SPP Southwest Power Pool

System Impact Study SPP-2004-101-1 For The Designation of a New Network Resource Requested By American Electric Power

For a Reserved Amount of 107 MW From 10/1/2004 To 10/1/2005

SPP Engineering, Tariff Studies

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1. Executive Summary

American Electric Power has requested a system impact study to designate a New Network Resource in the AEPW Control Area for 107 MW to serve Network Load in the AEPW Control Area. The period of the service requested is from 10/1/2004 to 10/1/2005. This request is for OASIS reservation number 669575.

The principal objective of this study is to identify system problems and potential system modifications necessary to facilitate the additional 107 MW request while maintaining system reliability. The AEPW to AEPW 107 MW request was studied using three System Scenarios. The service was modeled by a transfer from the new designated network resource in the AEPW Control Area to the Network Load in the AEPW Control Area. The three scenarios were studied to capture worst case system limitations dependent on the bias of the transmission system. Analysis was conducted for the requested service period above and for the remaining planning horizon from 10/1/2005 to 10/1/2015. The additional evaluation of the planning horizon was conducted to determine any future constraints that may limit the future renewal of service.

Tables 1.1, 1.2, and 1.3 list the AEPW facility overloads caused or impacted by the transfer modeled, using Scenarios 1, 2, and 3, respectively. Tables 2.1, 2.2, and 2.3 list the AEPW voltage violations caused or impacted by the transfer modeled, using Scenarios 1, 2, and 3, respectively. Tables 3.1, 3.2, and 3.3 list the Non- AEPW facility overloads caused or impacted by the transfer modeled, using Scenarios 1, 2, and 3, respectively. Tables 4.1, 4.2, and 4.3 list the Non- AEPW voltage violations caused or impacted by the transfer modeled, using Scenarios 1, 2, and 3, respectively.

The ATC is limited to 77 MW from 6/1/2005-10/1/2005 due the WFEC ELK CITY - ELK CITY 69KV line. The WFEC planned upgrade of the ELK CITY - ELK CITY 69KV line has an estimated in-service date of 12/1/2005. The WFEC facility is a summer limit only and would therefore defer the full 107 MW of service to a start date of 10/1/2005. AEPW and Non-AEPW limitations were identified outside the requested reservation period. Renewal rights will be limited starting 6/1/2008. The AEPW facilities limiting renewal rights can be found in Table 1 and Table 2. The Non-AEPW facilities limiting renewal rights can be found in Table 3 and Table 4. The ATC from 6/1/2008-10/1/2008 is limited to 60 MW on the ORU WEST TAP - RIVERSIDE STATION 138KV line. The ATC beginning 6/1/2010 is limited to 0 MW. The total Engineering and Construction estimate to mitigate the AEPW limitations identified outside the reservation period is $5,815,000. The total Engineering and Construction estimate to mitigate the Non-AEPW limitations identified outside the reservation period is $20,000.

2. Introduction

American Electric Power has requested a system impact study to designate a New Network Resource in the AEPW Control Area for 107 MW to serve a Network Load in the AEPW Control Area. The principal objective of this study is to identify the restraints on the SPP Regional Tariff System that may limit the requested service 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, transformers, and generating units, and selected multiple transmission lines and transformers on the SPP system and first tier Non - SPP systems.

The AEPW to AEPW 107 MW request was studied using three System Scenarios. The service was modeled from the new designated network resource in the AEPW Control Area to the Network Load in the AEPW Control Area. The three scenarios were studied to capture worst case system limitations dependent on the bias of the transmission system.

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 upper bound and lower bound of the normal voltage range monitored is 105% and 95%. The upper bound and lower bound of the emergency voltage range monitored is 110% and 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, any defined contingencies for these control areas, and generation unit outages for the SPP control areas, AECI, and ENTR with SPP reserve share program redispatch. 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 AECI, 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 sixteen seasonal models to study the AEPW to AEPW 107 MW request for the requested service period. The SPP 2005 Series Cases Update 2 2005 Spring Peak (05G), 2005 Summer Peak (05SP), 2005 Summer Shoulder (05SH), 2005 Fall Peak (05FA), 2005 Winter Peak (05WP) were used to study the impact of the 107 MW transfer on the system during the requested service period of 10/1/2004 to 10/1/2005. The 2006 April Minimum (06AP), 2006 Spring Peak (06G), 2006 Summer Peak (06SP), 2006 Summer Shoulder (06SH), 2006 Fall Peak (06FA), 2006 Winter Peak (06WP), 2007 Summer Peak (07SP), 2007/08 Winter Peak (07WP), 2010 Summer Peak (10SP), 2010/11 Winter Peak (10WP), and 2015 Summer Peak (15SP) were used to study the impact of the 107 MW transfer on the system during the remaining planning horizon from 10/1/2005 to 10/1/2015.. The Spring Peak models apply to April and May, the Summer Peak models apply to June through September, the Fall Peak models apply to October and November, and the Winter Peak models apply to December through March.

