



# **SPP** *Southwest Power Pool*

*System Impact Study  
SPP-2004-001-1  
For The Designation of a New  
Network Resource  
Requested By  
Empire District Electric Company*

*For a Reserved Amount of 150 MW  
From 1/1/2005  
To 1/1/2025*

*SPP Engineering, Tariff Studies*

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**ATTACHMENT: *SPP-2004-001-1 Tables***

## **1. Executive Summary**

Empire District Electric Company has requested a system impact study to designate a New Network Resource in the Westar Control Area for 150 MW to serve EDE Network Load in the EDE Control Area. The period of the service requested is from 1/1/2005 to 1/1/2025. The request is for OASIS reservation numbers 634282, 634284, and 634285.

The principal objective of this study is to identify system problems and potential system modifications necessary to facilitate the additional 150 MW request while maintaining system reliability.

The service was modeled from the source in WR to EDE load. The new source location causes new facility overloads on the SPP and Non-SPP transmission system, as well as increasing the loading on previously overloaded facilities. Tables 1.1 and 2.1 summarize the results of the system impact analyses for the new source location for Scenario 1. Table 1.1 lists SPP facility overloads identified. Table 2.1 lists Non-SPP facility overloads identified. Tables 1.2 and 2.2 summarize the results of the system impact analyses for the new source location for Scenario 2. Table 1.2 lists SPP facility overloads identified. Table 2.2 lists Non-SPP facility overloads identified.

The study results of the WR to EDE request show that limiting constraints exist. Due to the limiting constraints identified, the Transmission Service Requests cannot be granted. Any solutions, upgrades, and costs provided in the System Impact Study are planning estimates only. The final ATC and upgrades required may vary from these results due to unknown facility upgrades and proposed transmission plans that will be identified during the facility study process.

The Chamber Springs – Tontitown 161kV line was identified as limit to service for the 2005 Summer and 2005 Winter cases. This facility is scheduled to be upgraded by the summer of 2007. Expediting the upgrade is not possible to accommodate the requested start date for the WR to EDE service. SPP will review the possibility of curtailment of previously confirmed service and/or the redispatch of units as an option for relieving the additional impacts on this facility. This option will be evaluated as part of the Facility Study. If no redispatch or curtailment of service option is identified, the start date of the requested service may be delayed until the upgrade of the limiting facility is completed. Execution of a Facility Study Agreement is now required to maintain queue position. The final ATC, upgrade solutions, cost assignments, complete evaluation of renewal rights, and available redispatch and curtailment options will be determined upon the completion of the facility study.

## **2. Introduction**

Empire District Electric Company has requested a system impact study to designate a New Network Resource in the WR Control Area for 150 MW to serve EDE Network Load in the EDE Control Area. The principal objective of this study is to identify the restraints on the SPP Regional Tariff System that may limit the requested service.

This study includes steady-state contingency analyses (PSS/E function ACCC) and Available Transfer Capability (ATC) analyses. The steady-state analyses consider the impact of the 150 MW requests on transmission line loading and transmission bus voltages for system intact and system outages of single and selected multiple transmission lines and transformers on the SPP systems and first tier Non - SPP systems.

### **3. Study Methodology**

#### **A. Description**

The system impact analysis was conducted to determine the steady-state impact of the 150 MW transfer on the SPP and first tier Non - SPP systems. The steady-state analysis was done to ensure current SPP Criteria and NERC Planning Standards requirements are fulfilled. The Southwest Power Pool conforms to the NERC Planning Standards, which provide the strictest requirements, related to voltage violations and thermal overloads during normal conditions and during a contingency. It requires that all facilities be within normal operating ratings for normal system conditions and within emergency ratings after a contingency.

The contingency set includes all SPP facilities 69kV and above, SPP First Tier facilities 115 kV and above, and any defined contingencies for these areas. The monitor elements include all SPP and first tier Non-SPP facilities 69 kV and above.

#### **B. Model Updates**

SPP used eleven seasonal models to study the WR to EDE 150 MW transfer for the requested service period. The SPP 2004 Series Cases 2004/05 Winter Peak (04WP), 2005 April Minimum (05AP), 2005 Spring Peak (05G), 2005 Summer Peak (05SP), 2005 Summer Shoulder (05SH), 2005 Fall Peak (05FA), 2005/06 Winter Peak (05WP), 2007 Summer Peak (07SP), 2007/08 Winter Peak (07WP), 2010 Summer Peak (10SP), and 2010/11 Winter Peak (10WP) were used to study the impact of 150 MW transfer on the system during the requested service period of 1/1/2005 to 1/1/2025.

