



SPP *Southwest Power Pool*

*System Impact Study
For Transmission Service
Requested By
Energetix*

*From Oklahoma Gas & Electric to
Entergy*

*For a Reserved Amount Of 750MW
From 1/1/04
To 1/1/07*

SPP Transmission Planning

Table of Contents

1. EXECUTIVE SUMMARY	3
2. INTRODUCTION	4
3. STUDY METHODOLOGY	5
A. DESCRIPTION.....	5
B. MODEL UPDATES.....	5
C. TRANSFER ANALYSIS.....	6
4. STUDY RESULTS	7
A. STUDY ANALYSIS RESULTS.....	7
TABLE 1 - TRANSMISSION PROJECT ADDITIONS PROPOSED IN SPP SYSTEM IMPACT STUDY SPP-2000-108	
.....	8
TABLE 2 - TRANSMISSION PROJECT ADDITIONS PROPOSED IN SPP SYSTEM IMPACT STUDY SPP-2000-109	
.....	8
TABLE 3 – UPGRADES ASSIGNED TO SPP SYSTEM IMPACT STUDY SPP-2000-108	8
TABLE 4 – UPGRADES ASSIGNED TO SPP SYSTEM IMPACT STUDY SPP-2000-109	9
TABLE 5 – SPP FACILITIES OVERLOADED DUE TO 750MW TRANSFER FROM OKGE TO EES.....	10
TABLE 6 – NON-SPP FACILITY OVERLOADS CAUSED BY THE 750MW OKGE TO EES TRANSFER.....	23
TABLE 7 - SPP FACILITY OVERLOADS FOUND IN TABLE 5 THAT ARE RELIEVED DUE TO THE MUSKOGEE –	
ANO 500K V LINE ADDITION.....	25
TABLE 8 – NON - SPP FACILITY OVERLOADS FOUND IN TABLE 6 THAT ARE RELIEVED DUE TO THE	
MUSKOGEE – ANO 500K V LINE ADDITION	28
TABLE 9 – FACILITY UPGRADES REQUIRED IN ADDITION TO THE PROPOSED MUSKOGEE TO ANO 500K V	
LINE	29
5. CONCLUSION	34
APPENDIX A	35

Revised April 30, 2001 To Include ATC Values, Calculated By Linear Interpolation, For Identified Facility Overloads In Tables 5 and 9. This information was inadvertently left out of the initial System Impact Study.

1. Executive Summary

Energetix has requested a system impact study for long-term Firm Point-to-Point transmission service from Oklahoma Gas & Electric to Entergy. The period of the transaction is from 1/1/04 to 1/1/07. This is a 750MW request for the following reservations: 221104, 221106, 221107, and 221109-221114

The principal objective of this study is to identify system problems and potential system modifications necessary to facilitate the additional 750MW transfer while maintaining system reliability. New overloads caused by the 750MW transfer were determined along with monitoring any previously assigned facilities that were further overloaded by the transfer.

The previously requested Power Resource Group 670MW transfers from AEPW to Entergy and AEPW to Ameren are included in the models used for this study. The results of this analysis for the 750MW transfer are dependent on the completion of the upgrades assigned to these transmission requests, as well as the transmission projects that are proposed. These transmission requests and completed System Impact Studies are:

- ?? System Impact Study SPP-2000-108 for transmission request 212202, 670MW from AEPW to EES. The transmission projects proposed for this study are the Pittsburg to NW Texarkana to McNeil 500KV transmission line and the Dolet Hills to Coshatta 345kV transmission line. The details of these transmission lines are given in Table 1. These lines were proposed to relieve the facilities that were overloaded by the 670MW transfer from AEPW to EES and to improve system reliability.
- ?? System Impact Study SPP-2000-109 for transmission request 212203, 670MW from AEPW to AMRN. The transmission project proposed for this study is the Callaway to Montrose to La Cygne 345kV transmission line. The details of this line are given in Table 2. The line was proposed to expand the firm contract path capacity between SPP and AMRM and to improve system reliability. The line is necessary to provide the capacity needed for the 670MW transfer from AEPW to AMRN.

Using the updated models, an analysis was performed to determine the impact of the 750MW transfer on all SPP and Non-SPP facilities. Due to the facility overloads caused by the 750MW transfer, SPP proposes the addition of a 500kV transmission line connecting Muskogee to Arkansas Nuclear One. The analysis performed in the study shows that the addition of this transmission line relieves a majority of the overloaded facilities caused by the OKGE-EES 750MW transfer and improves system reliability.

2. Introduction

Energetix has requested an impact study for transmission service from OKGE control area with a sink of EES.

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 750MW and to propose additional transmission projects that will relieve the overloads caused by the transfer.

The impact of the 750MW transfer on the system was initially studied with no additional proposed transmission projects included. The new facilities that were overloaded due to the 750MW transfer are documented. The Muskogee to ANO 500kV line was proposed to relieve constraints and provide system reliability. This project was included in the models and the impact of the 750MW transfer was again studied. The results of these analyses are given in the report.

This study includes steady-state contingency analyses (PSS/E function ACCC) which considers the impact of the 750MW 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

The steady-state analyses of the impact of the 750MW on SPP and Non-SPP facilities 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.

An analysis was first conducted to determine the impact of the 750MW on SPP and Non-SPP facilities. Any new facilities that were overloaded or any previously assigned facilities further impacted by the transfer were documented in the report.

Initially, an analysis was performed on the system without the addition of any new transmission projects to determine the overloads that were caused by the 750MW transfer. From this study, it was found that the OKGE to EES transfer caused several new overloads in the system, as well as further overloading facilities that had previously been assigned to other transmission customers. The addition of the proposed Muskogee (OKGE) to Arkansas Nuclear One (EES) relieves 33 overloaded SPP facilities while improving system reliability. The details of this line are given below:

Branch		Length	R	X	B	Rate A	Rate B
Muskogee – ANO	MSKGE8 500 to 8ANO 500	122 miles	0.00202	0.02762	2.67267	1732	1732

The facilities that were relieved due to the line addition are documented in [Table 7](#). Though several of the overloaded SPP facilities were relieved by the 500kV line addition, some initial overloads caused by the transfer still exist. These remaining SPP facilities, which are given in [Table 9](#), are required to be upgraded in order to provide the capacity needed to allow the 750MW transfer.

B. Model Updates

SPP used five seasonal models to study the 750MW request. The SPP 2000 Series Cases 2001 Spring Peak, 2004 Summer Peak, 2004/2005 Winter Peak, 2006 Summer Peak, and 2006/2007 Winter Peak were used to study the impact of the 750MW transfer on the SPP system during the transaction period of 1/1/04 to 1/1/07. The 2001 Spring Peak model is representative of the Spring Peaks throughout the length of the reservation.

Included in the models is the previously studied 670MW transfer from AEPW to EES and the 670MW transfer from AEPW to AMRN. The proposed transmission projects for these transmission requests are also included. These projects are the Pittsburg – NW Texarkana – McNeil 500kV line and the 345kV line from Dolet Hills to tap the Mt. Olive to Hartburg 500kV line and the Callaway – Montrose – La Cygne 345kV transmission line.

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 request period that were not already included in the January 2000 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

The two 670MW transfers previously studied in System Impact Studies SPP-2000-108 and SPP-2000-109 are included in the models for this impact study. The transmission line projects that were proposed to provide the available capacity needed for these transactions are documented in Tables 1 and 2. In addition to the proposed transmission projects, the customer for these two previous studies is responsible for the necessary upgrades required to relieve the overloaded facilities found in Tables 3 and 4.

Tables 5, 6, 8, 7 and 9 document the results of the analyses performed for the 750MW transfer. 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 or proposed line, the estimated ATC value using linear interpolation if calculated, any SPP identification or assignment of the event, and any solutions received from the transmission owners.

Tables 5 and 6 document the results of the initial analysis of the 750MW transfer. The initial analysis was performed on the system without the addition of the Muskogee to ANO 500kV transmission line. Table 5 details the SPP facilities that were overloaded due to the 750MW transfer from OKGE to EES. The Non-SPP facilities overloaded by this transfer are shown in Table 6.

After determining the new overloads caused by the 750MW transfer, the proposed 500kV line was added to the system. Tables 7 and 8 document the new facility overloads found in Table 5 and 6 relieved by the addition of the Muskogee to ANO 500kV line. It was found that 33 SPP facilities that were overloaded by the 750MW transfer were relieved with the 500kV line addition. These facilities are given in Table 7. Table 8 shows the Non-SPP facilities relieved by the transmission line.

Though the addition of the new transmission line project relieved several of the overloads caused by the 750MW transfer, some facilities still remain overloaded. The facilities, outlined in Table 9, are required to be upgraded prior to the approval of the 750MW transfer.

Table 1 - Transmission Project Additions Proposed in SPP System Impact Study SPP-2000-108

Project	Length	R	X	B	Rate A	Rate B
Pittsburg to NW Texarkana, 500kV PITTSB-8 500 TO NWTXARK8 500	140 miles	0.00232	0.0317	3.067	1732	1732
NW Texarkana to McNeil, 500kV NWTXARK8 500 TO NWXARK8 500	65 miles	0.00108	0.01471	1.424	1732	1732
Dolet Hills to Coushatta, 500kV DOLHILL7 345 TO CHOUSHT7 345	28 miles	0.00148	0.01352	0.23423	1011	1176

Table 2 - Transmission Project Additions Proposed in SPP System Impact Study SPP-2000-109

Project	Length	R	X	B	Rate A	Rate B
Callaway to Montrose, 345kV CALAWY 1 345 to MONTROS7 345	127 miles	0.00599	0.06208	1.08224	1060	1426
Montrose to La Cygne, 345kV MONTROS7 345 to LACYGNE7 345	43 miles	0.00203	0.02102	0.36643	1060	1426

Table 3 – Upgrades Assigned to SPP System Impact Study SPP-2000-108

Study Year	From Area To Area	Branch Over 100% Rate B	RATEB	Outaged Branch That Caused Overload	Initial Limit, Available Solution and Cost, or Previous Assignment
04SP	OKGE-OKGE	PECAN CREEK 345/161KV TRANSFORMER 55235 PECAN7 345 to 55234 PECAN5 161 CKT 1	369	MUSKOGEE TO FORT SMITH, 345KV 55224 MSKGE7 345 to 55302 FTSMI7 345 CKT1	Add Second 369MVA 345/161KV Bus-Tie Transformer \$3,500,000
04SP	AEPW-SWPA	EUREKA SPRINGS TO BEAVER 161KV 53136 EUREKA 5 to 52680 BEAVER 5 1	274	"	SWPA Upgrade – Reconductor 5.98 miles with 1590MCM ACSR Conductor \$2,385,000
04SP	EMDE-EMDE	MONETT TO AURORA HT 161KV 59480 MON383 5 to 59468 AUR124 5 1	157	NW TEXARKANA TO MCNEIL, 500KV 53125 NWTXARK8 500 to 17543 8MCNEIL 500 CKT1	For 1999-015 2005SP Taken Out By EMDE

Table 4 – Upgrades Assigned to SPP System Impact Study SPP-2000-109

Study Year	From Area To Area	Branch Over 100% Rate B	RATEB	Outaged Branch That Caused Overload	Initial Limit, Available Solution and Cost, or Previous Assignment
04SP	AEPW-AEPW	LOWELL REC TO ROGERS, 69KV 53200 LOWELLR269.0 to 53152 ROGERS 269.0 CKT 1	72	FLINT CREEK TO GENTRY REC, 161KV 53139 FLINTCR5 161 to 53187 GENTRYR5 161 CKT1	350cu Breaker
04SP	AEPW-AEPW	ONETA TO BROKEN ARROW 101ST NORTH, 138KV 53818 ONETA--4 138 to 53781 BA101-N4 138 CKT 1	210	RIVERSIDE STATION AUTO TO RIVERSIDE STATION, 138KV 53785 RSSAUTO4 138 to 53795 R.S.S.-4 138 CKT1	Replace Wavetrap
04SP	GRRD-GRRD	KANSAS TO COLCORD TAP, 69KV 54515 KANSAS 269.0 to 54629 COLCOTP269.0 CKT 1	41	ZENA TAP TO JAY, 69KV 54467 ZENA TP269.0 to 54520 JAY GR 269.0 CKT1	Undetermined
04SP	OKGE-OKGE	CONTINENTAL TAP TO CHILOCCO, 69KV 54745 CONTT269.0 to 54744 CHLOC269.0 CKT 1	111	KILDARE TAP TO WHITE EAGLE, 138KV 54760 KILDR4 138 to 54761 WHEGL4 138 CKT1	Undetermined
04SP	AECI-KACP	CLINTON TO MONTROSE, 161KV 96071 5CLINTN 161 to 57995 MONTROS5 161 CKT 1	370	WEST GARDNER TO LACYGNE, 345KV 57965 W.GRDNR7 345 to 57981 LACYGNE7 345 CKT1	Terminal Equipment Limit
04SP	SWPA-SWPA	NORFORK 161/69KV TR 52648 NORFORK5 161 to 52650 NORFORK269.0 CKT 1	25	NORFORT TO WEST PLAINS, 161KV 52648 NORFORK5 161 to 96123 5WPLAIN 161 CKT1	Undetermined
04SP	AEPW-WERE	SOUTH COFFEEVILLE TO DEARING 138KV 53972 SCOFVLE4 to 56832 DEARING4 1	210	DELAWARE TO NEOSHO 345KV 53929 DELWARE7 to 56756 NEOSHO 7 1	Undetermined
04SP	AEPW-AEPW	CHEROKEE REC TO KNOX LEE 138KV 53522 CHEROKE4 to 53557 KNOXLEE4 1	303	Multiple Outage Contingency SW SHREVEPORT to DIANA 345KV 53454 SW SHV 7 to 53528 DIANA 7 CKT1 SW SHREVEPORT to LONGWOOD 345KV 53454 SW SHV 7 to 53424 LONGWD 7 CKT1	Undetermined
04SP	AEPW-AEPW	TATUM TO CHEROKEE REC 138KV 53611 TATUM 4 to 53522 CHEROKE4 1	287	Multiple Outage Contingency SW SHREVEPORT to DIANA 345KV 53454 SW SHV 7 to 53528 DIANA 7 CKT1 SW SHREVEPORT to LONGWOOD 345KV 53454 SW SHV 7 to 53424 LONGWD 7 CKT1	Undetermined
04WP	AEPW-AEPW	ROGERS TO LOWELL REC, 69KV 53152 ROGERS 269.0 to 53200 LOWELLR269.0 CKT 1	72	DYESS TO EAST ROGERS, 161KV 53131 DYESS 5 161 to 53135 EROGERS5 161 CKT1	350cu Breaker
04WP	GRRD-GRRD	AFTON 161/69KV TR 54432 AFTON 5 161 to 54433 AFTON 269.0 CKT 1	50	MIAMI TO AFTON, 161KV 54431 MIAMI 5 161 to 54432 AFTON 5 161 CKT1	Undetermined
04WP	SWPA-SWPA	NORFORK 161/69KV TR 52648 NORFORK5 161 to 52650 NORFORK269.0 CKT 1	25	NORFORK TO WEST PLAINS, 161KV 52648 NORFORK5 161 to 96123 5WPLAIN 161 CKT1	Undetermined
04WP	AEPW-WERE	SOUTH COFFEEVILLE TO DEARING 138KV 53972 SCOFVLE4 to 56832 DEARING4 1	210	DELAWARE TO NEOSHO 345KV 53929 DELWARE7 to 56756 NEOSHO 7 1	Undetermined

