



SPP *Southwest
Power Pool*

*System Impact Study
SPP-2003-271-2
For Transmission Service
Requested By
InterGen Services, Inc.*

From OKGE To OKGE

*For a Reserved Amount Of 1200 MW
From 5/1/04
To 5/1/07*

SPP Engineering, Tariff Studies

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ATTACHMENT: *SPP-2003-271-2 Tables*

1. Executive Summary

InterGen Services, Inc. has requested a system impact study for long-term Firm Point-to-Point transmission service from OKGE to OKGE. The period of the service is from 5/1/04 to 5/1/07. The request is for OASIS reservations 619539 - 619544 for a total amount of 1200 MW.

The principal objective of this study is to identify system problems and potential system modifications necessary to facilitate the additional 1200 MW request while maintaining system reliability. Analysis was conducted for the requested service period above and for the remaining planning horizon from 5/1/07 to 4/1/11. The additional evaluation of the planning horizon was conducted to determine any future constraints that may limit the renewal of service.

The OKGE to OKGE 1200 MW request was initially studied using three System Scenarios. With the application of the recently adopted 3% transfer distribution factor threshold, Scenario 2 analysis was discarded as not adding any unique results not already captured by the use of Scenario 1 and 3. Voltage analysis using Scenario 1 and 3 is included in the study revision.

The study results of the 1200 MW show that limiting constraints exist. Tables 1.1 and 1.2 list the SPP facility overloads caused or impacted by the transfers modeled using Scenario 1 and 3, respectively. Tables 2.1 and 2.2 lists the SPP voltage violations caused or impacted by the transfers modeled using Scenario 1 and 3, respectively. Tables 3.1 and 3.2 list the SPP Facility Overloads caused or impacted by modeling the selected upgrades to be assigned using Scenario 1 and 3, respectively. Selected solutions with engineering and construction costs are provided for the SPP Facility Overloads and Voltage violations found in the Tables. The least cost mitigation of the overloads and voltage violations identified for the 1200 MW was determined to be the addition of a new 345 kV line from Redbud to Horseshoe Lake with a reroute of the existing Arcadia to Seminole 345 kV line into a new 345 kV substation bay at Horseshoe Lake and the addition of two 345/138 kV transformers at Horseshoe Lake. The estimated cost is \$24 million. The estimated in-service date of the solution is 3/1/2007.

The ATC for the OKGE to OKGE request is 600 MW (9/1/04-9/1/05) and 620 MW (9/1/05-5/1/07) by interpolation between 652 MW (05SP) and 588 MW (07SP). For interim service, voluntary OKGE redispatch will be implemented for the Draper 345/138 kV Transformers, Memorial to Skyline 138 kV line, and Morgan to Mustang 138 kV line post-contingency overloads, until OKGE completes planned upgrades on these facilities with an estimated in-service date of 6/1/2005. Renewal rights are limited by the Northwest 345/138 kV Transformer with annual ATC of 588 MW (5/1/07-5/1/08), 586 MW by interpolation (5/1/08-5/1/09), 584 MW by interpolation (5/1/09-5/1/10), and 582 MW thereafter. The total estimated engineering and construction cost required in order to provide the 1200 MW of requested service is \$24,550,000. The total can be determined by summing totals from Tables 1.1, 2.1, and 3.2. The estimated in-service date of the facilities is 3/1/2007. The full 1200 MW requested will need to be deferred to a 3/1/2007 start date. The Northwest 345/138 kV transformer limits the 1200 MW of service with the selected upgrades for 1200 MW to 1195 MW during the deferred reservation period from 6/1/2009-10/1/2009 and limits the renewal rights of the service to 1165 MW starting 6/1/2010. The addition of the Northwest 345/138 kV transformer mitigation to add a third transformer would add \$7,500,000 to estimated engineering and cost and was determined not to cause any additional impacts to the system. A facility study may now be conducted to summarize the operating limits and to determine the financial characteristics associated with the requested service.

2. Introduction

InterGen Services, Inc. has requested a system impact study for long-term Firm Point-to-Point transmission service from OKGE to OKGE for 1200 MW. The principal objective of this study is to identify the restraints on the SPP Regional Tariff System that may limit the requested service and determine the least cost solutions required to alleviate the limiting facilities.

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 request on transmission line and transformer loadings, and bus voltages for outages of single transmission lines and transformers, and selected multiple transmission lines and transformers on the SPP system and first tier Non - SPP systems.

The OKGE to OKGE 1200 MW transfer was initially studied using three System Scenarios. The service was modeled by six increments of 200 MW from a source in OKGE to marginally dispatched OKGE units. The three scenarios were studied to capture worst case system limitations dependent on the bias of the transmission system. With the application of the recently adopted 3% transfer distribution factor threshold, Scenario 2 analysis was discarded as not adding any unique results not already captured by the use of Scenario 1 and 3.

3. Study Methodology

A. Description

The system impact analysis was conducted to determine the steady-state impact of the requested service on the SPP and first tier Non - SPP control area 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. Normal operating ratings and emergency operating ratings monitored are Rate A and B in the SPP MDWG models, respectively. The lower bound of the normal voltage range monitored for OKGE is 92.5% and 95% for the remaining SPP Control Areas. The lower bound of the emergency voltage range monitored is 90%. The SPS Tuco 230 kV bus voltage is monitored at 92.5% due to pre-determined system stability limitations.

The contingency set includes all SPP control area branches and ties 69kV and above, first tier Non - SPP control area branches and ties 115 kV and above, and any defined contingencies for these control areas. The monitor elements include all SPP control area branches, ties, and buses 69 kV and above, and all first tier Non – SPP control area branches and ties 69 kV and above. Voltage monitoring was performed for SPP control area buses 69 kV and above.

A 3 % transfer distribution factor (TDF) cutoff was applied to all SPP control area facilities. For first tier Non – SPP control area facilities, a 3 % TDF cutoff was applied to AECl, AMRN, and ENTR and a 2 % TDF cutoff was applied to MEC, NPPD, and OPPD. For voltage monitoring, a 0.02 per unit change in voltage must occur due to the transfer to be considered a valid limit to the transfer.

B. Model Updates

SPP used fourteen seasonal models to study the OKGE to OKGE 1200 MW transfer for the requested service period and the remaining planning horizon. The SPP 2004 Series Cases Update 2 2004 Summer Peak (04SP), 2004 Summer Shoulder (04SH), 2004 Fall Peak (04FA), 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), and 2007/08 Winter Peak (07WP) were used to study the impact of the 1200 MW transfer on the system during the requested service period of 5/1/04 to 5/1/07. The SPP 2004 Series Update 2 2010 Summer Peak (10SP), and 2010/11 Winter Peak (10WP) were used to study the impact of the 1200 MW transfer on the system during the remaining planning horizon from 5/1/07 to 4/1/11.

The chosen base case models were modified to reflect the most current modeling information. From the fourteen seasonal models, three system scenarios were developed. Scenario 1 includes SWPP OASIS transmission requests not already included in the SPP 2004 Series Cases flowing in a West to East direction with ERCOT exporting and the Southwestern Public Service (SPS) Control Area exporting to outside control areas and exporting to the planned Lamar HVDC Tie. Scenario 2 includes transmission requests not already included in the SPP 2004 Series Cases flowing in an East to West direction with ERCOT importing and SPS importing from an outside control area and importing from the planned Lamar HVDC Tie. The third scenario includes SWPP OASIS transmission requests not already included in the SPP 2004 Series Cases flowing

in a West to East direction with ERCOT importing and SPS importing from an outside control area and importing from the planned Lamar HVDC Tie. The system scenarios were developed to minimize counter flows to the transfers studied.

C. Transfer Analysis

Four different transfer analyses were initially performed. The first transfer analysis was performed on Scenario 1 using the entire contingency set and monitored list. The analysis provides the impact of the full 1200 MW transfer on SPP and Non-SPP facilities. The other three transfer analyses were performed to more thoroughly determine the impact of the full 1200 MW transfer in increments of 200 MW on the OKGE system using all three developed scenarios. With the application of the recently adopted 3% transfer distribution factor threshold, Scenario 2 analysis was discarded as not adding any unique results not already captured by the use of Scenario 1 and 3. Transfer analysis in 200 MW increments was conducted on Scenario 1 and 3 using a contingency set including facilities in OKGE and OKGE first-tier control areas while monitoring the whole SPP and First-tier Non-SPP control area footprint. Using the selected cases both with and without the respective transfer increments 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

Using the 2005 April Min, 2005 Spring Peak, 2005 Summer Shoulder, 2005 Fall Peak, 2007 Summer Peak, 2007/08 Winter Peak, 2010 Summer Peak, and 2010/11 Winter Peak cases both with and without the assigned upgrades modeled and with and without the 1200 MW transfer, the PSS/E Activity ACCC was run on the cases and compared to determine the facility overloads caused or impacted by the assigned upgrades. The contingency set used included facilities in OKGE and OKGE first-tier control areas while monitoring the whole SPP and First-tier Non-SPP control area footprint. The upgrades were also evaluated with the transfer at 600 MW. The 3% transfer distribution factor cutoff was applied to SPP Facilities identified. The PSS/E options chosen to conduct the analysis can be found in Appendix A.

4. Study Results

A. Study Analysis Results

Tables 1.1, 2.1, 3.1, 1.2, 2.2, and 3.2 contain the steady-state analysis results of the System Impact Study. The Tables are in the attached workbook *SPP-2003-271-2 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 or voltage with and without the 1200 MW transfer, the percent transfer distribution factor (TDF) if applicable, 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. The estimated ATC was calculated by interpolating between the six incremental steps of 200 MW for Tables 1.1 and 1.2. The estimated ATC was calculating by interpolating between 0 and 1200 MW for Tables 2.1 and 2.2.

Tables 1.1 and 1.2 list the SPP Facility Overloads caused or impacted by the transfers modeled using Scenario 1 and 3, respectively. Tables 2.1 and 2.2 list the SPP facility voltage violations caused or impacted by the transfers modeled using Scenario 1 and 3, respectively. No facilities outside of OKGE were identified as being impacted with application of established transfer distribution factor cutoffs. Tables 3.1 and 3.2 list additional SPP Facility Overloads caused or impacted by modeling the assigned upgrades. Solutions with engineering and construction costs are provided in the tables.

Tables 1.1a, 3.1a, 1.2a, and 3.2a documents the modeling representation of the events identified in Tables 1.1, 3.1, 1.2, and 3.2 to include bus numbers and bus names.

5. Conclusion

The ATC for the OKGE to OKGE request is 600 MW (9/1/04-9/1/05) and 620 MW (9/1/05-5/1/07) by interpolation between 652 MW (05SP) and 588 MW (07SP). For interim service, voluntary OKGE redispatch will be implemented for the Draper 345/138 kV Transformers, Memorial to Skyline 138 kV line, and Morgan to Mustang 138 kV line post-contingency overloads, until OKGE completes planned upgrades on these facilities with an estimated in-service date of 6/1/2005. Renewal rights are limited by the Northwest 345/138 kV Transformer with annual ATC of 588 MW (5/1/07-5/1/08), 586 MW by interpolation (5/1/08-5/1/09), 584 MW by interpolation (5/1/09-5/1/10), and 582 MW thereafter. The total estimated engineering and construction cost required in order to provide the 1200 MW of requested service is \$24,550,000. The total can be determined by summing totals from Tables 1.1, 2.1, and 3.2. The estimated in-service date of the facilities is 3/1/2007. The full 1200 MW requested will need to be deferred to a 3/1/2007 start date. The Northwest 345/138 kV transformer limits the 1200 MW of service with the selected upgrades for 1200 MW to 1195 MW during the deferred reservation period from 6/1/2009-10/1/2009 and limits the renewal rights of the service to 1165 MW starting 6/1/2010. The addition of the Northwest 345/138 kV transformer mitigation to add a third transformer would add \$7,500,000 to estimated engineering and cost and was determined not to cause any additional impacts to the system. A facility study may now be conducted to summarize the operating limits and to determine the financial characteristics associated with the requested service.

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

Table 1.1 - SPP Facility Overloads Caused or Impacted by 1200 MW Transfer using Scenario 1

Southwest Power Pool
System Impact Study

Study Case	From Area	To Area	Monitored Branch Overload	Rate <MVA>	BC % Loading	TC % Loading	%TDF	Outaged Branch Causing Overload	ATC (MW)	Solution	Estimated Cost
04SP	OKGE	OKGE	DRAPER 345/138KV TRANSFORMER CKT 1	493	88.5	107.6	7.9	DRAPER 345/138KV TRANSFORMER CKT 2	483	OKGE Project to add 3rd Draper xfrmr at OGE's expense. Estimated In-Service Date 6/1/2005. Voluntary OKGE Redispatch to be used as Interim Mitigation. See Previous Solution Specified for Facility	
04SP	OKGE	OKGE	DRAPER 345/138KV TRANSFORMER CKT 2	493	88.5	107.6	7.9	DRAPER 345/138KV TRANSFORMER CKT 1	483		
04SP	OKGE	OKGE	DRAPER 345/138KV TRANSFORMER CKT 1	493	86.1	103.8	7.3	DRAPER 345/138KV TRANSFORMER CKT 2	598		
04SP	OKGE	OKGE	DRAPER 345/138KV TRANSFORMER CKT 2	493	86.1	103.8	7.3	DRAPER 345/138KV TRANSFORMER CKT 1	598		
04SP	OKGE	OKGE	MEMORIAL - SKYLINE 138KV	287	61.6	120.9	14.2	DANFORTH - OMPA-EDMOND HAFFER 138KV	635	OKGE Project to replace breakers and switches at Memorial, Replace switch at Skyline, and Reconductor the line to at least 1800+ Amps at OGE's expense. Estimated In-Service Date 6/1/2005. Voluntary OKGE Redispatch to be used as Interim Mitigation. OKGE Project to Increase CTR at Mustang sub at OGE's expense. Estimated In-Service Date 6/1/2005. Voluntary OKGE Redispatch to be used as Interim Mitigation.	
04SP	OKGE	OKGE	MORGAN - MUSTANG 138KV	287	76.1	118.4	10.1	MCCLAIN - PLEASANT VALLEY 138KV	688		
04SP	OKGE	OKGE	MEMORIAL - SKYLINE 138KV	287	56.6	115.7	14.1	EASTERN AVE - OMPA-EDMOND HAFFER 138KV	719	See Previous Solution Specified for Facility	
04SP	OKGE	OKGE	NORTHWEST 345/138KV TRANSFORMER CKT 1	493	79.6	108.2	11.7	NORTHWEST 345/138KV TRANSFORMER CKT 2	730	Reroute the existing 345kv Arcadia-Seminole line to new 345kv sub bay at Horseshoe Lake sub and install two 345-138KV bus tie transformers at HSL. Build 14miles of 345KV line from Redbud to HSL. Will require 6-345KV breakers, 2-xfrmr, 4-138KV breakers, transmission line reroute, 14miles of new 345KV line. Estimated In-Service Date 3/1/2007	\$ 24,000,000
04SP	OKGE	OKGE	NORTHWEST 345/138KV TRANSFORMER CKT 1	493	78.2	105.3	11.1	NORTHWEST 345/138KV TRANSFORMER CKT 2	815	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SP	OKGE	OKGE	MEMORIAL - SKYLINE 138KV	287	47.5	106.5	14.1	EASTERN AVE - MEMORIAL 138KV	821	See Previous Solution Specified for Facility	
04SP	OKGE	OKGE	LONEOAK - QUAIL CREEK 138KV	308	72.2	107.8	9.1	NORTHWEST - PANTHER 138KV	827	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SP	OKGE	OKGE	ARCADIA - KAMO MEMORIAL 138KV	287	31.4	112.6	19.4	ARCADIA - DANFORTH 138KV	850	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SP	OKGE	OKGE	LONEOAK - QUAIL CREEK 138KV	308	71.5	107.0	9.1	PANTHER - SILVER LAKE 138KV	851	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SP	OKGE	OKGE	MEMORIAL - SKYLINE 138KV	287	53.9	109.2	13.2	DIVISION AVE - SILVER LAKE 138KV	861	See Previous Solution Specified for Facility	
04SP	OKGE	OKGE	CIMARRON - CZECH HALL 138KV	382	72.5	105.5	10.5	MCCLAIN - PLEASANT VALLEY 138KV	893	Change sw. to 2000A at czech hall. Increase trap an CTR to 2000A at cimarron sub. May require changing relays. This will bring the Rate B to the conductor Rate B of 444MVA. See Previous Solution Specified for Facility	\$ 150,000
04SP	OKGE	OKGE	MORGAN - MUSTANG 138KV	287	61.7	105.8	10.5	CIMARRON - HAYMAKER 138KV	901		
04SP	OKGE	OKGE	MORGAN - MUSTANG 138KV	287	60.3	104.3	10.5	DIVISION AVE - HAYMAKER 138KV	923		
04SP	OKGE	OKGE	ARCADIA 345/138KV TRANSFORMER CKT 1	493	50.2	107.8	23.7	ARCADIA 345/138KV TRANSFORMER CKT 2	937	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SP	OKGE	OKGE	ARCADIA - KAMO MEMORIAL 138KV	287	19.0	111.3	22.1	ARCADIA - NORTHWEST 345KV	941	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SP	OKGE	OKGE	REMNIGTON PARK - STONEWALL 138KV	191	75.7	103.7	4.5	Multiple Contingency Outage: 84TH ST - TENNESSEE TAP 138KV MEMORIAL - TENNESSEE TAP 138KV TENNESSEE - TENNESSEE TAP 138KV	986	Upgrade trap @ Stonewall	\$ 50,000
04SP	OKGE	OKGE	ARCADIA 345/138KV TRANSFORMER CKT 2	493	49.0	105.1	23.1	ARCADIA 345/138KV TRANSFORMER CKT 1	1005	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SP	OKGE	OKGE	ARCADIA 345/138KV TRANSFORMER CKT 1	493	49.4	104.6	22.7	ARCADIA 345/138KV TRANSFORMER CKT 2	1023	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SP	OKGE	OKGE	MEMORIAL - SKYLINE 138KV	287	57.7	101.7	10.5	DIVISION AVE - LAKESIDE 138KV	1034	See Previous Solution Specified for Facility	
04SP	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 2	1195	21.7	109.6	87.6	ARCADIA - REDBUD 345KV CKT 1	1066	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SP	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 1	1195	21.6	109.4	87.4	ARCADIA - REDBUD 345KV CKT 2	1069	Relieved or Impact Removed by Selected Upgrades for 1200 MW	

Table 1.1 - SPP Facility Overloads Caused or Impacted by 1200 MW Transfer using Scenario 1

Southwest Power Pool
System Impact Study

Study Case	From Area	To Area	Monitored Branch Overload	Rate <MVA>	BC % Loading	TC % Loading	%TDF	Outaged Branch Causing Overload	ATC (MW)	Solution	Estimated Cost
04SP	OKGE	OKGE	HORSESHOE LAKE - KAMO MEMORIAL 138KV	287	20.4	103.0	19.8	ARCADIA - DANFORTH 138KV	1102	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SP	OKGE	OKGE	ARCADIA 345/138KV TRANSFORMER CKT 2	493	48.1	101.9	22.1	ARCADIA 345/138KV TRANSFORMER CKT 1	1125	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SP	OKGE	OKGE	HORSESHOE LAKE - KAMO MEMORIAL 138KV	287	8.5	101.4	22.2	ARCADIA - NORTHWEST 345KV	1165	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SP	OKGE	OKGE	DIVISION AVE - SILVER LAKE 138KV	287	51.6	100.3	11.6	MEMORIAL - SKYLINE 138KV	1183	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 12/30/2004. New Emergency Rating 308 MVA. And, OKGE Planned Project to Build 138 kV line from Piedmont to Haymaker by 12/30/04.	
04SP	OKGE	OKGE	REMNIGTON PARK - STONEWALL 138KV	191	75.3	102.7	4.4	MEMORIAL - TENNESSEE TAP 138KV	1200		Invalid Contingency
04SH	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 2	1195	25.2	112.0	86.4	ARCADIA - REDBUD 345KV CKT 1	1032	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SH	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 1	1195	25.2	111.8	86.3	ARCADIA - REDBUD 345KV CKT 2	1035	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SH	OKGE	OKGE	MEMORIAL - SKYLINE 138KV	287	70.8	101.9	7.4	DANFORTH - OMPA-EDMOND HAFER 138KV	1102	See Previous Solution Specified for Facility	
04SH	OKGE	OKGE	ARCADIA - KAMO MEMORIAL 138KV	287	40.8	101.7	14.6	ARCADIA - NORTHWEST 345KV	1161	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SH	OKGE	OKGE	ARCADIA - KAMO MEMORIAL 138KV	287	51.8	100.7	11.7	ARCADIA - DANFORTH 138KV	1180	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04FA	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 2	1195	16.6	103.2	86.1	ARCADIA - REDBUD 345KV CKT 1	1156	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04FA	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 1	1195	16.6	102.9	86.0	ARCADIA - REDBUD 345KV CKT 2	1159	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04WP	OKGE	OKGE	EASTERN AVE - MEMORIAL 138KV	191	61.9	107.4	7.2	MEMORIAL - SKYLINE 138KV	1033	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 12/30/2004. New Emergency Rating 287 MVA	
04WP	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 2	1195	18.2	105.0	86.5	ARCADIA - REDBUD 345KV CKT 1	1131	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04WP	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 1	1195	18.2	104.8	86.3	ARCADIA - REDBUD 345KV CKT 2	1134	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05AP			NONE IDENTIFIED				0.0		1200		
05G	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 2	1195	26.4	112.3	85.5	ARCADIA - REDBUD 345KV CKT 1	1005	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05G	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 1	1195	26.3	112.0	85.4	ARCADIA - REDBUD 345KV CKT 2	1009	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05G	OKGE	OKGE	EASTERN AVE - MEMORIAL 138KV	191	38.9	104.6	10.5	MEMORIAL - SKYLINE 138KV	1054	See Previous Solution Specified for Facility	
05G	OKGE	OKGE	ARCADIA - KAMO MEMORIAL 138KV	287	14.5	102.3	21.0	ARCADIA - NORTHWEST 345KV	1149	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05G	OKGE	OKGE	ARCADIA - KAMO MEMORIAL 138KV	287	24.1	100.4	18.2	ARCADIA - DANFORTH 138KV	1188	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	NORTHWEST 345/138KV TRANSFORMER CKT 1	493	80.0	111.0	12.7	NORTHWEST 345/138KV TRANSFORMER CKT 2	705	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	POOST ROAD - SE15TH 138KV	191	58.1	102.9	7.1	POOST ROAD - TINKER #5 138KV	723	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	NORTHWEST 345/138KV TRANSFORMER CKT 1	493	78.4	107.7	12.0	NORTHWEST 345/138KV TRANSFORMER CKT 2	791	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	CIMARRON - CZECH HALL 138KV	382	74.9	110.0	11.2	MCCLAIN - PLEASANT VALLEY 138KV	858	See Previous Solution Specified for Facility	