The chosen base case models were modified to reflect the most current modeling information. The cases were modified to reflect firm transfers during the requested service period that were not already included in the SPP 2004 Series Cases. From the eleven seasonal models, two system scenarios were developed. Scenario 1 includes confirmed West to East transfers not already included in the January 2004 base case series models, SPS exporting, and the Lamar HVDC Tie flowing from SPS to Lamar, and ERCOT exporting. Scenario 2 includes confirmed East to West transfers not already included in the January 2004 base case series models, SPS importing, and the Lamar HVDC Tie flowing from Lamar to SPS, and ERCOT importing.

#### **C. Transfer Analysis**

Using the selected cases both with and without the transfer modeled, the PSS/E Activity ACCC was run on the cases and compared to determine the facility overloads caused or impacted by the transfers. The PSS/E options chosen to conduct the analysis can be found in Appendix A.

#### **D. Upgrade Analysis**

This system impact study does not include analysis with the assigned upgrades modeled. To determine the final cost and possible start date of the requested service, additional analysis will be performed to determine the impact of modeling the assigned upgrades for the request.

## **4. Study Results**

### **A. Study Analysis Results**

Tables 1.1, 2.1, 1.2, and 2.2 contain the steady-state analysis results of the System Impact Study. The Tables are in the attached workbook *SPP-2004-001-1 Tables*. The tables identify the seasonal case in which the event occurred, the facility control area location, applicable ratings of the overloaded facility, the loading percentage with and without the 150 MW transfer, and the estimated ATC value if calculated. Comments are provided in the tables to document any SPP or Non - SPP identification or assignment of the event, existing mitigations plans or criteria to disregard the event as a limiting constraint, upgrades and costs to mitigate a limiting constraint, or any specific study procedures associated with modeling an event.

Table 1.1 lists the SPP Facility Overloads caused or impacted by the 150 MW transfer for Scenario 1. Solutions with engineering and construction costs are provided in the tables.

Tables 2.1 lists overloads on first tier Non - SPP Regional Tariff participants' transmission systems caused or impacted by the 150 MW transfer for Scenario 1.

Table 1.2 lists the SPP Facility Overloads caused or impacted by the 150 MW transfer for Scenario 2. Solutions with engineering and construction costs are provided in the tables.

Tables 2.2 lists overloads on first tier Non - SPP Regional Tariff participants' transmission systems caused or impacted by the 150 MW transfer for Scenario 2.

Tables 1.1a and 1.2a document the modeling representation of the events identified in Tables 1.1 and 1.2 respectively to include bus numbers and bus names.

## **5. Conclusion**

The study results of the WR to EDE request show that limiting constraints exist. Due to the limiting constraints identified, the Transmission Service Requests cannot be granted. Any solutions, upgrades, and costs provided in the System Impact Study are planning estimates only. The final ATC and upgrades required may vary from these results due to unknown facility upgrades and proposed transmission plans that will be identified during the facility study process.

The Chamber Springs – Tontitown 161kV line was identified as limit to service for the 2005 Summer and 2005 Winter cases. This facility is scheduled to be upgraded by the summer of 2007. Expediting the upgrade is not possible to accommodate the requested start date for the WR to EDE service. SPP will review the possibility of curtailment of previously confirmed service and/or the redispatch of units as an option for relieving the additional impacts on this facility. This option will be evaluated as part of the Facility Study. If no redispatch or curtailment of service option is identified, the start date of the requested service may be delayed until the upgrade of the limiting facility is completed. Execution of a Facility Study Agreement is now required to maintain queue position. The final ATC, upgrade solutions, cost assignments, complete evaluation of renewal rights, and available redispatch and curtailment options will be determined upon the completion of the 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



SPP-2004-001-1 Scenario 1  
 Table 1.1 - SPP Facility Overloads Caused or Impacted  
 by 150 MW Transfer