Table 5 – SPP Facilities Overloaded Due to 750MW Transfer From OKGE to EES

Study Year	From Area To Area	Branch Over 100% Rate B	RATEB	BC % I Loading	TC % I Loading	ATC	Outaged Branch That Caused Overload	Initial Limit, Available Solution and Cost, or Previous Assignment
01SR	CESW-WERE	COFFEYVILLE TAP TO DEARING, 138KV 53972 SCOFVLE4 138 to 56832 DEARING4 138 CKT 1	143	90.9	101.4	652	DELAWARE to NEOSHO, 345KV 53929 DELWARE7 345 to 56756 NEOSHO 7 345 CKT1	Assigned To 1999-010 2005WP Switch Replacements And Reset CTs \$48,065
01SR	OKGE-OKGE	DRAPER LAKE 345/138KV TRANSFORMER 54934 DRAPR7 345 to 54933 DRAPR4 138 CKT 1	493	86.6	106.0	519	DRAPER LAKE 345/138KV TRANSFORMER 54933 DRAPR4 138 to 54934 DRAPR7 345 CKT2	Modify Draper sub, convert to Breaker and one-half scheme, and add 3rd 493 MVA transformer \$8,000,000
01SR	OKGE-OKGE	DRAPER LAKE 345/138KV TRANSFORMER 54933 DRAPR4 138 to 54934 DRAPR7 345 CKT2	493	86.6	106.0	519	DRAPER LAKE 345/138KV TRANSFORMER 54934 DRAPR7 345 to 54933 DRAPR4 138 CKT 1	See Solution Above
01SR	OKGE-OKGE	DRAPER LAKE TO THUNDERBIRD, 345KV 54934 DRAPR7 345 to 54998 THNDER 7 345 CKT 1	717	N/A	105.1	714	THUNDERBIRD TO SEMINOLE, 345KV 54998 THNDER 7 345 to 55045 SEMNL7 345 CKT1	Replace Relays and 1200 Amp CTs at Draper \$50,000
01SR	OKGE-OKGE	THUNDERBIRD TO SEMINOLE, 345KV 54998 THNDER 7 345 to 55045 SEMNL7 345 CKT1	717	N/A	104.2	720	DRAPER LAKE TO THUNDERBIRD, 345KV 54934 DRAPR7 345 to 54998 THNDER 7 345 CKT 1	Replace Relays and 1200 Amp CTs at Seminole \$50,000
01SR	SWPA-SWPA	ROBERT S. KERR TO VAN BUREN, 161KV 52782 RS KERR5 161 to 52722 VAN BUR5 161 CKT 1	167	97.5	105.9	222	BONANZA TAP TO AES, 161KV 55261 BONZT5 161 to 55262 AES 5 161 CKT1	Replace 161- kV Disconnect Switches 31,33,35,&37 with 1200A Switches \$105,000
04SP	CESW-CESW	NW TEXARKANA 500/345KV TRANSFORMER 53125 NWTXARK8 500 to 53301 NWTXARK7 345 CKT 1	896	92.5	103.6	507	PITTSBURG 500/345KV TRANSFORMER 52819 PITTSB-8 500 to 54033 PITTSB-7 345 CKT1	Undetermined
04SP	CESW-CESW	BANN TO ALUMAX TAP, 138KV 53250 BANN 4 138 to 53245 ALUMXT 4 138 CKT 1	261	98.3	100.4	614	NW TEXARKANA-BANN T TO NW TEXARKANA 138KV 53299 NWT-BNT4 138 to 53300 NWTXARK4 138 CKT1	Reconductor 0.67 miles of 1024 ACAR with 1590 ACSR. \$233,000
04SP	CESW-CESW	GRANIS TO DEQUEEN, 69KV 53348 GRANIS 269.0 to 53257 DEQUEEN269.0 CKT 1	44	98.7	102.2	272	MENA 4 TO CRAIG JUNCTION, 138KV 53340 MENA 4 138 to 54015 CRAIGJT4 138 CKT1	Undetermined

Table 5 continued – SPP Facilities Overloaded Due to 750MW Transfer From OKGE to EES

Study Year	From Area To Area	Branch Over 100% Rate B	RATEB	BC % I Loading	TC % I Loading	ATC	Outaged Branch That Caused Overload	Initial Limit, Available Solution and Cost, or Previous Assignment
04SP	CESW-CESW	FERNDALE LAKE TAP TO PITTSBURG, 69KV 53531 FERNDTP269.0 to 53310 PITTSB_269.0 CKT 1	72	100.0	100.9	0	HOPEWELL REC TO WINFIELD, 69KV 53262 HOPEWEL269.0 to 53335 WINFIEL269.0 CKT1	Undetermined
04SP	CESW-CESW	BARTLESVILLE SE TO N BARTLESVILLE, 138KV 53940 BV-SE--4 138 to 53935 NBVILLE4 138 CKT 1	210	97.7	104.4	255	DELAWARE TO NORTHEAST STATION, 345KV 53929 DELWARE7 345 to 53955 N.E.S.-7 345 CKT1	Undetermined
04SP	CESW-CESW	WILBURTON TO LONE OAK, 69KV 54031 WILBURT269.0 to 54021 LONEOAK269.0 CKT 1	48	94.0	100.5	691	EUFAULA TO STIGLER TAP, 138KV 52774 EUFAULA4 138 to 54050 STIGLRT4 138 CKT1	14.3mi Line Initial Limit Switch
04SP	EES-CESW	OSAGE TO EUREKA SPRINGS, 161KV 17880 5OSAGE # 161 to 53136 EUREKA 5 161 CKT 1	244	97.4	103.2	337	TABLE ROCK TO RIVERSIDE, 161KV 52672 TABLE R5 161 to 59497 RVS438 5 161 CKT1	6.55mi 82%AEPW 18%Entergy Rebuild 5.56 miles of 666 ACSR with 1590 ACSR \$2,213,000 New Emergency Rating is 263MVA 7.8% Increase Applies Only to AEPW Portion of Line
04SP	EES-EMDE	OMAHA TO OZARK DAM, 161KV 17879 SOMAHA * 161 to 59474 OZD312 5 161 CKT 1	162	95.3	103.1	455	OSAGE TO EUREKA SPRINGS, 161KV 17880 5OSAGE # 161 to 53136 EUREKA 5 161 CKT 1	Entergy Owned Tie And Limit
04SP	GRRD-OKGE	TAHLEQUAH TO HWY 59, 161KV 54455 TAHLQH 5 161 to 55347 HWY 59 161 CKT 1	167	87.0	103.3	599	MUSKOGEE TO FORT SMITH, 345KV 55224 MSKGE7 345 to 55302 FTSMI7 345 CKT1	Initial Estimate Rebuild and Reconductor 47.5 miles of 250MCM Copperweld line with 477ACSR, \$17,800,000
04SP	OKGE-CESW	BONZT5 TO BONANZA, 161KV 55261 BONZT5 161 to 53126 BONANZA5 161 CKT 1	177	93.4	103.3	501	FORT SMITH TO ARKANSAS NUCLEAR ONE, 500KV 55305 FTSMI8 500 to 17632 8ANO 500 CKT1	.06mi 100% Owned by AEPW Conductor Limited Solution Not Available
04SP	OKGE-OKGE	CHILOCCO TAP TO THREE SANDS, 69KV 54744 CHLOC269.0 to 54762 THREE269.0 CKT 1	57	98.9	104.7	143	KILDARE TAP TO WHITE EAGLE, 138KV 54760 KILDR4 138 to 54761 WHEGL4 138 CKT1	Undetermined
04SP	OKGE-OKGE	KILDARE TAP TO WHITE EAGLE, 138KV 54760 KILDR4 138 to 54761 WHEGL4 138 CKT1	222	92.6	100.2	727	OSAGE TO CONTINENTAL TAP, 69KV 54742 OSAGE269.0 to 54745 CONTT269.0 CKT1	Replace 800 Amp trap at White Eagle \$25,000

Table 5 continued – SPP Facilities Overloaded Due to 750MW Transfer From OKGE to EES

Study Year	From Area To Area	Branch Over 100% Rate B	RATEB	BC % I Loading	TC % I Loading	ATC	Outaged Branch That Caused Overload	Initial Limit, Available Solution and Cost, or Previous Assignment
04SP	OKGE-OKGE	TINKER NO. 4 TO TINKER 2, 138KV 54988 TNKR44 138 to 54990 TNKR24 138 CKT 1	100	96.6	109.1	203	NE 10TH TO MIDWAY, 138KV 54964 NE10 4 138 to 54966 MIDWY4 138 CKT1	Initial Estimate Cable Relay Protected Replace one mile 138kV UG Cable \$1,000,000
04SP	OKGE-OKGE	SPRINGDALE TAP TO RUSSET,T 138K V 55172 SPRIN4 138 to 55120 RUSSET4 138 CKT 1	96	92.0	106.5	415	ARBUCKLE TO MILL CREEK TAP, 138KV 55117 ARB 4 138 to 55121 MILLC4 138 CKT1	Replace 400A wavetrapp & relays @ Russett \$50,000
04SP	OKGE-OKGE	HARDEN CITY TO AHLOSO TAP, 69KV 55186 HARDN269.0 to 55187 AHLOT269.0 CKT 1	52	96.1	108.5	236	VALLEY VIEW TAP TO VALLEY VIEW, 69KV 55181 VLVUT269.0 to 55182 VALVU269.0 CKT1	Undetermined
04SP	OKGE-OKGE	A OC PUMP TAP TO ADA OC PUMP, 69KV 55190 AOCPT269.0 to 55189 AOCPA269.0 CKT 1	52	85.4	101.0	700	PARKLANE TO AHLOSO TAP, 69KV 55177 PRKLN269.0 to 55187 AHLOT269.0 CKT1	Undetermined
04SP	OKGE-OKGE	PANAMA TO SKULLYVILLE, 69KV 55272 PANAM269.0 to 55270 SKULY269.0 CKT 1	39	96.7	100.6	643	BONANZA TAP TO AES, 161KV 55261 BONZT5 161 to 55262 AES 5 161 CKT1	Initial Estimate Rebuild an Re conductor 7.77miles of 0X7 Copper line with 477ACSR \$1,750,000
04SP	OKGE-OKGE	FT SMITH 345/161KV TRANSFORMER 55302 FTSMI7 345 to 55300 FTSMI5 161 CKT 1	493	96.7	110.0	187	FT SMITH 500/345KV TR ANSFORMER 55302 FTSMI7 345 to 55305 FTSMI8 500 CKT1	Convert To Breaker -and-one-half Scheme, And Add Third 493MVA Transformer \$6,000,000
04SP	OKGE-OKGE	DRAPER LAKE TO THUNDERBIRD, 345KV 54934 DRAPR7 345 to 54998 THNDER 7 345 CKT 1	717	61.0	116.8	524	DRAPER TO SEMINOLE, 345KV 54934 DRAPR7 345 to 55045 SEMNL7 345 CKT3	See Previous
04SP	OKGE-OKGE	DRAPER LAKE TO THUNDERBIRD, 345KV 54934 DRAPR7 345 to 54998 THNDER 7 345 CKT 1	717	N/A	105.0	714	THUNDERBIRD TO SEMINOLE, 345KV 54998 THNDER 7 345 to 55045 SEMNL7 345 CKT1	See Previous
04SP	OKGE-OKGE	THUNDERBIRD TO SEMINOLE, 345KV 54998 THNDER 7 345 to 55045 SEMNL7 345 CKT1	717	N/A	104.6	717	DRAPER LAKE TO THUNDERBIRD, 345KV 54934 DRAPR7 345 to 54998 THNDER 7 345 CKT 1	See Previous

Table 5 continued – SPP Facilities Overloaded Due to 750MW Transfer From OKGE to EES

Study Year	From Area To Area	Branch Over 100% Rate B	RATEB	BC % I Loading	TC % I Loading	ATC	Outaged Branch That Caused Overload	Initial Limit, Available Solution and Cost, or Previous Assignment
04SP	SWPA-CESW	BROKEN BOW TO CRAIG JUNCTION, 138KV 52814 BRKN BW4 138 to 54015 CRAIGJT4 138 CKT 1	107	85.5	101.4	683	BBDAMTP4 TO MOUNTAIN RIVER, 138KV 55823 BBDAMTP4 138 to 56004 MTRIVER4 138 CKT1	Undetermined
04SP	SWPA-SWPA	GLENCOE TO NORFORK, 161KV 52646 GLENCOE5 161 to 52648 NORFORK5 161 CKT 1	112	97.8	102.5	346	NEWPORT-INDUSTRIAL TO NEWPORT, 161KV 17821 5NEW-IN 161 to 17822 5NEWPO 161 CKT1	Undetermined
04SP	SWPA-SWPA	BULL SHOALS TO NORFORK, 161KV 52660 BULL SH5 161 to 52648 NORFORK5 161 CKT 1	167	92.4	103.4	517	MIDWAY TO MT. HOME, 161KV 17875 5MIDWAY# 161 to 17877 5MT HOM 161 CKT1	26.19 Mile Line Solution Not Available
04SP	SWPA-SWPA	SALLISAW TO VAN BUREN, 161KV 52750 SALLISAW5 161 to 52722 VAN BUR5 161 CKT 1	167	82.9	102.8	644	MUSKOGEE TO FORT SMITH, 345KV 55224 MSKGE7 345 to 55302 FTSMI7 345 CKT1	Increase clearances of approximately 20 spans to allow operation of line at 100C. This will increase the line capacity to 223 MW. \$1,000,000
04SP	SWPA-SWPA	GORE TO SALLISAW, 161KV 52752 GORE 5 161 to 52750 SALLISAW5 161 CKT 1	167	94.4	111.2	250	MUSKOGEE TO FORT SMITH, 345KV 55224 MSKGE7 345 to 55302 FTSMI7 345 CKT1	Increase clearances of approximately ten spans to allow operation of line at 100C. This will increase the line capacity to 223 MW. \$500,000
04SP	SWPA-SWPA	MUSKOGEE TAP TO GORE, 161KV 52758 MUSKTAP5 161 to 52752 GORE 5 161 CKT 1	206	90.9	100.2	732	MUSKOGEE TO FORT SMITH, 345KV 55224 MSKGE7 345 to 55302 FTSMI7 345 CKT1	Reconductor 16 miles of and replace wavetrap @ Gore \$5,600,000
04SP	WERE-WERE	MIDLAND JUNCTION 161/115 KV TRANSFORMER 56946 MIDLAND3 115 to 56807 MIDLAND5 161 CKT 1	183	98.3	101.3	429	HOYT TO STRANGER CREEK, 345KV 56752 HOYT 7 345 to 56758 STRANGR7 345 CKT1	Undetermined
04SP	WERE-WERE	GOLDEN PLAINS JUNCTION TO HESSTON, 69KV 57289 GOLDPLJ269.0 to 57291 HESSTON269.0 CKT 1	32	99.9	100.7	114	CHISHOLM TO EVANS ENERGY CENTER, 138KV 56856 CHISHLM4 138 to 56860 EVANS 4 138 CKT1	Undetermined
04SP	WFEC-WFEC	FRANKLIN SW TO ACME, 69KV 55916 FRNKLS269.0 to 55802 ACME 269.0 CKT 1	34	99.2	103.4	140	GOLDSBY TO OKLAHOMA UNIVERSITY SW, 69KV 55924 GOLDSBY269.0 to 56018 OU SW 269.0 CKT1	Undetermined