Study Case	From Area	To Area	Monitored Branch Overload	Rate <MVA>	BC % Loading	TC % Loading	%TDF	Outaged Branch Causing Overload	ATC (MW)	Solution	Estimated Cost
05SP	OKGE	OKGE	DIVISION AVE - HAYMAKER 138KV	287	74.4	106.6	7.7	CIMARRON - CZECH HALL 138KV	871	Relieved or Impact Removed by Selected Upgrades for 1200 MW OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	ARCADIA - KAMO MEMORIAL 138KV	287	28.0	109.3	19.4	ARCADIA - DANFORTH 138KV	926		
05SP	OKGE	OKGE	ARCADIA 345/138KV TRANSFORMER CKT 1	493	49.7	107.7	23.9	ARCADIA 345/138KV TRANSFORMER CKT 2	941	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	DIVISION AVE - HAYMAKER 138KV	287	70.1	101.9	7.6	CZECH HALL - XEROX 138KV	956	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	NORTHWEST 345/138KV TRANSFORMER CKT 2	493	73.2	101.7	11.7	NORTHWEST 345/138KV TRANSFORMER CKT 1	990	Relieved or Impact Removed by Selected Upgrades for 1200 MW OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	ARCADIA - KAMO MEMORIAL 138KV	287	15.4	108.0	22.2	ARCADIA - NORTHWEST 345KV	999		
05SP	OKGE	OKGE	ARCADIA 345/138KV TRANSFORMER CKT 2	493	48.4	105.0	23.3	ARCADIA 345/138KV TRANSFORMER CKT 1	1002	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	ARCADIA 345/138KV TRANSFORMER CKT 1	493	48.8	104.4	22.8	ARCADIA 345/138KV TRANSFORMER CKT 2	1024	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 2	1195	19.1	107.2	87.8	ARCADIA - REDBUD 345KV CKT 1	1099	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 1	1195	19.0	107.0	87.6	ARCADIA - REDBUD 345KV CKT 2	1102	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	ARCADIA 345/138KV TRANSFORMER CKT 2	493	47.6	101.7	22.2	ARCADIA 345/138KV TRANSFORMER CKT 1	1131	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	REMINGTON PARK - STONEWALL 138KV	191	71.2	100.6	4.7	Multiple Contingency Outage: 84TH ST - TENNESSEE TAP 138KV MEMORIAL - TENNESSEE TAP 138KV TENNESSEE - TENNESSEE TAP 138KV	1165	See Previous Solution Specified for Facility	
05SP	OKGE	OKGE	TINKER #2 - TINKER #4 138KV	100	60.7	130.8	5.8	POOST ROAD - SE15TH 138KV	1200	Not a valid Overload; Relays trip to open UG transmission line when loading reaches 100%. No problem exist with line open.	
05SH	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 2	1195	24.0	110.8	86.4	ARCADIA - REDBUD 345KV CKT 1	1049	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SH	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 1	1195	23.9	110.5	86.3	ARCADIA - REDBUD 345KV CKT 2	1052	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SH	OKGE	OKGE	ARCADIA - KAMO MEMORIAL 138KV	287	53.8	102.9	11.8	ARCADIA - DANFORTH 138KV	1119	Relieved or Impact Removed by Selected Upgrades for 1200 MW OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SH	OKGE	OKGE	ARCADIA - KAMO MEMORIAL 138KV	287	42.2	103.3	14.6	ARCADIA - NORTHWEST 345KV	1129		
05FA	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 2	1195	14.3	101.2	86.5	ARCADIA - REDBUD 345KV CKT 1	1183	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05FA	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 1	1195	14.3	101.0	86.4	ARCADIA - REDBUD 345KV CKT 2	1186	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05WP	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 2	1195	23.4	109.8	86.1	ARCADIA - REDBUD 345KV CKT 1	1065	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05WP	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 1	1195	23.3	109.6	85.9	ARCADIA - REDBUD 345KV CKT 2	1067	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	NORTHWEST 345/138KV TRANSFORMER CKT 1	493	82.1	116.2	14.0	NORTHWEST 345/138KV TRANSFORMER CKT 2	636	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	NORTHWEST 345/138KV TRANSFORMER CKT 1	493	80.4	112.4	13.1	NORTHWEST 345/138KV TRANSFORMER CKT 2	718	Relieved or Impact Removed by Selected Upgrades for 1200 MW	

Study Case	From Area	To Area	Monitored Branch Overload	Rate <MVA>	BC % Loading	TC % Loading	%TDF	Outaged Branch Causing Overload	ATC (MW)	Solution	Estimated Cost
07SP	OKGE	OKGE	DIVISION AVE - HAYMAKER 138KV	287	75.9	113.8	9.1	CIMARRON - CZECH HALL 138KV	860	Relieved or Impact Removed by Selected Upgrades for 1200 MW See Previous Solution Specified for Facility	
07SP	OKGE	OKGE	CIMARRON - CZECH HALL 138KV	382	75.1	115.4	12.8	MCCLAIN - PLEASANT VALLEY 138KV	882		
07SP	OKGE	OKGE	ARCADIA - KAMO MEMORIAL 138KV	287	27.0	113.9	20.8	ARCADIA - DANFORTH 138KV	890	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	ARCADIA 345/138KV TRANSFORMER CKT 1	493	50.5	112.2	25.3	ARCADIA 345/138KV TRANSFORMER CKT 2	898	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	NORTHWEST 345/138KV TRANSFORMER CKT 2	493	75.1	106.5	12.9	NORTHWEST 345/138KV TRANSFORMER CKT 1	921	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	DIVISION AVE - HAYMAKER 138KV	287	71.3	108.7	9.0	CZECH HALL - XEROX 138KV	948	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	ARCADIA 345/138KV TRANSFORMER CKT 2	493	49.2	109.4	24.7	ARCADIA 345/138KV TRANSFORMER CKT 1	952	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	ARCADIA 345/138KV TRANSFORMER CKT 1	493	49.7	108.3	24.1	ARCADIA 345/138KV TRANSFORMER CKT 2	960	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	ARCADIA - KAMO MEMORIAL 138KV	287	13.6	111.4	23.4	ARCADIA - NORTHWEST 345KV	972	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	DIVISION AVE - HAYMAKER 138KV	287	69.2	106.3	8.9	MORGAN - XEROX 138KV	989	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	REMINGTON PARK - STONEWALL 138KV	191	75.0	108.2	5.3	Multiple Contingency Outage: 84TH ST - TENNESSEE TAP 138KV MEMORIAL - TENNESSEE TAP 138KV TENNESSEE - TENNESSEE TAP 138KV	1015	See Previous Solution Specified for Facility	
07SP	OKGE	OKGE	DIVISION AVE - HAYMAKER 138KV	287	67.9	105.0	8.9	MORGAN - MUSTANG 138KV	1025	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	NORTHWEST 345/138KV TRANSFORMER CKT 2	493	73.6	102.9	12.0	NORTHWEST 345/138KV TRANSFORMER CKT 1	1025	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	ARCADIA 345/138KV TRANSFORMER CKT 2	493	48.4	105.5	23.5	ARCADIA 345/138KV TRANSFORMER CKT 1	1028	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	CIMARRON - CZECH HALL 138KV	382	65.0	105.7	13.0	CIMARRON - HAYMAKER 138KV	1044	See Previous Solution Specified for Facility	
07SP	OKGE	OKGE	LONEOAK - QUAIL CREEK 138KV	308	67.3	103.7	9.3	NORTHWEST - PANTHER 138KV	1050	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	CIMARRON - CZECH HALL 138KV	382	63.0	105.7	13.6	DIVISION AVE - HAYMAKER 138KV	1056	See Previous Solution Specified for Facility	
07SP	OKGE	OKGE	CZECH HALL - XEROX 138KV	382	65.0	104.7	12.6	MCCLAIN - PLEASANT VALLEY 138KV	1072	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	LONEOAK - QUAIL CREEK 138KV	308	66.6	102.9	9.3	PANTHER - SILVER LAKE 138KV	1081	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 2	1195	17.5	106.1	88.2	ARCADIA - REDBUD 345KV CKT 1	1118	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 1	1195	17.4	105.8	88.0	ARCADIA - REDBUD 345KV CKT 2	1121	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	HORSESHOE LAKE - KAMO MEMORIAL 138KV	287	14.1	102.1	21.0	ARCADIA - DANFORTH 138KV	1146	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	CIMARRON - CZECH HALL 138KV	382	53.6	102.6	15.6	DIVISION AVE - MUSTANG 138KV	1148	See Previous Solution Specified for Facility	
07SP	OKGE	OKGE	PLEASANT VALLEY - SOUTHGATE 138KV	287	79.1	100.2	5.0	HOLLYWOOD - INDIAN HILLS 138KV	1188	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	CIMARRON - CZECH HALL 138KV	382	59.4	100.1	13.0	PLEASANT VALLEY - SOUTHGATE 138KV	1197	See Previous Solution Specified for Facility	
07SP	OKGE	OKGE	DIVISION AVE - LAKESIDE 138KV	287	85.3	101.4	3.8	MEMORIAL - TENNESSEE TAP 138KV	1200	Invalid Contingency	
07SP	OKGE	OKGE	REMINGTON PARK - STONEWALL 138KV	191	74.6	107.0	5.2	MEMORIAL - TENNESSEE TAP 138KV	1200	Invalid Contingency	
07WP	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 2	1195	20.6	108.1	87.1	ARCADIA - REDBUD 345KV CKT 1	1088	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07WP	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 1	1195	20.6	107.8	86.9	ARCADIA - REDBUD 345KV CKT 2	1091	Relieved or Impact Removed by Selected Upgrades for 1200 MW	

Table 1.1 - SPP Facility Overloads Caused or Impacted by 1200 MW Transfer using Scenario 1

Southwest Power Pool
System Impact Study

Study Case	From Area	To Area	Monitored Branch Overload	Rate <MVA>	BC % Loading	TC % Loading	%TDF	Outaged Branch Causing Overload	ATC (MW)	Solution	Estimated Cost
10SP	OKGE	OKGE	NORTHWEST 345/138KV TRANSFORMER CKT 1	493	84.4	118.4	13.9	NORTHWEST 345/138KV TRANSFORMER CKT 2	631	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	NORTHWEST 345/138KV TRANSFORMER CKT 1	493	82.6	114.7	13.2	NORTHWEST 345/138KV TRANSFORMER CKT 2	704	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	POOST ROAD - SE15TH 138KV	191	53.8	119.4	10.4	POOST ROAD - TINKER #5 138KV	758	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	ARCADIA 345/138KV TRANSFORMER CKT 1	493	51.4	114.5	26.0	ARCADIA 345/138KV TRANSFORMER CKT 2	901	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	NORTHWEST 345/138KV TRANSFORMER CKT 2	493	77.3	108.5	12.8	NORTHWEST 345/138KV TRANSFORMER CKT 1	919	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	ARCADIA - KAMO MEMORIAL 138KV	287	25.7	114.3	21.2	ARCADIA - DANFORTH 138KV	942	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	ARCADIA 345/138KV TRANSFORMER CKT 2	493	50.1	111.7	25.3	ARCADIA 345/138KV TRANSFORMER CKT 1	945	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	POOST ROAD - SE15TH 138KV	191	65.3	106.6	6.6	TINKER #2 - TINKER #5 138KV	948	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	ARCADIA 345/138KV TRANSFORMER CKT 1	493	50.5	110.7	24.7	ARCADIA 345/138KV TRANSFORMER CKT 2	954	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	ARCADIA 345/138KV TRANSFORMER CKT 2	493	49.2	107.8	24.1	ARCADIA 345/138KV TRANSFORMER CKT 1	1005	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	ARCADIA - KAMO MEMORIAL 138KV	287	10.4	110.4	23.9	ARCADIA - NORTHWEST 345KV	1010	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	DIVISION AVE - HAYMAKER 138KV	287	74.6	110.5	8.6	CIMARRON - CZECH HALL 138KV	1019	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	NORTHWEST 345/138KV TRANSFORMER CKT 2	493	75.7	105.0	12.1	NORTHWEST 345/138KV TRANSFORMER CKT 1	1030	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	CIMARRON - CZECH HALL 138KV	382	73.3	111.6	12.2	MCCLAIN - PLEASANT VALLEY 138KV	1040	See Previous Solution Specified for Facility	
10SP	OKGE	OKGE	DIVISION AVE - HAYMAKER 138KV	287	69.7	105.3	8.5	CZECH HALL - XEROX 138KV	1108	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	LONEOAK - QUAIL CREEK 138KV	308	66.5	102.2	9.2	NORTHWEST - PANTHER 138KV	1138	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	DIVISION AVE - HAYMAKER 138KV	287	67.5	102.8	8.5	MORGAN - XEROX 138KV	1151	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	LONEOAK - QUAIL CREEK 138KV	308	65.7	101.4	9.2	PANTHER - SILVER LAKE 138KV	1161	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	DIVISION AVE - HAYMAKER 138KV	287	66.2	101.5	8.4	MORGAN - MUSTANG 138KV	1174	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	CIMARRON - CZECH HALL 138KV	382	63.3	101.8	12.3	CIMARRON - HAYMAKER 138KV	1176	See Previous Solution Specified for Facility	
10SP	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 2	1195	13.3	101.7	88.0	ARCADIA - REDBUD 345KV CKT 1	1177	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 1	1195	13.2	101.5	87.9	ARCADIA - REDBUD 345KV CKT 2	1180	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	CIMARRON - CZECH HALL 138KV	382	61.0	101.3	12.8	DIVISION AVE - HAYMAKER 138KV	1182	See Previous Solution Specified for Facility	
10SP	OKGE	OKGE	HORSESHOE LAKE - KAMO MEMORIAL 138KV	287	10.9	100.5	21.4	ARCADIA - DANFORTH 138KV	1188	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	CZECH HALL - XEROX 138KV	382	62.6	100.5	12.1	MCCLAIN - PLEASANT VALLEY 138KV	1193	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	MAUD - SEMINOLE 138KV CKT 2	287	76.6	101.1	5.9	MAUD - SEMINOLE 138KV CKT 1	1198	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	TINKER #2 - TINKER #4 138KV	100	95.7	153.4	4.8	POOST ROAD - SE15TH 138KV	1200	Not a valid Overload; Relays trip to open UG transmission line when loading reaches 100%. No problem exist with line open.	
10WP	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 2	1195	20.4	105.7	84.9	ARCADIA - REDBUD 345KV CKT 1	1121	Relieved or Impact Removed by Selected Upgrades for 1200 MW	

Study Case	From Area	To Area	Monitored Branch Overload	Rate <MVA>	BC % Loading	TC % Loading	%TDF	Outaged Branch Causing Overload	ATC (MW)	Solution	Estimated Cost
10WP	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 1	1195	20.4	105.4	84.7	ARCADIA - REDBUD 345KV CKT 2	1124	Relieved or Impact Removed by Selected Upgrades for 1200 MW OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10WP	OKGE	OKGE	ARCADIA - KAMO MEMORIAL 138KV	287	29.5	100.7	17.0	ARCADIA - NORTHWEST 345KV	1184		
Total Estimated Engineering and Construction Cost											\$ 24,200,000

Table 2.1 - SPP Voltage Violations
Caused or Impacted by Transfer Using Scenario 1

Study Case	AREA	Monitored Bus with Violation	BC Voltage (PU)	TC Voltage (PU)	Outaged Branch Causing Voltage Violation	ATC (MW)	Solution	Estimated Cost	
04SP	OKGE	54951 LITTLAX269.0	0.9267	0.8992	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200	Close normally open switch between bus 54996 & bus 55052 by scada for mitigation.		
04SP	OKGE	54956 MACOCTP269.0	0.9236	0.8961	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200			
04SP	OKGE	54995 SPRNGHL269.0	0.9042	0.8760	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200			
04SP	OKGE	54996 ETOWAH 269.0	0.9115	0.8835	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200			
04SP	OKGE	55001 MACOMOC269.0	0.9214	0.8938	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200			
04SP	OKGE	55005 SPRHILT269.0	0.9051	0.8769	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200			
04SP	OMPA	56185 OMLXNTN169.0	0.9042	0.8759	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200			
04SP	OKGE	54951 LITTLAX269.0	0.9232	0.8950	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200		Close normally open switch between bus 54996 & bus 55052 by scada for mitigation.	
04SP	OKGE	54956 MACOCTP269.0	0.9200	0.8916	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200			
04SP	OKGE	54995 SPRNGHL269.0	0.8985	0.8694	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200			
04SP	OKGE	54996 ETOWAH 269.0	0.9070	0.8782	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200			
04SP	OKGE	55001 MACOMOC269.0	0.9177	0.8893	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200			
04SP	OKGE	55004 ROSEDAL269.0	0.8982	0.8691	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200			
04SP	OKGE	55005 SPRHILT269.0	0.8994	0.8703	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200			
04SP	OMPA	56185 OMLXNTN169.0	0.8985	0.8694	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200			
04SH		NONE IDENTIFIED				1200			
04FA		NONE IDENTIFIED				1200			
04WP		NONE IDENTIFIED				1200			
05AP		NONE IDENTIFIED				1200			
05G		NONE IDENTIFIED				1200			
05SP	OKGE	54951 LITTLAX269.0	0.9240	0.8948	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200	Close normally open switch between bus 54996 & bus 55052 by scada for mitigation.		
05SP	OKGE	54956 MACOCTP269.0	0.9208	0.8915	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200			
05SP	OKGE	54995 SPRNGHL269.0	0.9005	0.8704	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200			
05SP	OKGE	54996 ETOWAH 269.0	0.9082	0.8784	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200			
05SP	OKGE	55001 MACOMOC269.0	0.9185	0.8891	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200			
05SP	OKGE	55005 SPRHILT269.0	0.9014	0.8714	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200			
05SP	OMPA	56185 OMLXNTN169.0	0.9005	0.8704	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200			
05SP	OKGE	54951 LITTLAX269.0	0.9203	0.8903	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200		Close normally open switch between bus 54996 & bus 55052 by scada for mitigation.	
05SP	OKGE	54956 MACOCTP269.0	0.9170	0.8868	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200			
05SP	OKGE	54995 SPRNGHL269.0	0.8945	0.8635	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200			
05SP	OKGE	54996 ETOWAH 269.0	0.9035	0.8728	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200			
05SP	OKGE	55001 MACOMOC269.0	0.9147	0.8844	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200			
05SP	OKGE	55004 ROSEDAL269.0	0.8943	0.8632	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200			
05SP	OKGE	55005 SPRHILT269.0	0.8955	0.8644	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200			
05SP	OMPA	56185 OMLXNTN169.0	0.8945	0.8635	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200			
05SH		NONE IDENTIFIED				1200			
05FA		NONE IDENTIFIED				1200			
05WP		NONE IDENTIFIED				1200			
07SP	OKGE	54969 NE30TH 269.0	0.9372	0.8969	OPEN LINE FROM BUS 54969 [NE30TH 269.000] TO BUS 54972 [RENO 269.000] CKT 1	1108	Relieved or Impact Removed by Selected Upgrades for 1200 MW		
07SP	OKGE	54996 ETOWAH 269.0	0.9268	0.8921	OPEN LINE FROM BUS 54996 [ETOWAH 269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200	Close normally open switch between bus 54996 & bus 55052 by scada for mitigation.		
07SP	OKGE	55001 MACOMOC269.0	0.9333	0.8989	OPEN LINE FROM BUS 54996 [ETOWAH 269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200			
07SP	OKGE	54951 LITTLAX269.0	0.9205	0.8818	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200	Close normally open switch between bus 54996 & bus 55052 by scada for mitigation.		
07SP	OKGE	54956 MACOCTP269.0	0.9172	0.8783	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200			
07SP	OKGE	54995 SPRNGHL269.0	0.8966	0.8567	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200			
07SP	OKGE	54996 ETOWAH 269.0	0.9042	0.8646	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200			
07SP	OKGE	55001 MACOMOC269.0	0.9148	0.8758	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200			
07SP	OKGE	55005 SPRHILT269.0	0.8975	0.8576	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200			
07SP	OMPA	56185 OMLXNTN169.0	0.8966	0.8567	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200			
07SP	OKGE	54951 LITTLAX269.0	0.9165	0.8766	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200		Close normally open switch between bus 54996 & bus 55052 by scada for mitigation.	
07SP	OKGE	54956 MACOCTP269.0	0.9130	0.8729	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200			