Southwest Power Pool  
 System Impact Study

Study Case	From Area	To Area	Monitored Branch Over 100% Rate B	Rate <MVA>	BC % Loading	TC % Loading	Outaged Branch Causing Overload	ATC (MW)	Solution	Estimated Cost
05SH	AEPW	AEPW	CHAMBER SPRINGS - TONTITOWN 161KV	244	115.2	117.2	CHAMBER SPRINGS - FARMINGTON AECC 161KV	0	AEPW Upgrade Schedule Completion Date 6/1/2007	
05SH	AEPW	AEPW	CHAMBER SPRINGS - TONTITOWN 161KV	244	103.5	105.4	FARMINGTON AECC - SOUTH FAYETTEVILLE 161KV	0	See Previous Upgrade Specified for Facility	
05SP	AEPW	AEPW	CHAMBER SPRINGS - TONTITOWN 161KV	244	137.6	139.6	CHAMBER SPRINGS - FARMINGTON AECC 161KV	0	See Previous Upgrade Specified for Facility	
05SP	AEPW	AEPW	CHAMBER SPRINGS - TONTITOWN 161KV	244	123.2	125.2	FARMINGTON AECC - SOUTH FAYETTEVILLE 161KV	0	See Previous Upgrade Specified for Facility	
05SP	AEPW	AEPW	CHAMBER SPRINGS - TONTITOWN 161KV	244	103.8	105.7	FLINT CREEK - GENTRY REC 161KV	0	See Previous Upgrade Specified for Facility	
05SP	AEPW	AEPW	CHAMBER SPRINGS - TONTITOWN 161KV	244	103.0	104.9	EAST CENTERTON - GENTRY REC 161KV	0	See Previous Upgrade Specified for Facility	
05WP	AEPW	AEPW	CHAMBER SPRINGS - TONTITOWN 161KV	275	102.7	104.5	CHAMBER SPRINGS - FARMINGTON AECC 161KV	0	See Previous Upgrade Specified for Facility	
07SP	SWPA	ENTR	BULL SHOALS - BULL SHOALS HES 161KV	176	106.6	109.2	EUREKA SPRINGS - OSAGE CREEK (AECC) 161KV	0	Solution Undeterminex	
10SP	SWPA	ENTR	BULL SHOALS - BULL SHOALS HES 161KV	176	137.2	141.0	EUREKA SPRINGS - OSAGE CREEK (AECC) 161KV	0	Solution Undeterminex	
10SP	EMDE	EMDE	JOPLIN SW - EXPLORER SPRING CITY TAP 69KV	39	87.6	102.1	SUB 184 - NEOSHO STH JCT. - SUB 314 - NEOSHO LINDE 69KV	150	Excluded due to EMDE Mitigation Pla	
Total Estimated Cos:									\$	-