Table 5 continued – SPP Facilities Overloaded Due to 750MW Transfer From OKGE to EES

Study Year	From Area To Area	Branch Over 100% Rate B	RATEB	BC % I Loading	TC % I Loading	ATC	Outaged Branch That Caused Overload	Initial Limit, Available Solution and Cost, or Previous Assignment
04SP	WFEC-WFEC	GOLDSBY TO OKLAHOMA UNIVERSITY SW, 69KV 55924 GOLDSBY269.0 to 56018 OU SW 269.0 CKT 1	34	98.2	102.4	323	FRANKLIN SW TO ACME, 69KV 55916 FRNKLNS269.0 to 55802 ACME 269.0 CKT 1	Undetermined
04SP	AEPW-AEPW	NORTH MARSHALL TO WOODLAWN, 69KV 53579 NMARSHL269.0 to 53621 WOODLWN269.0 CKT 1	59	96.6	101.1	567	Multiple Outage Contingency SW SHREVEPORT TO DIANA, 345KV 53454 SW SHV 7 to 53528 DIANA 7 CKT1 SW SHREVEPORT TO LONGWOOD, 345KV 53454 SW SHV 7 to 53424 LONGWD 7 CKT1	Undetermined
04SP	AEPW-AEPW	TATUM TO ROCK HILL, 138KV 53611 TATUM 4 138 to 53598 ROKHILL4 138 CKT 1	287	99.9	104.6	16	Multiple Outage Contingency SW SHREVEPORT TO DIANA, 345KV 53454 SW SHV 7 to 53528 DIANA 7 CKT1 SW SHREVEPORT TO LONGWOOD, 345KV 53454 SW SHV 7 to 53424 LONGWD 7 CKT1	Undetermined
04WP	CESW-CESW	ROGERS TO LOWELL REC, 69KV 53152 ROGERS 269.0 to 53200 LOWELLR269.0 CKT 1	72	98.6	100.8	473	FLINT CREEK TO GENTRY REC, 161KV 53139 FLINTCR5 161 to 53187 GENTRYR5 161 CKT1	Assigned to SPP-2000-109 04SP 350cu Breaker
04WP	CESW-CESW	NW TEXARKANA 500/345KV TRANSFORMER 53301 NWTXARK7 345 to 53125 NWTXARK8 500 CKT 1	896	94.3	104.7	411	PITTSBURG 500/345KV TRANSFORMER 52819 PITTSB-8 500 to 54033 PITTSB-7 345 CKT1	Undetermined
04WP	CESW-CESW	IPC JEFFERSON TO LIEBERMAN, 138KV 53548 IPCJEFF4 138 to 53420 LIEBERM4 138 CKT 1	135	97.3	106.4	224	LONGWOOD TO WILKES, 345KV 53424 LONGWD 7 345 to 53620 WILKES 7 345 CKT1	Assigned To 2000-086 2001SP Replace 4/0 jumpers to switches & Wavetrap and Switches at Lieberman. Reconductor 26.51 miles of 336 ACSR with 795 ACSR \$6,241,585

Table 5 continued – SPP Facilities Overloaded Due to 750MW Transfer From OKGE to EES

Study Year	From Area To Area	Branch Over 100% Rate B	RATEB	BC % I Loading	TC % I Loading	ATC	Outaged Branch That Caused Overload	Initial Limit, Available Solution and Cost, or Previous Assignment
04WP	GRRD-GRRD	KANSAS TO COLCORD TAP, 69KV 54515 KANSAS 269.0 to 54629 COLCOTP269.0 CKT 1	41	98.4	100.2	661	PENSACOLA TO GRAY TAP, 69KV 54428 PENZA 269.0 to 54465 GRAY TP269.0 CKT1	Undetermined
04WP	OKGE-OKGE	DRAPER LAKE 345/138KV TRANSFORMER 54934 DRAPR7 345 to 54933 DRAPR4 138 CKT 1	493	97.2	116.8	107	DRAPER LAKE 345/138KV TRANSFORMER 54933 DRAPR4 138 to 54934 DRAPR7 345 CKT2	See Previous
04WP	OKGE-OKGE	DRAPER LAKE 345/138KV TRANSFORMER 54933 DRAPR4 138 to 54934 DRAPR7 345 CKT2	493	97.2	116.8	107	DRAPER LAKE 345/138KV TRANSFORMER 54934 DRAPR7 345 to 54933 DRAPR4 138 CKT 1	See Previous
04WP	OKGE-OKGE	DRAPER LAKE TO THUNDERBIRD, 345KV 54934 DRAPR7 345 to 54998 THNDR 7 345 CKT 1	717	50.2	105.5	675	DRAPER TO SEMINOLE, 345KV 54934 DRAPR7 345 to 55045 SEMNL7 345 CKT3	See Previous
04WP	OKGE-OKGE	DRAPER LAKE TO THUNDERBIRD, 345KV 54934 DRAPR7 345 to 54998 THNDR 7 345 CKT 1	717	N/A	104.5	718	THUNDERBIRD TO SEMINOLE, 345KV 54998 THNDR 7 345 to 55045 SEMNL7 345 CKT1	See Previous
04WP	OKGE-OKGE	THUNDERBIRD TO SEMINOLE, 345KV 54998 THNDR 7 345 to 55045 SEMNL7 345 CKT1	717	N/A	104.3	719	DRAPER LAKE TO THUNDERBIRD, 345KV 54934 DRAPR7 345 to 54998 THNDR 7 345 CKT 1	See Previous
04WP	OKGE-OKGE	TINKER NO. 4 TO TINKER 2, 138KV 54988 TNKR44 138 to 54990 TNKR24 138 CKT 1	100	81.1	105.3	586	POST ROAD TAP TO SE15TH, 138KV 54965 POST 4 138 to 54993 SE15 4 138 CKT1	See Previous
04WP	OKGE-OKGE	ETNA TO BRANCH, 69KV 55318 ETNA 269.0 to 55313 BRNCH269.0 CKT 1	48	96.7	102.9	398	BRANCH TO VBI, 161KV 55316 BRNCH5 161 to 55339 VBI 5 161 CKT1	Initial Estimate Rebuild and Reconductor 7.38miles of 267ACSR with 477ACSR, \$2,767,000
04WP	SWPA-CESW	BEAVER TO EUREKA SPRINGS,161KV 52680 BEAVER 5 161 to 53136 EUREKA 5 161 CKT 1	287	99.9	109.8	4	PITTSBURG 500/345KV TRANSFORMER 52819 PITTSB-8 500 to 54033 PITTSB-7 345 CKT1	Assigned to SPP-2000-108 04SP

Table 5 continued – SPP Facilities Overloaded Due to 750MW Transfer From OKGE to EES

Study Year	From Area To Area	Branch Over 100% Rate B	RATEB	BC % I Loading	TC % I Loading	ATC	Outaged Branch That Caused Overload	Initial Limit, Available Solution and Cost, or Previous Assignment
04WP	WFEC-OKGE	CANADIAN SW TO CANADIAN, 138KV 55842 CANADNS4 138 to 54947 CANDN4 138 CKT 1	70	88.3	104.1	556	MIDWEST TAP TO FRANKLIN SW, 138KV 54946 MDWST4 138 to 55917 FRNKLNS4 138 CKT1	Undetermined
04WP	WFEC-WFEC	FRANKLIN SW 138/69KV TRANSFORMER 55917 FRNKLNS4 138 to 55916 FRNKLNS269.0 CKT 1	70	97.0	100.9	572	CANADIAN SW 138/69KV TRANSFORMER 55841 CANADNS269.0 to 55842 CANADNS4 138 CKT1	Undetermined
06SP	AECI-KACP	CLINTON TO MONTROSE, 161KV 96071 5CLINTN 161 to 57995 MONTROS5 161 CKT 1	370	100.0	102.5	0	PITTSBURG TO VALLIANT, 345KV 54033 PITTSB-7 345 to 54037 VALIANT7 345 CKT1	100.0% Owned by KACP 12.48mi Initial Limit Terminal Equipment
06SP	CESW-CESW	BONANZA TO HACKETT AECC, 161KV 53126 BONANZA5 161 to 53196 HACKETT5 161 CKT 1	177	95.5	105.3	345	FT SMITH TO ANO, 500KV 55305 FTSMI8 500 to 17632 8ANO 500 CKT1	2.36 miles Conductor Limited Solution Not Available
06SP	CESW-CESW	ROGERS TO LOWELL REC, 69KV 53152 ROGERS 269.0 to 53200 LOWELLR269.0 CKT 1	72	99.6	100.6	308	EAST ROGERS TO NORTH ROGERS, 69KV 53134 EROGERS269.0 to 53150 NROGERS269.0 CKT1	See Previous
06SP	CESW-CESW	LELMDAL5 TO DYESS, 161KV 53175 LELMDAL5 161 to 53131 DYESS 5 161 CKT 2	354	98.3	100.3	640	CHAMBER SPRINGS RD TO FARMINGTON AECC, 161KV 53154 CHAMSPR5 161 to 53195 FARMGTN5 161 CKT1	Undetermined
06SP	CESW-CESW	NW TEXARKANA 500/345KV TRANSFORMER 53301 NWTXARK7 345 to 53125 NWTXARK8 500 CKT 1	896	92.4	104.3	477	PITTSBURG TO NW TEXARKANA, 500KV 52819 PITTSB-8 500 to 53125 NWTXARK8 500 CKT1	Undetermined
06SP	CESW-CESW	WINFIELD TO ADORA REC, 69KV 53335 WINFIEL269.0 to 53243 ADORA 269.0 CKT 1	85	99.6	100.6	314	PITTSBURG TO FERNDALE LAKE TAP, 69KV 53310 PITTSB_269.0 to 53531 FERNDTP269.0 CKT1	Undetermined
06SP	CESW-CESW	FULTON TO HOPE, 115KV 53374 FULTON 3 115 to 53383 HOPE 3 115 CKT 1	239	99.3	103.2	135	LONGWOOD TO WILKES, 345KV 53424 LONGWD 7 345 to 53620 WILKES 7 345 CKT1	Replace circuit switcher & CTs at Hope \$80,000

Table 5 continued – SPP Facilities Overloaded Due to 750MW Transfer From OKGE to EES

Study Year	From Area To Area	Branch Over 100% Rate B	RATEB	BC % I Loading	TC % I Loading	ATC	Outaged Branch That Caused Overload	Initial Limit, Available Solution and Cost, or Previous Assignment
06SP	CESW-CESW	OAK HILL #2 TO KNOX LEE, 138KV 53586 OAK2HIL4 138 to 53557 KNOXLEE4 138 CKT 1	210	99.1	100.2	594	KNOX LEE TO MONROE CORNERS REC, 138KV 53557 KNOXLEE4 138 to 53574 MONROCR4 138 CKT1	Undetermined
06SP	CESW-CESW	BROKEN ARROW N - S TAP TO ONETA, 138KV 53798 BA.N-ST4 138 to 53818 ONETA--4 138 CKT 1	235	99.5	104.0	75	CHAMSPR7 TO CLARKSVILLE, 345KV 53155 CHAMSPR7 345 to 53756 CLARKSV7 345 CKT1	Undetermined
06SP	CESW-CESW	SAND SPRINGS TO CARSON TAP, 138KV 53827 S.S.---4 138 to 53750 CARSN-T4 138 CKT 1	143	99.3	100.2	559	TULSA POWER STATION TO OAKS WEST TAP, 138KV 53800 T.P.S.-4 138 to 53862 OAKSWTP4 138 CKT1	Undetermined
06SP	CESW-CESW	SAND SPRINGS TO OAKS WEST TAP, 138KV 53827 S.S.---4 138 to 53862 OAKSWTP4 138 CKT 1	143	99.8	100.7	135	CARSON TAP TO TULSA POWER STATION, 138KV 53750 CARSN-T4 138 to 53800 T.P.S.-4 138 CKT1	Undetermined
06SP	CESW-CESW	BARTLESVILLE SE TO NORTH BARTLESVILLE, 138KV 53940 BV-SE--4 138 to 53935 NBVILLE4 138 CKT 1	210	96.7	103.3	376	DELAWARE TO NORTHEAST STATION, 345KV 53929 DELWARE7 345 to 53955 N.E.S.-7 345 CKT1	Undetermined
06SP	CESW-CESW	PITTSBURG 500/345KV TRANSFORMER 54033 PITTSB-7 345 to 52819 PITTSB-8 500 CKT 1	896	85.1	105.1	559	NW TEXARKANA 500/345KV TRANSFORMER 53125 NWTXARK8 500 to 53301 NWTXARK7 345 CKT1	Undetermined
06SP	CESW-CESW	ARMY AMMUNITION DEPOT TO McALESTER, 69KV 54038 A.DEPOT269.0 to 54024 MCALEST269.0 CKT 1	42	98.5	100.1	709	COALGATE TAP TO LEHIGH, 138KV 54005 COALGTP4 138 to 54020 LEHIGH-4 138 CKT1	Undetermined
06SP	EES-CESW	OSAGE TO EUREKA SPRINGS, 161KV 17880 5OSAGE # 161 to 53136 EUREKA 5 161 CKT 1	244	97.2	105.0	271	MUSKOGEE TO FORT SMITH, 345KV 55224 MSKGE7 345 to 55302 FTSMI7 345 CKT1	See Previous
06SP	EES-EMDE	OMAHA TO OZARK DAM, 161KV 17879 5OMAHA * 161 to 59474 OZD312 5 161 CKT 1	162	98.3	106.2	163	EUREKA SPRINGS TO OSAGE, 161KV 53136 EUREKA 5 161 to 17880 5OSAGE # 161 CKT1	Entergy Owned Tie And Limit