Table 2.1 - SPP Voltage Violations
Caused or Impacted by Transfer Using Scenario 1

Study Case	AREA	Monitored Bus with Violation	BC Voltage (PU)	TC Voltage (PU)	Outaged Branch Causing Voltage Violation	ATC (MW)	Solution	Estimated Cost
07SP	OKGE	54991 LTRVRLK269.0	0.9355	0.8966	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200	"	
07SP	OKGE	54995 SPRNGHL269.0	0.8902	0.8489	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200	"	
07SP	OKGE	54996 ETOWAH 269.0	0.8991	0.8582	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200	"	
07SP	OKGE	55001 MACOMOC269.0	0.9106	0.8704	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200	"	
07SP	OKGE	55004 ROSEDAL269.0	0.8898	0.8484	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200	"	
07SP	OKGE	55005 SPRHILT269.0	0.8911	0.8498	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200	"	
07SP	OMPA	56185 OMLXNTN169.0	0.8902	0.8489	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200	"	
07SP	OKGE	54996 ETOWAH 269.0	0.9161	0.8937	OPEN LINE FROM BUS 55099 PAOLI 269.0 TO BUS 55100 PAOLI- 4 138 TO BUS 55746 PAOLI 113.8 CKT1	1200	Close normally open switch between bus 54996 & bus 55052 by scada for mitigation.	
07WP		NONE IDENTIFIED				1200		
10SP	OKGE	54738 KOCH 269.0	0.8962	0.8694	OPEN LINE FROM BUS 54738 [KOCH 269.000] TO BUS 54739 [MEDFORD269.000] CKT 1	896	Look at installing 69kV caps at Koch.	\$ 300,000
10SP	OKGE	54719 CLYDE 269.0	0.9137	0.8880	OPEN LINE FROM BUS 54738 [KOCH 269.000] TO BUS 54739 [MEDFORD269.000] CKT 1	934	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	54969 NE30TH 269.0	0.9327	0.8914	OPEN LINE FROM BUS 54969 [NE30TH 269.000] TO BUS 54972 [RENO 269.000] CKT 1	950	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	54970 DEEPFKT269.0	0.9373	0.8964	OPEN LINE FROM BUS 54969 [NE30TH 269.000] TO BUS 54972 [RENO 269.000] CKT 1	1094	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	54974 DEEPFRK269.0	0.9380	0.8969	OPEN LINE FROM BUS 54969 [NE30TH 269.000] TO BUS 54972 [RENO 269.000] CKT 1	1109	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	54956 MACOCTP269.0	0.9317	0.8978	OPEN LINE FROM BUS 54996 [ETOWAH 269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200	Close normally open switch between bus 54996 & bus 55052 by scada for mitigation.	
10SP	OKGE	54996 ETOWAH 269.0	0.9223	0.8881	OPEN LINE FROM BUS 54996 [ETOWAH 269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200	"	
10SP	OKGE	55001 MACOMOC269.0	0.9292	0.8952	OPEN LINE FROM BUS 54996 [ETOWAH 269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200	"	
10SP	OKGE	54951 LITTLAX269.0	0.9148	0.8759	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200	Close normally open switch between bus 54996 & bus 55052 by scada for mitigation.	
10SP	OKGE	54956 MACOCTP269.0	0.9112	0.8722	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200	"	
10SP	OKGE	54991 LTRVRLK269.0	0.9340	0.8962	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200	"	
10SP	OKGE	54995 SPRNGHL269.0	0.8889	0.8489	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200	"	
10SP	OKGE	54996 ETOWAH 269.0	0.8971	0.8575	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200	"	
10SP	OKGE	55001 MACOMOC269.0	0.9086	0.8695	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200	"	
10SP	OKGE	55005 SPRHILT269.0	0.8899	0.8499	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200	"	
10SP	OMPA	56185 OMLXNTN169.0	0.8889	0.8489	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200	"	
10SP	OKGE	54951 LITTLAX269.0	0.9104	0.8701	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200	Close normally open switch between bus 54996 & bus 55052 by scada for mitigation.	
10SP	OKGE	54956 MACOCTP269.0	0.9066	0.8662	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200	"	
10SP	OKGE	54983 LTRVRTP269.0	0.9350	0.8961	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200	"	
10SP	OKGE	54985 TXSTELA269.0	0.9375	0.8987	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200	"	
10SP	OKGE	54991 LTRVRLK269.0	0.9310	0.8919	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200	"	
10SP	OKGE	54995 SPRNGHL269.0	0.8819	0.8401	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200	"	
10SP	OKGE	54996 ETOWAH 269.0	0.8915	0.8503	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200	"	
10SP	OKGE	55001 MACOMOC269.0	0.9040	0.8635	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200	"	
10SP	OKGE	55004 ROSEDAL269.0	0.8814	0.8396	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200	"	
10SP	OKGE	55005 SPRHILT269.0	0.8828	0.8411	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200	"	
10SP	OMPA	56185 OMLXNTN169.0	0.8819	0.8401	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200	"	
10WP		NONE IDENTIFIED				1200		
Total Estimated Engineering and Construction Cost								\$ 300,000

SPP-2003-271-2
 Table 3.1 - SPP Facility Overloads
 Caused or Impacted by Selected Upgrades
 for 1200 MW using Scenario 1

Southwest Power Pool
 System Impact Study

Study Case	From Area	To Area	Monitored Branch Overload	Rate <MVA>	BC Without Upgrades %Loading	BC With Upgrades %Loading	TC Without Upgrades %Loading	TC With Upgrades %Loading	Outaged Branch Causing Overload	Solution	Estimated Cost
05AP			NONE IDENTIFIED								
05G			NONE IDENTIFIED								
05SH			NONE IDENTIFIED								
05FA			NONE IDENTIFIED								
07SP			NONE IDENTIFIED								
07WP			NONE IDENTIFIED								
10SP			NONE IDENTIFIED								
10WP			NONE IDENTIFIED								
Total Estimated Engineering and Construction Cost											\$ -

Table 1.2 - SPP Facility Overloads Caused or Impacted by 1200 MW Transfer using Scenario 3

Study Case	From Area	To Area	Monitored Branch Overload	Rate <MVA>	BC % Loading	TC % Loading	%TDF	Outaged Branch Causing Overload	ATC (MW)	Solution	Estimated Cost
04SP	OKGE	OKGE	DRAPER 345/138KV TRANSFORMER CKT 1	493	86.7	106.2	8.0	DRAPER 345/138KV TRANSFORMER CKT 2	547	See Previous Solution Specified for Facility in Table 1.1	
04SP	OKGE	OKGE	DRAPER 345/138KV TRANSFORMER CKT 2	493	86.7	106.2	8.0	DRAPER 345/138KV TRANSFORMER CKT 1	547	See Previous Solution Specified for Facility in Table 1.1	
04SP	OKGE	OKGE	MEMORIAL - SKYLINE 138KV	287	64.9	124.5	14.3	DANFORTH - OMPA-EDMOND HAFER 138KV	574	See Previous Solution Specified for Facility in Table 1.1	
04SP	OKGE	OKGE	MEMORIAL - SKYLINE 138KV	287	59.9	119.4	14.2	EASTERN AVE - OMPA-EDMOND HAFER 138KV	658	See Previous Solution Specified for Facility in Table 1.1	
04SP	OKGE	OKGE	DRAPER 345/138KV TRANSFORMER CKT 1	493	84.4	102.3	7.4	DRAPER 345/138KV TRANSFORMER CKT 2	662	See Previous Solution Specified for Facility in Table 1.1	
04SP	OKGE	OKGE	DRAPER 345/138KV TRANSFORMER CKT 2	493	84.4	102.3	7.4	DRAPER 345/138KV TRANSFORMER CKT 1	662	See Previous Solution Specified for Facility in Table 1.1	
04SP	OKGE	OKGE	NORTHWEST 345/138KV TRANSFORMER CKT 1	493	80.2	108.9	11.8	NORTHWEST 345/138KV TRANSFORMER CKT 2	707	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SP	OKGE	OKGE	LONEOK - QUAIL CREEK 138KV	308	74.5	110.5	9.2	NORTHWEST - PANTHER 138KV	757	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SP	OKGE	OKGE	MEMORIAL - SKYLINE 138KV	287	57.8	113.4	13.3	DIVISION AVE - SILVER LAKE 138KV	772	See Previous Solution Specified for Facility in Table 1.1	
04SP	OKGE	OKGE	LONEOK - QUAIL CREEK 138KV	308	73.7	109.7	9.2	PANTHER - SILVER LAKE 138KV	778	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SP	OKGE	OKGE	ARCADIA - KAMO MEMORIAL 138KV	287	34.4	116.2	19.6	ARCADIA - DANFORTH 138KV	782	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SP	OKGE	OKGE	NORTHWEST 345/138KV TRANSFORMER CKT 1	493	78.8	106.0	11.2	NORTHWEST 345/138KV TRANSFORMER CKT 2	787	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SP	OKGE	OKGE	MORGAN - MUSTANG 138KV	287	70.3	112.8	10.2	MCCLAIN - PLEASANT VALLEY 138KV	798	See Previous Solution Specified for Facility in Table 1.1	
04SP	OKGE	OKGE	MEMORIAL - SKYLINE 138KV	287	50.8	110.1	14.2	EASTERN AVE - MEMORIAL 138KV	820	See Previous Solution Specified for Facility in Table 1.1	
04SP	OKGE	OKGE	ARCADIA - KAMO MEMORIAL 138KV	287	23.9	116.6	22.2	ARCADIA - NORTHWEST 345KV	838	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SP	OKGE	OKGE	REMINGTON PARK - STONEWALL 138KV	191	81.9	110.2	4.5	Multiple Contingency Outage: 84TH ST - TENNESSEE TAP 138KV MEMORIAL - TENNESSEE TAP 138KV TENNESSEE - TENNESSEE TAP 138KV	864	See Previous Solution Specified for Facility in Table 1.1	
04SP	OKGE	OKGE	DIVISION AVE - SILVER LAKE 138KV	287	62.6	115.6	12.7	CIMARRON - NORTHWEST 345KV	869	See Previous Solution Specified for Facility in Table 1.1	
04SP	OKGE	OKGE	ARCADIA 345/138KV TRANSFORMER CKT 1	493	51.5	109.6	23.9	ARCADIA 345/138KV TRANSFORMER CKT 2	891	See Previous Solution Specified for Facility in Table 1.1	
04SP	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 2	1195	32.9	121.0	87.7	ARCADIA - REDBUD 345KV CKT 1	912	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SP	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 1	1195	32.8	120.7	87.6	ARCADIA - REDBUD 345KV CKT 2	915	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SP	OKGE	OKGE	HORSESHOE LAKE - KAMO MEMORIAL 138KV	287	26.3	109.2	19.8	ARCADIA - DANFORTH 138KV	927	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SP	OKGE	OKGE	DIVISION AVE - SILVER LAKE 138KV	287	58.5	107.4	11.7	MEMORIAL - SKYLINE 138KV	933	See Previous Solution Specified for Facility in Table 1.1	
04SP	OKGE	OKGE	ARCADIA 345/138KV TRANSFORMER CKT 2	493	50.2	106.9	23.3	ARCADIA 345/138KV TRANSFORMER CKT 1	958	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SP	OKGE	OKGE	ARCADIA 345/138KV TRANSFORMER CKT 1	493	50.6	106.1	22.8	ARCADIA 345/138KV TRANSFORMER CKT 2	974	See Previous Solution Specified for Facility in Table 1.1	
04SP	OKGE	OKGE	HORSESHOE LAKE - KAMO MEMORIAL 138KV	287	16.5	109.4	22.2	ARCADIA - NORTHWEST 345KV	974	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SP	OKGE	OKGE	CIMARRON - CZECH HALL 138KV	382	68.2	101.5	10.6	MCCLAIN - PLEASANT VALLEY 138KV	976	See Previous Solution Specified for Facility in Table 1.1	
04SP	OKGE	OKGE	MEMORIAL - SKYLINE 138KV	287	57.9	102.3	10.6	DIVISION AVE - LAKESIDE 138KV	990	See Previous Solution Specified for Facility in Table 1.1	
04SP	OKGE	OKGE	DIVISION AVE - SILVER LAKE 138KV	287	58.9	102.5	10.4	QUAIL CREEK - SKYLINE 138KV	1038	See Previous Solution Specified for Facility in Table 1.1	
04SP	OKGE	OKGE	ARCADIA 345/138KV TRANSFORMER CKT 2	493	49.3	103.3	22.2	ARCADIA 345/138KV TRANSFORMER CKT 1	1067	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SP	OKGE	OKGE	DIVISION AVE - SILVER LAKE 138KV	287	65.4	101.9	8.7	Multiple Contingency Outage: 84TH ST - TENNESSEE TAP 138KV MEMORIAL - TENNESSEE TAP 138KV TENNESSEE - TENNESSEE TAP 138KV	1085	See Previous Solution Specified for Facility in Table 1.1	
04SP	OKGE	OMPA	EASTERN AVE - OMPA-EDMOND HAFER 138KV	287	52.8	101.9	11.7	MEMORIAL - SKYLINE 138KV	1094	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SP	OKGE	OKGE	NORTHWEST 345/138KV TRANSFORMER CKT 2	493	73.8	100.4	10.9	NORTHWEST 345/138KV TRANSFORMER CKT 1	1134	Relieved or Impact Removed by Selected Upgrades for 1200 MW	

Study Case	From Area	To Area	Monitored Branch Overload	Rate <MVA>	BC % Loading	TC % Loading	%TDF	Outaged Branch Causing Overload	ATC (MW)	Solution	Estimated Cost
04SP	OKGE	OKGE	DIVISION AVE - SILVER LAKE 138KV	287	65.7	102.8	8.9	MEMORIAL - TENNESSEE TAP 138KV	1200	Invalid Contingency	
04SP	OKGE	OKGE	REMINGTON PARK - STONEWALL 138KV	191	81.5	109.2	4.4	MEMORIAL - TENNESSEE TAP 138KV	1200	Invalid Contingency	
04SH	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 2	1195	36.3	123.1	86.4	ARCADIA - REDBUD 345KV CKT 1	880	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SH	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 1	1195	36.2	122.8	86.2	ARCADIA - REDBUD 345KV CKT 2	883	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SH	OKGE	OKGE	MEMORIAL - SKYLINE 138KV	287	73.8	105.2	7.5	DANFORTH - OMPA-EDMOND HAFER 138KV	925	See Previous Solution Specified for Facility in Table 1.1	
04SH	OKGE	OKGE	ARCADIA - KAMO MEMORIAL 138KV	287	45.8	107.1	14.7	ARCADIA - NORTHWEST 345KV	1037	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SH	OKGE	OKGE	ARCADIA - KAMO MEMORIAL 138KV	287	54.9	104.2	11.8	ARCADIA - DANFORTH 138KV	1075	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SH	OKGE	OKGE	HORSESHOE LAKE - KAMO MEMORIAL 138KV	287	42.7	102.5	14.3	ARCADIA - NORTHWEST 345KV	1140	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SH	OKGE	OKGE	MEMORIAL - SKYLINE 138KV	287	69.6	101.0	7.5	EASTERN AVE - OMPA-EDMOND HAFER 138KV	1147	See Previous Solution Specified for Facility in Table 1.1	
04SH	OKGE	OKGE	HORSESHOE LAKE - KAMO MEMORIAL 138KV	287	51.4	100.0	11.6	ARCADIA - DANFORTH 138KV	1199	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04FA	OKGE	OKGE	EASTERN AVE - MEMORIAL 138KV	191	74.2	106.2	5.1	MEMORIAL - SKYLINE 138KV	958	See Previous Solution Specified for Facility in Table 1.1	
04FA	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 2	1195	27.7	114.2	86.1	ARCADIA - REDBUD 345KV CKT 1	1003	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04FA	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 1	1195	27.7	114.0	85.9	ARCADIA - REDBUD 345KV CKT 2	1006	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04FA	OKGE	OKGE	ARCADIA - KAMO MEMORIAL 138KV	287	52.5	103.0	12.1	ARCADIA - NORTHWEST 345KV	1123	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04WP	OKGE	OKGE	EASTERN AVE - MEMORIAL 138KV	191	68.3	114.1	7.3	MEMORIAL - SKYLINE 138KV	819	See Previous Solution Specified for Facility in Table 1.1	
04WP	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 2	1195	30.2	117.3	86.8	ARCADIA - REDBUD 345KV CKT 1	963	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04WP	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 1	1195	30.1	117.1	86.6	ARCADIA - REDBUD 345KV CKT 2	966	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04WP	OKGE	OKGE	EASTERN AVE - MEMORIAL 138KV	191	63.8	106.0	6.7	KETCH - OMPA-FAIRVIEW 138KV	1064	See Previous Solution Specified for Facility in Table 1.1	
04WP	OKGE	OKGE	EASTERN AVE - MEMORIAL 138KV	191	56.8	105.1	7.7	ARCADIA - KAMO MEMORIAL 138KV	1088	See Previous Solution Specified for Facility in Table 1.1	
04WP	OKGE	OKGE	EASTERN AVE - MEMORIAL 138KV	191	56.1	104.7	7.7	HORSESHOE LAKE - KAMO MEMORIAL 138KV	1097	See Previous Solution Specified for Facility in Table 1.1	
04WP	OKGE	OKGE	ARCADIA - KAMO MEMORIAL 138KV	287	39.6	105.5	15.8	ARCADIA - NORTHWEST 345KV	1099	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04WP	OKGE	OKGE	EASTERN AVE - MEMORIAL 138KV	191	60.2	102.3	6.7	OMPA-FAIRVIEW - SKYLINE 138KV	1147	See Previous Solution Specified for Facility in Table 1.1	
04WP	OKGE	OKGE	ARCADIA - KAMO MEMORIAL 138KV	287	48.0	101.9	12.9	ARCADIA - DANFORTH 138KV	1156	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04WP	OKGE	OKGE	HORSESHOE LAKE - KAMO MEMORIAL 138KV	287	36.5	101.2	15.5	ARCADIA - NORTHWEST 345KV	1178	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04WP	OKGE	OKGE	EASTERN AVE - MEMORIAL 138KV	191	50.2	100.4	8.0	ARCADIA - NORTHWEST 345KV	1191	See Previous Solution Specified for Facility in Table 1.1	
05AP	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 2	1195	35.9	112.3	76.1	ARCADIA - REDBUD 345KV CKT 1	1028	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05AP	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 1	1195	35.8	112.0	76.0	ARCADIA - REDBUD 345KV CKT 2	1031	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05G	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 2	1195	38.2	124.7	86.1	ARCADIA - REDBUD 345KV CKT 1	842	Relieved or Impact Removed by Selected Upgrades for 1200 MW	

Table 1.2 - SPP Facility Overloads Caused or Impacted by 1200 MW Transfer using Scenario 3

