115/13.8 Transformer	308	108.6	110	Midland Junction 230/115/18kV Transformer	200	Westar Transmission Operating Directive 615
03SP	WERE-WERE	Lawrence Hill 230/115/13.8 Transformer	308	108.7	110	Lawrence Hill - Midland Junction 230kV	200	Westar Transmission Operating Directive 901
03SP	WERE-WERE	County Line 115/69/34/5kV Transformer	66	102.7	103.8	Hoyt - Stranger Creek 345kV	200	Westar Transmission Operating Directive 803
03SP	WERE-WERE	County Line 115/69/34/5kV Transformer	66	114.2	114.7	Stranger Creek 345/115/14.4kV Transformer	200	Westar Transmission Operating Directive 612
03SP	WERE-WERE	County Line 115/69/34/5kV Transformer	66	112.6	113.2	Arnold - Stranger Creek 115kV	200	Westar Transmission Operating Directive 1200
03WP	EDE-EDE	Stockton Northwest 69/34.5/12.5kV Transformer	94	117.3	117.4	Fairplay East 69/34.5/12.5kV Transformer	0	Solution Undetermined
03WP	WERE-WERE	Auburn Road - Jeffrey Energy Center 230kV	565	102.4	102.7	Hoyt - Jeffrey Energy Center 345kV	200	Westar Transmission Operating Directive 400
03WP	WERE-WERE	Auburn Road - South Gage 115KV #1	75	103.4	104.3	Hoyt - Jeffrey Energy Center 345kV	200	"
04G	WERE-WERE	Stull Switch - Tecumseh Hill 115kV	92	99.6	101.7	Hoyt - Stranger Creek 345kV	200	Westar Transmission Operating Directive 803
05SP	OKGE-OKGE	Beeline - Tibbens 69kV	66	102.7	102.8	Bluebell 138/69kV Transformer	200	OKGE Transmission Operating Directive
05SP	WERE-WERE	Auburn Road - Jeffrey Energy Center 230kV	565	110.6	110.9	Hoyt - Jeffrey Energy Center 345kV	200	Westar Transmission Operating Directive 400
05SP	WERE-WERE	Circleville - Hoyt HTI Switching JCT 115kV	97	101.7	102.0	Hoyt - Stranger Creek 345kV	200	Westar Transmission Operating Directive 803
05SP	WERE-WERE	Stull Switch - Tecumseh Hill 115kV	92	100.0	102.0	Hoyt - Stranger Creek 345kV	200	"
05SP	WERE-WERE	Jarbalo Jct Sw. Sta. - 166th Street 115kV	97	101.8	105.6	Craig - Stranger Creek 345kV	200	Westar Transmission Operating Directive 1202
05SP	WERE-WERE	Jarbalo Jct Sw. Sta. - 166th Street 115kV	97	102.7	107.2	Midland Junction - Pentagon 115kV	200	"
05SP	WERE-WERE	Lawrence Hill - Wren 115kV	141	101.1	101.6	Mockingbird Hill Switch - Southwest Lawrence 115kV	200	Westar Transmission Operating Directive 1211
05SP	WERE-WERE	Lawrence Hill 230/115/13.8 Transformer	308	110.1	111.6	Midland Junction 230/115/18kV Transformer	200	Westar Transmission Operating Directive 615
05SP	WERE-WERE	Lawrence Hill 230/115/13.8 Transformer	308	110.2	111.8	Lawrence Hill - Midland Junction 230kV	200	Westar Transmission Operating Directive 901
05SP	WERE-WERE	County Line 115/69/34/5kV Transformer	66	104.3	105.4	Hoyt - Stranger Creek 345kV	200	Westar Transmission Operating Directive 803
05SP	WERE-WERE	County Line 115/69/34/5kV Transformer	66	120	120.7	Stranger Creek 345/115/14.4kV Transformer	200	Westar Transmission Operating Directive 612
05SP	WERE-WERE	County Line 115/69/34/5kV Transformer	66	112	112.6	Arnold - Stranger Creek 115kV	200	Westar Transmission Operating Directive 1200
05WP	EDE-EDE	Stockton Northwest 69/34.5/12.5kV Transformer	94	138.6	138.7	Fairplay East 69/34.5/12.5kV Transformer	0	Solution Undetermined
05WP	WERE-WERE	Auburn Road - Jeffrey Energy Center 230kV	565	100.9	101.1	Hoyt - Jeffrey Energy Center 345kV	200	Westar Transmission Operating Directive 400