Table 5 continued – SPP Facilities Overloaded Due to 750MW Transfer From OKGE to EES

Study Year	From Area To Area	Branch Over 100% Rate B	RATEB	BC % I Loading	TC % I Loading	ATC	Outaged Branch That Caused Overload	Initial Limit, Available Solution and Cost, or Previous Assignment
06SP	EMDE-SWPA	LARUSSEL TO SPRINGFIELD, 161KV 59479 LAR382 5 161 to 52692 SPRGFLD5 161 CKT 1	167	98.9	104.9	142	MONETT TO BROOKLINE, 345KV 59481 MON383 7 345 to 59984 BRKLINE 7 345 CKT1	Undetermined
06SP	GRRD-OKGE	TAHLEQUAH TO HWY 59, 161KV 54455 TAHLQH 5 161 to 55347 HWY 59 161 CKT 1	167	97.6	113.9	112	MUSKOGEE TO FORT SMITH, 345KV 55224 MSKGE7 345 to 55302 FTSMI7 345 CKT1	See Previous
06SP	OKGE-CESW	BONZT5 TO BONANZA, 161KV 55261 BONZT5 161 to 53126 BONANZA5 161 CKT 1	177	97.1	101.1	540	BRANCH TO VBI, 161KV 55316 BRNCH5 161 to 55339 VBI 5 161 CKT1	See Previous
06SP	OKGE-OKGE	WHITE EAGLE TO KILDARE, 138KV 54761 WHEGL4 138 to 54760 KILDR4 138 CKT 1	222	93.2	100.5	697	OSAGE TO CONTINENTAL T AP, 69KV 54742 OSAGE269.0 to 54745 CONTT269.0 CKT1	See Previous
06SP	OKGE-OKGE	DRAPER LAKE 345/138KV TRANSFORMER 54934 DRAPR7 345 to 54933 DRAPR4 138 CKT 1	493	82.4	103.9	613	CIMARRON TO DRAPER LAKE, 345KV 54901 CMARN7 345 to 54934 DRAPR7 345 CKT1	See Previous
06SP	OKGE-OKGE	DRAPER LAKE 345/138KV TRANSFORMER 54934 DRAPR7 345 to 54933 DRAPR4 138 CKT 2	493	82.4	103.9	613	CIMARRON TO DRAPER LAKE, 345KV 54901 CMARN7 345 to 54934 DRAPR7 345 CKT1	See Previous
06SP	OKGE-OKGE	DRAPER LAKE TO THUNDERBIRD, 345KV 54934 DRAPR7 345 to 54998 THNDER 7 345 CKT 1	717	63.2	119.2	493	DRAPER TO SEMINOLE, 345KV 54934 DRAPR7 345 to 55045 SEMNL7 345 CKT3	See Above
06SP	OKGE-OKGE	DRAPER LAKE TO THUNDERBIRD, 345KV 54934 DRAPR7 345 to 54998 THNDER 7 345 CKT 1	717	N/A	105.0	714	THUNDERBIRD TO SEMINOLE, 345KV 54998 THNDER 7 345 to 55045 SEMNL7 345 CKT1	See Previous
06SP	OKGE-OKGE	THUNDERBIRD TO SEMINOLE, 345KV 54998 THNDER 7 345 to 55045 SEMNL7 345 CKT1	717	N/A	104.6	717	DRAPER LAKE TO THUNDERBIRD, 345KV 54934 DRAPR7 345 to 54998 THNDER 7 345 CKT 1	See Previous

Table 5 continued – SPP Facilities Overloaded Due to 750MW Transfer From OKGE to EES

Study Year	From Area To Area	Branch Over 100% Rate B	RATEB	BC % I Loading	TC % I Loading	ATC	Outaged Branch That Caused Overload	Initial Limit, Available Solution and Cost, or Previous Assignment
06SP	OKGE-OKGE	TINKER NO. 4 TO TINKER 2, 138KV 54988 TNKR44 138 to 54990 TNKR24 138 CKT 1	100	99.8	112.4	9	NE 10TH TO MIDWAY, 138KV 54964 NE10 4 138 to 54966 MIDWY4 138 CKT1	See Previous
06SP	OKGE-OKGE	SEMINOLE TO MAUD TAP, 345KV 55044 SEMNL4 138 to 55055 MAUD 4 138 CKT 1	214	91.7	104.5	485	SEMINOLE TO MAUD TAP, 345KV 55044 SEMNL4 138 to 55055 MAUD 4 138 CKT2	See Previous
06SP	OKGE-OKGE	SPRINGDALE TAP TO RUSSETT, 138KV 55172 SPRIN4 138 to 55120 RUSSET4 138 CKT 1	96	100.0	114.4	0	ARBUCKLE TO MILL CREEK TAP, 138KV 55117 ARB 4 138 to 55121 MILLC4 138 CKT1	Replace 400A wavetrap & relays @ Russett \$50,000
06SP	OKGE-OKGE	PARK LANE TO SEMINOLE, 138KV 55178 PRKLN4 138 to 55044 SEMNL4 138 CKT 1	287	99.2	109.2	59	SEMINOLE TO VANOSS TAP, 138KV 55044 SEMNL4 138 to 55174 VANOS4 138 CKT1	Replace relays and 1200 Amp CTs at Park Lane and Seminole \$100,000
06SP	OKGE-OKGE	A OC PUMP TAP TO ADA OC PUMP, 69KV 55190 AOCPT269.0 to 55189 AOCPA269.0 CKT 1	52	95.0	110.5	243	PARKLANE TO AHLOSO TAP, 69KV 55177 PRKLN269.0 to 55187 AHLLOT269.0 CKT1	Undetermined
06SP	OKGE-OKGE	PANAMA TO SKULLYVILLE, 69KV 55272 PANAM269.0 to 55270 SKULY269.0 CKT 1	39	98.2	102.8	289	BONANZA TAP TO AES, 161KV 55261 BONZT5 161 to 55262 AES 5 161 CKT1	See Previous
06SP	OKGE-OKGE	VBI TO HIGHWAY 59, 161KV 55339 VBI 5 161 to 55347 HWY 59 161 CKT 1	167	93.7	110.1	287	MUSKOGEE TO FORT SMITH, 345KV 55224 MSKGE7 345 to 55302 FTSMI7 345 CKT1	Initial Estimate Rebuild and Reconductor 0.07 miles \$350,000
06SP	SWPA-CESW	BROKEN BOW TO CRAIG JUNCTION, 138KV 52814 BRKN BW4 138 to 54015 CRAIGJT4 138 CKT 1	107	85.4	101.3	691	BBDAMTP4 TO MOUNTAIN RIVER, 138KV 55823 BBDAMTP4 138 to 56004 MTRIVER4 138 CKT1	Undetermined
06SP	SWPA-OKGE	VAN BUREN TO VBI, 161KV 52722 VAN BUR5 161 to 55339 VBI 5 161 CKT 1	335	95.8	106.3	301	MUSKOGEE TO FORT SMITH, 345KV 55224 MSKGE7 345 to 55302 FTSMI7 345 CKT1	Reconductor 0.22 miles of line with 2 conductor bundled 795 MCM ACSR. Replace terminal equipment at both ends of line. This will increase the line capacity to 558 MW. \$500,000

Table 5 continued – SPP Facilities Overloaded Due to 750MW Transfer From OKGE to EES

Study Year	From Area To Area	Branch Over 100% Rate B	RATEB	BC % I Loading	TC % I Loading	ATC	Outaged Branch That Caused Overload	Initial Limit, Available Solution and Cost, or Previous Assignment
06SP	SWPA-SWPA	GLENCOE TO NORFORK, 161K V 52646 GLENCOE5 161 to 52648 NORFORK5 161 CKT 1	112	98.7	103.9	183	DONIPHAN TO GREEN FOREST, 161KV 52640 DONIPHAN5 161 to 96084 5GRNFRT 161 CKT1	Undetermined
06SP	SWPA-SWPA	BULL SHOALS TO NORFORK, 161KV 52660 BULL SH5 161 to 52648 NORFORK5 161 CKT 1	167	95.5	106.8	297	MIDWAY TO MT. HOME, 161KV 17875 5MIDWAY# 161 to 17877 5MT HOM 161 CKT1	See Previous
06SP	SWPA-SWPA	SALLISAW TO VAN BUREN, 161KV 52750 SALLISAW5 161 to 52722 VAN BUR5 161 CKT 1	167	94.2	114.2	219	MUSKOGEE TO FORT SMITH, 345KV 55224 MSKGE7 345 to 55302 FTSMI7 345 CKT1	Increase clearances of approximately 20 spans to allow operation of line at 100C. This will increase the line capacity to 223 MW. \$1,000,000
06SP	SWPA-SWPA	MUSKOGEE TAP TO GORE, 161KV 52758 MUSKTAP5 161 to 52752 GORE 5 161 CKT 1	206	99.2	108.6	62	MUSKOGEE TO FORT SMITH, 345KV 55224 MSKGE7 345 to 55302 FTSMI7 345 CKT1	See Previous
06SP	WERE-WERE	GILL ENERGY CENTER TO OATVILLE, 69 KV 57347 GILL 269.0 to 57374 OATVILL269.0 CKT 1	72	99.8	100.7	133	HOOVER TO HOOVER NORTH, 69 KV 56865 HOOVER 4 138 to 57355 HOOV-NO269.0 CKT3	Undetermined
06SP	WERE-WERE	OATVILLE TO MACARTHUR, 69KV 57374 OATVILL269.0 to 57364 MACARTH269.0 CKT 1	72	99.7	100.3	367	GILL ENERGY CENTER TO MACARTHUR, 69KV 57347 GILL 269.0 to 57364 MACARTH269.0 CKT1	Undetermined
06SP	AEPW-AEPW	NORTH MARSHALL TO WOODLAWN, 69KV 53579 NMARSHL269.0 to 53621 WOODLWN269.0 CKT 1	59	97.2	102.2	420	Multiple Outage Contingency SW SHREVEPORT TO DIANA, 345KV 53454 SW SHV 7 to 53528 DIANA 7 CKT1 SW SHREVEPORT TO LONGWOOD, 345KV 53454 SW SHV 7 to 53424 LONGWD 7 CKT1	Undetermined
06WP	CESW-CESW	NW TEXARKANA 500/345KV TRANSFORMER 53125 NWTXARK8 500 to 53301 NWTXARK7 345 CKT 1	896	94.7	106.0	353	PITTSBURG TO NW TEXARKANA, 500KV 52819 PITTSB-8 500 to 53125 NWTXARK8 500 CKT1	Undetermined

Table 5 continued – SPP Facilities Overloaded Due to 750MW Transfer From OKGE to EES

Study Year	From Area To Area	Branch Over 100% Rate B	RATEB	BC % I Loading	TC % I Loading	ATC	Outaged Branch That Caused Overload	Initial Limit, Available Solution and Cost, or Previous Assignment
06WP	CESW-CESW	ROGERS TO LOWELL REC, 69KV 53152 ROGERS 269.0 to 53200 LOWELLR269.0 CKT 1	72	99.3	101.5	244	FLINT CREEK TO GENTRY REC, 161KV 53139 FLINTCR5 161 to 53187 GENTRYR5 161 CKT1	Assigned to SPP-2000-109 04SP 350cu Breaker
06WP	CESW-CESW	FULTON TO HOPE, 115KV 53374 FULTON 3 115 to 53383 HOPE 3 115 CKT 1	239	98.9	102.5	231	LONGWOOD TO WILKES, 345KV 53424 LONGWD 7 345 to 53620 WILKES 7 345 CKT1	Replace circuit switcher & CTs at Hope \$80,000
06WP	CESW-CESW	FERNDALE LAKE TAP TO PITTSBURG, 69KV 53531 FERNDTP269.0 to 53310 PITTSB_269.0 CKT 1	72	99.3	100.1	625	PERDUE TO LAKE HAWKINS, 138KV 53590 PERDUE 4 138 to 53666 LHAWKIN4 138 CKT1	Undetermined
06WP	CESW-CESW	IPC JEFFERSON TO LIEBERMAN, 138KV 53548 IPCJEFF4 138 to 53420 LIEBERM4 138 CKT 1	135	96.1	105.1	326	LONGWOOD TO WILKES, 345KV 53424 LONGWD 7 345 to 53620 WILKES 7 345 CKT1	See Previous
06WP	CESW-CESW	BARTLESVILLE SE TO N BARTLESVILLE, 138KV 53940 BV-SE--4 138 to 53935 NBVILLE4 138 CKT 1	210	99.8	106.2	20	DELWARE TO NORTHEAST STATION, 345KV 53929 DELWARE7 345 to 53955 N.E.S.-7 345 CKT1	Undetermined
06WP	CESW-CESW	IDABEL TO HUGO TAP, 138KV 54011 IDABEL-4 138 to 54014 HUGOTAP4 138 CKT 1	186	99.5	105.3	60	BROKEN BOW TO DOMINAN4, 138KV 55834 BROKNBW4 138 to 55878 DOMINAN4 138 CKT1	Undetermined
06WP	OKGE-OKGE	DRAPER LAKE 345/138KV TRANSFORMER 54934 DRAPR7 345 to 54933 DRAPR4 138 CKT 1	493	93.0	112.7	267	DRAPER LAKE 345/138KV TRANSFORMER 54933 DRAPR4 138 to 54934 DRAPR7 345 CKT2	See Previous
06WP	OKGE-OKGE	DRAPER LAKE 345/138KV TRANSFORMER 54933 DRAPR4 138 to 54934 DRAPR7 345 CKT2	493	93.0	112.7	267	DRAPER LAKE 345/138KV TRANSFORMER 54934 DRAPR7 345 to 54933 DRAPR4 138 CKT 1	See Previous
06WP	OKGE-OKGE	DRAPER LAKE TO THUNDERBIRD, 345KV 54934 DRAPR7 345 to 54998 THNDER 7 345 CKT 1	717	N/A	104.3	719	THUNDERBIRD TO SEMINOLE, 345KV 54998 THNDER 7 345 to 55045 SEMNL7 345 CKT1	See Previous

Table 5 continued – SPP Facilities Overloaded Due to 750MW Transfer From OKGE to EES