The chosen base case models were modified to reflect the most current modeling information. From the sixteen seasonal models, three system scenarios were developed. Scenario 1 includes SWPP OASIS transmission requests not already included in the SPP 2005 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 Lamar HVDC Tie. Scenario 2 includes transmission requests not already included in the SPP 2005 Series Cases flowing in an

East to West direction with ERCOT net importing and SPS importing from an outside control area and importing from the Lamar HVDC Tie. The third scenario includes SWPP OASIS transmission requests not already included in the SPP 2005 Series Cases flowing in a West to East direction with ERCOT net importing and SPS importing from an outside control area and importing from the Lamar HVDC Tie. The system scenarios were developed to minimize counter flows to the transfer studied.

C. Transfer Analysis

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

D. Upgrade Analysis

Using the cases both with and without the assigned upgrades modeled and with and without the 107 MW transfer modeled, the PSS/E Activity ACCC was run on the cases and compared in order to determine the facility overloads caused or impacted by the assigned upgrades. The transfer distribution cutoffs and voltage threshold were applied to determine the impacted facilities. The PSS/E options chosen to conduct the analysis can be found in Appendix A.

4. Study Results

A. Study Analysis Results

Tables 1 through 4 contain the initial steady-state analysis results of the System Impact Study. The Tables are in the attached workbook *SPP-2004-101-1 Tables*. The tables identify the seasonal case in which the event occurred, the facility control area location, applicable ratings of the overloaded facility, the loading percentage or voltage with and without the transfer, the percent transfer distribution factor (TDF) if applicable, and the estimated ATC value using interpolation 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.

Tables 1.1, 1.2, and 1.3 list the AEPW Facility Overloads caused or impacted by the transfer modeled, using Scenarios 1, 2, and 3, respectively. Tables 2.1, 2.2, and 2.3 list the AEPW facility voltage violations caused or impacted by the transfer modeled, using Scenarios 1, 2, and 3, respectively. Tables 3.1, 3.2, and 3.3 list the Non- AEPW Facility Overloads caused or impacted by the transfer modeled, using Scenarios 1, 2, and 3, respectively. Tables 4.1, 4.2, and 4.3 list the Non- AEPW facility voltage violations caused or impacted by the transfer modeled, using Scenarios 1, 2, and 3, respectively. Solutions with engineering and construction costs are provided in the tables.

Tables 1.1a, 1.2a, and 1.3a document the modeling representation of the events identified in Tables 1.1, 1.2, and 1.3 to include bus numbers and bus names.

5. **Conclusion**

The ATC is limited to 77 MW from 6/1/2005-10/1/2005 due the WFEC ELK CITY - ELK CITY 69KV line. The WFEC planned upgrade of the ELK CITY - ELK CITY 69KV line has an estimated in-service date of 12/1/2005. The WFEC facility is a summer limit only and would therefore defer the full 107 MW of service to a start date of 10/1/2005. AEPW and Non-AEPW limitations were identified outside the requested reservation period. Renewal rights will be limited starting 6/1/2008. The AEPW facilities limiting renewal rights can be found in Table 1 and Table 2. The Non-AEPW facilities limiting renewal rights can be found in Table 3 and Table 4. The ATC from 6/1/2008-10/1/2008 is limited to 60 MW on the ORU WEST TAP - RIVERSIDE STATION 138KV line. The ATC beginning 6/1/2010 is limited to 0 MW. The total Engineering and Construction estimate to mitigate the AEPW limitations identified outside the reservation period is $5,815,000. The total Engineering and Construction estimate to mitigate the Non-AEPW limitations identified outside the reservation period is $20,000.