Table 2.1 - Non-SPP Facility Overloads Caused or Impacted  
by 150 MW Transfer

Study Case	From Area	To Area	Monitored Branch Over 100% Rate B	Rate <MVA>	BC % Loading	TC % Loading	Outaged Branch Causing Overload	Comment
05SP	AECI	AECI	96089 5JAMESV 161 WND 2 JAMESV1 1	84	90.2	100.5	96089 5JAMESV 161 WND 2 JAMESV2 2	Third Party Overload - Solution Undetermined
05SP	AECI	AECI	96089 5JAMESV 161 WND 2 JAMESV2 2	84	89.5	101.3	96089 5JAMESV 161 WND 2 JAMESV1 1	Third Party Overload - Solution Undetermined
07SP	AECI	AECI	96089 5JAMESV 161 WND 2 JAMESV1 1	84	98.2	110.4	96089 5JAMESV 161 WND 2 JAMESV2 2	Third Party Overload - Solution Undetermined
07SP	AECI	AECI	96089 5JAMESV 161 WND 2 JAMESV2 2	84	99.0	111.1	96089 5JAMESV 161 WND 2 JAMESV1 1	Third Party Overload - Solution Undetermined
07SP	SWPA	ENTR	52660 BULL SH5 161 to 99802 5BULLSH* 161 CKT 1	176	106.6	109.2	53136 EUREKA 5 161 to 99832 5OSAGE # 161 CKT 1	Third Party Overload - Solution Undetermined
07SP	ENTR	ENTR	99802 5BULLSH* 161 to 99809 5FLIPN 161 CKT 1	162	112.2	115.0	53136 EUREKA 5 161 to 99832 5OSAGE # 161 CKT 1	Third Party Overload - Solution Undetermined
10SP	AECI	AECI	96089 5JAMESV 161 WND 2 JAMESV1 1	84	108.2	117.2	96089 5JAMESV 161 WND 2 JAMESV2 2	Third Party Overload - Solution Undetermined
10SP	AECI	AECI	96089 5JAMESV 161 WND 2 JAMESV2 2	84	107.3	116.3	96089 5JAMESV 161 WND 2 JAMESV1 1	Third Party Overload - Solution Undetermined
10SP	SWPA	ENTR	52660 BULL SH5 161 to 99802 5BULLSH* 161 CKT 1	176	137.2	141.0	53136 EUREKA 5 161 to 99832 5OSAGE # 161 CKT 1	Third Party Overload - Solution Undetermined
10SP	ENTR	ENTR	99797 5HARR-S 161 to 99811 5HARR-E 161 CKT 1	223	153.1	156.3	53136 EUREKA 5 161 to 99832 5OSAGE # 161 CKT 1	Third Party Overload - Solution Undetermined
10SP	ENTR	ENTR	99797 5HARR-S 161 to 99812 5HARR-W 161 CKT 1	223	144.2	147.2	53136 EUREKA 5 161 to 99832 5OSAGE # 161 CKT 1	Third Party Overload - Solution Undetermined
10SP	ENTR	ENTR	99802 5BULLSH* 161 to 99809 5FLIPN 161 CKT 1	162	145.2	149.3	53136 EUREKA 5 161 to 99832 5OSAGE # 161 CKT 1	Third Party Overload - Solution Undetermined
10SP	ENTR	ENTR	99802 5BULLSH* 161 to 99809 5FLIPN 161 CKT 1	162	98.6	101.7	52680 BEAVER 5 161 to 53136 EUREKA 5 161 CKT 1	Third Party Overload - Solution Undetermined
10SP	ENTR	ENTR	99802 5BULLSH* 161 to 99809 5FLIPN 161 CKT 1	162	97.6	101.3	99519 5QUITMN 161 to 99799 5BEE BR 161 CKT 1	Third Party Overload - Solution Undetermined
10SP	ENTR	ENTR	99809 5FLIPN 161 to 99837 5SUMMIT 161 CKT 1	162	134.4	138.4	53136 EUREKA 5 161 to 99832 5OSAGE # 161 CKT 1	Third Party Overload - Solution Undetermined
10SP	ENTR	ENTR	99810 5GR FOR 161 to 99812 5HARR-W 161 CKT 1	223	111.9	114.5	53136 EUREKA 5 161 to 99832 5OSAGE # 161 CKT 1	Third Party Overload - Solution Undetermined
10SP	ENTR	ENTR	99811 5HARR-E 161 to 99837 5SUMMIT 161 CKT 1	162	122.0	125.9	53136 EUREKA 5 161 to 99832 5OSAGE # 161 CKT 1	Third Party Overload - Solution Undetermined

SPP-2004-001-1 Scenario 2  
 Table 1.2 - SPP Facility Overloads Caused or Impacted  
 by 150 MW Transfer