Study Year	From Area To Area	Branch Over 100% Rate B	RATEB	BC % I Loading	TC % I Loading	ATC	Outaged Branch That Caused Overload	Initial Limit, Available Solution and Cost, or Previous Assignment
06WP	OKGE-OKGE	THUNDERBIRD TO SEMINOLE, 345KV 54998 THNDER 7 345 to 55045 SEMNL7 345 CKT1	717	N/A	104.5	718	DRAPER LAKE TO THUNDERBIRD, 345KV 54934 DRAPR7 345 to 54998 THNDER 7 345 CKT 1	See Previous
06WP	OKGE-OKGE	TINKER NO. 4 TO TINKER 2, 138KV 54990 TNKR24 138 to 54988 TNKR44 138 CKT 1	100	88.7	101.6	657	HORSESHOE LAKE TO MIDWAY, 138KV 54941 HSL 4 138 to 54966 MIDWY4 138 CKT1	See Previous
06WP	SWPA-SWPA	GLENCOE TO NORFORK, 161KV 52646 GLENCOE5 161 to 52648 NORFORK5 161 CKT 1	117	97.8	102.3	364	NEWPORT-INDUSTRIAL TO NEWPORT, 161KV 17821 5NEW-IN 161 to 17822 5NEWPO 161 CKT1	Undetermined

Table 6 – Non-SPP Facility Overloads Caused by the 750MW OKGE to EES Transfer

Study Year	From Area To Area	Branch Over 100% Rate B	RATEB	BC % I Loading	TC % I Loading	Outaged Branch That Caused Overload
01SR	EES-EES	16528 4L558T48 138 to 16532 4HUNTSVL 138 CKT 1	206	98.8	108.5	16503 4WALDEN 138 to 16518 4APRIL 138 CKT1
01SR	EES-EES	16534 4MT.ZION 138 to 16528 4L558T48 138 CKT 1	206	99.7	109.3	16508 4CONROE 138 to 16578 4WDHAVN 138 CKT1
01SR	EES-EES	16555 7GRIMES 345 to 16556 4GRIMES 138 CKT 1	525	94.8	103.0	16555 7GRIMES 345 to 16556 4GRIMES 138 CKT2
01SR	EES-EES	16556 4GRIMES 138 to 16503 4WALDEN 138 CKT 1	206	93.5	102.0	16534 4MT.ZION 138 to 16556 4GRIMES 138 CKT1
01SR	EES-EES	16556 4GRIMES 138 to 16534 4MT.ZION 138 CKT 1	206	96.2	107.4	53125 NWTXARK8 500 to 17543 8MCNEIL 500 CKT1
01SR	EES-EES	16618 4NEWTONB 138 to 17917 4HLYSPG 138 CKT 1	112	97.4	102.0	53526 CROCKET7 345 to 54061 TENASKA7 345 CKT1
01SR	EES-EES	16657 4LEACH 138 to 16618 4NEWTONB 138 CKT 1	144.6	98.4	106.2	16686 8HARTBRG 500 to 50002 CHOUSHT8 500 CKT1
01SR	EES-EES	16677 4TOLEDO 138 to 16657 4LEACH 138 CKT 1	144.6	99.5	107.3	16686 8HARTBRG 500 to 50002 CHOUSHT8 500 CKT1
01SR	EES-EES	17430 3STERL 115 to 17539 3MERIDN# 115 CKT 1	68	100.0	100.8	17430 3STERL 115 to 17480 3CROS-N 115 CKT1
01SR	EES-EES	17516 3STEPHN 115 to 17536 3CAMD-S# 115 CKT 1	96	98.3	100.8	17482 3CAMDMG 115 to 17514 3SMACKO 115 CKT1
01SR	EES-EES	17544 3MCNEIL 115 to 17516 3STEPHN 115 CKT 1	96	96.8	101.7	17506 3MAG-W 115 to 17544 3MCNEIL 115 CKT1
01SR	EES-EES	17917 4HLYSPG 138 to 16668 4JASPER 138 CKT 1	112	98.4	103.6	53526 CROCKET7 345 to 16555 7GRIMES 345 CKT1
04SP	EES-EES	16534 4MT.ZION 138 to 16528 4L558T48 138 CKT 1	206	94.5	104.0	16503 4WALDEN 138 to 16556 4GRIMES 138 CKT1
04SP	EES-EES	16555 7GRIMES 345 to 16556 4GRIMES 138 CKT 1	525	92.3	100.5	16555 7GRIMES 345 to 16556 4GRIMES 138 CKT2
04SP	EES-EES	16556 4GRIMES 138 to 16534 4MT.ZION 138 CKT 1	206	98.2	107.6	16503 4WALDEN 138 to 16518 4APRIL 138 CKT1
04SP	EES-EES	17183 3HRNADO 115 to 17182 3NESBT* 115 CKT 1	108	98.5	102.4	17196 6BATESV 230 to 17782 6RITCH 230 CKT1
04SP	EES-EES	17188 3TUNICA 115 to 17177 3CRNSHW 115 CKT 1	69	99.6	102.4	17196 6BATESV 230 to 17782 6RITCH 230 CKT1
04SP	EES-EES	17430 3STERL 115 to 17480 3CROS-N 115 CKT 1	80	99.8	100.3	17434 3BASTRP 115 to 17441 3BASTAP 115 CKT1
04SP	EES-EES	17503 3MAG-DW 115 to 17478 3COUCH 115 CKT 1	108	99.6	103.6	17505 3MAG-ST 115 to 17523 3KERLIN* 115 CKT1
04SP	EES-EES	17537 3PATMOS# 115 to 17502 3LEWIS # 115 CKT 1	159	96.4	104.9	17543 8MCNEIL 500 to 17544 3MCNEIL 115 CKT1
04SP	EES-EES	17539 3MERIDN# 115 to 17521 3CROS-S* 115 CKT 1	68	99.9	101.0	17569 3WOODW 115 to 17628 3PNBRG# 115 CKT1
04SP	EES-EES	17544 3MCNEIL 115 to 17516 3STEPHN 115 CKT 1	96	96.7	103.1	17506 3MAG-W 115 to 17544 3MCNEIL 115 CKT1
04SP	EES-EES	17582 3CARPE 115 to 17578 3ARKLA 115 CKT 1	159	99.6	100.9	17582 3CARPE 115 to 17593 3HS-E * 115 CKT1
04SP	EES-EES	17609 4MURFRE 138 to 17607 3MURF-S 115 CKT 1	60	96.7	108.6	53125 NWTXARK8 500 to 53301 NWTXARK7 345 CKT1
04SP	EES-EES	17694 3LR-WAL 115 to 17687 3LR-PIN 115 CKT 1	159	98.5	100.1	17676 3KANIS * 115 to 17687 3LR-PIN 115 CKT1
04SP	EES-EES	17716 3NLR-LV 115 to 17705 3MAUMEL* 115 CKT 1	239	99.8	100.9	17706 3MAYFL 115 to 17718 3ROL RD* 115 CKT1
04SP	EES-EES	17875 5MIDWAY# 161 to 17877 5MT HOM 161 CKT 1	162	94.7	106.2	52648 NORFORK5 161 to 52660 BULL SH5 161 CKT1
04SP	EES-EES	17917 4HLYSPG 138 to 16668 4JASPER 138 CKT 1	112	99.6	102.5	16660 4CYPRESS 138 to 16669 4KOUNTZE 138 CKT1
04WP	EES-EES	17175 3PLUM PT 115 to 17174 3HN LAK 115 CKT 1	120	99.4	101.5	17259 8MCADAM 500 to 17260 6MCADAM 230 CKT1
04WP	EES-EES	17516 3STEPHN 115 to 17536 3CAMD-S# 115 CKT 1	96	100.0	105.0	17432 8STERL 500 to 17530 8ELDEHV 500 CKT1
04WP	EES-EES	17516 3STEPHN 115 to 17544 3MCNEIL 115 CKT 1	96	100.0	104.0	16828 8RICHARD 500 to 17026 8WEBRE 500 CKT1
04WP	EES-EES	17537 3PATMOS# 115 to 17502 3LEWIS # 115 CKT 1	159	93.6	101.6	53125 NWTXARK8 500 to 53301 NWTXARK7 345 CKT1
04WP	EES-EES	17862 5HARR-W 161 to 17849 5HARR-S 161 CKT 1	223	99.1	100.4	53136 EUREKA 5 161 to 17880 5OSAGE # 161 CKT1
06SP	EES-EES	16528 4L558T48 138 to 16532 4HUNTSVL 138 CKT 1	206	90.8	101.1	16503 4WALDEN 138 to 16556 4GRIMES 138 CKT1
06SP	EES-EES	16534 4MT.ZION 138 to 16528 4L558T48 138 CKT 1	206	98.5	108.7	16503 4WALDEN 138 to 16556 4GRIMES 138 CKT1
06SP	EES-EES	16555 7GRIMES 345 to 16556 4GRIMES 138 CKT 1	525	94.9	103.1	16555 7GRIMES 345 to 16556 4GRIMES 138 CKT2
06SP	EES-EES	16556 4GRIMES 138 to 16503 4WALDEN 138 CKT 1	206	92.2	101.1	16534 4MT.ZION 138 to 16556 4GRIMES 138 CKT1

Table 6 continued – Non-SPP Facility Overloads Caused by the 750MW OKGE to EES Transfer

Study Year	From Area To Area	Branch Over 100% Rate B	RATEB	BC % I Loading	TC % I Loading	Outaged Branch That Caused Overload
06SP	EES- EES	16556 4GRIMES 138 to 16534 4MT.ZION 138 CKT 1	206	97.3	107.4	16519 4LFOREST 138 to 16578 4WDHAVN 138 CKT1
06SP	EES- EES	16618 4NEWTONB 138 to 17917 4HLYSPG 138 CKT 1	112	97.5	103.3	16686 8HARTBRG 500 to 50002 CHOUSHT8 500 CKT1
06SP	EES- EES	17454 3SPRINGH 115 to 17517 3TAYLOR 115 CKT 1	120	99.2	102.8	17542 3MAG-E 115 to 17544 3MCNEIL 115 CKT1
06SP	EES- EES	17502 3LEWIS # 115 to 17478 3COUCH 115 CKT 1	159	92.5	100.4	53323 SUGARHL4 138 to 53373 FULTON 4 138 CKT1
06SP	EES- EES	17503 3MAG-DW 115 to 17478 3COUCH 115 CKT 1	108	98.8	102.9	17493 3EMERSN 115 to 17523 3KERLIN* 115 CKT1
06SP	EES- EES	17516 3STEPHN 115 to 17536 3CAMD-S# 115 CKT 1	96	99.2	105.0	17513 3SHULER 115 to 17538 3CALH-N* 115 CKT1
06SP	EES- EES	17531 3WYATT 115 to 17513 3SHULER 115 CKT 1	120	96.8	100.7	17528 3ELDEHV 115 to 17530 8ELDEHV 500 CKT1
06SP	EES- EES	17537 3PATMOS# 115 to 17502 3LEWIS # 115 CKT 1	159	96.1	105.6	53526 CROCKET7 345 to 16555 7GRIMES 345 CKT1
06SP	EES- EES	17544 3MCNEIL 115 to 17516 3STEPHN 115 CKT 1	96	99.6	105.3	17453 3MINDEN 115 to 17455 3SAREPT 115 CKT1
06SP	EES- EES	17582 3CARPE 115 to 17578 3ARKLA 115 CKT 1	159	99.3	100.7	17589 3HS-UC 115 to 17593 3HS-E * 115 CKT1
06SP	EES- EES	17716 3NLR-LV 115 to 17705 3MAUMEL* 115 CKT 1	239	99.0	100.2	17706 3MAYFL 115 to 17718 3ROL RD* 115 CKT1
06SP	EES- EES	17861 5HARR-E 161 to 17879 5OMAHA * 161 CKT 1	162	93.2	101.0	53136 EUREKA 5 161 to 17880 5OSAGE # 161 CKT1
06SP	EES- EES	17875 5MIDWAY# 161 to 17877 5MT HOM 161 CKT 1	162	98.0	109.8	52648 NORFORK5 161 to 52660 BULL SH5 161 CKT1
06SP	AMRN-AMRN	31409 OVERTON 161 to 30233 CALIF 161 CKT 1	176	97.4	100.6	31088 MCCREDIE 345 to 31230 MONTGMRY 345 CKT1
06SP	CWL1-AECI	33401 BOLSTAD 161 to 96499 5HINTON 161 CKT 1	252	100.0	101.0	57965 W.GRDNR7 345 to 57977 CRAIG 7 345 CKT1
06WP	EES- EES	17175 3PLUM PT 115 to 17174 3HN LAK 115 CKT 1	120	99.2	101.9	17178 6FRPORT 230 to 17181 6ROBNVL 230 CKT1
06WP	EES- EES	17502 3LEWIS # 115 to 17478 3COUCH 115 CKT 1	159	96.8	104.1	53323 SUGARHL4 138 to 53373 FULTON 4 138 CKT1
06WP	EES- EES	17513 3SHULER 115 to 17538 3CALH-N* 115 CKT 1	120	96.5	100.2	17528 3ELDEHV 115 to 17530 8ELDEHV 500 CKT1
06WP	EES- EES	17516 3STEPHN 115 to 17536 3CAMD-S# 115 CKT 1	96	98.7	102.7	53277 LYDIA 7 345 to 53615 WELSH 7 345 CKT1
06WP	EES- EES	17516 3STEPHN 115 to 17544 3MCNEIL 115 CKT 1	96	99.7	103.0	17478 3COUCH 115 to 17502 3LEWIS # 115 CKT1
06WP	EES- EES	17537 3PATMOS# 115 to 17502 3LEWIS # 115 CKT 1	159	98.4	107.1	53424 LONGWD 7 345 to 53620 WILKES 7 345 CKT1
06WP	EES- EES	17607 3MURF-S 115 to 17608 3MURF-E# 115 CKT 1	98	88.3	102.4	53125 NWTXARK8 500 to 17543 8MCNEIL 500 CKT1
06WP	EES- EES	17609 4MURFRE 138 to 17607 3MURF-S 115 CKT 1	60	97.0	108.6	17543 8MCNEIL 500 to 17621 8HSEHV 500 CKT1
06WP	EES- EES	17862 5HARR-W 161 to 17849 5HARR-S 161 CKT 1	223	100.0	101.4	53136 EUREKA 5 161 to 17880 5OSAGE # 161 CKT1
06WP	AMRN-AMRN	31221 MOBERLY 161 to 31409 OVERTON 161 CKT 1	167	99.4	101.2	96044 7MCCRED 345 to 96049 7THOMHL 345 CKT1
06WP	CWL1-AECI	33401 BOLSTAD 161 to 96499 5HINTON 161 CKT 1	252	99.4	100.4	31230 MONTGMRY 345 to 31231 MONTGMRY 161 CKT1