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 - X 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. Excld cases w/ no overloads from 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 - X Phase shift adjustment
   _ Flat start
   _ Lock DC taps
   _ Lock switched shunts

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	AEPW	AEPW	EAST 61ST STREET - TULSA SOUTHEAST 138KV	143	113.4	117.4	5.4	ORU EAST TAP - RIVERSIDE STATION 138KV	107	Invalid Contingency	
05G	AEPW	AEPW	EAST 61ST STREET - TULSA SOUTHEAST 138KV	143	100.6	104.1	4.7	ORU EAST TAP - WARNREN TAP 138KV	107	Invalid Contingency	
05SP	AEPW	AEPW	EAST 61ST STREET - TULSA SOUTHEAST 138KV	187	101.8	104.8	5.2	ORU EAST TAP - RIVERSIDE STATION 138KV	107	Invalid Contingency	
05SP	AEPW	WFEC	ELK CITY - ELK CITY 69KV	39	92.6	102.8	3.7	CLINTO AIR FORCE BASE TAP - ELK CITY 138KV	77	Refer to Expansion Plan Phase I to Upgrade 4/0 to 795 ACSR Planned In Service date: 12/1/2005	
05SP	AEPW	WFEC	ELK CITY - ELK CITY 69KV	39	90.9	101.1	3.7	CLINTO AIR FORCE BASE TAP - HOBART JUNCTION 138KV	96	"	
05SH	AEPW	AEPW	EAST 61ST STREET - TULSA SOUTHEAST 138KV	143	111.2	115.0	5.1	ORU EAST TAP - RIVERSIDE STATION 138KV	107	Invalid Contingency	
05SH	AEPW	AEPW	EAST 61ST STREET - TULSA SOUTHEAST 138K\	143	97.8	101.2	4.5	ORU EAST TAP - WARNREN TAP 138KV	107	Invalid Contingency	
05FA			NONE IDENTIFIED						107		
05WP			NONE IDENTIFIED						107		
06AP			NONE IDENTIFIED						107		
06G			NONE IDENTIFIED						107		
06SP	AEPW	AEPW	EAST 61ST STREET - TULSA SOUTHEAST 138KV	187	103.4	106.4	5.2	ORU EAST TAP - RIVERSIDE STATION 138KV	107	Invalid Contingency	
06SH	AEPW	AEPW	EAST 61ST STREET - TULSA SOUTHEAST 138KV	143	112.8	116.6	5.1	ORU EAST TAP - RIVERSIDE STATION 138KV	107	Invalid Contingency	
06SH	AEPW	AEPW	EAST 61ST STREET - TULSA SOUTHEAST 138KV	143	99.2	102.5	4.5	ORU EAST TAP - WARNREN TAP 138KV	107	Invalid Contingency	
06FA			NONE IDENTIFIED						107		
06WP			NONE IDENTIFIED						107		
07SP	AEPW	AEPW	EAST 61ST STREET - TULSA SOUTHEAST 138KV	187	110.4	113.6	5.6	ORU EAST TAP - RIVERSIDE STATION 138KV	107	Invalid Contingency	
07SP	AEPW	AEPW	EAST 61ST STREET - TULSA SOUTHEAST 138KV	187	98.0	100.8	5.0	ORU EAST TAP - WARNREN TAP 138KV	107	Invalid Contingency	
07SP	AEPW	WFEC	ELK CITY - ELK CITY 69KV	39	90.9	101.2	3.7	CLINTO AIR FORCE BASE TAP - ELK CITY 138KV	107	Refer to Expansion Plan Phase I to Upgrade 4/0 to 795 ACSR Planned In Service date: 12/1/2005	
07WP			NONE IDENTIFIED						107		
10SP	AEPW	AEPW	53RD & GARNETT NORTH TAP - TULSA SOUTHEAST 138KV	143	101.3	104.1	3.7	121ST & LYNN LANE - ONETA 138KV	107	Invalid Contingency	
10SP	AEPW	AEPW	ORU WEST TAP - RIVERSIDE STATION 138KV	304	100.8	103.3	7.1	ORU EAST TAP - RIVERSIDE STATION 138KV ORU EAST TAP - ORU EAST 138KV ORU EAST TAP - WARNREN TAP 138KV WARNREN TAP - 81ST & YALE SOUTH 138KV WARNREN TAP - 96TH & YALE 138KV 81ST & YALE SOUTH - WARREN WEST 138KV	0	Replace wavetrap jumpers @ Riverside	$10,000