Southwest Power Pool
System Impact Study

Study Case	From Area	To Area	Monitored Branch Overload	Rate <MVA>	BC % Loading	TC % Loading	%TDF	Outaged Branch Causing Overload	ATC (MW)	Solution	Estimated Cost
05G	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 1	1195	38.2	124.5	86.0	ARCADIA - REDBUD 345KV CKT 2	845	Relieved or Impact Removed by Selected Upgrades for 1200 MW See Previous Solution Specified for Facility in Table 1.1	
05G	OKGE	OKGE	EASTERN AVE - MEMORIAL 138KV	191	45.7	111.8	10.5	MEMORIAL - SKYLINE 138KV	872		
05G	OKGE	OKGE	ARCADIA - KAMO MEMORIAL 138KV	287	18.5	108.6	21.5	ARCADIA - NORTHWEST 345KV	1022	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05G	OKGE	OKGE	HORSESHOE LAKE - KAMO MEMORIAL 138KV	287	16.3	106.9	21.7	ARCADIA - NORTHWEST 345KV	1049	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05G	OKGE	OKGE	ARCADIA - KAMO MEMORIAL 138KV	287	26.7	104.4	18.6	ARCADIA - DANFORTH 138KV	1082	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05G	OKGE	OKGE	EASTERN AVE - MEMORIAL 138KV	191	46.9	104.1	9.1	KETCH - OMPA-FAIRVIEW 138KV	1082	See Previous Solution Specified for Facility in Table 1.1	
05G	OKGE	OKGE	MEMORIAL - SKYLINE 138KV	287	49.0	102.1	12.7	DANFORTH - OMPA-EDMOND HAFER 138KV	1109	See Previous Solution Specified for Facility in Table 1.1	
05G	OKGE	OKGE	HORSESHOE LAKE - KAMO MEMORIAL 138KV	287	24.3	103.2	18.9	ARCADIA - DANFORTH 138KV	1110	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05G	OKGE	OKGE	EASTERN AVE - MEMORIAL 138KV	191	33.7	102.3	10.9	HORSESHOE LAKE - KAMO MEMORIAL 138KV	1138	See Previous Solution Specified for Facility in Table 1.1	
05G	OKGE	OKGE	EASTERN AVE - MEMORIAL 138KV	191	34.1	101.8	10.8	ARCADIA - KAMO MEMORIAL 138KV	1152	See Previous Solution Specified for Facility in Table 1.1	
05SP	OKGE	OKGE	NORTHWEST 345/138KV TRANSFORMER CKT 1	493	81.6	112.6	12.7	NORTHWEST 345/138KV TRANSFORMER CKT 2	652	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	NORTHWEST 345/138KV TRANSFORMER CKT 1	493	80.0	109.3	12.0	NORTHWEST 345/138KV TRANSFORMER CKT 2	734	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	ARCADIA - KAMO MEMORIAL 138KV	287	31.4	113.0	19.5	ARCADIA - DANFORTH 138KV	845	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	ARCADIA 345/138KV TRANSFORMER CKT 1	493	51.3	109.9	24.1	ARCADIA 345/138KV TRANSFORMER CKT 2	892	See Previous Solution Specified for Facility in Table 1.1	
05SP	OKGE	OKGE	ARCADIA - KAMO MEMORIAL 138KV	287	20.9	113.7	22.2	ARCADIA - NORTHWEST 345KV	895	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	CIMARRON - CZECH HALL 138KV	382	70.1	105.5	11.3	MCCLAIN - PLEASANT VALLEY 138KV	926	See Previous Solution Specified for Facility in Table 1.1	
05SP	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 2	1195	31.0	119.3	88.0	ARCADIA - REDBUD 345KV CKT 1	935	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 1	1195	30.9	119.1	87.8	ARCADIA - REDBUD 345KV CKT 2	938	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	REMINGTON PARK - STONEWALL 138KV	191	77.5	107.1	4.7	Multiple Contingency Outage: 84TH ST - TENNESSEE TAP 138KV MEMORIAL - TENNESSEE TAP 138KV TENNESSEE - TENNESSEE TAP 138KV	940	See Previous Solution Specified for Facility in Table 1.1	
05SP	OKGE	OKGE	NORTHWEST 345/138KV TRANSFORMER CKT 2	493	74.6	103.2	11.7	NORTHWEST 345/138KV TRANSFORMER CKT 1	941	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	ARCADIA 345/138KV TRANSFORMER CKT 2	493	50.0	107.1	23.4	ARCADIA 345/138KV TRANSFORMER CKT 1	952	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	ARCADIA 345/138KV TRANSFORMER CKT 1	493	50.5	106.3	22.9	ARCADIA 345/138KV TRANSFORMER CKT 2	967	See Previous Solution Specified for Facility in Table 1.1	
05SP	OKGE	OKGE	HORSESHOE LAKE - KAMO MEMORIAL 138KV	287	22.5	105.3	19.8	ARCADIA - DANFORTH 138KV	1018	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	HORSESHOE LAKE - KAMO MEMORIAL 138KV	287	12.4	105.6	22.3	ARCADIA - NORTHWEST 345KV	1053	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	ARCADIA 345/138KV TRANSFORMER CKT 2	493	49.2	103.5	22.3	ARCADIA 345/138KV TRANSFORMER CKT 1	1055	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	LONEOAK - QUAIL CREEK 138KV	308	67.5	100.5	8.5	NORTHWEST - PANTHER 138KV	1141	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	ARCADIA 345/138KV TRANSFORMER CKT 1	493	40.5	100.3	24.6	ARCADIA - NORTHWEST 345KV	1189	See Previous Solution Specified for Facility in Table 1.1	

Study Case	From Area	To Area	Monitored Branch Overload	Rate <MVA>	BC % Loading	TC % Loading	%TDF	Outaged Branch Causing Overload	ATC (MW)	Solution	Estimated Cost
05SP	OKGE	OKGE	NORTHWEST 345/138KV TRANSFORMER CKT 2	493	73.3	100.0	11.0	NORTHWEST 345/138KV TRANSFORMER CKT 1	1194	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	REMINGTON PARK - STONEWALL 138KV	191	77.2	106.1	4.6	MEMORIAL - TENNESSEE TAP 138KV	1200	Invalid Contingency	
05SP	OKGE	OKGE	TINKER #2 - TINKER #4 138KV	100	48.9	119.6	5.9	POOST ROAD - SE15TH 138KV	1200	Not a valid Overload; Relays trip to open UG transmission line when loading reaches 100%. No problem exist with line open.	
05SH	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 2	1195	35.9	122.8	86.5	ARCADIA - REDBUD 345KV CKT 1	883	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SH	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 1	1195	35.8	122.5	86.3	ARCADIA - REDBUD 345KV CKT 2	886	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SH	OKGE	OKGE	ARCADIA - KAMO MEMORIAL 138KV	287	47.8	109.4	14.7	ARCADIA - NORTHWEST 345KV	1003	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SH	OKGE	OKGE	ARCADIA - KAMO MEMORIAL 138KV	287	57.3	106.7	11.8	ARCADIA - DANFORTH 138KV	1016	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SH	OKGE	OKGE	NORTHWEST 345/138KV TRANSFORMER CKT 1	493	83.5	101.0	7.2	NORTHWEST 345/138KV TRANSFORMER CKT 2	1096	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SH	OKGE	OKGE	HORSESHOE LAKE - KAMO MEMORIAL 138KV	287	44.4	104.4	14.3	ARCADIA - NORTHWEST 345KV	1105	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SH	OKGE	OKGE	REMINGTON PARK - STONEWALL 138KV	191	74.1	101.0	4.3	Multiple Contingency Outage: 84TH ST - TENNESSEE TAP 138KV MEMORIAL - TENNESSEE TAP 138KV TENNESSEE - TENNESSEE TAP 138KV	1139	See Previous Solution Specified for Facility in Table 1.1	
05SH	OKGE	OKGE	HORSESHOE LAKE - KAMO MEMORIAL 138KV	287	53.4	102.1	11.6	ARCADIA - DANFORTH 138KV	1141	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SH	OKGE	OKGE	ARCADIA 345/138KV TRANSFORMER CKT 1	493	59.3	100.2	16.8	ARCADIA 345/138KV TRANSFORMER CKT 2	1193	See Previous Solution Specified for Facility in Table 1.1	
05FA	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 2	1195	26.2	113.2	86.6	ARCADIA - REDBUD 345KV CKT 1	1017	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05FA	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 1	1195	26.2	113.0	86.5	ARCADIA - REDBUD 345KV CKT 2	1020	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05FA	OKGE	OKGE	EASTERN AVE - MEMORIAL 138KV	191	53.8	102.5	7.8	MEMORIAL - SKYLINE 138KV	1102	See Previous Solution Specified for Facility in Table 1.1	
05FA	OKGE	OKGE	ARCADIA - KAMO MEMORIAL 138KV	287	29.6	101.5	17.2	ARCADIA - NORTHWEST 345KV	1162	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05WP	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 2	1195	35.3	121.9	86.2	ARCADIA - REDBUD 345KV CKT 1	897	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05WP	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 1	1195	35.2	121.7	86.1	ARCADIA - REDBUD 345KV CKT 2	900	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05WP	OKGE	OKGE	ARCADIA - KAMO MEMORIAL 138KV	287	52.2	103.8	12.3	ARCADIA - NORTHWEST 345KV	1113	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	NORTHWEST 345/138KV TRANSFORMER CKT 1	493	83.4	117.6	14.1	NORTHWEST 345/138KV TRANSFORMER CKT 2	588	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	NORTHWEST 345/138KV TRANSFORMER CKT 1	493	81.8	113.8	13.1	NORTHWEST 345/138KV TRANSFORMER CKT 2	665	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	ARCADIA - KAMO MEMORIAL 138KV	287	30.2	117.4	20.9	ARCADIA - DANFORTH 138KV	837	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	ARCADIA 345/138KV TRANSFORMER CKT 1	493	52.3	114.4	25.5	ARCADIA 345/138KV TRANSFORMER CKT 2	855	See Previous Solution Specified for Facility in Table 1.1	
07SP	OKGE	OKGE	NORTHWEST 345/138KV TRANSFORMER CKT 2	493	76.4	107.8	12.9	NORTHWEST 345/138KV TRANSFORMER CKT 1	879	Relieved or Impact Removed by Selected Upgrades for 1200 MW	

Study Case	From Area	To Area	Monitored Branch Overload	Rate <MVA>	BC % Loading	TC % Loading	%TDF	Outaged Branch Causing Overload	ATC (MW)	Solution	Estimated Cost
07SP	OKGE	OKGE	ARCADIA - KAMO MEMORIAL 138KV	287	19.1	117.1	23.4	ARCADIA - NORTHWEST 345KV	888	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	REMINGTON PARK - STONEWALL 138KV	191	80.7	114.1	5.3	Multiple Contingency Outage: 84TH ST - TENNESSEE TAP 138KV MEMORIAL - TENNESSEE TAP 138KV TENNESSEE - TENNESSEE TAP 138KV	898	See Previous Solution Specified for Facility in Table 1.1	
07SP	OKGE	OKGE	ARCADIA 345/138KV TRANSFORMER CKT 2	493	51.0	111.6	24.9	ARCADIA 345/138KV TRANSFORMER CKT 1	908	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	ARCADIA 345/138KV TRANSFORMER CKT 1	493	51.5	110.3	24.2	ARCADIA 345/138KV TRANSFORMER CKT 2	916	See Previous Solution Specified for Facility in Table 1.1	
07SP	OKGE	OKGE	CIMARRON - CZECH HALL 138KV	382	70.1	110.7	12.9	MCCLAIN - PLEASANT VALLEY 138KV	952	See Previous Solution Specified for Facility in Table 1.1	
07SP	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 2	1195	28.7	117.5	88.4	ARCADIA - REDBUD 345KV CKT 1	966	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 1	1195	28.6	117.2	88.2	ARCADIA - REDBUD 345KV CKT 2	968	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	NORTHWEST 345/138KV TRANSFORMER CKT 2	493	74.9	104.2	12.0	NORTHWEST 345/138KV TRANSFORMER CKT 1	970	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	ARCADIA 345/138KV TRANSFORMER CKT 2	493	50.2	107.4	23.5	ARCADIA 345/138KV TRANSFORMER CKT 1	976	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	HORSESHOE LAKE - KAMO MEMORIAL 138KV	287	19.7	108.3	21.2	ARCADIA - DANFORTH 138KV	991	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	DIVISION AVE - HAYMAKER 138KV	287	68.3	106.7	9.2	CIMARRON - CZECH HALL 138KV	992	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	LONEOAK - QUAIL CREEK 138KV	308	68.5	105.1	9.4	NORTHWEST - PANTHER 138KV	997	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	LONEOAK - QUAIL CREEK 138KV	308	67.7	104.3	9.4	PANTHER - SILVER LAKE 138KV	1027	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	HORSESHOE LAKE - KAMO MEMORIAL 138KV	287	9.0	107.5	23.6	ARCADIA - NORTHWEST 345KV	1038	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	ARCADIA 345/138KV TRANSFORMER CKT 1	493	40.9	103.5	25.7	ARCADIA - NORTHWEST 345KV	1116	See Previous Solution Specified for Facility in Table 1.1	
07SP	OKGE	OKGE	DIVISION AVE - HAYMAKER 138KV	287	63.7	101.6	9.1	CZECH HALL - XEROX 138KV	1149	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OMPA	EASTERN AVE - OMPA-EDMOND HAFFER 138KV	287	49.3	101.6	12.5	MEMORIAL - SKYLINE 138KV	1149	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	NORTHWEST 345/138KV TRANSFORMER CKT 1	493	67.1	100.7	13.8	CIMARRON - NORTHWEST 345KV	1173	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	ARCADIA 345/138KV TRANSFORMER CKT 1	493	40.5	100.4	24.6	ARCADIA - NORTHWEST 345KV	1188	See Previous Solution Specified for Facility in Table 1.1	
07SP	OKGE	OKGE	CIMARRON - CZECH HALL 138KV	382	57.2	100.2	13.7	DIVISION AVE - HAYMAKER 138KV	1195	See Previous Solution Specified for Facility in Table 1.1	
07SP	OKGE	OKGE	DIVISION AVE - LAKESIDE 138KV	287	84.8	101.0	3.9	MEMORIAL - TENNESSEE TAP 138KV	1200	Invalid Contingency	
07SP	OKGE	OKGE	REMINGTON PARK - STONEWALL 138KV	191	80.3	112.9	5.2	MEMORIAL - TENNESSEE TAP 138KV	1200	Invalid Contingency	
07WP	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 2	1195	32.7	120.3	87.2	ARCADIA - REDBUD 345KV CKT 1	919	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07WP	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 1	1195	32.6	120.0	87.1	ARCADIA - REDBUD 345KV CKT 2	922	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07WP	OKGE	OKGE	ARCADIA - KAMO MEMORIAL 138KV	287	17.0	103.8	20.8	ARCADIA - NORTHWEST 345KV	1109	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	NORTHWEST 345/138KV TRANSFORMER CKT 1	493	85.8	119.8	14.0	NORTHWEST 345/138KV TRANSFORMER CKT 2	582	Facility Limits Service to 1195 MW 6/1/2009-10/1/2009 and Limits Renewal Rights to 1165 MW 6/1/2010 with Selected Upgrades modeled for 1200 MW,	
10SP	OKGE	OKGE	NORTHWEST 345/138KV TRANSFORMER CKT 1	493	84.1	116.2	13.2	NORTHWEST 345/138KV TRANSFORMER CKT 2	654	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	ARCADIA 345/138KV TRANSFORMER CKT 1	493	53.0	116.6	26.1	ARCADIA 345/138KV TRANSFORMER CKT 2	867	See Previous Solution Specified for Facility in Table 1.1	

Table 1.2 - SPP Facility Overloads Caused or Impacted by 1200 MW Transfer using Scenario 3

Southwest Power Pool
System Impact Study

Study Case	From Area	To Area	Monitored Branch Overload	Rate <MVA>	BC % Loading	TC % Loading	%TDF	Outaged Branch Causing Overload	ATC (MW)	Solution	Estimated Cost
10SP	OKGE	OKGE	NORTHWEST 345/138KV TRANSFORMER CKT 2	493	78.6	109.9	12.9	NORTHWEST 345/138KV TRANSFORMER CKT 1	868	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	POOST ROAD - SE15TH 138KV	191	46.7	112.1	10.4	POOST ROAD - TINKER #5 138KV	878	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	ARCADIA - KAMO MEMORIAL 138KV	287	29.0	118.0	21.3	ARCADIA - DANFORTH 138KV	901	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	ARCADIA 345/138KV TRANSFORMER CKT 2	493	51.7	113.6	25.5	ARCADIA 345/138KV TRANSFORMER CKT 1	911	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	ARCADIA 345/138KV TRANSFORMER CKT 1	493	52.1	112.4	24.8	ARCADIA 345/138KV TRANSFORMER CKT 2	921	See Previous Solution Specified for Facility in Table 1.1	
10SP	OKGE	OKGE	ARCADIA - KAMO MEMORIAL 138KV	287	16.0	116.2	24.0	ARCADIA - NORTHWEST 345KV	947	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	ARCADIA 345/138KV TRANSFORMER CKT 2	493	50.8	109.5	24.1	ARCADIA 345/138KV TRANSFORMER CKT 1	970	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	NORTHWEST 345/138KV TRANSFORMER CKT 2	493	77.0	106.4	12.1	NORTHWEST 345/138KV TRANSFORMER CKT 1	981	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 2	1195	25.5	114.2	88.3	ARCADIA - REDBUD 345KV CKT 1	1010	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 1	1195	25.4	113.9	88.1	ARCADIA - REDBUD 345KV CKT 2	1013	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	HORSESHOE LAKE - KAMO MEMORIAL 138KV	287	17.0	107.2	21.6	ARCADIA - DANFORTH 138KV	1039	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	LONEOAK - QUAIL CREEK 138KV	308	67.8	103.7	9.2	NORTHWEST - PANTHER 138KV	1095	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	CIMARRON - CZECH HALL 138KV	382	68.6	107.0	12.2	MCCLAIN - PLEASANT VALLEY 138KV	1104	See Previous Solution Specified for Facility in Table 1.1	
10SP	OKGE	OKGE	HORSESHOE LAKE - KAMO MEMORIAL 138KV	287	4.4	105.1	24.1	ARCADIA - NORTHWEST 345KV	1105	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	LONEOAK - QUAIL CREEK 138KV	308	67.0	102.9	9.2	PANTHER - SILVER LAKE 138KV	1118	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	NORTHWEST 345/138KV TRANSFORMER CKT 1	493	69.1	102.6	13.8	CIMARRON - NORTHWEST 345KV	1121	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	ARCADIA 345/138KV TRANSFORMER CKT 1	493	39.9	103.8	26.3	ARCADIA - NORTHWEST 345KV	1124	See Previous Solution Specified for Facility in Table 1.1	
10SP	OKGE	OKGE	DIVISION AVE - HAYMAKER 138KV	287	67.1	103.3	8.6	CIMARRON - CZECH HALL 138KV	1144	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	ARCADIA 345/138KV TRANSFORMER CKT 1	493	39.5	100.8	25.2	ARCADIA - NORTHWEST 345KV	1183	See Previous Solution Specified for Facility in Table 1.1	
10SP	OKGE	OKGE	REMINGTON PARK - STONEWALL 138KV	191	71.2	100.9	4.7	Multiple Contingency Outage: 84TH ST - TENNESSEE TAP 138KV MEMORIAL - TENNESSEE TAP 138KV TENNESSEE - TENNESSEE TAP 138KV	1185	See Previous Solution Specified for Facility in Table 1.1	
10SP	OKGE	OKGE	NORTHWEST 345/138KV TRANSFORMER CKT 1	493	68.0	100.3	13.3	CIMARRON - NORTHWEST 345KV	1191	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	TINKER #2 - TINKER #4 138KV	100	82.3	141.1	4.9	POOST ROAD - SE15TH 138KV	1200	Not a valid Overload; Relays trip to open UG transmission line when loading reaches 100%. No problem exist with line open.	
10WP	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 2	1195	32.4	117.6	84.8	ARCADIA - REDBUD 345KV CKT 1	954	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10WP	OKGE	OKGE	ARCADIA - REDBUD 345KV CKT 1	1195	32.4	117.4	84.7	ARCADIA - REDBUD 345KV CKT 2	957	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10WP	OKGE	OKGE	ARCADIA - KAMO MEMORIAL 138KV	287	34.7	106.5	17.2	ARCADIA - NORTHWEST 345KV	1052	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	

Study Case	From Area	To Area	Monitored Branch Overload	Rate <MVA>	BC % Loading	TC % Loading	%TDF	Outaged Branch Causing Overload	ATC (MW)	Solution	Estimated Cost
10WP	OKGE	OKGE	ARCADIA - KAMO MEMORIAL 138KV	287	42.7	102.4	14.3	ARCADIA - DANFORTH 138KV	1128	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
Total Estimated Engineering and Construction Cost											\$ -