Table 3-continued – Previously Identified SPP Facilities Impacted by the MPS to KACY 200 MW Transfer

Study Year	From Area - To Area	Branch Over 100% Rate B	Rate B	BC % Loading	TC % Loading	Outaged Branch Causing Overload	ATC (MW)	Comment
08SP	SWPA-SWPA	Springfield 161/69kV Transformer #3	25	112.6	112.7	James River - Plainview 69kV	0	Replace 25MVA transformer #3 with 80MVA transformer, \$1,300,000
08SP	SWPA-SPRM	Brookline - Springfield 161kV	323	108.3	108.4	Battlefield - Southwest Disposal 161kV	0	Solution Undetermined
08SP	WFEC-OKGE	Franklin Switch - Midwest Tap 138kV	215	106.7	106.8	Pharoah - Wetumka 138kV	0	Replace 600A metering CTs with 1200A, \$55,000
08SP	WERE-WERE	Arnold - Midwest Grain Solvents Jct2 69kV	41	103.7	104.0	Arnold - Parallel 115kV	0	Solution Undetermined
08SP	WERE-WERE	Litchfield 161/69/13.2kV Transformer	110	102.8	103.2	Litchfield 161/69/13.2kV Transformer	0	"
08SP	WERE-WERE	Stull Switch - Tecumseh Hill 115kV	92	102.4	104.2	Lawrence Hill 230/115/13.8 Transformer	0	"
08SP	WERE-WERE	Stull Switch - Tecumseh Hill 115kV	92	111.1	112.6	Stranger Creek 345/115/14.4kV Transformer	0	"
08SP	WERE-WERE	Mockingbird Hill Switch - Stull Switch 115kV	92	103.6	105.2	Stranger Creek 345/115/14.4kV Transformer	0	"
08SP	WERE-WERE	Auburn Road - Jeffrey Energy Center 230kV	565	113.3	113.6	Hoyt - Jeffrey Energy Center 345kV	200	Westar Transmission Operating Directive 400
08SP	WERE-WERE	Circleville - Hoyt HTI Switching JCT 115kV	97	109.0	109.3	Hoyt - Stranger Creek 345kV	200	Westar Transmission Operating Directive 803
08SP	WERE-WERE	Stull Switch - Tecumseh Hill 115kV	92	113.9	116.1	Hoyt - Stranger Creek 345kV	200	"
08SP	WERE-WERE	Jarbalo Jct Sw. Sta. - 166th Street 115kV	97	108.8	112.7	Craig - Stranger Creek 345kV	200	Westar Transmission Operating Directive 1202
08SP	WERE-WERE	Jarbalo Jct Sw. Sta. - 166th Street 115kV	97	98.7	102.3	Captain Junction - Eudora Township 115kV	200	"
08SP	WERE-WERE	Jarbalo Jct Sw. Sta. - 166th Street 115kV	97	101.9	105.6	Eudora Township - Wakarus Junction Switching Station 115kV	200	"
08SP	WERE-WERE	Jarbalo Jct Sw. Sta. - 166th Street 115kV	97	109.8	114.5	Midland Junction - Pentagon 115kV	200	"
08SP	WERE-WERE	Mockingbird Hill Switch - Stull Switch 115kV	92	106.6	108.8	Hoyt - Stranger Creek 345kV	200	Westar Transmission Operating Directive 803
08SP	WERE-WERE	Lawrence Hill - Wren 115kV	141	110.5	111.1	Mockingbird Hill Switch - Southwest Lawrence 115kV	200	Westar Transmission Operating Directive 1211
08SP	WERE-WERE	Lawrence Hill 230/115/13.8 Transformer	308	115.2	116.9	Midland Junction 230/115/18kV Transformer	200	Westar Transmission Operating Directive 615
08SP	WERE-WERE	Lawrence Hill 230/115/13.8 Transformer	308	115.2	117	Lawrence Hill - Midland Junction 230kV	200	Westar Transmission Operating Directive 901
08SP	WERE-WERE	Midland Junction 230/115/18kV Transformer	308	103.1	104.5	Lawrence Hill 230/115/13.8 Transformer	200	Westar Transmission Operating Directive 631
08SP	WERE-WERE	County Line 115/69/34/5kV Transformer	66	119.6	120.3	Arnold - Stranger Creek 115kV	200	Westar Transmission Operating Directive 1200
08SP	WERE-WERE	County Line 115/69/34/5kV Transformer	66	111.4	112.5	Hoyt - Stranger Creek 345kV	200	Westar Transmission Operating Directive 803
08SP	WERE-WERE	County Line 115/69/34/5kV Transformer	66	131	131.6	Stranger Creek 345/115/14.4kV Transformer	200	Westar Transmission Operating Directive 612
08SP	WERE-WERE	County Line 115/69/34/5kV Transformer	41	102.3	102.8	Stranger Creek 345/115/14.4kV Transformer	200	"
08WP	WERE-WERE	Auburn Road - Jeffrey Energy Center 230kV	565	104.9	105.0	Hoyt - Jeffrey Energy Center 345kV	200	Westar Transmission Operating Directive 400
08WP	WERE-WERE	Circleville - Hoyt HTI Switching JCT 115kV	97	100.0	100.3	Hoyt - Stranger Creek 345kV	200	Westar Transmission Operating Directive 803
08WP	WERE-WERE	Stull Switch - Tecumseh Hill 115kV	92	100.2	102.4	Hoyt - Stranger Creek 345kV	200	"