Table 7 - SPP Facility Overloads found in Table 5 that are relieved due to the Muskogee – ANO 500kV line addition

Study Year	From Area To Area	Branch Over 100% Rate B	RATEB	TC % I Loading (No Line Additions)	TC % I Loading (With Line Additions)	Outaged Branch That Caused Overload
01SR	AEPW-WERE	COFFEYVILLE TAP TO DEARING, 138KV 53972 SCOFVLE4 138 to 56832 DEARING4 138 CKT 1	143	101.4	88.1	DELWARE TO NEOSHO, 345KV 53929 DELWARE7 345 to 56756 NEOSHO 7 345 CKT1
01SR	SWPA-SWPA	ROBERT S. KERR TO VAN BUREN, 161KV 52782 RS KERR5 161 to 52722 VAN BUR5 161 CKT 1	167	105.9	98.6	BONANZA TAP TO AES, 161KV 55261 BONZT5 161 to 55262 AES 5 161 CKT1
04SP	AEPW-AEPW	NW TEXARKANA 500/345KV TRANSFORMER 53125 NWTXARK8 500 to 53301 NWTXARK7 345 CKT 1	896	103.6	94.6	PITTSBURG 500/345KV TRANSFORMER 52819 PITTSB-8 500 to 54033 PITTSB-7 345 CKT1
04SP	AEPW-AEPW	BANN TO ALUMAX TAP, 138KV 53250 BANN 4 138 to 53245 ALUMXT 4 138 CKT 1	261	100.4	99.6	NW TEXARKANA-BANN T TO NW TEXARKANA 138KV 53299 NWT-BNT4 138 to 53300 NWTXARK4 138 CKT1
04SP	AEPW-AEPW	BARTLESVILLE SE TO NORTH BARTLESVILLE, 138KV 53940 BV-SE--4 138 to 53935 NBVILLE4 138 CKT 1	210	104.4	93.9	DELWARE TO NORTHEAST STATION, 345KV 53929 DELWARE7 345 to 53955 N.E.S.-7 345 CKT1
04SP	AEPW-AEPW	WILBURTON TO LONE OAK, 69KV 54031 WILBURT269.0 to 54021 LONEOAK269.0 CKT 1	48	100.5	95.2	EUFAULA TO STIGLER TAP, 138KV 52774 EUFAULA4 138 to 54050 STIGLRT4 138 CKT1
04SP	EES-AEPW	OSAGE TO EUREKA SPRINGS, 161KV 17880 5OSAGE # 161 to 53136 EUREKA 5 161 CKT 1	244	103.2	95.5	TABLE ROCK TO RIVERSIDE, 161KV 52672 TABLE R5 161 to 59497 RVS438 5 161 CKT1
04SP	EES-EMDE	OMAHA TO OZARK DAM, 161KV 17879 5OMAHA * 161 to 59474 OZD312 5 161 CKT 1	162	103.1	93.5	OSAGE TO EUREKA SPRINGS, 161KV 17880 5OSAGE # 161 to 53136 EUREKA 5 161 CKT 1
04SP	GRRD-OKGE	TAHLEQUAH TO HWY 59, 161KV 54455 TAHLQH 5 161 to 55347 HWY 59 161 CKT 1	167	103.3	62.6	MUSKOGEE TO FORT SMITH, 345KV 55224 MSKGE7 345 to 55302 FTSMI7 345 CKT1
04SP	OKGE-AEPW	BONZT5 TO BONANZA, 161KV 55261 BONZT5 161 to 53126 BONANZA5 161 CKT 1	177	103.3	82.4	FORT SMITH TO ARKANSAS NUCLEAR ONE, 500KV 55305 FTSMI8 500 to 17632 8ANO 500 CKT1
04SP	OKGE-OKGE	A OC PUMP TAP TO ADA OC PUMP, 69KV 55190 AOCPT269.0 to 55189 AOCPA269.0 CKT 1	52	101.0	98.8	PARKLANE TO AHLOSO TAP, 69KV 55177 PRKLN269.0 to 55187 AHLTOT269.0 CKT1
04SP	OKGE-OKGE	PANAMA TO SKULLYVILLE, 69KV 55272 PANAM269.0 to 55270 SKULY269.0 CKT 1	39	100.6	96.3	BONANZA TAP TO AES, 161KV 55261 BONZT5 161 to 55262 AES 5 161 CKT1
04SP	OKGE-OKGE	FT SMITH 345/161KV TRANSFORMER 55302 FTSMI7 345 to 55300 FTSMI5 161 CKT 1	493	110.0	74.6	FT SMITH 500/345KV TRANSFORMER 55302 FTSMI7 345 to 55305 FTSMI8 500 CKT1
04SP	OKGE-OKGE	KILDARE TAP TO WHITE EAGLE, 138KV 54760 KILDR4 138 to 54761 WHEGL4 138 CKT1	222	100.2	98.1	OSAGE TO CONTINENTAL TAP, 69KV 54742 OSAGE269.0 to 54745 CONTT269.0 CKT1
04SP	SWPA-AEPW	BROKEN BOW TO CRAIG JUNCTION, 138KV 52814 BRKN BW4 138 to 54015 CRAIGJT4 138 CKT 1	107	101.4	92.2	BBDAMTP4 TO MOUNTAIN RIVER, 138KV 55823 BBDAMTP4 138 to 56004 MTRIVER4 138 CKT1
04SP	SWPA-SWPA	GLENCOE TO NORFORK, 161KV 52646 GLENCOE5 161 to 52648 NORFORK5 161 CKT 1	112	102.5	99.2	NEWPORT-INDUSTRIAL TO NEWPORT, 161KV 17821 5NEW-IN 161 to 17822 5NEWPO 161 CKT1
04SP	SWPA-SWPA	BULL SHOALS TO NORFORK, 161KV 52660 BULL SH5 161 to 52648 NORFORK5 161 CKT 1	167	103.4	95.5	MIDWAY TO MT. HOME, 161KV 17875 5MIDWAY# 161 to 17877 5MT HOM 161 CKT1

Table 7 continued - SPP Facility Overloads found in Table 5 that are relieved due to the Muskogee – ANO 500kV line addition

Study Year	From Area To Area	Branch Over 100% Rate B	RATEB	TC % I Loading (No Line Additions)	TC % I Loading (With Line Additions)	Outaged Branch That Caused Overload
04SP	SWPA-SWPA	SALLISAW TO VAN BUREN, 161KV 52750 SALLISAW5 161 to 52722 VAN BUR5 161 CKT 1	167	102.8	59.1	MUSKOGEE TO FORT SMITH, 345KV 55224 MSKGE7 345 to 55302 FTSMI7 345 CKT1
04SP	SWPA-SWPA	GORE TO SALLISAW, 161KV 52752 GORE 5 161 to 52750 SALLISAW5 161 CKT 1	167	111.2	75.5	MUSKOGEE TO FORT SMITH, 345KV 55224 MSKGE7 345 to 55302 FTSMI7 345 CKT1
04SP	SWPA-SWPA	MUSKOGEE TAP TO GORE, 161KV 52758 MUSKTAP5 161 to 52752 GORE 5 161 CKT 1	206	100.2	62.1	MUSKOGEE TO FORT SMITH, 345KV 55224 MSKGE7 345 to 55302 FTSMI7 345 CKT1
04SP	AEPW-AEPW	NORTH MARSHALL TO WOODLAWN, 69KV 53579 NMARSHL269.0 to 53621 WOODLWN269.0 CKT 1	59	101.1	99.1	Multiple Outage Contingency SW SHREVEPORT TO DIANA, 345KV 53454 SW SHV 7 to 53528 DIANA 7 CKT1 SW SHREVEPORT TO LONGWOOD, 345KV 53454 SW SHV 7 to 53424 LONGWD 7 CKT1
04WP	AEPW-AEPW	NW TEXARKANA 500/345KV TRANSFORMER 53301 NWTXARK7 345 to 53125 NWTXARK8 500 CKT 1	896	104.7	96.1	PITTSBURG 500/345KV TRANSFORMER 52819 PITTSB-8 500 to 54033 PITTSB-7 345 CKT1
04WP	AEPW-AEPW	ROGERS TO LOWELL REC, 69KV 53152 ROGERS 269.0 to 53200 LOWELLR269.0 CKT 1	72	100.8	97.4	FLINT CREEK TO GENTRY REC, 161KV 53139 FLINTCR5 161 to 53187 GENTRYR5 161 CKT1
04WP	GRRD-GRRD	KANSAS TO COLCORD TAP, 69KV 54515 KANSAS 269.0 to 54629 COLCOTP269.0 CKT 1	41	100.2	97.3	PENSACOLA TO GRAY TAP, 69KV 54428 PENZA 269.0 to 54465 GRAY TP269.0 CKT1
06SP	EMDE-SWPA	LARUSSEL TO SPRINGFIELD, 161KV 59479 LAR382 5 161 to 52692 SPRGFLD5 161 CKT 1	167	104.9	96.8	MONETT TO BROOKLINE, 345KV 59481 MON383 7 345 to 59984 BRKLINE 7 345 CKT1
06SP	AEPW-AEPW	BONANZA TO HACKETT AECC, 161KV 53126 BONANZA5 161 to 53196 HACKETT5 161 CKT 1	177	105.3	87.9	FT SMITH TO ANO, 500KV 55305 FTSMI8 500 to 17632 8ANO 500 CKT1
06SP	AEPW-AEPW	LELMDAL5 TO DYESS, 161KV 53175 LELMDAL5 161 to 53131 DYESS 5 161 CKT 2	354	100.3	96.4	CHAMBER SPRINGS ROAD TO FARMINGTON AECC, 161KV 53154 CHAMSPR5 161 to 53195 FARMGTN5 161 CKT1
06SP	AEPW-AEPW	NW TEXARKANA 500/345KV TRANSFORMER 53301 NWTXARK7 345 to 53125 NWTXARK8 500 CKT 1	896	104.3	93.7	PITTSBURG TO NW TEXARKANA, 500KV 52819 PITTSB-8 500 to 53125 NWTXARK8 500 CKT1
06SP	AEPW-AEPW	BROKEN ARROW NORTH - SOUTH TAP TO ONETA, 138KV 53798 BA.N-ST4 138 to 53818 ONETA--4 138 CKT 1	235	104.0	89.2	CHAMSPR7 TO CLARKSVILLE, 345KV 53155 CHAMSPR7 345 to 53756 CLARKSV7 345 CKT1
06SP	AEPW-AEPW	SAND SPRINGS TO CARSON TAP, 138KV 53827 S.S.--4 138 to 53750 CARSN-T4 138 CKT 1	143	100.2	92.5	TULSA POWER STATION TO OAKS WEST TAP, 138KV 53800 T.P.S.-4 138 to 53862 OAKSWTP4 138 CKT1
06SP	AEPW-AEPW	SAND SPRINGS TO OAKS WEST TAP, 138KV 53827 S.S.--4 138 to 53862 OAKSWTP4 138 CKT 1	143	100.7	93.0	CARSON TAP TO TULSA POWER STATION, 138KV 53750 CARSN-T4 138 to 53800 T.P.S.-4 138 CKT1
06SP	AEPW-AEPW	BARTLESVILLE SE TO NORTH BARTLESVILLE, 138KV 53940 BV-SE--4 138 to 53935 NBVILLE4 138 CKT 1	210	103.3	91.9	DELAWARE TO NORTHEAST STATION, 345KV 53929 DELWARE7 345 to 53955 N.E.S.-7 345 CKT1
06SP	AEPW-AEPW	PITTSBURG 500/345KV TRANSFORMER 54033 PITTSB-7 345 to 52819 PITTSB-8 500 CKT 1	896	105.1	92.0	NW TEXARKANA 500/345KV TRANSFORMER 53125 NWTXARK8 500 to 53301 NWTXARK7 345 CKT1
06SP	AEPW-AEPW	ARMY AMMUNITION DEPOT TO McALESTER, 69KV 54038 A.DEPOT269.0 to 54024 MCALEST269.0 CKT 1	42	100.1	98.8	COALGATE TAP TO LEHIGH, 138KV 54005 COALGTP4 138 to 54020 LEHIGH-4 138 CKT1

Table 7 continued - SPP Facility Overloads found in Table 5 that are relieved due to the Muskogee – ANO 500kV line addition