Study Case	AREA	Monitored Bus with Violation	BC Voltage (PU)	TC Voltage (PU)	Outaged Branch Causing Voltage Violation	ATC (MW)	Solution	Estimated Cost
04SP	OKGE	54951 LITTLAX269.0	0.9266	0.8953	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200	Close normally open switch between bus 54996 & bus 55052 by scada for mitigation.	
04SP	OKGE	54956 MACOCTP269.0	0.9236	0.8921	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200		
04SP	OKGE	54995 SPRNGHL269.0	0.9041	0.8718	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200		
04SP	OKGE	54996 ETOWAH 269.0	0.9114	0.8794	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200		
04SP	OKGE	55001 MACOMOC269.0	0.9213	0.8898	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200		
04SP	OKGE	55005 SPRHILT269.0	0.9050	0.8728	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200		
04SP	OMPA	56185 OMLXNTN169.0	0.9041	0.8718	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200		
04SP	OKGE	54951 LITTLAX269.0	0.9231	0.8909	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200		Close normally open switch between bus 54996 & bus 55052 by scada for mitigation.
04SP	OKGE	54956 MACOCTP269.0	0.9199	0.8875	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200		
04SP	OKGE	54995 SPRNGHL269.0	0.8984	0.8651	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200		
04SP	OKGE	54996 ETOWAH 269.0	0.9069	0.8740	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200		
04SP	OKGE	55001 MACOMOC269.0	0.9177	0.8852	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200		
04SP	OKGE	55004 ROSEDAL269.0	0.8981	0.8648	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200		
04SP	OKGE	55005 SPRHILT269.0	0.8993	0.8661	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200		
04SP	OMPA	56185 OMLXNTN169.0	0.8984	0.8651	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200		
04SH		NONE IDENTIFIED				1200		
04FA		NONE IDENTIFIED				1200		
04WP		NONE IDENTIFIED				1200		
05AP		NONE IDENTIFIED				1200		
05G		NONE IDENTIFIED				1200		
05SP	OKGE	54951 LITTLAX269.0	0.9239	0.8912	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200	Close normally open switch between bus 54996 & bus 55052 by scada for mitigation.	
05SP	OKGE	54956 MACOCTP269.0	0.9208	0.8879	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200		
05SP	OKGE	54995 SPRNGHL269.0	0.9004	0.8667	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200		
05SP	OKGE	54996 ETOWAH 269.0	0.9081	0.8748	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200		
05SP	OKGE	55001 MACOMOC269.0	0.9185	0.8856	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200		
05SP	OKGE	55005 SPRHILT269.0	0.9013	0.8677	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200		
05SP	OMPA	56185 OMLXNTN169.0	0.9004	0.8667	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200		
05SP	OKGE	54951 LITTLAX269.0	0.9203	0.8866	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200		Close normally open switch between bus 54996 & bus 55052 by scada for mitigation.
05SP	OKGE	54956 MACOCTP269.0	0.9170	0.8831	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200		
05SP	OKGE	54995 SPRNGHL269.0	0.8945	0.8597	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200		
05SP	OKGE	54996 ETOWAH 269.0	0.9035	0.8690	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200		
05SP	OKGE	55001 MACOMOC269.0	0.9147	0.8807	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200		
05SP	OKGE	55004 ROSEDAL269.0	0.8943	0.8594	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200		
05SP	OKGE	55005 SPRHILT269.0	0.8955	0.8607	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200		
05SP	OMPA	56185 OMLXNTN169.0	0.8945	0.8597	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200		
05SH		NONE IDENTIFIED				1200		
05FA		NONE IDENTIFIED				1200		
05WP		NONE IDENTIFIED				1200		
07SP	OKGE	54969 NE30TH 269.0	0.9372	0.8936	OPEN LINE FROM BUS 54969 [NE30TH 269.000] TO BUS 54972 [RENO 269.000] CKT 1	1024	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	54970 DEEPFKT269.0	0.9414	0.8982	OPEN LINE FROM BUS 54969 [NE30TH 269.000] TO BUS 54972 [RENO 269.000] CKT 1	1150	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	54974 DEEPFRK269.0	0.9421	0.8988	OPEN LINE FROM BUS 54969 [NE30TH 269.000] TO BUS 54972 [RENO 269.000] CKT 1	1167	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	54971 GRNPAST269.0	0.9316	0.8998	OPEN LINE FROM BUS 54937 [HSL 269.000] TO BUS 54971 [GRNPAST269.000] CKT 1	1192	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	54956 MACOCTP269.0	0.9357	0.8983	OPEN LINE FROM BUS 54996 [ETOWAH 269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200	Close normally open switch between bus 54996 & bus 55052 by scada for mitigation.	
07SP	OKGE	54996 ETOWAH 269.0	0.9268	0.8890	OPEN LINE FROM BUS 54996 [ETOWAH 269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200		
07SP	OKGE	55001 MACOMOC269.0	0.9333	0.8958	OPEN LINE FROM BUS 54996 [ETOWAH 269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200		
07SP	OKGE	54951 LITTLAX269.0	0.9205	0.8785	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200	Close normally open switch between bus 54996 & bus 55052 by scada for mitigation.	
07SP	OKGE	54956 MACOCTP269.0	0.9172	0.8750	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200		
07SP	OKGE	54991 LTRVRLK269.0	0.9382	0.8972	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200		
07SP	OKGE	54995 SPRNGHL269.0	0.8966	0.8533	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200		
07SP	OKGE	54996 ETOWAH 269.0	0.9042	0.8612	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200		

Table 2.2 - SPP Voltage Violations
Caused or Impacted by Transfer using Scenario 3

Study Case	AREA	Monitored Bus with Violation	BC Voltage (PU)	TC Voltage (PU)	Outaged Branch Causing Voltage Violation	ATC (MW)	Solution	Estimated Cost
07SP	OKGE	55001 MACOMOC269.0	0.9148	0.8725	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200	"	
07SP	OKGE	55005 SPRHILT269.0	0.8975	0.8542	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200	"	
07SP	OMPA	56185 OMLXNTN169.0	0.8966	0.8533	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200	"	
07SP	OKGE	54951 LITTLAX269.0	0.9165	0.8734	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200	Close normally open switch between bus 54996 & bus 55052 by scada for mitigation.	
07SP	OKGE	54956 MACOCTP269.0	0.9130	0.8697	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200	"	
07SP	OKGE	54983 LTRVRTP269.0	0.9393	0.8975	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200	"	
07SP	OKGE	54991 LTRVRLK269.0	0.9354	0.8935	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200	"	
07SP	OKGE	54995 SPRNGHL269.0	0.8902	0.8455	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200	"	
07SP	OKGE	54996 ETOWAH 269.0	0.8990	0.8549	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200	"	
07SP	OKGE	55001 MACOMOC269.0	0.9106	0.8671	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200	"	
07SP	OKGE	55004 ROSEDAL269.0	0.8898	0.8451	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200	"	
07SP	OKGE	55005 SPRHILT269.0	0.8911	0.8465	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200	"	
07SP	OMPA	56185 OMLXNTN169.0	0.8902	0.8455	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200	"	
07WP		NONE IDENTIFIED				1200		
10SP	OKGE	54738 KOCH 269.0	0.8960	0.8683	OPEN LINE FROM BUS 54738 [KOCH 269.000] TO BUS 54739 [MEDFORD269.000] CKT 1	866	See Previous Solution Specified for Facility in Table 2.1	
10SP	OKGE	54969 NE30TH 269.0	0.9328	0.8886	OPEN LINE FROM BUS 54969 [NE30TH 269.000] TO BUS 54972 [RENO 269.000] CKT 1	890	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	54719 CLYDE 269.0	0.9135	0.8870	OPEN LINE FROM BUS 54738 [KOCH 269.000] TO BUS 54739 [MEDFORD269.000] CKT 1	906	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	54970 DEEPFKT269.0	0.9373	0.8936	OPEN LINE FROM BUS 54969 [NE30TH 269.000] TO BUS 54972 [RENO 269.000] CKT 1	1024	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	54974 DEEPFRK269.0	0.9380	0.8942	OPEN LINE FROM BUS 54969 [NE30TH 269.000] TO BUS 54972 [RENO 269.000] CKT 1	1041	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	54951 LITTLAX269.0	0.9342	0.8978	OPEN LINE FROM BUS 54996 [ETOWAH 269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200	Close normally open switch between bus 54996 & bus 55052 by scada for mitigation.	
10SP	OKGE	54956 MACOCTP269.0	0.9317	0.8951	OPEN LINE FROM BUS 54996 [ETOWAH 269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200	"	
10SP	OKGE	54996 ETOWAH 269.0	0.9223	0.8853	OPEN LINE FROM BUS 54996 [ETOWAH 269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200	"	
10SP	OKGE	55001 MACOMOC269.0	0.9291	0.8925	OPEN LINE FROM BUS 54996 [ETOWAH 269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200	"	
10SP	OKGE	54951 LITTLAX269.0	0.9148	0.8731	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200	Close normally open switch between bus 54996 & bus 55052 by scada for mitigation.	
10SP	OKGE	54956 MACOCTP269.0	0.9113	0.8694	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200	"	
10SP	OKGE	54983 LTRVRTP269.0	0.9381	0.8976	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200	"	
10SP	OKGE	54991 LTRVRLK269.0	0.9341	0.8935	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200	"	
10SP	OKGE	54995 SPRNGHL269.0	0.8890	0.8459	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200	"	
10SP	OKGE	54996 ETOWAH 269.0	0.8972	0.8546	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200	"	
10SP	OKGE	55001 MACOMOC269.0	0.9087	0.8667	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200	"	
10SP	OKGE	55005 SPRHILT269.0	0.8900	0.8469	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200	"	
10SP	OMPA	56185 OMLXNTN169.0	0.8890	0.8459	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55005 [SPRHILT269.000] CKT 1	1200	"	
10SP	OKGE	54951 LITTLAX269.0	0.9104	0.8672	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200	Close normally open switch between bus 54996 & bus 55052 by scada for mitigation.	
10SP	OKGE	54956 MACOCTP269.0	0.9066	0.8633	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200	"	
10SP	OKGE	54983 LTRVRTP269.0	0.9350	0.8933	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200	"	
10SP	OKGE	54985 TXSTELA269.0	0.9375	0.8959	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200	"	
10SP	OKGE	54991 LTRVRLK269.0	0.9310	0.8891	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200	"	
10SP	OKGE	54995 SPRNGHL269.0	0.8819	0.8371	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200	"	
10SP	OKGE	54996 ETOWAH 269.0	0.8915	0.8473	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200	"	
10SP	OKGE	55001 MACOMOC269.0	0.9040	0.8605	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200	"	
10SP	OKGE	55004 ROSEDAL269.0	0.8814	0.8366	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200	"	
10SP	OKGE	55005 SPRHILT269.0	0.8828	0.8381	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200	"	
10SP	OMPA	56185 OMLXNTN169.0	0.8819	0.8371	OPEN LINE FROM BUS 55004 [ROSEDAL269.000] TO BUS 55099 [PAOLI 269.000] CKT 1	1200	"	
10WP		NONE IDENTIFIED				1200		
							Total Estimated Engineering and Construction Cost	\$ -

SPP-2003-271-2
 Table 3.2 - SPP Facility Overloads
 Caused or Impacted by Selected Upgrades
 for 1200 MW using Scenario 3

Southwest Power Pool
 System Impact Study

Study Case	From Area	To Area	Monitored Branch Overload	Rate <MVA>	BC Without Upgrades %Loading	BC With Upgrades %Loading	TC Without Upgrades %Loading	TC With Upgrades %Loading	Outaged Branch Causing Overload	Solution	Estimated Cost
05AP			NONE IDENTIFIED								
05G			NONE IDENTIFIED								
05SH			NONE IDENTIFIED								
05FA			NONE IDENTIFIED								
07SP	OKGE	OKGE	STONEWALL - WESTERN 138KV	191	75.6	79.9	86.1	102.3	Multiple Contingency Outage: 84TH ST - TENNESSEE TAP 138KV MEMORIAL - TENNESSEE TAP 138KV TENNESSEE - TENNESSEE TAP 138KV	Replace Wavetrap	\$ 50,000
07WP			NONE IDENTIFIED								
10SP			NONE IDENTIFIED								
10WP			NONE IDENTIFIED								
Total Estimated Engineering and Construction Cost											\$ 50,000

SPP-2003-271-2
 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 Overload	Rate <MVA>	BC % Loading	TC % Loading	%TDF	Outaged Branch Causing Overload	ATC (MW)	Solution	Estimated Cost
04SP	OKGE	OKGE	54934 DRAPER 7 345 WND 2 DRAPER 3 1	493	88.5	107.6	7.9	54933 DRAPER 4 138 to 54934 DRAPER 7 345 to 55721 DRAPER2113.8 CKT 2	483	OKGE Project to add 3rd Draper xfmr at OGE's expense. Estimated In-Service Date 6/1/2005. Use OKGE Redispatch as Interim Mitigation.	
04SP	OKGE	OKGE	54934 DRAPER 7 345 WND 2 DRAPER 4 2	493	88.5	107.6	7.9	54933 DRAPER 4 138 to 54934 DRAPER 7 345 to 55720 DRAPER1113.8 CKT 1	483	See Previous Solution Specified for Facility	
04SP	OKGE	OKGE	54933 DRAPER 4 138 WND 1 DRAPER 3 1	493	86.1	103.8	7.3	54933 DRAPER 4 138 to 54934 DRAPER 7 345 to 55721 DRAPER2113.8 CKT 2	598	See Previous Solution Specified for Facility	
04SP	OKGE	OKGE	54933 DRAPER 4 138 WND 1 DRAPER 4 2	493	86.1	103.8	7.3	54933 DRAPER 4 138 to 54934 DRAPER 7 345 to 55720 DRAPER1113.8 CKT 1	598	See Previous Solution Specified for Facility	
04SP	OKGE	OKGE	54835 MEMRIAL4 138 to 54850 SKYLINE4 138 CKT 1	287	61.6	120.9	14.2	54833 DANFRTH4 138 to 56174 OMHAFAER4 138 CKT 1	635	OKGE Project to replace breakers and switches at Memorial, Replace switch at Skyline, and Reconductor the line to at least 1800+ Amps at OGE's expense. Estimated In-Service Date 6/1/2005. Use OKGE Redispatch as Interim Mitigation.	
04SP	OKGE	OKGE	54896 MORGAN 4 138 to 54861 MUSTANG4 138 CKT 1	287	76.1	118.4	10.1	54902 MCCLAIN4 138 to 54929 PLVALLY4 138 CKT 1	688	OKGE Project to Increase CTR at Mustang sub at OGE's expense. Estimated In-Service Date 6/1/2005. Use OKGE Redispatch as Interim Mitigation.	
04SP	OKGE	OKGE	54835 MEMRIAL4 138 to 54850 SKYLINE4 138 CKT 1	287	56.6	115.7	14.1	54832 EASTERN4 138 to 56174 OMHAFAER4 138 CKT 1	719	See Previous Solution Specified for Facility	
04SP	OKGE	OKGE	54880 NORTWST7 345 WND 2 NORTWST2 1	493	79.6	108.2	11.7	54879 NORTWST4 138 to 54880 NORTWST7 345 to 55743 NORTWS2113.8 CKT 2	730	Reroute the existing 345kV Arcadia-Seminole line to new 345kV sub bay at Horseshoe Lake sub and install two 345-138kV bus tie transformers at HSL. Build 14miles of 345kV line from Redbud to HSL. Will require 6-345kV breakers, 2-xfmr, 4-138kV breakers, transmission line reroute, 14miles of new 345kV line. Estimated In-Service Date 3/1/2007	\$ 24,000,000
04SP	OKGE	OKGE	54879 NORTWST4 138 WND 1 NORTWST2 1	493	78.2	105.3	11.1	54879 NORTWST4 138 to 54880 NORTWST7 345 to 55743 NORTWS2113.8 CKT 2	815	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SP	OKGE	OKGE	54835 MEMRIAL4 138 to 54850 SKYLINE4 138 CKT 1	287	47.5	106.5	14.1	54832 EASTERN4 138 to 54835 MEMRIAL4 138 CKT 1	821	See Previous Solution Specified for Facility	
04SP	OKGE	OKGE	54851 QUAILCK4 138 to 54873 LONEOAK4 138 CKT 1	308	72.2	107.8	9.1	54854 BRADEN 4 138 to 54879 NORTWST4 138 CKT 1	827	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SP	OKGE	OKGE	54906 KAMOMEM4 138 to 54907 ARCADIA4 138 CKT 1	287	31.4	112.6	19.4	54833 DANFRTH4 138 to 54907 ARCADIA4 138 CKT 1	850	OKGE Terminal Equipment Project underway to increase line rating, Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SP	OKGE	OKGE	54851 QUAILCK4 138 to 54873 LONEOAK4 138 CKT 1	308	71.5	107.0	9.1	54852 SLVRLAK4 138 to 54854 BRADEN 4 138 CKT 1	851	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SP	OKGE	OKGE	54835 MEMRIAL4 138 to 54850 SKYLINE4 138 CKT 1	287	53.9	109.2	13.2	54852 SLVRLAK4 138 to 54853 DVISION4 138 CKT 1	861	See Previous Solution Specified for Facility	
04SP	OKGE	OKGE	54894 CZECHAL4 138 to 54898 CIMARON4 138 CKT 1	382	72.5	105.5	10.5	54902 MCCLAIN4 138 to 54929 PLVALLY4 138 CKT 1	893	Change sw. to 2000A at czech hall. Increase trap an CTR to 2000A at cimarron sub. May require changing relays. This will bring the Rate B to the conductor Rate B of 444MVA.	\$ 150,000
04SP	OKGE	OKGE	54896 MORGAN 4 138 to 54861 MUSTANG4 138 CKT 1	287	61.7	105.8	10.5	54863 HAYMAKR4 138 to 54898 CIMARON4 138 CKT 1	901	See Previous Solution Specified for Facility	
04SP	OKGE	OKGE	54896 MORGAN 4 138 to 54861 MUSTANG4 138 CKT 1	287	60.3	104.3	10.5	54853 DVISION4 138 to 54863 HAYMAKR4 138 CKT 1	923	See Previous Solution Specified for Facility	
04SP	OKGE	OKGE	54908 ARCADIA7 345 WND 2 ARCADIA2 1	493	50.2	107.8	23.7	54907 ARCADIA4 138 to 54908 ARCADIA7 345 to 55704 ARCADI2113.8 CKT 2	937	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SP	OKGE	OKGE	54906 KAMOMEM4 138 to 54907 ARCADIA4 138 CKT 1	287	19.0	111.3	22.1	54880 NORTWST7 345 to 54908 ARCADIA7 345 CKT 1	941	OKGE Terminal Equipment Project underway to increase line rating, Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SP	OKGE	OKGE	54870 STONWAL4 138 to 54872 REMPKTP4 138 CKT 1	191	75.7	103.7	4.5	Multiple Contingency Outage: 54837 TENESTP4 138 to 54843 84TH ST4 138 CKT 1 54835 MEMRIAL4 138 to 54837 TENESTP4 138 CKT 1 54838 TENNESE4 138 to 54837 TENESTP4 138 CKT 1	986	Upgrade trap @ Stonewall	\$ 50,000
04SP	OKGE	OKGE	54908 ARCADIA7 345 WND 2 ARCADIA3 2	493	49.0	105.1	23.1	54907 ARCADIA4 138 to 54908 ARCADIA7 345 to 55703 ARCAD1113.8 CKT 1	1005	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SP	OKGE	OKGE	54907 ARCADIA4 138 WND 1 ARCADIA2 1	493	49.4	104.6	22.7	54907 ARCADIA4 138 to 54908 ARCADIA7 345 to 55704 ARCADI2113.8 CKT 2	1023	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SP	OKGE	OKGE	54835 MEMRIAL4 138 to 54850 SKYLINE4 138 CKT 1	287	57.7	101.7	10.5	54849 LAKESIDA 138 to 54853 DVISION4 138 CKT 1	1034	See Previous Solution Specified for Facility	
04SP	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	1195	21.7	109.6	87.6	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	1066	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SP	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	1195	21.6	109.4	87.4	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	1069	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SP	OKGE	OKGE	54906 KAMOMEM4 138 to 54941 HSL 4 138 CKT 1	287	20.4	103.0	19.8	54833 DANFRTH4 138 to 54907 ARCADIA4 138 CKT 1	1102	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SP	OKGE	OKGE	54907 ARCADIA4 138 WND 1 ARCADIA3 2	493	48.1	101.9	22.1	54907 ARCADIA4 138 to 54908 ARCADIA7 345 to 55703 ARCAD1113.8 CKT 1	1125	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SP	OKGE	OKGE	54906 KAMOMEM4 138 to 54941 HSL 4 138 CKT 1	287	8.5	101.4	22.2	54880 NORTWST7 345 to 54908 ARCADIA7 345 CKT 1	1165	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SP	OKGE	OKGE	54852 SLVRLAK4 138 to 54853 DVISION4 138 CKT 1	287	51.6	100.3	11.6	54835 MEMRIAL4 138 to 54850 SKYLINE4 138 CKT 1	1183	OKGE Terminal Equipment Project underway to increase line rating, Estimated In-Service Date 12/30/2004. New Emergency Rating 308 MVA. And, OKGE Planned Project to Build 138 kV line from Piedmont to Haymaker by 12/30/04.	
04SP	OKGE	OKGE	54870 STONWAL4 138 to 54872 REMPKTP4 138 CKT 1	191	75.3	102.7	4.4	54835 MEMRIAL4 138 to 54837 TENESTP4 138 CKT 1	1200	Invalid Contingency	