5. Conclusion

The MPS to KACY 200 MW transfer causes new facility overloads on the SPP transmission system, as well as increasing the loading on previously identified facilities. To provide the 200MW of service requested, upgrades must be completed for those facilities given in Tables 1 and 3 that limit the ATC to less than 200MW.

The final cost assignment of facilities and ATC to Aquila Energy Marketing Corp. will be determined upon the completion of a facility study.

Appendix A

PSS/E CHOICES IN RUNNING LOAD FLOW PROGRAM AND ACCC

BASE CASES:

Solutions - Fixed slope decoupled Newton-Raphson solution (FDNS)

1. Tap adjustment – Stepping
2. Area interchange control – Tie lines only
3. Var limits – Apply immediately
4. Solution options - Phase shift adjustment
 - Flat start
 - Lock DC taps
 - Lock switched shunts

ACCC CASES:

Solutions – AC contingency checking (ACCC)

1. MW mismatch tolerance – 0.5
2. Contingency case rating – Rate B
3. Percent of rating – 100
4. Output code – Summary
5. Min flow change in overload report – 1mw
6. Excl'd cases w/ no overloads form report – YES
7. Exclude interfaces from report – NO
8. Perform voltage limit check – YES
9. Elements in available capacity table – 60000
10. Cutoff threshold for available capacity table – 99999.0
11. Min. contng. case Vltg chng for report – 0.02
12. Sorted output – None

Newton Solution:

1. Tap adjustment – Stepping
2. Area interchange control – Tie lines only
3. Var limits - Apply automatically
4. Solution options - Phase shift adjustment
 - Flat start
 - Lock DC taps
 - Lock switched shunts

Appendix B

Table 1a – Model Data for SPP Facility Overloads caused by the MPS to KACY 200 MW Transfer

Study Year	From Area - To Area	Branch Over 100% Rate B	Rate B	BC % Loading	TC % Loading	Outaged Branch Causing Overload	ATC (MW)	Comment
02WP		None				None	200	
03AP		None				None	200	
03G		None				None	200	
03SP	KACP-KACP	58027 RANDLPH5 161 to 57973 HAWTHRN5 161 CKT 1	335	98.7	106.0	57973 HAWTHRN5 161 to 58011 CHOUTEU5 161 CKT1	35	Solution Undetermined, 05SP Rate B = 588MVA
03SP	KACP-KACP	58027 RANDLPH5 161 to 57973 HAWTHRN5 161 CKT 1	335	97.3	104.6	57985 NEAST 5 161 to 58011 CHOUTEU5 161 CKT1	73	Solution Undetermined, 05SP Rate B = 588MVA
03SP	KACY-KACY	58683 OWN COR269.0 to 58686 LEVEE 269.0 CKT 1	82	95.5	102.3	58682 EVERETT269.0 to 58692 QUIN 269.0 CKT1	132	Solution Undetermined
03SP	KACP-KACP	58015 AVONDAL5 161 to 58027 RANDLPH5 161 CKT 1	335	93.4	100.9	57976 LEVEE 5 161 to 57985 NEAST 5 161 CKT1	175	Solution Undetermined, 05SP Rate B = 588MVA
03FA		None				None	200	
03WP		None				None	200	
04G		None				None	200	
05SP		None				None	200	
05WP		None				None	200	
08SP		None				None	200	
08WP		None				None	200	