Southwest Power Pool  
 System Impact Study

Study Case	From Area	To Area	Monitored Branch Over 100% Rate B	Rate <MVA>	BC % Loading	TC % Loading	Outaged Branch Causing Overload	ATC (MW)	Solution	Estimated Cos
05SP	SWPA	ENTR	BULL SHOALS - BULL SHOALS HES 161KV	167	100.3	103.7	BEE BRANCH (AECC) - QUITMAN 161KV	0	Solution Undeterminec	
05SP	SWPA	ENTR	BULL SHOALS - BULL SHOALS HES 161KV	167	97.6	100.9	BEE BRANCH (AECC) - CLINTON 161KV	108	Solution Undeterminec	
06SP	AEPW	AEPW	CHAMBER SPRINGS - TONTITOWN 161KV	244	120.2	122.2	CHAMBER SPRINGS - FARMINGTON AECC 161KV	0	AEPW Upgrade Schedule Completion Date 6/1/2007	
06SP	AEPW	AEPW	CHAMBER SPRINGS - TONTITOWN 161KV	244	105.7	107.7	FARMINGTON AECC - SOUTH FAYETTEVILLE 161KV	0	See Previous Upgrade Specified for Facilit	
07SP	SWPA	ENTR	BULL SHOALS - BULL SHOALS HES 161KV	176	112.2	114.7	EUREKA SPRINGS - OSAGE CREEK (AECC) 161KV	0	Solution Undeterminec	
07SP	SWPA	ENTR	BULL SHOALS - BULL SHOALS HES 161KV	176	97.6	100.8	BEE BRANCH (AECC) - QUITMAN 161KV	112	Solution Undeterminec	
10SP	SWPA	ENTR	BULL SHOALS - BULL SHOALS HES 161KV	176	141.7	145.8	EUREKA SPRINGS - OSAGE CREEK (AECC) 161KV	0	Solution Undeterminec	
10SP	SWPA	ENTR	BULL SHOALS - BULL SHOALS HES 161KV	176	113.4	116.9	BEE BRANCH (AECC) - QUITMAN 161KV	0	Solution Undeterminec	
10SP	SWPA	ENTR	BULL SHOALS - BULL SHOALS HES 161KV	176	110.2	113.6	BEE BRANCH (AECC) - CLINTON 161KV	0	Solution Undeterminec	
10SP	SWPA	ENTR	BULL SHOALS - BULL SHOALS HES 161KV	176	107.5	110.8	CLINTON - CLINTON WEST (AECC) 161KV	0	Solution Undeterminec	
10SP	SWPA	ENTR	BULL SHOALS - BULL SHOALS HES 161KV	176	102.1	105.0	BEAVER - EUREKA SPRINGS 161KV	0	Solution Undeterminec	
10SP	SWPA	ENTR	BULL SHOALS - BULL SHOALS HES 161KV	176	100.1	104.8	SUB 438 - RIVERSIDE - TABLE ROCK 161KV	0	Solution Undeterminec	
10SP	SWPA	ENTR	BULL SHOALS - BULL SHOALS HES 161KV	176	96.8	100.3	BULL SHOALS - LEAD HL 161KV	138	Solution Undeterminec	
10SP	SWPA	ENTR	BULL SHOALS - BULL SHOALS HES 161KV	176	96.8	100.1	AECC BOTKINBURG - CLINTON WEST (AECC) 161KV	145	Solution Undeterminec	
10SP	EMDE	SWPA	NEOSHO - SUB 184 - NEOSHO SOUTH JCT. 161KV	157	96.7	104.2	FLINT CREEK - SUB 392 - DECATUR SOUTH 161KV	66	Rebuild 161 kV line from 336 ACSR to 795 ACSR and replace terminal equipment	\$ 800,000
10SP	EMDE	EMDE	JOPLIN SW - EXPLORER SPRING CITY TAP 69KV	39	87.4	101.8	SUB 184 - NEOSHO STH JCT. - SUB 314 - NEOSHO LINDE 69KV	150	Excluded due to EMDE Mitigation Plan	
									Total Estimated Cos	\$ 800,000