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 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 Overload	Rate <MVA>	BC % Loading	TC % Loading	%TDF	Outaged Branch Causing Overload	ATC (MW)	Solution	Estimated Cost
04SH	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	1195	25.2	112.0	86.4	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	1032	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SH	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	1195	25.2	111.8	86.3	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	1035	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SH	OKGE	OKGE	54835 MEMRIAL4 138 to 54850 SKYLINE4 138 CKT 1	287	70.8	101.9	7.4	54833 DANFRTH4 138 to 56174 OMHAFFER4 138 CKT 1	1102	See Previous Solution Specified for Facility	
04SH	OKGE	OKGE	54906 KAMOMEM4 138 to 54907 ARCADIA4 138 CKT 1	287	40.8	101.7	14.6	54880 NORTWST7 345 to 54908 ARCADIA7 345 CKT 1	1161	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SH	OKGE	OKGE	54906 KAMOMEM4 138 to 54907 ARCADIA4 138 CKT 1	287	51.8	100.7	11.7	54833 DANFRTH4 138 to 54907 ARCADIA4 138 CKT 1	1180	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04FA	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	1195	16.6	103.2	86.1	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	1156	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04FA	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	1195	16.6	102.9	86.0	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	1159	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04WP	OKGE	OKGE	54832 EASTERN4 138 to 54835 MEMRIAL4 138 CKT 1	191	61.9	107.4	7.2	54835 MEMRIAL4 138 to 54850 SKYLINE4 138 CKT 1	1033	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 12/30/2004. New Emergency Rating 287 MVA	
04WP	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	1195	18.2	105.0	86.5	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	1131	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04WP	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	1195	18.2	104.8	86.3	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	1134	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05AP			NONE IDENTIFIED				0.0		1200		
05G	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	1195	26.4	112.3	85.5	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	1005	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05G	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	1195	26.3	112.0	85.4	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	1009	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05G	OKGE	OKGE	54832 EASTERN4 138 to 54835 MEMRIAL4 138 CKT 1	191	38.9	104.6	10.5	54835 MEMRIAL4 138 to 54850 SKYLINE4 138 CKT 1	1054	See Previous Solution Specified for Facility	
05G	OKGE	OKGE	54906 KAMOMEM4 138 to 54907 ARCADIA4 138 CKT 1	287	14.5	102.3	21.0	54880 NORTWST7 345 to 54908 ARCADIA7 345 CKT 1	1149	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05G	OKGE	OKGE	54906 KAMOMEM4 138 to 54907 ARCADIA4 138 CKT 1	287	24.1	100.4	18.2	54833 DANFRTH4 138 to 54907 ARCADIA4 138 CKT 1	1188	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	54880 NORTWST7 345 WND 2 NORTWST2 1	493	80.0	111.0	12.7	54879 NORTWST4 138 to 54880 NORTWST7 345 to 55743 NORTWS2113.8 CKT 2	705	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	54965 POSTRDT4 138 to 54993 SE15TH 4 138 CKT 1	191	58.1	102.9	7.1	54965 POSTRDT4 138 to 54994 TINKER54 138 CKT 1	723	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	54879 NORTWST4 138 WND 1 NORTWST2 1	493	78.4	107.7	12.0	54879 NORTWST4 138 to 54880 NORTWST7 345 to 55743 NORTWS2113.8 CKT 2	791	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	54894 CZECHAL4 138 to 54898 CIMARON4 138 CKT 1	382	74.9	110.0	11.2	54902 MCCLAIN4 138 to 54929 PLVALLY4 138 CKT 1	858	See Previous Solution Specified for Facility	
05SP	OKGE	OKGE	54853 DVISION4 138 to 54863 HAYMAKR4 138 CKT 1	287	74.4	106.6	7.7	54894 CZECHAL4 138 to 54898 CIMARON4 138 CKT 1	871	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	54906 KAMOMEM4 138 to 54907 ARCADIA4 138 CKT 1	287	28.0	109.3	19.4	54833 DANFRTH4 138 to 54907 ARCADIA4 138 CKT 1	926	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	54908 ARCADIA7 345 WND 2 ARCADIA2 1	493	49.7	107.7	23.9	54907 ARCADIA4 138 to 54908 ARCADIA7 345 to 55704 ARCADI2113.8 CKT 2	941	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	54853 DVISION4 138 to 54863 HAYMAKR4 138 CKT 1	287	70.1	101.9	7.6	54893 XEROX 4 138 to 54894 CZECHAL4 138 CKT 1	956	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	54880 NORTWST7 345 WND 2 NORTWST3 2	493	73.2	101.7	11.7	54879 NORTWST4 138 to 54880 NORTWST7 345 to 55742 NORTWS1113.8 CKT 1	990	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	54906 KAMOMEM4 138 to 54907 ARCADIA4 138 CKT 1	287	15.4	108.0	22.2	54880 NORTWST7 345 to 54908 ARCADIA7 345 CKT 1	999	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	54908 ARCADIA7 345 WND 2 ARCADIA3 2	493	48.4	105.0	23.3	54907 ARCADIA4 138 to 54908 ARCADIA7 345 to 55703 ARCADI1113.8 CKT 1	1002	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	54907 ARCADIA4 138 WND 1 ARCADIA2 1	493	48.8	104.4	22.8	54907 ARCADIA4 138 to 54908 ARCADIA7 345 to 55704 ARCADI2113.8 CKT 2	1024	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	1195	19.1	107.2	87.8	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	1099	Relieved or Impact Removed by Selected Upgrades for 1200 MW	

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 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 Overload	Rate <MVA>	BC % Loading	TC % Loading	%TDF	Outaged Branch Causing Overload	ATC (MW)	Solution	Estimated Cost
05SP	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	1195	19.0	107.0	87.6	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	1102	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	54907 ARCADIA4 138 WND 1 ARCADIA3 2	493	47.6	101.7	22.2	54907 ARCADIA4 138 to 54908 ARCADIA7 345 to 55703 ARCAD1113.8 CKT 1	1131	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	54870 STONWAL4 138 to 54872 REMP4 138 CKT 1	191	71.2	100.6	4.7	Multiple Contingency Outage: 54837 TENESTP4 138 to 54843 84TH ST4 138 CKT 1 54835 MEMRIAL4 138 to 54837 TENESTP4 138 CKT 1 54838 TENNESE4 138 to 54837 TENESTP4 138 CKT 1	1165	See Previous Solution Specified for Facility	
05SP	OKGE	OKGE	54988 TINKER44 138 to 54990 TINKER24 138 CKT 1	100	60.7	130.8	5.8	54965 POSTRDT4 138 to 54993 SE15TH 4 138 CKT 1	1200	Not a valid Overload; Relays trip to open UG transmission line when loading reaches 100%, No problem exist with line open.	
05SH	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	1195	24.0	110.8	86.4	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	1049	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SH	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	1195	23.9	110.5	86.3	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	1052	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SH	OKGE	OKGE	54906 KAMOMEM4 138 to 54907 ARCADIA4 138 CKT 1	287	53.8	102.9	11.8	54833 DANFRTH4 138 to 54907 ARCADIA4 138 CKT 1	1119	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SH	OKGE	OKGE	54906 KAMOMEM4 138 to 54907 ARCADIA4 138 CKT 1	287	42.2	103.3	14.6	54880 NORTHST7 345 to 54908 ARCADIA7 345 CKT 1	1129	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05FA	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	1195	14.3	101.2	86.5	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	1183	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05FA	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	1195	14.3	101.0	86.4	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	1186	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05WP	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	1195	23.4	109.8	86.1	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	1065	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05WP	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	1195	23.3	109.6	85.9	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	1067	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	54880 NORTHST7 345 WND 2 NORTHST2 1	493	82.1	116.2	14.0	54879 NORTHST4 138 to 54880 NORTHST7 345 to 55743 NORTHWS2113.8 CKT 2	636	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	54879 NORTHST4 138 WND 1 NORTHST2 1	493	80.4	112.4	13.1	54879 NORTHST4 138 to 54880 NORTHST7 345 to 55743 NORTHWS2113.8 CKT 2	718	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	54853 DIVISION4 138 to 54863 HAYMAKR4 138 CKT 1	287	75.9	113.8	9.1	54894 CZECHAL4 138 to 54898 CIMARON4 138 CKT 1	860	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	54894 CZECHAL4 138 to 54898 CIMARON4 138 CKT 1	382	75.1	115.4	12.8	54902 MCCLAIN4 138 to 54929 PLVALLY4 138 CKT 1	882	See Previous Solution Specified for Facility	
07SP	OKGE	OKGE	54906 KAMOMEM4 138 to 54907 ARCADIA4 138 CKT 1	287	27.0	113.9	20.8	54833 DANFRTH4 138 to 54907 ARCADIA4 138 CKT 1	890	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	54908 ARCADIA7 345 WND 2 ARCADIA2 1	493	50.5	112.2	25.3	54907 ARCADIA4 138 to 54908 ARCADIA7 345 to 55704 ARCAD12113.8 CKT 2	898	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	54880 NORTHST7 345 WND 2 NORTHST3 2	493	75.1	106.5	12.9	54879 NORTHST4 138 to 54880 NORTHST7 345 to 55742 NORTHWS1113.8 CKT 1	921	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	54853 DIVISION4 138 to 54863 HAYMAKR4 138 CKT 1	287	71.3	108.7	9.0	54893 XEROX 4 138 to 54894 CZECHAL4 138 CKT 1	948	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	54908 ARCADIA7 345 WND 2 ARCADIA3 2	493	49.2	109.4	24.7	54907 ARCADIA4 138 to 54908 ARCADIA7 345 to 55703 ARCAD1113.8 CKT 1	952	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	54907 ARCADIA4 138 WND 1 ARCADIA2 1	493	49.7	108.3	24.1	54907 ARCADIA4 138 to 54908 ARCADIA7 345 to 55704 ARCAD12113.8 CKT 2	960	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	54906 KAMOMEM4 138 to 54907 ARCADIA4 138 CKT 1	287	13.6	111.4	23.4	54880 NORTHST7 345 to 54908 ARCADIA7 345 CKT 1	972	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	54853 DIVISION4 138 to 54863 HAYMAKR4 138 CKT 1	287	69.2	106.3	8.9	54893 XEROX 4 138 to 54896 MORGAN 4 138 CKT 1	989	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	54870 STONWAL4 138 to 54872 REMP4 138 CKT 1	191	75.0	108.2	5.3	Multiple Contingency Outage: 54837 TENESTP4 138 to 54843 84TH ST4 138 CKT 1 54835 MEMRIAL4 138 to 54837 TENESTP4 138 CKT 1 54838 TENNESE4 138 to 54837 TENESTP4 138 CKT 1	1015	See Previous Solution Specified for Facility	
07SP	OKGE	OKGE	54853 DIVISION4 138 to 54863 HAYMAKR4 138 CKT 1	287	67.9	105.0	8.9	54861 MUSTANG4 138 to 54896 MORGAN 4 138 CKT 1	1025	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	54879 NORTHST4 138 WND 1 NORTHST3 2	493	73.6	102.9	12.0	54879 NORTHST4 138 to 54880 NORTHST7 345 to 55742 NORTHWS1113.8 CKT 1	1025	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	54907 ARCADIA4 138 WND 1 ARCADIA3 2	493	48.4	105.5	23.5	54907 ARCADIA4 138 to 54908 ARCADIA7 345 to 55703 ARCAD1113.8 CKT 1	1028	Relieved or Impact Removed by Selected Upgrades for 1200 MW	

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Study Case	From Area	To Area	Monitored Branch Overload	Rate <MVA>	BC % Loading	TC % Loading	%TDF	Outaged Branch Causing Overload	ATC (MW)	Solution	Estimated Cost
07SP	OKGE	OKGE	54894 CZECHAL4 138 to 54898 CIMARON4 138 CKT 1	382	65.0	105.7	13.0	54863 HAYMAKR4 138 to 54898 CIMARON4 138 CKT 1	1044	See Previous Solution Specified for Facility	
07SP	OKGE	OKGE	54851 QUAILCK4 138 to 54873 LONEOAK4 138 CKT 1	308	67.3	103.7	9.3	54854 BRADEN 4 138 to 54879 NORTHST4 138 CKT 1	1050	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	54894 CZECHAL4 138 to 54898 CIMARON4 138 CKT 1	382	63.0	105.7	13.6	54853 DIVISION4 138 to 54863 HAYMAKR4 138 CKT 1	1056	See Previous Solution Specified for Facility	
07SP	OKGE	OKGE	54893 XEROX 4 138 to 54894 CZECHAL4 138 CKT 1	382	65.0	104.7	12.6	54902 MCCLAIN4 138 to 54929 PLVALLY4 138 CKT 1	1072	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	54851 QUAILCK4 138 to 54873 LONEOAK4 138 CKT 1	308	66.6	102.9	9.3	54852 SLVRLAK4 138 to 54854 BRADEN 4 138 CKT 1	1081	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	1195	17.5	106.1	88.2	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	1118	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	1195	17.4	105.8	88.0	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	1121	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	54906 KAMOMEM4 138 to 54941 HSL 4 138 CKT 1	287	14.1	102.1	21.0	54833 DANFRTH4 138 to 54907 ARCADIA4 138 CKT 1	1146	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	54894 CZECHAL4 138 to 54898 CIMARON4 138 CKT 1	382	53.6	102.6	15.6	54853 DIVISION4 138 to 54861 MUSTANG4 138 CKT 1	1148	See Previous Solution Specified for Facility	
07SP	OKGE	OKGE	54928 SOGATE 4 138 to 54929 PLVALLY4 138 CKT 1	287	79.1	100.2	5.0	54953 HOLLYWD4 138 to 54954 INDNHIL4 138 CKT 1	1188	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	54894 CZECHAL4 138 to 54898 CIMARON4 138 CKT 1	382	59.4	100.1	13.0	54928 SOGATE 4 138 to 54929 PLVALLY4 138 CKT 1	1197	See Previous Solution Specified for Facility	
07SP	OKGE	OKGE	54849 LAKESID4 138 to 54853 DIVISION4 138 CKT 1	287	85.3	101.4	3.8	54835 MEMRIAL4 138 to 54837 TENESTP4 138 CKT 1	1200	Invalid Contingency	
07SP	OKGE	OKGE	54870 STONWAL4 138 to 54872 REMPKTP4 138 CKT 1	191	74.6	107.0	5.2	54835 MEMRIAL4 138 to 54837 TENESTP4 138 CKT 1	1200	Invalid Contingency	
07WP	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	1195	20.6	108.1	87.1	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	1088	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07WP	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	1195	20.6	107.8	86.9	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	1091	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	54880 NORTHST7 345 WND 2 NORTHST2 1	493	84.4	118.4	13.9	54879 NORTHST4 138 to 54880 NORTHST7 345 to 55743 NORTHWS2113.8 CKT 2	631	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	54879 NORTHST4 138 WND 1 NORTHST2 1	493	82.6	114.7	13.2	54879 NORTHST4 138 to 54880 NORTHST7 345 to 55743 NORTHWS2113.8 CKT 2	704	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	54965 POSTRDT4 138 to 54993 SE15TH 4 138 CKT 1	191	53.8	119.4	10.4	54965 POSTRDT4 138 to 54994 TINKER54 138 CKT 1	758	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	54908 ARCADIA7 345 WND 2 ARCADIA2 1	493	51.4	114.5	26.0	54907 ARCADIA4 138 to 54908 ARCADIA7 345 to 55704 ARCADI2113.8 CKT 2	901	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	54880 NORTHST7 345 WND 2 NORTHST3 2	493	77.3	108.5	12.8	54879 NORTHST4 138 to 54880 NORTHST7 345 to 55742 NORTHWS1113.8 CKT 1	919	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	54906 KAMOMEM4 138 to 54907 ARCADIA4 138 CKT 1	287	25.7	114.3	21.2	54833 DANFRTH4 138 to 54907 ARCADIA4 138 CKT 1	942	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	54908 ARCADIA7 345 WND 2 ARCADIA3 2	493	50.1	111.7	25.3	54907 ARCADIA4 138 to 54908 ARCADIA7 345 to 55703 ARCADI1113.8 CKT 1	945	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	54965 POSTRDT4 138 to 54993 SE15TH 4 138 CKT 1	191	65.3	106.6	6.6	54990 TINKER24 138 to 54994 TINKER54 138 CKT 1	948	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	54907 ARCADIA4 138 WND 1 ARCADIA2 1	493	50.5	110.7	24.7	54907 ARCADIA4 138 to 54908 ARCADIA7 345 to 55704 ARCADI2113.8 CKT 2	954	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	54907 ARCADIA4 138 WND 1 ARCADIA3 2	493	49.2	107.8	24.1	54907 ARCADIA4 138 to 54908 ARCADIA7 345 to 55703 ARCADI1113.8 CKT 1	1005	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	54906 KAMOMEM4 138 to 54907 ARCADIA4 138 CKT 1	287	10.4	110.4	23.9	54880 NORTHST7 345 to 54908 ARCADIA7 345 CKT 1	1010	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	54853 DIVISION4 138 to 54863 HAYMAKR4 138 CKT 1	287	74.6	110.5	8.6	54894 CZECHAL4 138 to 54898 CIMARON4 138 CKT 1	1019	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	54879 NORTHST4 138 WND 1 NORTHST3 2	493	75.7	105.0	12.1	54879 NORTHST4 138 to 54880 NORTHST7 345 to 55742 NORTHWS1113.8 CKT 1	1030	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	54894 CZECHAL4 138 to 54898 CIMARON4 138 CKT 1	382	73.3	111.6	12.2	54902 MCCLAIN4 138 to 54929 PLVALLY4 138 CKT 1	1040	See Previous Solution Specified for Facility	
10SP	OKGE	OKGE	54853 DIVISION4 138 to 54863 HAYMAKR4 138 CKT 1	287	69.7	105.3	8.5	54893 XEROX 4 138 to 54894 CZECHAL4 138 CKT 1	1108	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	54851 QUAILCK4 138 to 54873 LONEOAK4 138 CKT 1	308	66.5	102.2	9.2	54854 BRADEN 4 138 to 54879 NORTHST4 138 CKT 1	1138	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	54853 DIVISION4 138 to 54863 HAYMAKR4 138 CKT 1	287	67.5	102.8	8.5	54893 XEROX 4 138 to 54896 MORGAN 4 138 CKT 1	1151	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	54851 QUAILCK4 138 to 54873 LONEOAK4 138 CKT 1	308	65.7	101.4	9.2	54852 SLVRLAK4 138 to 54854 BRADEN 4 138 CKT 1	1161	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	54853 DIVISION4 138 to 54863 HAYMAKR4 138 CKT 1	287	66.2	101.5	8.4	54861 MUSTANG4 138 to 54896 MORGAN 4 138 CKT 1	1174	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	54894 CZECHAL4 138 to 54898 CIMARON4 138 CKT 1	382	63.3	101.8	12.3	54863 HAYMAKR4 138 to 54898 CIMARON4 138 CKT 1	1176	See Previous Solution Specified for Facility	

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 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 Overload	Rate <MVA>	BC % Loading	TC % Loading	%TDF	Outaged Branch Causing Overload	ATC (MW)	Solution	Estimated Cost
10SP	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	1195	13.3	101.7	88.0	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	1177	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	1195	13.2	101.5	87.9	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	1180	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	54894 CZECHAL4 138 to 54898 CIMARON4 138 CKT 1	382	61.0	101.3	12.8	54853 DIVISION4 138 to 54863 HAYMAKR4 138 CKT 1	1182	See Previous Solution Specified for Facility	
10SP	OKGE	OKGE	54906 KAMOMEM4 138 to 54941 HSL 4 138 CKT 1	287	10.9	100.5	21.4	54833 DANFRTH4 138 to 54907 ARCADIA4 138 CKT 1	1188	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	54893 XEROX 4 138 to 54894 CZECHAL4 138 CKT 1	382	62.6	100.5	12.1	54902 MCCLAIN4 138 to 54929 PLVALLY4 138 CKT 1	1193	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	55044 SEMINOL4 138 to 55055 MAUD 4 138 CKT 2	287	76.6	101.1	5.9	55044 SEMINOL4 138 to 55055 MAUD 4 138 CKT 1	1198	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	54988 TINKER44 138 to 54990 TINKER24 138 CKT 1	100	95.7	153.4	4.8	54965 POSTRDT4 138 to 54993 SE15TH 4 138 CKT 1	1200	Not a valid Overload; Relays trip to open UG transmission line when loading reaches 100%. No problem exist with line open.	
10WP	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	1195	20.4	105.7	84.9	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	1121	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10WP	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	1195	20.4	105.4	84.7	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	1124	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10WP	OKGE	OKGE	54906 KAMOMEM4 138 to 54907 ARCADIA4 138 CKT 1	287	29.5	100.7	17.0	54880 NORTWST7 345 to 54908 ARCADIA7 345 CKT 1	1184	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
										Total Estimated Engineering and Construction Cost	\$ 24,200,000

Study Case	From Area	To Area	Monitored Branch Overload	Rate <MVA>	BC Without Upgrades %Loading	BC With Upgrades %Loading	TC Without Upgrades %Loading	TC With Upgrades %Loading	Outaged Branch Causing Overload	Solution	Estimated Cost
05AP			NONE IDENTIFIED								
05G			NONE IDENTIFIED								
05SH			NONE IDENTIFIED								
05FA			NONE IDENTIFIED								
07SP			NONE IDENTIFIED								
07WP			NONE IDENTIFIED								
10SP			NONE IDENTIFIED								
10WP			NONE IDENTIFIED								
Total Estimated Engineering and Construction Cost											\$ -

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 Table 1.2a - Modeling Representation for Table 1.2
 Includes Bus Numbers and Bus Names