Table 3a – Model Data for Previously Identified SPP Facilities Impacted by the MPS to KACY 200 MW Transfer

Study Year	From Area - To Area	Branch Over 100% Rate B	Rate B	BC % Loading	TC % Loading	Outaged Branch Causing Overload	ATC (MW)	Comment
02WP	WERE-WERE	56852 JEC 6 230 to 56851 AUBURN 6 230 CKT 1	565	101.1	101.2	56765 HOYT 7 345 to 56766 JEC N 7 345 CKT1	200	Westar Transmission Operating Directive 400
02WP	WERE-WERE	57151 AUBURN 3 115 to 57179 S GAGEW3 115 CKT 1	75	114.3	115.1	56765 HOYT 7 345 to 56766 JEC N 7 345 CKT1	200	"
02WP	WERE-WERE	57151 AUBURN 3 115 to 57179 S GAGEW3 115 CKT 2	97	104.4	105.2	56765 HOYT 7 345 to 56766 JEC N 7 345 CKT1	200	"
02WP	WERE-WERE	57166 INDIANH3 115 to 57151 AUBURN 3 115 CKT 1	118	107.1	107.9	56765 HOYT 7 345 to 56766 JEC N 7 345 CKT1	200	"
03AP	SWPA-SWPA	52692 SPRGFLD5 161 to 52694 SPRGFLD269.0 CKT 3	25	99.7	103.6	52692 SPRGFLD5 161 to 52694 SPRGFLD269.0 CKT 1	15	Replace 25MVA transformer #3 with 60MVA transformer, \$1,300,000
03FA	WERE-WERE	57165 HTI JCT3 115 to 57152 CIRCLV1.3 115 CKT 1	97	99.8	100.1	56765 HOYT 7 345 to 56772 STRANGR7 345 CKT1	200	Westar Transmission Operating Directive 803
03G	WERE-WERE	57301 EAST ST3 115 57309*WEMPOR13 115 1	92	103.3	103.5	56863MORRIS 6230 to 57305 MORRIS 3115 to 56890 MORRIS 113.8 CKT 1	200	Westar Transmission Operating Directive 625 Solution Undetermined, 05SP Rate B =
03SP	KACP-KACP	58027 RANDLPH5 161 to 57973 HAWTHRN5 161 CKT 1	335	100.5	108.0	57976 LEVEE 5 161 to 57985 NEAST 5 161 CKT1	0	Westar Transmission Operating Directive 400
03SP	WERE-WERE	56851 AUBURN 6 230 to 56852 JEC 6 230 CKT 1	565	107.3	107.5	56765 HOYT 7 345 to 56766 JEC N 7 345 CKT1	200	"
03SP	WERE-WERE	57151 AUBURN 3 115 to 57179 S GAGEW3 115 CKT 2	97	111.0	111.7	56765 HOYT 7 345 to 56766 JEC N 7 345 CKT1	200	"
03SP	WERE-WERE	57165 HTI JCT3 115 to 57152 CIRCLV1.3 115 CKT 1	97	101.6	102.0	56765 HOYT 7 345 to 56772 STRANGR7 345 CKT1	200	Westar Transmission Operating Directive 803
03SP	WERE-WERE	57244 JARBALO3 115 to 57233 166TH 3 115 CKT 1	97	98.5	101.6	56772 STRANGR7 345 to 57977 CRAIG 7 345 CKT1	200	Westar Transmission Operating Directive 1202
03SP	WERE-WERE	57244 JARBALO3 115 to 57233 166TH 3 115 CKT 1	97	99.0	102.7	57252 MIDLAND3 115 to 57261 PENTAGN3 115 CKT1	200	"
03SP	WERE-WERE	56853*LAWHILL6 230 LAHWL29X	308	108.6	110	56855 MIDLAND6230 to 57252 MIDLAND3115 to 56884 MIDLAND118 CKT 1	200	Westar Transmission Operating Directive 615
03SP	WERE-WERE	56853*LAWHILL6 230 LAHWL29X	308	108.7	110	56853 LAWHILL6230 to 56855 MIDLAND6230 CKT 1	200	Westar Transmission Operating Directive 901
03SP	WERE-WERE	57153*COLINE 3 115 COLINE5X	66	102.7	103.8	56765 HOYT 7345 to 56772 STRANGR7345 CKT 1	200	Westar Transmission Operating Directive 803
03SP	WERE-WERE	57153*COLINE 3 115 COLINE5X	66	114.2	114.7	56772 STRANGR7345 to 57268 STRANGR3115 to 56811 STRANGR114.4 CKT 1	200	Westar Transmission Operating Directive 612