Study Year	From Area To Area	Branch Over 100% Rate B	RATEB	TC % I Loading (No Line Additions)	TC % I Loading (With Line Additions)	Outaged Branch That Caused Overload
06SP	GRRD-OKGE	TAHLEQUAH TO HWY 59, 161KV 54455 TAHLQH 5 161 to 55347 HWY 59 161 CKT 1	167	113.9	69.4	MUSKOGEE TO FORT SMITH, 345KV 55224 MSKGE7 345 to 55302 FTSMI7 345 CKT1
06SP	OKGE-AEPW	BONZT5 TO BONANZA, 161KV 55261 BONZT5 161 to 53126 BONANZA5 161 CKT 1	177	101.1	94.9	BRANCH TO VBI, 161KV 55316 BRNCH5 161 to 55339 VBI 5 161 CKT1
06SP	OKGE-OKGE	WHITE EAGLE TO KILDARE, 138KV 54761 WHEGL4 138 to 54760 KILDR4 138 CKT 1	222	100.5	98.1	OSAGE TO CONTINENTAL TAP, 69KV 54742 OSAGE269.0 to 54745 CONTT269.0 CKT1
06SP	OKGE-OKGE	PANAMA TO SKULLYVILLE, 69KV 55272 PANAM269.0 to 55270 SKULY269.0 CKT 1	39	102.8	97.2	BONANZA TAP TO AES, 161KV 55261 BONZT5 161 to 55262 AES 5 161 CKT1
06SP	OKGE-OKGE	VBI TO HIGHWAY 59, 161KV 55339 VBI 5 161 to 55347 HWY 59 161 CKT 1	167	110.1	65.5	MUSKOGEE TO FORT SMITH, 345KV 55224 MSKGE7 345 to 55302 FTSMI7 345 CKT1
06SP	SWPA-AEPW	BROKEN BOW TO CRAIG JUNCTION, 138KV 52814 BRKN BW4 138 to 54015 CRAIGJT4 138 CKT 1	107	101.3	91.0	BBDAMTP4 TO MOUNTAIN RIVER, 138KV 55823 BBDAMTP4 138 to 56004 MTRIVER4 138 CKT1
06SP	SWPA-OKGE	VAN BUREN TO VBI, 161KV 52722 VAN BUR5 161 to 55339 VBI 5 161 CKT 1	335	106.3	81.1	MUSKOGEE TO FORT SMITH, 345KV 55224 MSKGE7 345 to 55302 FTSMI7 345 CKT1
06SP	SWPA-SWPA	GLENCOE TO NORFORK, 161KV 52646 GLENCOE5 161 to 52648 NORFORK5 161 CKT 1	112	103.9	99.8	DONIPHAN TO GREEN FOREST, 161KV 52640 DONIPHAN5 161 to 96084 5GRNFRT 161 CKT1
06SP	SWPA-SWPA	BULL SHOALS TO NORFORK, 161KV 52660 BULL SH5 161 to 52648 NORFORK5 161 CKT 1	167	106.8	98.1	MIDWAY TO MT. HOME, 161KV 17875 5MIDWAY# 161 to 17877 5MT HOM 161 CKT1
06SP	SWPA-SWPA	SALLISAW TO VAN BUREN, 161KV 52750 SALLISAW5 161 to 52722 VAN BUR5 161 CKT 1	167	114.2	66.0	MUSKOGEE TO FORT SMITH, 345KV 55224 MSKGE7 345 to 55302 FTSMI7 345 CKT1
06SP	SWPA-SWPA	MUSKOGEE TAP TO GORE, 161KV 52758 MUSKTAP5 161 to 52752 GORE 5 161 CKT 1	206	108.6	67.3	MUSKOGEE TO FORT SMITH, 345KV 55224 MSKGE7 345 to 55302 FTSMI7 345 CKT1
06SP	EES-AEPW	OSAGE TO EUREKA SPRINGS, 161KV 17880 5OSAGE # 161 to 53136 EUREKA 5 161 CKT 1	244	105.0	88.8	MUSKOGEE TO FORT SMITH, 345KV 55224 MSKGE7 345 to 55302 FTSMI7 345 CKT1
06SP	AEPW-AEPW	NORTH MARSHALL TO WOODLAWN, 69KV 53579 NMARSHL269.0 to 53621 WOODLWN269.0 CKT 1	59	102.2	99.8	Multiple Outage Contingency SW SHREVEPORT TO DIANA, 345KV 53454 SW SHV 7 to 53528 DIANA 7 CKT1 SW SHREVEPORT TO LONGWOOD, 345KV 53454 SW SHV 7 to 53424 LONGWD 7 CKT1
06WP	AEPW-AEPW	BARTLESVILLE SE TO N BARTLESVILLE, 138KV 53940 BV-SE--4 138 to 53935 NBVILLE4 138 CKT 1	210	106.2	96.7	DELAWARE TO NORTHEAST STATION, 345KV 53929 DELWARE7 345 to 53955 N.E.S. -7 345 CKT1
06WP	SWPA-SWPA	GLENCOE TO NORFORK, 161KV 52646 GLENCOE5 161 to 52648 NORFORK5 161 CKT 1	117	102.3	99.3	NEWPORT-INDUSTRIAL TO NEWPORT, 161KV 17821 5NEW-IN 161 to 17822 5NEWPO 161 CKT1

Table 8 – Non - SPP Facility Overloads found in Table 6 that are relieved due to the Muskogee – ANO 500kV line addition

Study Year	From Area To Area	Branch Over 100% Rate B	RATEB	TC % I Loading (No Line Additions)	TC % I Loading (With Line Additions)	Outaged Branch That Caused Overload
01SR	EES-EES	17430 3STERL 115 to 17539 3MERIDN# 115 CKT 1	68	100.8	99.9	17430 3STERL 115 to 17480 3CROS-N 115 CKT1
01SR	EES-EES	17516 3STEPHN 115 to 17536 3CAMD-S# 115 CKT 1	96	100.8	98.9	17482 3CAMDMG 115 to 17514 3SMACKO 115 CKT1
04SP	EES-EES	17430 3STERL 115 to 17480 3CROS-N 115 CKT 1	80	100.3	99.5	17434 3BASTRP 115 to 17441 3BASTAP 115 CKT1
04SP	EES-EES	17609 4MURFRE 138 to 17607 3MURF-S 115 CKT 1	60	108.6	97.6	53125 NWTXARK8 500 to 53301 NWTXARK7 345 CKT1
04SP	EES-EES	17875 5MIDWAY# 161 to 17877 5MT HOM 161 CKT 1	162	106.2	98.0	52648 NORFORK5 161 to 52660 BULL SH5 161 CKT1
04WP	EES-EES	17862 5HARR-W 161 to 17849 5HARR-S 161 CKT 1	223	100.4	99.2	53136 EUREKA 5 161 to 17880 5OSAGE # 161 CKT1
06SP	EES-EES	16528 4L558T48 138 to 16532 4HUNTSVL 138 CKT 1	206	101.1	99.3	16503 4WALDEN 138 to 16556 4GRIMES 138 CKT1
06SP	EES-EES	16556 4GRIMES 138 to 16503 4WALDEN 138 CKT 1	206	101.1	99.6	16534 4MT.ZION 138 to 16556 4GRIMES 138 CKT1
06SP	EES-EES	17861 5HARR-E 161 to 17879 5SOMAHA * 161 CKT 1	162	101.0	90.4	53136 EUREKA 5 161 to 17880 5OSAGE # 161 CKT1
06SP	AMRN-AMRN	31409 OVERTON 161 to 30233 CALIF 161 CKT 1	176	100.6	98.4	31088 MCCREDIE 345 to 31230 MONTGMRY 345 CKT1
06WP	EES-EES	17502 3LEWIS # 115 to 17478 3COUCH 115 CKT 1	159	104.1	99.5	53323 SUGARHL4 138 to 53373 FULTON 4 138 CKT1
06WP	EES-EES	17513 3SHULER 115 to 17538 3CALH-N* 115 CKT 1	120	100.2	99.6	17528 3ELDEHV 115 to 17530 8ELDEHV 500 CKT1
06WP	EES-EES	17607 3MURF-S 115 to 17608 3MURF-E# 115 CKT 1	98	102.4	89.2	53125 NWTXARK8 500 to 17543 8MCNEIL 500 CKT1
06WP	EES-EES	17609 4MURFRE 138 to 17607 3MURF-S 115 CKT 1	60	108.6	95.5	17543 8MCNEIL 500 to 17621 8HSEHV 500 CKT1
06WP	AMRN-AMRN	31221 MOBERLY 161 to 31409 OVERTON 161 CKT 1	167	101.2	99.9	96044 7MCCRED 345 to 96049 7THOMHL 345 CKT1
06WP	CWL1-AECI	33401 BOLSTAD 161 to 96499 5HINTON 161 CKT 1	252	100.4	99.7	31230 MONTGMRY 345 to 31231 MONTGMRY 161 CKT1

Table 9 – Facility Upgrades Required In Addition to the proposed Muskogee to ANO 500kV line

Study Year	From Area To Area	Branch Over 100% Rate B	RATEB	BC % I Loading	TC % I Loading	ATC	Outaged Branch That Caused Overload	Initial Limit, Available Solution and Cost, or Previous Assignment
01SR	OKGE-OKGE	DRAPER LAKE 345/138KV TRANSFORMER 54934 DRAPR7 345 to 54933 DRAPR4 138 CKT 1	493	87.0	106.5	500	DRAPER LAKE 345/138KV TRANSFORMER 54933 DRAPR4 138 to 54934 DRAPR7 345 CKT2	Modify Draper sub, convert to Breaker and one-half scheme, and add 3rd 493 MVA transformer \$8,000,000
01SR	OKGE-OKGE	DRAPER LAKE 345/138KV TRANSFORMER 54933 DRAPR4 138 to 54934 DRAPR7 345 CKT2	493	87.0	106.5	500	DRAPER LAKE 345/138KV TRANSFORMER 54934 DRAPR7 345 to 54933 DRAPR4 138 CKT 1	See Above
01SR	OKGE-OKGE	DRAPER LAKE TO THUNDERBIRD, 345KV 54934 DRAPR7 345 to 54998 THNDER 7 345 CKT 1	717	N/A	105.1	714	THUNDERBIRD TO SEMINOLE, 345KV 54998 THNDER 7 345 to 55045 SEMNL7 345 CKT1	Replace Relays and 1200 Amp CTs at Draper \$50,000
01SR	OKGE-OKGE	THUNDERBIRD TO SEMINOLE, 345KV 54998 THNDER 7 345 to 55045 SEMNL7 345 CKT1	717	N/A	104.2	720	DRAPER LAKE TO THUNDERBIRD, 345KV 54934 DRAPR7 345 to 54998 THNDER 7 345 CKT 1	Replace Relays and 1200 Amp CTs at Seminole \$50,000
04SP	AEPW-AEPW	GRANIS TO DEQUEEN, 69KV 53348 GRANIS 269.0 to 53257 DEQUEEN269.0 CKT 1	44	97.2	100.2	700	MENA 4 TO CRAIG JUNCTION, 138KV 53340 MENA 4 138 to 54015 CRAIGJT4 138 CKT1	Undetermined
04SP	AEPW-AEPW	FERNDALE LAKE TAP TO PITTSBURG, 69KV 53531 FERNDTP269.0 to 53310 PITTSB_269.0 CKT 1	72	100.0	100.8	0	HOPEWELL REC TO WINFIELD, 69KV 53262 HOPEWEL269.0 to 53335 WINFIEL269.0 CKT1	Undetermined
04SP	OKGE-OKGE	CHILOCCO TAP TO THREE SANDS, 69KV 54744 CHLOC269.0 to 54762 THREE269.0 CKT 1	57	97.5	103.0	341	KILDARE TAP TO WHITE EAGLE, 138KV 54760 KILDR4 138 to 54761 WHEGL4 138 CKT1	Undetermined
04SP	OKGE-OKGE	TINKER NO. 4 TO TINKER 2, 138KV 54988 TNKR44 138 to 54990 TNKR24 138 CKT 1	100	97.2	109.8	167	NE 10TH TO MIDWAY, 138KV 54964 NE10 4 138 to 54966 MIDWY4 138 CKT1	Initial Estimate Cable Relay Protected Replace one mile 138kV UG Cable \$1,000,000
04SP	OKGE-OKGE	SPRINGDALE TAP TO RUSSET,T 138KV 55172 SPRIN4 138 to 55120 RUSSET4 138 CKT 1	96	89.3	102.9	590	ARBUCKLE TO MILL CREEK TAP, 138KV 55117 ARB 4 138 to 55121 MILLC4 138 CKT1	Replace 400A wavetrap & relays @ Russett \$50,000
04SP	OKGE-OKGE	HARDEN CITY TO AHLOSO TAP, 69KV 55186 HARDN269.0 to 55187 AHLLOT269.0 CKT 1	52	94.9	106.8	321	VALLEY VIEW TAP TO VALLEY VIEW, 69KV 55181 VLVUT269.0 to 55182 VALVU269.0 CKT1	Undetermined
04SP	OKGE-OKGE	DRAPER LAKE 345/138KV TRANSFORMER 54934 DRAPR7 345 to 54933 DRAPR4 138 CKT 1	493	79.8	101.2	708	CIMARRON TO DRAPER LAKE, 345KV 54901 CMARN7 345 to 54934 DRAPR7 345 CKT1	See Previous
04SP	OKGE-OKGE	DRAPER LAKE 345/138KV TRANSFORMER 54934 DRAPR7 345 to 54933 DRAPR4 138 CKT 2	493	79.8	101.2	708	CIMARRON TO DRAPER LAKE, 345KV 54901 CMARN7 345 to 54934 DRAPR7 345 CKT1	See Previous
04SP	OKGE-OKGE	DRAPER LAKE TO THUNDERBIRD, 345KV 54934 DRAPR7 345 to 54998 THNDER 7 345 CKT 1	717	61.5	117.3	517	DRAPER TO SEMINOLE, 345KV 54934 DRAPR7 345 to 55045 SEMNL7 345 CKT3	See Previous

Table 9 continued – Facility Upgrades Required In Addition to the proposed Muskogee to ANO 500kV line

Study Year	From Area To Area	Branch Over 100% Rate B	RATEB	BC % I Loading	TC % I Loading	ATC	Outaged Branch That Caused Overload	Initial Limit, Available Solution and Cost, or Previous Assignment
04SP	OKGE-OKGE	DRAPER LAKE TO THUNDERBIRD, 345KV 54934 DRAPR7 345 to 54998 THNDER 7 345 CKT 1	717	N/A	105.0	714	THUNDERBIRD TO SEMINOLE, 345KV 54998 THNDER 7 345 to 55045 SEMNL7 345 CKT1	See Previous
04SP	OKGE-OKGE	THUNDERBIRD TO SEMINOLE, 345KV 54998 THNDER 7 345 to 55045 SEMNL7 345 CKT1	717	N/A	104.6	717	DRAPER LAKE TO THUNDERBIRD, 345KV 54934 DRAPR7 345 to 54998 THNDER 7 345 CKT 1	See Previous
04SP	WERE-WERE	MIDLAND JUNCTION 161/115 KV TRANSFORMER 56946 MIDLAND3 115 to 56807 MIDLAND5 161 CKT 1	183	97.4	100.4	650	HOYT TO STRANGER CREEK, 345KV 56752 HOYT 7 345 to 56758 STRANGR7 345 CKT1	Undetermined
04SP	WERE-WERE	GOLDEN PLAINS JUNCTION TO HESSTON, 69KV 57289 GOLDPLJ269.0 to 57291 HESSTON269.0 CKT 1	32	99.9	100.6	107	CHISHOLM TO EVANS ENERGY CENTER, 138KV 56856 CHISHLM4 138 to 56860 EVANS 4 138 CKT1	Undetermined
04SP	WFEC-WFEC	FRANKLIN SW TO ACME, 69KV 55916 FRNKLNS269.0 to 55802 ACME 269.0 CKT 1	34	98.8	102.9	220	GOLDSBY TO OKLAHOMA UNIVERSITY SW, 69KV 55924 GOLDSBY269.0 to 56018 OU SW 269.0 CKT1	Undetermined
04SP	WFEC-WFEC	GOLDSBY TO OKLAHOMA UNIVERSITY SW, 69KV 55924 GOLDSBY269.0 to 56018 OU SW 269.0 CKT 1	34	97.7	101.9	411	FRANKLIN SW TO ACME, 69KV 55916 FRNKLNS269.0 to 55802 ACME 269.0 CKT 1	Undetermined
04SP	AEPW-AEPW	TATUM TO ROCK HILL, 138KV 53611 TATUM 4 138 to 53598 ROKHILL4 138 CKT 1	287	98.6	102.8	250	Multiple Outage Contingency SW SHREVEPORT TO DIANA, 345KV 53454 SW SHV 7 to 53528 DIANA 7 CKT1 SW SHREVEPORT TO LONGWOOD, 345KV 53454 SW SHV 7 to 53424 LONGWD 7 CKT1	Undetermined
04WP	OKGE-OKGE	DRAPER LAKE 345/138KV TRANSFORMER 54934 DRAPR7 345 to 54933 DRAPR4 138 CKT 1	493	97.6	117.4	91	DRAPER LAKE 345/138KV TRANSFORMER 54933 DRAPR4 138 to 54934 DRAPR7 345 CKT2	See Previous
04WP	OKGE-OKGE	DRAPER LAKE 345/138KV TRANSFORMER 54933 DRAPR4 138 to 54934 DRAPR7 345 CKT2	493	97.6	117.4	91	DRAPER LAKE 345/138KV TRANSFORMER 54934 DRAPR7 345 to 54933 DRAPR4 138 CKT 1	See Previous
04WP	OKGE-OKGE	DRAPER LAKE TO THUNDERBIRD, 345KV 54934 DRAPR7 345 to 54998 THNDER 7 345 CKT 1	717	50.5	106.0	669	DRAPER TO SEMINOLE, 345KV 54934 DRAPR7 345 to 55045 SEMNL7 345 CKT3	See Previous
04WP	OKGE-OKGE	DRAPER LAKE TO THUNDERBIRD, 345KV 54934 DRAPR7 345 to 54998 THNDER 7 345 CKT 1	717	N/A	104.5	718	THUNDERBIRD TO SEMINOLE, 345KV 54998 THNDER 7 345 to 55045 SEMNL7 345 CKT1	See Previous
04WP	OKGE-OKGE	THUNDERBIRD TO SEMINOLE, 345KV 54998 THNDER 7 345 to 55045 SEMNL7 345 CKT1	717	N/A	104.3	719	DRAPER LAKE TO THUNDERBIRD, 345KV 54934 DRAPR7 345 to 54998 THNDER 7 345 CKT 1	See Previous