Southwest Power Pool
 System Impact Study

Study Case	From Area	To Area	Monitored Branch Overload	Rate <MVA>	BC % Loading	TC % Loading	%TDF	Outaged Branch Causing Overload	ATC (MW)	Solution	Estimated Cost
04SP	OKGE	OKGE	54934 DRAPER 7 345 WND 2 DRAPER 3 1	493	86.7	106.2	8.0	54933 DRAPER 4 138 to 54934 DRAPER 7 345 to 55721 DRAPER2113.8 CKT 2	547	See Previous Solution Specified for Facility in Table 1.1	
04SP	OKGE	OKGE	54934 DRAPER 7 345 WND 2 DRAPER 4 2	493	86.7	106.2	8.0	54933 DRAPER 4 138 to 54934 DRAPER 7 345 to 55720 DRAPER1113.8 CKT 1	547	See Previous Solution Specified for Facility in Table 1.1	
04SP	OKGE	OKGE	54835 MEMRIAL4 138 to 54850 SKYLINE4 138 CKT 1	287	64.9	124.5	14.3	54833 DANFRTH4 138 to 56174 OMHAFAER4 138 CKT 1	574	See Previous Solution Specified for Facility in Table 1.1	
04SP	OKGE	OKGE	54835 MEMRIAL4 138 to 54850 SKYLINE4 138 CKT 1	287	59.9	119.4	14.2	54832 EASTERN4 138 to 56174 OMHAFAER4 138 CKT 1	658	See Previous Solution Specified for Facility in Table 1.1	
04SP	OKGE	OKGE	54933 DRAPER 4 138 WND 1 DRAPER 3 1	493	84.4	102.3	7.4	54933 DRAPER 4 138 to 54934 DRAPER 7 345 to 55721 DRAPER2113.8 CKT 2	662	See Previous Solution Specified for Facility in Table 1.1	
04SP	OKGE	OKGE	54933 DRAPER 4 138 WND 1 DRAPER 4 2	493	84.4	102.3	7.4	54933 DRAPER 4 138 to 54934 DRAPER 7 345 to 55720 DRAPER1113.8 CKT 1	662	See Previous Solution Specified for Facility in Table 1.1	
04SP	OKGE	OKGE	54880 NORTWST7 345 WND 2 NORTWST2 1	493	80.2	108.9	11.8	54879 NORTWST4 138 to 54880 NORTWST7 345 to 55743 NORTWS2113.8 CKT 2	707	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SP	OKGE	OKGE	54851 QUAILCK4 138 to 54873 LONEOAK4 138 CKT 1	308	74.5	110.5	9.2	54854 BRADEN 4 138 to 54879 NORTWST4 138 CKT 1	757	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SP	OKGE	OKGE	54835 MEMRIAL4 138 to 54850 SKYLINE4 138 CKT 1	287	57.8	113.4	13.3	54852 SLVRLAK4 138 to 54853 DVISION4 138 CKT 1	772	See Previous Solution Specified for Facility in Table 1.1	
04SP	OKGE	OKGE	54851 QUAILCK4 138 to 54873 LONEOAK4 138 CKT 1	308	73.7	109.7	9.2	54852 SLVRLAK4 138 to 54854 BRADEN 4 138 CKT 1	778	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SP	OKGE	OKGE	54906 KAMOMEM4 138 to 54907 ARCADIA4 138 CKT 1	287	34.4	116.2	19.6	54833 DANFRTH4 138 to 54907 ARCADIA4 138 CKT 1	782	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SP	OKGE	OKGE	54879 NORTWST4 138 WND 1 NORTWST2 1	493	78.8	106.0	11.2	54879 NORTWST4 138 to 54880 NORTWST7 345 to 55743 NORTWS2113.8 CKT 2	787	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SP	OKGE	OKGE	54896 MORGAN 4 138 to 54861 MUSTANG4 138 CKT 1	287	70.3	112.8	10.2	54902 MCCLAIN4 138 to 54929 PLVALLY4 138 CKT 1	798	See Previous Solution Specified for Facility in Table 1.1	
04SP	OKGE	OKGE	54835 MEMRIAL4 138 to 54850 SKYLINE4 138 CKT 1	287	50.8	110.1	14.2	54832 EASTERN4 138 to 54835 MEMRIAL4 138 CKT 1	820	See Previous Solution Specified for Facility in Table 1.1	
04SP	OKGE	OKGE	54906 KAMOMEM4 138 to 54907 ARCADIA4 138 CKT 1	287	23.9	116.6	22.2	54880 NORTWST7 345 to 54908 ARCADIA7 345 CKT 1	838	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SP	OKGE	OKGE	54870 STONWAL4 138 to 54872 REMPKTP4 138 CKT 1	191	81.9	110.2	4.5	Multiple Contingency Outage: 54837 TENESTP4 138 to 54843 84TH ST4 138 CKT 1 54835 MEMRIAL4 138 to 54837 TENESTP4 138 CKT 1 54838 TENNESE4 138 to 54837 TENESTP4 138 CKT 1	864	See Previous Solution Specified for Facility in Table 1.1	
04SP	OKGE	OKGE	54852 SLVRLAK4 138 to 54853 DVISION4 138 CKT 1	287	62.6	115.6	12.7	54880 NORTWST7 345 to 54901 CIMARON7 345 CKT 1	869	See Previous Solution Specified for Facility in Table 1.1	
04SP	OKGE	OKGE	54908 ARCADIA7 345 WND 2 ARCADIA2 1	493	81.5	109.6	23.9	54907 ARCADIA4 138 to 54908 ARCADIA7 345 to 55704 ARCADI2113.8 CKT 2	891	See Previous Solution Specified for Facility in Table 1.1	
04SP	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	1195	32.9	121.0	87.7	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	912	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SP	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	1195	32.8	120.7	87.6	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	915	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SP	OKGE	OKGE	54906 KAMOMEM4 138 to 54941 HSL 4 138 CKT 1	287	26.3	109.2	19.8	54833 DANFRTH4 138 to 54907 ARCADIA4 138 CKT 1	927	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SP	OKGE	OKGE	54852 SLVRLAK4 138 to 54853 DVISION4 138 CKT 1	287	58.5	107.4	11.7	54835 MEMRIAL4 138 to 54850 SKYLINE4 138 CKT 1	933	See Previous Solution Specified for Facility in Table 1.1	
04SP	OKGE	OKGE	54908 ARCADIA7 345 WND 2 ARCADIA3 2	493	50.2	106.9	23.3	54907 ARCADIA4 138 to 54908 ARCADIA7 345 to 55703 ARCADI1113.8 CKT 1	958	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SP	OKGE	OKGE	54907 ARCADIA4 138 WND 1 ARCADIA2 1	493	50.6	106.1	22.8	54907 ARCADIA4 138 to 54908 ARCADIA7 345 to 55704 ARCADI2113.8 CKT 2	974	See Previous Solution Specified for Facility in Table 1.1	
04SP	OKGE	OKGE	54906 KAMOMEM4 138 to 54941 HSL 4 138 CKT 1	287	16.5	109.4	22.2	54880 NORTWST7 345 to 54908 ARCADIA7 345 CKT 1	974	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SP	OKGE	OKGE	54894 CZECHAL4 138 to 54898 CIMARON4 138 CKT 1	382	68.2	101.5	10.6	54902 MCCLAIN4 138 to 54929 PLVALLY4 138 CKT 1	976	See Previous Solution Specified for Facility in Table 1.1	
04SP	OKGE	OKGE	54835 MEMRIAL4 138 to 54850 SKYLINE4 138 CKT 1	287	57.9	102.3	10.6	54849 LAKESID4 138 to 54853 DVISION4 138 CKT 1	990	See Previous Solution Specified for Facility in Table 1.1	
04SP	OKGE	OKGE	54852 SLVRLAK4 138 to 54853 DVISION4 138 CKT 1	287	58.9	102.5	10.4	54850 SKYLINE4 138 to 54851 QUAILCK4 138 CKT 1	1038	See Previous Solution Specified for Facility in Table 1.1	
04SP	OKGE	OKGE	54907 ARCADIA4 138 WND 1 ARCADIA3 2	493	49.3	103.3	22.2	54907 ARCADIA4 138 to 54908 ARCADIA7 345 to 55703 ARCADI1113.8 CKT 1	1067	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SP	OKGE	OKGE	54852 SLVRLAK4 138 to 54853 DVISION4 138 CKT 1	287	65.4	101.9	8.7	Multiple Contingency Outage: 54837 TENESTP4 138 to 54843 84TH ST4 138 CKT 1 54835 MEMRIAL4 138 to 54837 TENESTP4 138 CKT 1 54838 TENNESE4 138 to 54837 TENESTP4 138 CKT 1	1085	See Previous Solution Specified for Facility in Table 1.1	
04SP	OKGE	OMPA	54832 EASTERN4 138 to 56174 OMHAFAER4 138 CKT 1	287	52.8	101.9	11.7	54835 MEMRIAL4 138 to 54850 SKYLINE4 138 CKT 1	1094	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SP	OKGE	OKGE	54880 NORTWST7 345 WND 2 NORTWST3 2	493	73.8	100.4	10.9	54879 NORTWST4 138 to 54880 NORTWST7 345 to 55742 NORTWS1113.8 CKT 1	1134	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SP	OKGE	OKGE	54852 SLVRLAK4 138 to 54853 DVISION4 138 CKT 1	287	65.7	102.8	8.9	54835 MEMRIAL4 138 to 54837 TENESTP4 138 CKT 1	1200	Invalid Contingency	
04SP	OKGE	OKGE	54870 STONWAL4 138 to 54872 REMPKTP4 138 CKT 1	191	81.5	109.2	4.4	54835 MEMRIAL4 138 to 54837 TENESTP4 138 CKT 1	1200	Invalid Contingency	
04SH	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	1195	36.3	123.1	86.4	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	880	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SH	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	1195	36.2	122.8	86.2	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	883	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SH	OKGE	OKGE	54835 MEMRIAL4 138 to 54850 SKYLINE4 138 CKT 1	287	73.8	105.2	7.5	54833 DANFRTH4 138 to 56174 OMHAFAER4 138 CKT 1	925	See Previous Solution Specified for Facility in Table 1.1	

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 Table 1.2a - Modeling Representation for Table 1.2
 Includes Bus Numbers and Bus Names

Southwest Power Pool
 System Impact Study

Study Case	From Area	To Area	Monitored Branch Overload	Rate <MVA>	BC % Loading	TC % Loading	%TDF	Outaged Branch Causing Overload	ATC (MW)	Solution	Estimated Cost
04SH	OKGE	OKGE	54906 KAMOMEM4 138 to 54907 ARCADIA4 138 CKT 1	287	45.8	107.1	14.7	54880 NORTHWEST7 345 to 54908 ARCADIA7 345 CKT 1	1037	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SH	OKGE	OKGE	54906 KAMOMEM4 138 to 54907 ARCADIA4 138 CKT 1	287	54.9	104.2	11.8	54833 DANFRTH4 138 to 54907 ARCADIA4 138 CKT 1	1075	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SH	OKGE	OKGE	54906 KAMOMEM4 138 to 54941 HSL 4 138 CKT 1	287	42.7	102.5	14.3	54880 NORTHWEST7 345 to 54908 ARCADIA7 345 CKT 1	1140	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04SH	OKGE	OKGE	54835 MEMRIAL4 138 to 54850 SKYLINE4 138 CKT 1	287	69.6	101.0	7.5	54832 EASTERN4 138 to 56174 OMHAFA4 138 CKT 1	1147	See Previous Solution Specified for Facility in Table 1.1	
04SH	OKGE	OKGE	54906 KAMOMEM4 138 to 54941 HSL 4 138 CKT 1	287	51.4	100.0	11.6	54833 DANFRTH4 138 to 54907 ARCADIA4 138 CKT 1	1199	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04FA	OKGE	OKGE	54832 EASTERN4 138 to 54835 MEMRIAL4 138 CKT 1	191	74.2	106.2	5.1	54835 MEMRIAL4 138 to 54850 SKYLINE4 138 CKT 1	958	See Previous Solution Specified for Facility in Table 1.1	
04FA	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	1195	27.7	114.2	86.1	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	1003	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04FA	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	1195	27.7	114.0	85.9	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	1006	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04FA	OKGE	OKGE	54906 KAMOMEM4 138 to 54907 ARCADIA4 138 CKT 1	287	52.5	103.0	12.1	54880 NORTHWEST7 345 to 54908 ARCADIA7 345 CKT 1	1123	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04WP	OKGE	OKGE	54832 EASTERN4 138 to 54835 MEMRIAL4 138 CKT 1	191	68.3	114.1	7.3	54835 MEMRIAL4 138 to 54850 SKYLINE4 138 CKT 1	819	See Previous Solution Specified for Facility in Table 1.1	
04WP	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	1195	30.2	117.3	86.8	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	963	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04WP	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	1195	30.1	117.1	86.6	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	966	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04WP	OKGE	OKGE	54832 EASTERN4 138 to 54835 MEMRIAL4 138 CKT 1	191	63.8	106.0	6.7	54834 KETCH 4 138 to 56173 OMFAIRF4 138 CKT 1	1064	See Previous Solution Specified for Facility in Table 1.1	
04WP	OKGE	OKGE	54832 EASTERN4 138 to 54835 MEMRIAL4 138 CKT 1	191	56.8	105.1	7.7	54906 KAMOMEM4 138 to 54907 ARCADIA4 138 CKT 1	1088	See Previous Solution Specified for Facility in Table 1.1	
04WP	OKGE	OKGE	54832 EASTERN4 138 to 54835 MEMRIAL4 138 CKT 1	191	56.1	104.7	7.7	54906 KAMOMEM4 138 to 54941 HSL 4 138 CKT 1	1097	See Previous Solution Specified for Facility in Table 1.1	
04WP	OKGE	OKGE	54906 KAMOMEM4 138 to 54907 ARCADIA4 138 CKT 1	287	39.6	105.5	15.8	54880 NORTHWEST7 345 to 54908 ARCADIA7 345 CKT 1	1099	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04WP	OKGE	OKGE	54832 EASTERN4 138 to 54835 MEMRIAL4 138 CKT 1	191	60.2	102.3	6.7	54850 SKYLINE4 138 to 56173 OMFAIRF4 138 CKT 1	1147	See Previous Solution Specified for Facility in Table 1.1	
04WP	OKGE	OKGE	54906 KAMOMEM4 138 to 54907 ARCADIA4 138 CKT 1	287	48.0	101.9	12.9	54833 DANFRTH4 138 to 54907 ARCADIA4 138 CKT 1	1156	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04WP	OKGE	OKGE	54906 KAMOMEM4 138 to 54941 HSL 4 138 CKT 1	287	36.5	101.2	15.5	54880 NORTHWEST7 345 to 54908 ARCADIA7 345 CKT 1	1178	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
04WP	OKGE	OKGE	54832 EASTERN4 138 to 54835 MEMRIAL4 138 CKT 1	191	50.2	100.4	8.0	54880 NORTHWEST7 345 to 54908 ARCADIA7 345 CKT 1	1191	See Previous Solution Specified for Facility in Table 1.1	
05AP	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	1195	35.9	112.3	76.1	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	1028	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05AP	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	1195	35.8	112.0	76.0	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	1031	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05G	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	1195	38.2	124.7	86.1	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	842	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05G	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	1195	38.2	124.5	86.0	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	845	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05G	OKGE	OKGE	54832 EASTERN4 138 to 54835 MEMRIAL4 138 CKT 1	191	45.7	111.8	10.5	54835 MEMRIAL4 138 to 54850 SKYLINE4 138 CKT 1	872	See Previous Solution Specified for Facility in Table 1.1	
05G	OKGE	OKGE	54906 KAMOMEM4 138 to 54907 ARCADIA4 138 CKT 1	287	18.5	108.6	21.5	54880 NORTHWEST7 345 to 54908 ARCADIA7 345 CKT 1	1022	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05G	OKGE	OKGE	54906 KAMOMEM4 138 to 54941 HSL 4 138 CKT 1	287	16.3	106.9	21.7	54880 NORTHWEST7 345 to 54908 ARCADIA7 345 CKT 1	1049	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05G	OKGE	OKGE	54906 KAMOMEM4 138 to 54907 ARCADIA4 138 CKT 1	287	26.7	104.4	18.6	54833 DANFRTH4 138 to 54907 ARCADIA4 138 CKT 1	1082	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05G	OKGE	OKGE	54832 EASTERN4 138 to 54835 MEMRIAL4 138 CKT 1	191	46.9	104.1	9.1	54834 KETCH 4 138 to 56173 OMFAIRF4 138 CKT 1	1082	See Previous Solution Specified for Facility in Table 1.1	
05G	OKGE	OKGE	54850 SKYLINE4 138 to 54835 MEMRIAL4 138 CKT 1	287	49.0	102.1	12.7	54833 DANFRTH4 138 to 56174 OMHAFA4 138 CKT 1	1109	See Previous Solution Specified for Facility in Table 1.1	
05G	OKGE	OKGE	54906 KAMOMEM4 138 to 54941 HSL 4 138 CKT 1	287	24.3	103.2	18.9	54833 DANFRTH4 138 to 54907 ARCADIA4 138 CKT 1	1110	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05G	OKGE	OKGE	54832 EASTERN4 138 to 54835 MEMRIAL4 138 CKT 1	191	33.7	102.3	10.9	54906 KAMOMEM4 138 to 54941 HSL 4 138 CKT 1	1138	See Previous Solution Specified for Facility in Table 1.1	

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 Table 1.2a - Modeling Representation for Table 1.2
 Includes Bus Numbers and Bus Names