03SP	WERE-WERE	57153*COLINE 3 115 COLINE5X	66	112.6	113.2	57211 ARNOLD 3115 to 57268 STRANGR3115 CKT 1	200	Westar Transmission Operating Directive 1200
03WP	EDE-EDE	59568*STK324 269.0 STOCK34	9.4	117.3	117.4	59545 FRP217 269 to 59635 FRP217 134.5 to 59717 FRP217112.5 CKT 1	0	Solution Undetermined
03WP	WERE-WERE	56852 JEC 6 230 to 56851 AUBURN 6 230 CKT 1	565	102.4	102.7	56765 HOYT 7 345 to 56766 JEC N 7 345 CKT1	200	Westar Transmission Operating Directive 400
03WP	WERE-WERE	57151 AUBURN 3 115 to 57179 S GAGEW3 115 CKT 1	75	103.4	104.3	56765 HOYT 7 345 to 56766 JEC N 7 345 CKT1	200	"
04G	WERE-WERE	57182 TECHILE3 115 to 57270 STULL T3 115 CKT 1	92	99.6	101.7	56765 HOYT 7 345 to 56772 STRANGR7 345 CKT1	200	Westar Transmission Operating Directive 803
05SP	OKGE-OKGE	59237 TIBBENS269.0 to 55246 BEELINE269.0 CKT 1	66	102.7	102.8	55241 BLUEBEL269.0 to 55242 BLUEBEL4 138 CKT1	200	OKGE Transmission Operating Directive
05SP	WERE-WERE	56851 AUBURN 6 230 to 56852 JEC 6 230 CKT 1	565	110.6	110.9	56765 HOYT 7 345 to 56766 JEC N 7 345 CKT1	200	Westar Transmission Operating Directive 400
05SP	WERE-WERE	57165 HTI JCT3 115 to 57152 CIRCLV1.3 115 CKT 1	97	101.7	102.0	56765 HOYT 7 345 to 56772 STRANGR7 345 CKT1	200	Westar Transmission Operating Directive 803
05SP	WERE-WERE	57182 TECHILE3 115 to 57270 STULL T3 115 CKT 1	92	100.0	102.0	56765 HOYT 7 345 to 56772 STRANGR7 345 CKT1	200	"
05SP	WERE-WERE	57244 JARBALO3 115 to 57233 166TH 3 115 CKT 1	97	101.8	105.6	56772 STRANGR7 345 to 57977 CRAIG 7 345 CKT1	200	Westar Transmission Operating Directive 1202
05SP	WERE-WERE	57244 JARBALO3 115 to 57233 166TH 3 115 CKT 1	97	102.7	107.2	57252 MIDLAND3 115 to 57261 PENTAGN3 115 CKT1	200	"
05SP	WERE-WERE	57280 WREN 3 115 to 57250 LWRNCHL3 115 CKT 1	141	101.1	101.6	57253 MOCKBRD3 115 to 57271 SWLWRN3 115 CKT1	200	Westar Transmission Operating Directive 1211
05SP	WERE-WERE	56853*LAWHILL6 230 LAHWL29X	308	110.1	111.6	56855 MIDLAND6230 to 57252 MIDLAND3115 to 56884 MIDLAND118 CKT 1	200	Westar Transmission Operating Directive 615
05SP	WERE-WERE	56853*LAWHILL6 230 LAHWL29X	308	110.2	111.8	56853 LAWHILL6230 to 56855 MIDLAND6230 CKT 1	200	Westar Transmission Operating Directive 901
05SP	WERE-WERE	57153*COLINE 3 115 COLINE5X	66	104.3	105.4	56765 HOYT 7345 to 56772 STRANGR7345 CKT 1	200	Westar Transmission Operating Directive 803
05SP	WERE-WERE	57153*COLINE 3 115 COLINE5X	66	120	120.7	56772 STRANGR7345 to 57268 STRANGR3115 to 56811 STRANGR114.4 CKT 1	200	Westar Transmission Operating Directive 612
05SP	WERE-WERE	57153*COLINE 3 115 COLINE5X	66	112	112.6	57211 ARNOLD 3115 to 57268 STRANGR3115 CKT 1	200	Westar Transmission Operating Directive 1200
05WP	EDE-EDE	59568*STK324 269.0 STOCK34	9.4	138.6	138.7	59545 FRP217 269 to 59635 FRP217 134.5 to 59717 FRP217112.5 CKT 1	0	Solution Undetermined
05WP	WERE-WERE	56852 JEC 6 230 to 56851 AUBURN 6 230 CKT 1	565	100.9	101.1	56765 HOYT 7 345 to 56766 JEC N 7 345 CKT1	200	Westar Transmission Operating Directive 400