Table 9 continued – Facility Upgrades Required In Addition to the proposed Muskogee to ANO 500kV line

Study Year	From Area To Area	Branch Over 100% Rate B	RATEB	BC % I Loading	TC % I Loading	ATC	Outaged Branch That Caused Overload	Initial Limit, Available Solution and Cost, or Previous Assignment
04WP	OKGE-OKGE	TINKER NO. 4 TO TINKER 2, 138KV 54988 TNKR44 138 to 54990 TNKR24 138 CKT 1	100	82.6	107.3	528	POST ROAD TAP TO SE15TH, 138KV 54965 POST 4 138 to 54993 SE15 4 138 CKT1	See Previous
04WP	OKGE-OKGE	ETNA TO BRANCH, 69KV 55318 ETNA 269.0 to 55313 BRNCH269.0 CKT 1	48	98.6	100.9	457	BONANZA TO HACKETT, 161KV 53126 BONANZA5 161 to 53196 HACKETT5 161 CKT1	Initial Estimate Rebuild and Reconductor 7.38miles of 267ACSR with 477ACSR, \$2,767,000
04WP	WFEC-OKGE	CANADIAN SW TO CANADIAN, 138KV 55842 CANADNS4 138 to 54947 CANDN4 138 CKT 1	70	87.9	103.5	582	MIDWEST TAP TO FRANKLIN SW, 138KV 54946 MDWST4 138 to 55917 FRNKLNS4 138 CKT1	Undetermined
04WP	WFEC-WFEC	FRANKLIN SW 138/69KV TRANSFORMER 55917 FRNKLNS4 138 to 55916 FRNKLNS269.0 CKT 1	70	96.6	100.4	671	CANADIAN SW 138/69KV TRANSFORMER 55841 CANADNS269.0 to 55842 CANADNS4 138 CKT1	Undetermined
06SP	AEPW-AEPW	WINFIELD TO ADORA REC, 69KV 53335 WINFIEL269.0 to 53243 ADORA 269.0 CKT 1	85	99.5	100.3	469	PITTSBURG TO FERNDALE LAKE TAP, 69KV 53310 PITTSB_269.0 to 53531 FERNDTP269.0 CKT1	Undetermined
06SP	AEPW-AEPW	FULTON TO HOPE, 115KV 53374 FULTON 3 115 to 53383 HOPE 3 115 CKT 1	239	99.6	102.3	111	ASHDOWN TO PATTERSON, 115KV 53225 ASHDWNR3 115 to 53305 PATTERS3 115 CKT1	Replace circuit switcher & CTs at Hope \$80,000
06SP	AEPW-AEPW	OAK HILL #2 TO KNOX LEE, 138KV 53586 OAK2HIL4 138 to 53557 KNOXLEE4 138 CKT 1	210	98.9	100.1	688	KNOX LEE TO MONROE CORNERS REC, 138KV 53557 KNOXLEE4 138 to 53574 MONROCR4 138 CKT1	Undetermined
06SP	OKGE-OKGE	DRAPER LAKE 345/138KV TRANSFORMER 54934 DRAPR7 345 to 54933 DRAPR4 138 CKT 1	493	82.9	104.5	594	CIMARRON TO DRAPER LAKE, 345KV 54901 CMARN7 345 to 54934 DRAPR7 345 CKT1	See Previous
06SP	OKGE-OKGE	DRAPER LAKE 345/138KV TRANSFORMER 54934 DRAPR 7 345 to 54933 DRAPR4 138 CKT 2	493	82.9	104.5	594	CIMARRON TO DRAPER LAKE, 345KV 54901 CMARN7 345 to 54934 DRAPR7 345 CKT1	See Previous
06SP	OKGE-OKGE	DRAPER LAKE TO THUNDERBIRD, 345KV 54934 DRAPR7 345 to 54998 THNDER 7 345 CKT 1	717	63.6	119.6	488	DRAPER TO SEMINOLE, 345KV 54934 DRAPR7 345 to 55045 SEMNL7 345 CKT3	See Previous
06SP	OKGE-OKGE	DRAPER LAKE TO THUNDERBIRD, 345KV 54934 DRAPR7 345 to 54998 THNDER 7 345 CKT 1	717	N/A	105.0	714	THUNDERBIRD TO SEMINOLE, 345KV 54998 THNDER 7 345 to 55045 SEMNL7 345 CKT1	See Previous
06SP	OKGE-OKGE	THUNDERBIRD TO SEMINOLE, 345KV 54998 THNDER 7 345 to 55045 SEMNL7 345 CKT1	717	N/A	104.6	717	DRAPER LAKE TO THUNDERBIRD, 345KV 54934 DRAPR7 345 to 54998 THNDER 7 345 CKT 1	See Previous
06SP	OKGE-OKGE	TINKER NO. 4 TO TINKER 2, 138KV 54988 TNKR44 138 to 54990 TNKR24 138 CKT 1	100	86.8	108.0	467	DRAPER LAKE TO MIDWEST, 138KV 54933 DRAPR4 138 to 54946 MDWST4 138 CKT1	See Previous

Table 9 continued – Facility Upgrades Required In Addition to the proposed Muskogee to ANO 500kV line

Study Year	From Area To Area	Branch Over 100% Rate B	RATEB	BC % I Loading	TC % I Loading	ATC	Outaged Branch That Caused Overload	Initial Limit, Available Solution and Cost, or Previous Assignment
06SP	OKGE-OKGE	SEMINOLE TO MAUD TAP, 345KV 55044 SEMNL4 138 to 55055 MAUD 4 138 CKT 1	214	93.1	106.1	398	SEMINOLE TO MAUD TAP, 345KV 55044 SEMNL4 138 to 55055 MAUD 4 138 CKT2	Undetermined
06SP	OKGE-OKGE	SPRINGDALE TAP TO RUSSETT, 138KV 55172 SPRIN4 138 to 55120 RUSET4 138 CKT 1	96	97.0	110.6	165	ARBUCKLE TO MILL CREEK TAP, 138KV 55117 ARB 4 138 to 55121 MILLC4 138 CKT1	See Previous
06SP	OKGE-OKGE	PARK LANE TO SEMINOLE, 138KV 55178 PRKLN4 138 to 55044 SEMNL4 138 CKT 1	287	98.0	107.7	155	SEMINOLE TO VANOSS TAP, 138KV 55044 SEMNL4 138 to 55174 VANOS4 138 CKT1	Replace relays and 1200 Amp CTs at Park Lane and Seminole \$100,000
06SP	OKGE-OKGE	A OC PUMP TAP TO ADA OC PUMP, 69KV 55190 AOCPT269.0 to 55189 AOCPA269.0 CKT 1	52	93.2	108.2	340	PARKLANE TO AHLOSO TAP, 69KV 55177 PRKLN269.0 to 55187 AHLOT269.0 CKT1	Undetermined
06SP	WERE-WERE	GILL ENERGY CENTER TO OATVILLE, 69 KV 57347 GILL 269.0 to 57374 OATVILL269.0 CKT 1	72	99.7	100.6	250	HOOVER TO HOOVER NORTH, 69 KV 56865 HOOVER 4 138 to 57355 HOOV-NO269.0 CKT3	Undetermined
06SP	WERE-WERE	OATVILLE TO MACARTHUR, 69KV 57374 OATVILL269.0 to 57364 MACARTH269.0 CKT 1	72	99.8	100.3	300	GILL ENERGY CENTER TO MACARTHUR, 69KV 57347 GILL 269.0 to 57364 MACARTH269.0 CKT1	Undetermined
06SP	OKGE-OKGE	MUSKOGEE 500/345KV TRANSFORMER 55231 MSKGE8 500 to 55224 MSKGE7 345 CKT 1	896	91.9	108.4	368	MUSKOGEE TO FORT SMITH, 345KV 55224 MSKGE7 345 to 55302 FTSMI7 345 CKT1	Undetermined
06WP	CESW-CESW	NW TEXARKANA 500/345KV TRANSFORMER 53125 NWTXARK8 500 to 53301 NWTXARK7 345 CKT 1	896	93.1	101.7	602	PITTSBURG TO NW TEXARKANA, 500KV 52819 PITTSB-8 500 to 53125 NWTXARK8 500 CKT1	Undetermined
06WP	AEPW-AEPW	FULTON TO HOPE, 115KV 53374 FULTON 3 115 to 53383 HOPE 3 115 CKT 1	239	98.6	101.4	375	HOPE TAP TO NW HOPE, 115KV 53376 HOPETAP3 115 to 53379 NWHOPE 3 115 CKT1	See Previous
06WP	AEPW-AEPW	FERNDALE LAKE TAP TO PITTSBURG, 69KV 53531 FERNDTP269.0 to 53310 PITTSB_269.0 CKT 1	72	99.9	100.7	94	ADORA TO WINFIELD, 69KV 53243 ADORA 269.0 to 53335 WINFIEL269.0 CKT1	Undetermined
06WP	AEPW-AEPW	IDABEL TO HUGO TAP, 138KV 54011 IDABEL-4 138 to 54014 HUGOTAP4 138 CKT 1	186	97.5	102.6	368	BROKEN BOW TO DOMINAN4, 138KV 55834 BROKNBW4 138 to 55878 DOMINAN4 138 CKT1	Undetermined
06WP	OKGE-OKGE	DRAPER LAKE 345/138KV TRANSFORMER 54934 DRAPR7 345 to 54933 DRAPR4 138 CKT 1	493	93.4	113.3	249	DRAPER LAKE 345/138KV TRANSFORMER 54933 DRAPR4 138 to 54934 DRAPR7 345 CKT2	See Previous
06WP	OKGE-OKGE	DRAPER LAKE 345/138KV TRANSFORMER 54933 DRAPR4 138 to 54934 DRAPR7 345 CKT2	493	93.4	113.3	249	DRAPER LAKE 345/138KV TRANSFORMER 54934 DRAPR7 345 to 54933 DRAPR4 138 CKT 1	See Previous

Table 9 continued – Facility Upgrades Required In Addition to the proposed Muskogee to ANO 500kV line

Study Year	From Area To Area	Branch Over 100% Rate B	RATEB	BC % I Loading	TC % I Loading	ATC	Outaged Branch That Caused Overload	Initial Limit, Available Solution and Cost, or Previous Assignment
06WP	OKGE-OKGE	DRAPER LAKE TO THUNDERBIRD, 345KV 54934 DRAPR7 345 to 54998 THNDER 7 345 CKT 1	717	N/A	104.4	718	THUNDERBIRD TO SEMINOLE, 345KV 54998 THNDER 7 345 to 55045 SEMNL7 345 CKT1	See Previous
06WP	OKGE-OKGE	THUNDERBIRD TO SEMINOLE, 345KV 54998 THNDER 7 345 to 55045 SEMNL7 345 CKT1	717	N/A	104.5	718	DRAPER LAKE TO THUNDERBIRD, 345KV 54934 DRAPR7 345 to 54998 THNDER 7 345 CKT 1	See Previous
06WP	OKGE-OKGE	TINKER NO. 4 TO TINKER 2, 138KV 54990 TNKR24 138 to 54988 TNKR44 138 CKT 1	100	89.2	102.2	623	HORSESHOE LAKE TO MIDWAY, 138KV 54941 HSL 4 138 to 54966 MIDWY4 138 CKT1	See Previous

5. Conclusion

The results of the study show that before the 750MW transfer from OKGE to EES can take place system improvements will be needed.

1. The study of the 750MW transfer is contingent on the two previous studies that were discussed. These are SPP System Impact Studies SPP-2000-108 and SPP-2000-109. SPP-2000-108 is the study of OASIS Reservation 212202 requesting 670MW from AEPW to EES. Proposed in this study is the addition of the Pittsburg to NW Texarkana to McNeil 500kV line and Dolet Hills to Coushatta 345kV line. This line is also included in the Impact Study SPP-2000-109, which is the study of OASIS Reservation 212203 requesting 670MW from AEPW to Ameren. Proposed in this study is the addition of the Callaway to Montrose to La Cygne 345kV line, which is included to increase the SPP to Ameren Contract Path Capacity. The study of the 750MW from OKGE to EES assumes that these transfers will exist and the construction of the proposed transmission lines will be completed.
2. As shown in Table 5, the 750MW transfer from OKGE to EES causes overloads on facilities that have not been previously assigned. These new overloads must be relieved in order to provide the capacity needed for the transaction. SPP proposes the addition of a 500kV line from Muskogee to Arkansas Nuclear One. The addition of this line helps maintain and improve system reliability and also relieves 33 SPP facility overloads caused by the 750MW transfer.
3. The new overloads that were not relieved by the addition of the 500kV line must be upgraded. These facilities are included in Table 9.

The 750MW transfer from OKGE to EES, requested by Energetix is dependant on the completion of the additions and upgrades from the two previous studies that are listed in Tables 1 thru 4, along with any remaining facilities that have been previously assigned to other customers.

The final cost assignment of facilities and ATC to Energetix 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 –1.0
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