Table 2.2 - Non-SPP Facility Overloads Caused or Impacted  
by 150 MW Transfer

Study Case	From Area	To Area	Monitored Branch Over 100% Rate B	Rate <MVA>	BC % Loading	TC % Loading	Outaged Branch Causing Overload	Comment
05SP	SWPA	ENTR	52660 BULL SH5 161 to 99802 5BULLSH* 161 CKT 1	167	100.3	103.7	99519 5QUITMN 161 to 99799 5BEE BR 161 CKT 1	Third Party Overload - Solution Undetermined
05SP	SWPA	ENTR	52660 BULL SH5 161 to 99802 5BULLSH* 161 CKT 1	167	97.6	100.9	99799 5BEE BR 161 to 99807 5CLINTN 161 CKT 1	Third Party Overload - Solution Undetermined
05SP	ENTR	ENTR	99802 5BULLSH* 161 to 99809 5FLIPN 161 CKT 1	162	100.0	103.5	99519 5QUITMN 161 to 99799 5BEE BR 161 CKT 1	Third Party Overload - Solution Undetermined
05SP	ENTR	ENTR	99802 5BULLSH* 161 to 99809 5FLIPN 161 CKT 1	162	97.2	100.6	99799 5BEE BR 161 to 99807 5CLINTN 161 CKT 1	Third Party Overload - Solution Undetermined
07SP	AECI	AECI	96089 5JAMESV 161 WND 2 JAMESV1 1	84	96.3	108.6	96089 5JAMESV 161 WND 2 JAMESV2 2	Third Party Overload - Solution Undetermined
07SP	AECI	AECI	96089 5JAMESV 161 WND 2 JAMESV2 2	84	95.7	107.7	96089 5JAMESV 161 WND 2 JAMESV1 1	Third Party Overload - Solution Undetermined
07SP	SWPA	ENTR	52660 BULL SH5 161 to 99802 5BULLSH* 161 CKT 1	176	112.2	114.7	53136 EUREKA 5 161 to 99832 5OSAGE # 161 CKT 1	Third Party Overload - Solution Undetermined
07SP	SWPA	ENTR	52660 BULL SH5 161 to 99802 5BULLSH* 161 CKT 1	176	97.6	100.8	99519 5QUITMN 161 to 99799 5BEE BR 161 CKT 1	Third Party Overload - Solution Undetermined
07SP	ENTR	ENTR	99802 5BULLSH* 161 to 99809 5FLIPN 161 CKT 1	162	118.3	121.0	53136 EUREKA 5 161 to 99832 5OSAGE # 161 CKT 1	Third Party Overload - Solution Undetermined
07SP	ENTR	ENTR	99802 5BULLSH* 161 to 99809 5FLIPN 161 CKT 1	162	102.5	106.0	99519 5QUITMN 161 to 99799 5BEE BR 161 CKT 1	Third Party Overload - Solution Undetermined
07SP	ENTR	ENTR	99802 5BULLSH* 161 to 99809 5FLIPN 161 CKT 1	162	99.5	103.0	99799 5BEE BR 161 to 99807 5CLINTN 161 CKT 1	Third Party Overload - Solution Undetermined
10SP	AECI	AECI	96089 5JAMESV 161 WND 2 JAMESV1 1	84	105.2	115.9	96089 5JAMESV 161 WND 2 JAMESV2 2	Third Party Overload - Solution Undetermined
10SP	AECI	AECI	96089 5JAMESV 161 WND 2 JAMESV2 2	84	106.0	115.0	96089 5JAMESV 161 WND 2 JAMESV1 1	Third Party Overload - Solution Undetermined
10SP	SWPA	ENTR	52660 BULL SH5 161 to 99802 5BULLSH* 161 CKT 1	176	141.7	145.8	53136 EUREKA 5 161 to 99832 5OSAGE # 161 CKT 1	Third Party Overload - Solution Undetermined
10SP	SWPA	ENTR	52660 BULL SH5 161 to 99802 5BULLSH* 161 CKT 1	176	113.4	116.9	99519 5QUITMN 161 to 99799 5BEE BR 161 CKT 1	Third Party Overload - Solution Undetermined
10SP	SWPA	ENTR	52660 BULL SH5 161 to 99802 5BULLSH* 161 CKT 1	176	110.2	113.6	99799 5BEE BR 161 to 99807 5CLINTN 161 CKT 1	Third Party Overload - Solution Undetermined
10SP	ENTR	ENTR	99519 5QUITMN 161 to 99799 5BEE BR 161 CKT 1	167	97.4	101.0	53136 EUREKA 5 161 to 99832 5OSAGE # 161 CKT 1	Third Party Overload - Solution Undetermined
10SP	ENTR	ENTR	99797 5HARR-S 161 to 99811 5HARR-E 161 CKT 1	223	151.7	155.5	53136 EUREKA 5 161 to 99832 5OSAGE # 161 CKT 1	Third Party Overload - Solution Undetermined
10SP	ENTR	ENTR	99797 5HARR-S 161 to 99812 5HARR-W 161 CKT 1	223	142.9	146.5	53136 EUREKA 5 161 to 99832 5OSAGE # 161 CKT 1	Third Party Overload - Solution Undetermined
10SP	ENTR	ENTR	99802 5BULLSH* 161 to 99809 5FLIPN 161 CKT 1	162	150.1	154.5	53136 EUREKA 5 161 to 99832 5OSAGE # 161 CKT 1	Third Party Overload - Solution Undetermined
10SP	ENTR	ENTR	99802 5BULLSH* 161 to 99809 5FLIPN 161 CKT 1	162	119.5	123.2	99519 5QUITMN 161 to 99799 5BEE BR 161 CKT 1	Third Party Overload - Solution Undetermined
10SP	ENTR	ENTR	99802 5BULLSH* 161 to 99809 5FLIPN 161 CKT 1	162	116.0	119.7	99799 5BEE BR 161 to 99807 5CLINTN 161 CKT 1	Third Party Overload - Solution Undetermined
10SP	ENTR	ENTR	99809 5FLIPN 161 to 99837 5SUMMIT 161 CKT 1	162	139.3	143.6	53136 EUREKA 5 161 to 99832 5OSAGE # 161 CKT 1	Third Party Overload - Solution Undetermined
10SP	ENTR	ENTR	99809 5FLIPN 161 to 99837 5SUMMIT 161 CKT 1	162	109.6	113.2	99519 5QUITMN 161 to 99799 5BEE BR 161 CKT 1	Third Party Overload - Solution Undetermined
10SP	ENTR	ENTR	99809 5FLIPN 161 to 99837 5SUMMIT 161 CKT 1	162	106.1	109.8	99799 5BEE BR 161 to 99807 5CLINTN 161 CKT 1	Third Party Overload - Solution Undetermined
10SP	ENTR	ENTR	99810 5GR FOR 161 to 99812 5HARR-W 161 CKT 1	223	110.8	113.8	53136 EUREKA 5 161 to 99832 5OSAGE # 161 CKT 1	Third Party Overload - Solution Undetermined
10SP	ENTR	ENTR	99811 5HARR-E 161 to 99837 5SUMMIT 161 CKT 1	162	126.8	130.9	53136 EUREKA 5 161 to 99832 5OSAGE # 161 CKT 1	Third Party Overload - Solution Undetermined
10SP	ENTR	ENTR	99811 5HARR-E 161 to 99837 5SUMMIT 161 CKT 1	162	98.0	101.5	99519 5QUITMN 161 to 99799 5BEE BR 161 CKT 1	Third Party Overload - Solution Undetermined