Table 3a-continued – Model Data for Previously Identified SPP Facilities Impacted by the MPS to KACY 200 MW Transfer

Study Year	From Area - To Area	Branch Over 100% Rate B	Rate B	BC % Loading	TC % Loading	Outaged Branch Causing Overload	ATC (MW)	Comment
08SP	SWPA-SWPA	52692 SPRGFLD5 161 to 52694 SPRGFLD269.0 CKT 3	25	112.6	112.7	59904 JRPS 269.0 to 59905 PLAINV269.0 CKT1	0	Replace 25MVA transformer #3 with 80MVA transformer. \$1,300,000
08SP	SWPA-SPRM	52692 SPRGFLD5 161 to 59969 BRKLINE 5 161 CKT 1	323	108.3	108.4	59959 BATFLD 5 161 to 59960 SWDISP 5 161 CKT1	0	Solution Undetermined
08SP	WFEC-OKGE	55917 FRNKLNS4 138 to 54946 MIDWEST4 138 CKT 1	215	106.7	106.8	56026 PHAROAH4 138 to 56084 WETUMKA4 138 CKT1	0	Replace 600A metering CTs with 1200A, \$55,000
08SP	WERE-WERE	57479 MWSOLJ2289.0 to 57471 ARNOLD 269.0 CKT 1	41	103.7	104.0	57211 ARNOLD 3 115 to 57218 PARALEL3 115 CKT1	0	Solution Undetermined
08SP	WERE-WERE	58932*LITCH 5 161 LITCH 1X 1	110	102.8	103.2	58932 LITCH 5161 to 57765 LITCH 269 to 58953 LITCH 113.2 CKT 1	0	"
08SP	WERE-WERE	57182 TECHILE3 115 57270*STULL T3 115 1	92	102.4	104.2	56853 LAWHILL6230 to 57250 LWRNCHL3115 to 56882 LAWHILL113.8 CKT 1	0	"
08SP	WERE-WERE	57182*TECHILE3 115 57270*STULL T3 115 1	92	111.1	112.6	56772 STRANGR7345 to 57268 STRANGR3115 to 56811 STRANGR114.4 CKT 1	0	"
08SP	WERE-WERE	57253 MOCKBRD3 115 57270*STULL T3 115 1	92	103.6	105.2	56772 STRANGR7345 to 57268 STRANGR3115 to 56811 STRANGR114.4 CKT 1	0	"
08SP	WERE-WERE	56851 AUBURN 6 230 to 56852 JEC 6 230 CKT 1	565	113.3	113.6	56765 HOYT 7 345 to 56766 JEC N 7 345 CKT1	200	Westar Transmission Operating Directive 400
08SP	WERE-WERE	57165 HTI JCT3 115 to 57152 CIRCLVL3 115 CKT 1	97	109.0	109.3	56765 HOYT 7 345 to 56772 STRANGR7 345 CKT1	200	Westar Transmission Operating Directive 803
08SP	WERE-WERE	57182 TECHILE3 115 to 57270 STULL T3 115 CKT 1	92	113.9	116.1	56765 HOYT 7 345 to 56772 STRANGR7 345 CKT1	200	"
08SP	WERE-WERE	57244 JARBAL03 115 to 57233 166TH 3 115 CKT 1	97	108.8	112.7	56772 STRANGR7 345 to 57977 CRAIG 7 345 CKT1	200	Westar Transmission Operating Directive 1202
08SP	WERE-WERE	57244 JARBAL03 115 to 57233 166TH 3 115 CKT 1	97	98.7	102.3	57235 CAPTAIN3 115 to 57240 EUDORA 3 115 CKT1	200	"