Southwest Power Pool
 System Impact Study

Study Case	From Area	To Area	Monitored Branch Overload	Rate <MVA>	BC % Loading	TC % Loading	%TDF	Outaged Branch Causing Overload	ATC (MW)	Solution	Estimated Cost
05G	OKGE	OKGE	54832 EASTERN4 138 to 54835 MEMRIAL4 138 CKT 1	191	34.1	101.8	10.8	54906 KAMOMEM4 138 to 54907 ARCADIA4 138 CKT 1	1152	See Previous Solution Specified for Facility in Table 1.1	
05SP	OKGE	OKGE	54880 NORTHWEST7 345 WND 2 NORTHWEST2 1	493	81.6	112.6	12.7	54879 NORTHWEST4 138 to 54880 NORTHWEST7 345 to 55743 NORTHWEST2113.8 CKT 2	652	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	54879 NORTHWEST4 138 WND 1 NORTHWEST2 1	493	80.0	109.3	12.0	54879 NORTHWEST4 138 to 54880 NORTHWEST7 345 to 55743 NORTHWEST2113.8 CKT 2	734	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	54906 KAMOMEM4 138 to 54907 ARCADIA4 138 CKT 1	287	31.4	113.0	19.5	54833 DANFRTH4 138 to 54907 ARCADIA4 138 CKT 1	845	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	54908 ARCADIA7 345 WND 2 ARCADIA2 1	493	51.3	109.9	24.1	54907 ARCADIA4 138 to 54908 ARCADIA7 345 to 55704 ARCADI2113.8 CKT 2	892	See Previous Solution Specified for Facility in Table 1.1	
05SP	OKGE	OKGE	54906 KAMOMEM4 138 to 54907 ARCADIA4 138 CKT 1	287	20.9	113.7	22.2	54880 NORTHWEST7 345 to 54908 ARCADIA7 345 CKT 1	895	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	54894 CZECHAL4 138 to 54898 CIMARON4 138 CKT 1	382	70.1	105.5	11.3	54902 MCCLAIN4 138 to 54929 PLVALLY4 138 CKT 1	926	See Previous Solution Specified for Facility in Table 1.1	
05SP	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	1195	31.0	119.3	88.0	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	935	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	1195	30.9	119.1	87.8	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	938	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	54870 STONWAL4 138 to 54872 REMPCKP4 138 CKT 1	191	77.5	107.1	4.7	Multiple Contingency Outage: 54837 TENESTP4 138 to 54843 84TH ST4 138 CKT 1 54835 MEMRIAL4 138 to 54837 TENESTP4 138 CKT 1 54838 TENNESE4 138 to 54837 TENESTP4 138 CKT 1	940	See Previous Solution Specified for Facility in Table 1.1	
05SP	OKGE	OKGE	54880 NORTHWEST7 345 WND 2 NORTHWEST3 2	493	74.6	103.2	11.7	54879 NORTHWEST4 138 to 54880 NORTHWEST7 345 to 55742 NORTHWEST1113.8 CKT 1	941	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	54908 ARCADIA7 345 WND 2 ARCADIA3 2	493	50.0	107.1	23.4	54907 ARCADIA4 138 to 54908 ARCADIA7 345 to 55703 ARCADI1113.8 CKT 1	952	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	54907 ARCADIA4 138 WND 1 ARCADIA2 1	493	50.5	106.3	22.9	54907 ARCADIA4 138 to 54908 ARCADIA7 345 to 55704 ARCADI2113.8 CKT 2	967	See Previous Solution Specified for Facility in Table 1.1	
05SP	OKGE	OKGE	54906 KAMOMEM4 138 to 54941 HSL 4 138 CKT 1	287	22.5	105.3	19.8	54833 DANFRTH4 138 to 54907 ARCADIA4 138 CKT 1	1018	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	54906 KAMOMEM4 138 to 54941 HSL 4 138 CKT 1	287	12.4	105.6	22.3	54880 NORTHWEST7 345 to 54908 ARCADIA7 345 CKT 1	1053	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	54907 ARCADIA4 138 WND 1 ARCADIA3 2	493	49.2	103.5	22.3	54907 ARCADIA4 138 to 54908 ARCADIA7 345 to 55703 ARCADI1113.8 CKT 1	1055	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	54851 QUAILCK4 138 to 54873 LONEOAK4 138 CKT 1	308	67.5	100.5	8.5	54854 BRADEN 4 138 to 54879 NORTHWEST4 138 CKT 1	1141	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	54908 ARCADIA7 345 WND 2 ARCADIA2 1	493	40.5	100.3	24.6	54880 NORTHWEST7 345 to 54908 ARCADIA7 345 CKT 1	1189	See Previous Solution Specified for Facility in Table 1.1	
05SP	OKGE	OKGE	54879 NORTHWEST4 138 WND 1 NORTHWEST3 2	493	73.3	100.0	11.0	54879 NORTHWEST4 138 to 54880 NORTHWEST7 345 to 55742 NORTHWEST1113.8 CKT 1	1194	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SP	OKGE	OKGE	54870 STONWAL4 138 to 54872 REMPCKP4 138 CKT 1	191	77.2	106.1	4.6	54835 MEMRIAL4 138 to 54837 TENESTP4 138 CKT 1	1200	Invalid Contingency	
05SP	OKGE	OKGE	54988 TINKER44 138 to 54990 TINKER24 138 CKT 1	100	48.9	119.6	5.9	54965 POSTRDT4 138 to 54993 SE15TH 4 138 CKT 1	1200	Not a valid Overload; Relays trip to open UG transmission line when loading reaches 100%. No problem exist with line open.	
05SH	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	1195	35.9	122.8	86.5	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	883	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SH	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	1195	35.8	122.5	86.3	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	886	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SH	OKGE	OKGE	54906 KAMOMEM4 138 to 54907 ARCADIA4 138 CKT 1	287	47.8	109.4	14.7	54880 NORTHWEST7 345 to 54908 ARCADIA7 345 CKT 1	1003	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SH	OKGE	OKGE	54906 KAMOMEM4 138 to 54907 ARCADIA4 138 CKT 1	287	57.3	106.7	11.8	54833 DANFRTH4 138 to 54907 ARCADIA4 138 CKT 1	1016	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SH	OKGE	OKGE	54880 NORTHWEST7 345 WND 2 NORTHWEST2 1	493	83.5	101.0	7.2	54879 NORTHWEST4 138 to 54880 NORTHWEST7 345 to 55743 NORTHWEST2113.8 CKT 2	1096	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SH	OKGE	OKGE	54906 KAMOMEM4 138 to 54941 HSL 4 138 CKT 1	287	44.4	104.4	14.3	54880 NORTHWEST7 345 to 54908 ARCADIA7 345 CKT 1	1105	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SH	OKGE	OKGE	54870 STONWAL4 138 to 54872 REMPCKP4 138 CKT 1	191	74.1	101.0	4.3	Multiple Contingency Outage: 54837 TENESTP4 138 to 54843 84TH ST4 138 CKT 1 54835 MEMRIAL4 138 to 54837 TENESTP4 138 CKT 1 54838 TENNESE4 138 to 54837 TENESTP4 138 CKT 1	1139	See Previous Solution Specified for Facility in Table 1.1	
05SH	OKGE	OKGE	54906 KAMOMEM4 138 to 54941 HSL 4 138 CKT 1	287	53.4	102.1	11.6	54833 DANFRTH4 138 to 54907 ARCADIA4 138 CKT 1	1141	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05SH	OKGE	OKGE	54908 ARCADIA7 345 WND 2 ARCADIA2 1	493	59.3	100.2	16.8	54907 ARCADIA4 138 to 54908 ARCADIA7 345 to 55704 ARCADI2113.8 CKT 2	1193	See Previous Solution Specified for Facility in Table 1.1	

Study Case	From Area	To Area	Monitored Branch Overload	Rate <MVA>	BC % Loading	TC % Loading	%TDF	Outaged Branch Causing Overload	ATC (MW)	Solution	Estimated Cost
05FA	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	1195	26.2	113.2	86.6	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	1017	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05FA	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	1195	26.2	113.0	86.5	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	1020	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05FA	OKGE	OKGE	54832 EASTERN4 138 to 54835 MEMRIAL4 138 CKT 1	191	53.8	102.5	7.8	54835 MEMRIAL4 138 to 54850 SKYLINE4 138 CKT 1	1102	See Previous Solution Specified for Facility in Table 1.1	
05FA	OKGE	OKGE	54906 KAMOMEM4 138 to 54907 ARCADIA4 138 CKT 1	287	29.6	101.5	17.2	54880 NORTWST7 345 to 54908 ARCADIA7 345 CKT 1	1162	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05WP	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	1195	35.3	121.9	86.2	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	897	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05WP	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	1195	35.2	121.7	86.1	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	900	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
05WP	OKGE	OKGE	54906 KAMOMEM4 138 to 54907 ARCADIA4 138 CKT 1	287	52.2	103.8	12.3	54880 NORTWST7 345 to 54908 ARCADIA7 345 CKT 1	1113	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	54880 NORTWST7 345 WND 2 NORTWST2 1	493	83.4	117.6	14.1	54879 NORTWST4 138 to 54880 NORTWST7 345 to 55743 NORTWS2113.8 CKT 2	588	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	54879 NORTWST4 138 WND 1 NORTWST2 1	493	81.8	113.8	13.1	54879 NORTWST4 138 to 54880 NORTWST7 345 to 55743 NORTWS2113.8 CKT 2	665	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	54906 KAMOMEM4 138 to 54907 ARCADIA4 138 CKT 1	287	30.2	117.4	20.9	54833 DANFRTH4 138 to 54907 ARCADIA4 138 CKT 1	837	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	54908 ARCADIA7 345 WND 2 ARCADIA2 1	493	52.3	114.4	25.5	54907 ARCADIA4 138 to 54908 ARCADIA7 345 to 55704 ARCAD2113.8 CKT 2	855	See Previous Solution Specified for Facility in Table 1.1	
07SP	OKGE	OKGE	54880 NORTWST7 345 WND 2 NORTWST3 2	493	76.4	107.8	12.9	54879 NORTWST4 138 to 54880 NORTWST7 345 to 55742 NORTWS1113.8 CKT 1	879	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	54906 KAMOMEM4 138 to 54907 ARCADIA4 138 CKT 1	287	19.1	117.1	23.4	54880 NORTWST7 345 to 54908 ARCADIA7 345 CKT 1	888	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	54870 STONWAL4 138 to 54872 REMPKTP4 138 CKT 1	191	80.7	114.1	5.3	Multiple Contingency Outage: 54837 TENESTP4 138 to 54843 84TH ST4 138 CKT 1 54835 MEMRIAL4 138 to 54837 TENESTP4 138 CKT 1 54838 TENNESE4 138 to 54837 TENESTP4 138 CKT 1	898	See Previous Solution Specified for Facility in Table 1.1	
07SP	OKGE	OKGE	54908 ARCADIA7 345 WND 2 ARCADIA3 2	493	51.0	111.6	24.9	54907 ARCADIA4 138 to 54908 ARCADIA7 345 to 55703 ARCAD1113.8 CKT 1	908	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	54907 ARCADIA4 138 WND 1 ARCADIA2 1	493	51.5	110.3	24.2	54907 ARCADIA4 138 to 54908 ARCADIA7 345 to 55704 ARCAD2113.8 CKT 2	916	See Previous Solution Specified for Facility in Table 1.1	
07SP	OKGE	OKGE	54894 CZECHAL4 138 to 54898 CIMARON4 138 CKT 1	382	70.1	110.7	12.9	54902 MCCLAIN4 138 to 54929 PLVALLY4 138 CKT 1	952	See Previous Solution Specified for Facility in Table 1.1	
07SP	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	1195	28.7	117.5	88.4	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	966	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	1195	28.6	117.2	88.2	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	968	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	54879 NORTWST4 138 WND 1 NORTWST3 2	493	74.9	104.2	12.0	54879 NORTWST4 138 to 54880 NORTWST7 345 to 55742 NORTWS1113.8 CKT 1	970	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	54907 ARCADIA4 138 WND 1 ARCADIA3 2	493	50.2	107.4	23.5	54907 ARCADIA4 138 to 54908 ARCADIA7 345 to 55703 ARCAD1113.8 CKT 1	976	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	54906 KAMOMEM4 138 to 54941 HSL 4 138 CKT 1	287	19.7	108.3	21.2	54833 DANFRTH4 138 to 54907 ARCADIA4 138 CKT 1	991	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	54853 DIVISION4 138 to 54863 HAYMAKR4 138 CKT 1	287	68.3	106.7	9.2	54894 CZECHAL4 138 to 54898 CIMARON4 138 CKT 1	992	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	54851 QUAILCK4 138 to 54873 LONEOAK4 138 CKT 1	308	68.5	105.1	9.4	54854 BRADEN 4 138 to 54879 NORTWST4 138 CKT 1	997	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	54851 QUAILCK4 138 to 54873 LONEOAK4 138 CKT 1	308	67.7	104.3	9.4	54852 SLVRLAK4 138 to 54854 BRADEN 4 138 CKT 1	1027	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	54906 KAMOMEM4 138 to 54941 HSL 4 138 CKT 1	287	9.0	107.5	23.6	54880 NORTWST7 345 to 54908 ARCADIA7 345 CKT 1	1038	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	54908 ARCADIA7 345 WND 2 ARCADIA2 1	493	40.9	103.5	25.7	54880 NORTWST7 345 to 54908 ARCADIA7 345 CKT 1	1116	See Previous Solution Specified for Facility in Table 1.1	
07SP	OKGE	OKGE	54853 DIVISION4 138 to 54863 HAYMAKR4 138 CKT 1	287	63.7	101.6	9.1	54893 XEROX 4 138 to 54894 CZECHAL4 138 CKT 1	1149	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OMPA	54832 EASTERN4 138 to 56174 OMHAFFER4 138 CKT 1	287	49.3	101.6	12.5	54835 MEMRIAL4 138 to 54850 SKYLINE4 138 CKT 1	1149	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	54880 NORTWST7 345 WND 2 NORTWST2 1	493	67.1	100.7	13.8	54880 NORTWST7 345 to 54901 CIMARON7 345 CKT 1	1173	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07SP	OKGE	OKGE	54907 ARCADIA4 138 WND 1 ARCADIA2 1	493	40.5	100.4	24.6	54880 NORTWST7 345 to 54908 ARCADIA7 345 CKT 1	1188	See Previous Solution Specified for Facility in Table 1.1	

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 Table 1.2a - Modeling Representation for Table 1.2
 Includes Bus Numbers and Bus Names

Southwest Power Pool
 System Impact Study

Study Case	From Area	To Area	Monitored Branch Overload	Rate <MVA>	BC % Loading	TC % Loading	%TDF	Outaged Branch Causing Overload	ATC (MW)	Solution	Estimated Cost
07SP	OKGE	OKGE	54894 CZECHAL4 138 to 54898 CIMARON4 138 CKT 1	382	57.2	100.2	13.7	54853 DIVISION4 138 to 54863 HAYMAKR4 138 CKT 1	1195	See Previous Solution Specified for Facility in Table 1.1	
07SP	OKGE	OKGE	54849 LAKESID4 138 to 54853 DIVISION4 138 CKT 1	287	84.8	101.0	3.9	54835 MEMRIAL4 138 to 54837 TENESTP4 138 CKT 1	1200	Invalid Contingency	
07SP	OKGE	OKGE	54870 STONWAL4 138 to 54872 REMPKTP4 138 CKT 1	191	80.3	112.9	5.2	54835 MEMRIAL4 138 to 54837 TENESTP4 138 CKT 1	1200	Invalid Contingency	
07WP	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	1195	32.7	120.3	87.2	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	919	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07WP	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	1195	32.6	120.0	87.1	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	922	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
07WP	OKGE	OKGE	54906 KAMOMEM4 138 to 54907 ARCADIA4 138 CKT 1	287	17.0	103.8	20.8	54880 NORTHWEST7 345 to 54908 ARCADIA7 345 CKT 1	1109	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	54880 NORTHWEST7 345 WND 2 NORTHWEST2 1	493	85.8	119.8	14.0	54879 NORTHWEST4 138 to 54880 NORTHWEST7 345 to 55743 NORTHWEST113.8 CKT 2	582	Facility Limits Service to 1195 MW 6/1/2009-10/1/2009 and Limits Renewal Rights to 1165 MW 6/1/2010 with Selected Upgrades modeled for 1200 MW.	
10SP	OKGE	OKGE	54879 NORTHWEST4 138 WND 1 NORTHWEST2 1	493	84.1	116.2	13.2	54879 NORTHWEST4 138 to 54880 NORTHWEST7 345 to 55743 NORTHWEST113.8 CKT 2	654	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	54908 ARCADIA7 345 WND 2 ARCADIA2 1	493	53.0	116.6	26.1	54907 ARCADIA4 138 to 54908 ARCADIA7 345 to 55704 ARCADIA2113.8 CKT 2	867	See Previous Solution Specified for Facility in Table 1.1	
10SP	OKGE	OKGE	54880 NORTHWEST7 345 WND 2 NORTHWEST3 2	493	78.6	109.9	12.9	54879 NORTHWEST4 138 to 54880 NORTHWEST7 345 to 55742 NORTHWEST113.8 CKT 1	868	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	54965 POSTRDT4 138 to 54993 SE15TH 4 138 CKT 1	191	46.7	112.1	10.4	54965 POSTRDT4 138 to 54994 TINKER54 138 CKT 1	878	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	54906 KAMOMEM4 138 to 54907 ARCADIA4 138 CKT 1	287	29.0	118.0	21.3	54833 DANFRTH4 138 to 54907 ARCADIA4 138 CKT 1	901	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	54908 ARCADIA7 345 WND 2 ARCADIA3 2	493	51.7	113.6	25.5	54907 ARCADIA4 138 to 54908 ARCADIA7 345 to 55703 ARCADIA1113.8 CKT 1	911	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	54907 ARCADIA4 138 WND 1 ARCADIA2 1	493	52.1	112.4	24.8	54907 ARCADIA4 138 to 54908 ARCADIA7 345 to 55704 ARCADIA2113.8 CKT 2	921	See Previous Solution Specified for Facility in Table 1.1	
10SP	OKGE	OKGE	54906 KAMOMEM4 138 to 54907 ARCADIA4 138 CKT 1	287	16.0	116.2	24.0	54880 NORTHWEST7 345 to 54908 ARCADIA7 345 CKT 1	947	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	54907 ARCADIA4 138 WND 1 ARCADIA3 2	493	50.8	109.5	24.1	54907 ARCADIA4 138 to 54908 ARCADIA7 345 to 55703 ARCADIA1113.8 CKT 1	970	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	54879 NORTHWEST4 138 WND 1 NORTHWEST3 2	493	77.0	106.4	12.1	54879 NORTHWEST4 138 to 54880 NORTHWEST7 345 to 55742 NORTHWEST113.8 CKT 1	981	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	1195	25.5	114.2	88.3	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	1010	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	1195	25.4	113.9	88.1	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	1013	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	54906 KAMOMEM4 138 to 54941 HSL 4 138 CKT 1	287	17.0	107.2	21.6	54833 DANFRTH4 138 to 54907 ARCADIA4 138 CKT 1	1039	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	54851 QUAILCK4 138 to 54873 LONEOAK4 138 CKT 1	308	67.8	103.7	9.2	54854 BRADEN 4 138 to 54879 NORTHWEST4 138 CKT 1	1095	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	54894 CZECHAL4 138 to 54898 CIMARON4 138 CKT 1	382	68.6	107.0	12.2	54902 MCCLAIN4 138 to 54929 PLVALLY4 138 CKT 1	1104	See Previous Solution Specified for Facility in Table 1.1	
10SP	OKGE	OKGE	54906 KAMOMEM4 138 to 54941 HSL 4 138 CKT 1	287	4.4	105.1	24.1	54880 NORTHWEST7 345 to 54908 ARCADIA7 345 CKT 1	1105	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	54851 QUAILCK4 138 to 54873 LONEOAK4 138 CKT 1	308	67.0	102.9	9.2	54852 SLVRLAK4 138 to 54854 BRADEN 4 138 CKT 1	1118	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	54880 NORTHWEST7 345 WND 2 NORTHWEST2 1	493	69.1	102.6	13.8	54880 NORTHWEST7 345 to 54901 CIMARON7 345 CKT 1	1121	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	54908 ARCADIA7 345 WND 2 ARCADIA2 1	493	39.9	103.8	26.3	54880 NORTHWEST7 345 to 54908 ARCADIA7 345 CKT 1	1124	See Previous Solution Specified for Facility in Table 1.1	
10SP	OKGE	OKGE	54853 DIVISION4 138 to 54863 HAYMAKR4 138 CKT 1	287	67.1	103.3	8.6	54894 CZECHAL4 138 to 54898 CIMARON4 138 CKT 1	1144	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	54907 ARCADIA4 138 WND 1 ARCADIA2 1	493	39.5	100.8	25.2	54880 NORTHWEST7 345 to 54908 ARCADIA7 345 CKT 1	1183	See Previous Solution Specified for Facility in Table 1.1	
10SP	OKGE	OKGE	54870 STONWAL4 138 to 54872 REMPKTP4 138 CKT 1	191	71.2	100.9	4.7	Multiple Contingency Outage: 54837 TENESTP4 138 to 54843 84TH ST4 138 CKT 1 54835 MEMRIAL4 138 to 54837 TENESTP4 138 CKT 1 54838 TENNESE4 138 to 54837 TENESTP4 138 CKT 1	1185	See Previous Solution Specified for Facility in Table 1.1	
10SP	OKGE	OKGE	54879 NORTHWEST4 138 WND 1 NORTHWEST2 1	493	68.0	100.3	13.3	54880 NORTHWEST7 345 to 54901 CIMARON7 345 CKT 1	1191	Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10SP	OKGE	OKGE	54988 TINKER44 138 to 54990 TINKER24 138 CKT 1	100	82.3	141.1	4.9	54965 POSTRDT4 138 to 54993 SE15TH 4 138 CKT 1	1200	Not a valid Overload; Relays trip to open UG transmission line when loading reaches 100%. No problem exist with line open.	
10WP	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	1195	32.4	117.6	84.8	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	954	Relieved or Impact Removed by Selected Upgrades for 1200 MW	

Study Case	From Area	To Area	Monitored Branch Overload	Rate <MVA>	BC % Loading	TC % Loading	%TDF	Outaged Branch Causing Overload	ATC (MW)	Solution	Estimated Cost
10WP	OKGE	OKGE	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 1	1195	32.4	117.4	84.7	54908 ARCADIA7 345 to 54909 REDBUD 7 345 CKT 2	957	Relieved or Impact Removed by Selected Upgrades for 1200 MW OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
10WP	OKGE	OKGE	54906 KAMOMEM4 138 to 54907 ARCADIA4 138 CKT 1	287	34.7	106.5	17.2	54880 NORTWST7 345 to 54908 ARCADIA7 345 CKT 1	1052		
10WP	OKGE	OKGE	54906 KAMOMEM4 138 to 54907 ARCADIA4 138 CKT 1	287	42.7	102.4	14.3	54833 DANFRTH4 138 to 54907 ARCADIA4 138 CKT 1	1128	OKGE Terminal Equipment Project underway to increase line rating. Estimated In-Service Date 9/30/2004. New Emergency Rating 308 MVA. Relieved or Impact Removed by Selected Upgrades for 1200 MW	
Total Estimated Engineering and Construction Cost											\$ -

Study Case	From Area	To Area	Monitored Branch Overload	Rate <MVA>	BC Without Upgrades %Loading	BC With Upgrades %Loading	TC Without Upgrades %Loading	TC With Upgrades %Loading	Outaged Branch Causing Overload	Solution	Estimated Cost
05AP			NONE IDENTIFIED								
05G			NONE IDENTIFIED								
05SH			NONE IDENTIFIED								
05FA			NONE IDENTIFIED								
07SP	OKGE	OKGE	54870 STONWAL4 138 to 54869 WESTERN4 138 CKT 1	191	75.6	79.9	86.1	102.3	Multiple Contingency Outage: 54837 TENESTP4 138 to 54843 84TH ST4 138 CKT 1 54835 MEMRIAL4 138 to 54837 TENESTP4 138 CKT 1 54838 TENNESE4 138 to 54837 TENESTP4 138 CKT 1	Replace Wavetrap	\$ 50,000
07WP			NONE IDENTIFIED								
10SP			NONE IDENTIFIED								
10WP			NONE IDENTIFIED								
Total Estimated Engineering and Construction Cost											\$ 50,000