SPP-2004-001-1 Scenario 1  
 Table 1.1a - Modeling Representation for Table 1.1  
 Includes Bus Numbers and Bus Names

Southwest Power Pool  
 System Impact Study

Study Case	From Area	To Area	Monitored Branch Over 100% Rate B	Rate <MVA>	BC % Loading	TC % Loading	Outaged Branch Causing Overload	ATC (MW)	Solution	Estimated Cost
05SH	AEPW	AEPW	53154 CHAMSPR5 161 to 53170 TONTITNS 161 CKT 1	244	115.2	117.2	53154 CHAMSPR5 161 to 53195 FARMGTNS 161 CKT 1	0	AEPW Upgrade Schedule Completion Date 6/1/2007	
05SH	AEPW	AEPW	53154 CHAMSPR5 161 to 53170 TONTITNS 161 CKT 1	244	103.5	105.4	53157 SFAYTVL5 161 to 53195 FARMGTNS 161 CKT 1	0	See Previous Upgrade Specified for Facilit	
05SP	AEPW	AEPW	53154 CHAMSPR5 161 to 53170 TONTITNS 161 CKT 1	244	137.6	139.6	53154 CHAMSPR5 161 to 53195 FARMGTNS 161 CKT 1	0	See Previous Upgrade Specified for Facilit	
05SP	AEPW	AEPW	53154 CHAMSPR5 161 to 53170 TONTITNS 161 CKT 1	244	123.2	125.2	53157 SFAYTVL5 161 to 53195 FARMGTNS 161 CKT 1	0	See Previous Upgrade Specified for Facilit	
05SP	AEPW	AEPW	53154 CHAMSPR5 161 to 53170 TONTITNS 161 CKT 1	244	103.8	105.7	53139 FLINTCR5 161 to 53187 GENTRYR5 161 CKT 1	0	See Previous Upgrade Specified for Facilit	
05SP	AEPW	AEPW	53154 CHAMSPR5 161 to 53170 TONTITNS 161 CKT 1	244	103.0	104.9	53133 ECANTRNS 161 to 53187 GENTRYR5 161 CKT 1	0	See Previous Upgrade Specified for Facilit	
05WP	AEPW	AEPW	53154 CHAMSPR5 161 to 53170 TONTITNS 161 CKT 1	275	102.7	104.5	53154 CHAMSPR5 161 to 53195 FARMGTNS 161 CKT 1	0	See Previous Upgrade Specified for Facilit	
07SP	SWPA	ENTR	52660 BULL SH5 161 to 99802 5BULLSH* 161 CKT 1	176	106.6	109.2	53136 EUREKA 5 161 to 99832 5OSAGE # 161 CKT 1	0	Solution Undeterminer	
10SP	SWPA	ENTR	52660 BULL SH5 161 to 99802 5BULLSH* 161 CKT 1	176	137.2	141.0	53136 EUREKA 5 161 to 99832 5OSAGE # 161 CKT 1	0	Solution Undeterminer	
10SP	EMDE	EMDE	59438 EXP449T2 69 to 59592 JOP389 2 69 CKT 1	39	87.6	102.1	59543 NEO184 2 69 to 59563 LIN314 2 69 CKT 1	150	Excluded due to EMDE Mitigation Plan	
									Total Estimated Cos	\$ -