08SP	WERE-WERE	57244 JARBAL03 115 to 57233 166TH 3 115 CKT 1	97	101.9	105.6	57240 EUDORA 3 115 to 57277 WAKARUS3 115 CKT1	200	"
08SP	WERE-WERE	57244 JARBAL03 115 to 57233 166TH 3 115 CKT 1	97	109.8	114.5	57252 MIDLAND3 115 to 57261 PENTAGN3 115 CKT1	200	"
08SP	WERE-WERE	57270 STULL T3 115 to 57253 MOCKBRD3 115 CKT 1	92	106.6	108.8	56765 HOYT 7 345 to 56772 STRANGR7 345 CKT1	200	Westar Transmission Operating Directive 803
08SP	WERE-WERE	57280 WREN 3 115 to 57250 LWRNCHL3 115 CKT 1	141	110.5	111.1	57253 MOCKBRD3 115 to 57271 SWLWRNC3 115 CKT1	200	Westar Transmission Operating Directive 1211
08SP	WERE-WERE	56853*LAWHILL6 230 LAWHL29X	308	115.2	116.9	56855 MIDLAND6230 to 57252 MIDLAND3115 to 56884 MIDLAND118 CKT 1	200	Westar Transmission Operating Directive 615
08SP	WERE-WERE	56855*LAWHILL6 230 LAWHL29X 1	308	115.2	117	56853 LAWHILL6230 to 56855 MIDLAND6230 CKT 1	200	Westar Transmission Operating Directive 901
08SP	WERE-WERE	56855*MIDLAND6 230 MIDJ126X 1	308	103.1	104.5	56853 LAWHILL6230 to 57250 LWRNCHL3115 to 56882 LAWHILL113.8 CKT 1	200	Westar Transmission Operating Directive 631
08SP	WERE-WERE	57153*COLINE 3 115 COLINE5X	66	119.6	120.3	57211 ARNOLD 3115 to 57268 STRANGR3115 CKT 1	200	Westar Transmission Operating Directive 1200
08SP	WERE-WERE	57153*COLINE 3 115 COLINE5X 1	66	111.4	112.5	56765 HOYT 7345 to 56772 STRANGR7345 CKT 1	200	Westar Transmission Operating Directive 803
08SP	WERE-WERE	57153*COLINE 3 115 COLINE5X 1	66	131	131.6	56772 STRANGR7345 to 57268 STRANGR3115 to 56811 STRANGR114.4 CKT 1	200	Westar Transmission Operating Directive 612
08SP	WERE-WERE	57456 COLINE 269.0 57458*ROCKCRK269.0 1	41	102.3	102.8	56772 STRANGR7345 to 57268 STRANGR3115 to 56811 STRANGR114.4 CKT 1	200	"
08WP	WERE-WERE	56852 JEC 6 230 to 56851 AUBURN 6 230 CKT 1	565	104.9	105.0	56765 HOYT 7 345 to 56766 JEC N 7 345 CKT1	200	Westar Transmission Operating Directive 400
08WP	WERE-WERE	57165 HTI JCT3 115 to 57152 CIRCLVL3 115 CKT 1	97	100.0	100.3	56765 HOYT 7 345 to 56772 STRANGR7 345 CKT1	200	Westar Transmission Operating Directive 803
08WP	WERE-WERE	57182 TECHILE3 115 to 57270 STULL T3 115 CKT 1	92	100.2	102.4	56765 HOYT 7 345 to 56772 STRANGR7 345 CKT1	200	"