Study Case	From Area	To Area	Monitored Branch Over 100% Rate B	Rate <MVA>	BC % Loading	TC % Loading	Outaged Branch Causing Overload	ATC (MW)	Solution	Estimated Cost
05SP	SWPA	ENTR	52660 BULL SH5 161 to 99802 5BULLSH* 161 CKT 1	167	100.3	103.7	99519 5QUITMN 161 to 99799 5BEE BR 161 CKT 1	0	Solution Undeterminex	
05SP	SWPA	ENTR	52660 BULL SH5 161 to 99802 5BULLSH* 161 CKT 1	167	97.6	100.9	99799 5BEE BR 161 to 99807 5CLINTN 161 CKT 1	108	Solution Undeterminex	
05SP	AEPW	AEPW	53154 CHAMSPR5 161 to 53170 TONTITN5 161 CKT 1	244	120.2	122.2	53154 CHAMSPR5 161 to 53195 FARMGTN5 161 CKT 1	0	AEPW Upgrade Schedule Completion Date 6/1/2007	
05SP	AEPW	AEPW	53154 CHAMSPR5 161 to 53170 TONTITN5 161 CKT 1	244	105.7	107.7	53157 SFAYTVL5 161 to 53195 FARMGTN5 161 CKT 1	0	See Previous Upgrade Specified for Facilit	
07SP	SWPA	ENTR	52660 BULL SH5 161 to 99802 5BULLSH* 161 CKT 1	176	112.2	114.7	53136 EUREKA 5 161 to 99832 5OSAGE # 161 CKT 1	0	Solution Undeterminex	
07SP	SWPA	ENTR	52660 BULL SH5 161 to 99802 5BULLSH* 161 CKT 1	176	97.8	100.8	99519 5QUITMN 161 to 99799 5BEE BR 161 CKT 1	112	Solution Undeterminex	
10SP	SWPA	ENTR	52660 BULL SH5 161 to 99802 5BULLSH* 161 CKT 1	176	141.7	145.8	53136 EUREKA 5 161 to 99832 5OSAGE # 161 CKT 1	0	Solution Undeterminex	
10SP	SWPA	ENTR	52660 BULL SH5 161 to 99802 5BULLSH* 161 CKT 1	176	113.4	116.9	99519 5QUITMN 161 to 99799 5BEE BR 161 CKT 1	0	Solution Undeterminex	
10SP	SWPA	ENTR	52660 BULL SH5 161 to 99802 5BULLSH* 161 CKT 1	176	110.2	113.6	99799 5BEE BR 161 to 99807 5CLINTN 161 CKT 1	0	Solution Undeterminex	
10SP	SWPA	ENTR	52660 BULL SH5 161 to 99802 5BULLSH* 161 CKT 1	176	107.5	110.8	99806 5CLIN-W# 161 to 99807 5CLINTN 161 CKT 1	0	Solution Undeterminex	
10SP	SWPA	ENTR	52660 BULL SH5 161 to 99802 5BULLSH* 161 CKT 1	176	102.1	105.0	52680 BEAVER 5 161 to 53136 EUREKA 5 161 CKT 1	0	Solution Undeterminex	
10SP	SWPA	ENTR	52660 BULL SH5 161 to 99802 5BULLSH* 161 CKT 1	176	100.1	104.8	52672 TABLE R5 161 to 59497 RVS438 5 161 CKT 1	0	Solution Undeterminex	
10SP	SWPA	ENTR	52660 BULL SH5 161 to 99802 5BULLSH* 161 CKT 1	176	96.8	100.3	52660 BULL SH5 161 to 99859 5LEAD HL 161 CKT 1	138	Solution Undeterminex	
10SP	SWPA	ENTR	52660 BULL SH5 161 to 99802 5BULLSH* 161 CKT 1	176	96.8	100.1	99806 5CLIN-W# 161 to 99847 5BOTKIN# 161 CKT 1	145	Solution Undeterminex	
10SP	EMDE	SWPA	52686 NEO SPA5 161 to 59471 NEO184 5 161 CKT 1	157	96.7	104.2	53139 FLINTCR5 161 to 59484 DEC392 5 161 CKT 1	66	Rebuild 161 kV line from 336 ACSR to 795 ACSR and replace terminal equipment	\$ 800,000
10SP	EMDE	EMDE	59438 EXP449T2 69 to 59592 JOP389 2 69 CKT 1	39	87.4	101.8	59543 NEO184 2 69 to 59563 LIN314 2 69 CKT 1	150	Excluded due to EMDE Mitigation Pla	
									Total Estimated Cost	\$ 800,000