10SP	AEPW	AEPW	EAST 61ST STREET - TULSA SOUTHEAST 138KV	187	115.0	118.2	5.6	ORU EAST TAP - RIVERSIDE STATION 138KV	107	Invalid Contingency	
10SP	AEPW	AEPW	EAST 61ST STREET - TULSA SOUTHEAST 138KV	187	101.9	104.8	5.0	ORU EAST TAP - WARNREN TAP 138KV	107	Invalid Contingency	
10WP			NONE IDENTIFIED						107		
15SP	AEPW	AEPW	53RD & GARNETT NORTH TAP - TULSA SOUTHEAST 138K\	143	113.8	116.8	4.0	121ST & LYNN LANE - ONETA 138K\	107	Invalid Contingency	
15SP	AEPW	AEPW	ORU WEST TAP - RIVERSIDE STATION 138KV	304	109.6	112.2	7.4	ORU EAST TAP - RIVERSIDE STATION 138KV ORU EAST TAP - ORU EAST 138KV ORU EAST TAP - WARNREN TAP 138KV WARNREN TAP - 81ST & YALE SOUTH 138KV WARNREN TAP - 96TH & YALE 138KV 81ST & YALE SOUTH - WARREN WEST 138KV	0	See Previous Upgrade Specified For Facility	
15SP	AEPW	AEPW	EAST 61ST STREET - TULSA SOUTHEAST 138K\	187	124.7	128.0	5.8	ORU EAST TAP - RIVERSIDE STATION 138KV	107	Invalid Contingency	
15SP	AEPW	AEPW	EAST 61ST STREET - TULSA SOUTHEAST 138K\	187	110.3	113.3	5.1	ORU EAST TAP - WARNREN TAP 138KV	107	Invalid Contingency	
15SP	AEPW	OKGE	FIXICO TAP - MAUD 138KV	107	123.9	127.0	3.2	MAUD 138/69 KV TRANSFORMER	0	Rebuild 11.83 miles of 3/0 shielded Copperweld with 795 ACSR.	$3,305,000
15SP	AEPW	OKGE	FIXICO TAP - MAUD 138KV	107	123.0	126.5	3.5	FRANKLIN - FRANKLIN SW 138KV	0	See Previous Upgrade Specified For Facility	
15SP	AEPW	OKGE	FIXICO TAP - MAUD 138KV	107	119.8	123.3	3.5	FRANKLIN - PINK SW 138KV	0	See Previous Upgrade Specified For Facility	
15SP	AEPW	OKGE	FIXICO TAP - MAUD 138KV	107	118.1	121.1	3.0	FOREST HILL - MAUD 138KV	0	See Previous Upgrade Specified For Facility	
15SP	AEPW	OKGE	FIXICO TAP - MAUD 138KV	107	116.4	119.5	3.1	LITTLE RIVER - MAUD 69KV	0	See Previous Upgrade Specified For Facility	
15SP	AEPW	AEPW	ORU WEST TAP - RIVERSIDE STATION 138KV	304	98.8	101.1	6.7	ORU EAST TAP - RIVERSIDE STATION 138KV	107	Invalid Contingency	
										Total Estimated Engineering and Construction Cos	$3,315,000

Study Case	AREA	Monitored Bus with Violation	BC Voltage (PU)	TC Voltage (PU)	Outaged Branch Causing Voltage Violation	ATC (MW)	Solution	Estimated Cost
05G	AEPW	53990 S-MCALT4 138	0.7648	0.7423	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
05G	AEPW	54032 SMCALTP4 138	0.7674	0.7451	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
05G	AEPW	54034 MCALT-S4 138	0.7691	0.7469	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
05G	AEPW	54024 MCALEST269.0	0.8041	0.7837	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
05SP	AEPW	53851 46ST--E4 138	0.4886	0.4478	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
05SP	AEPW	53834 W.ED.-E4 138	0.4901	0.4493	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
05SP	AEPW	53757 DENVTAP4 138	0.4912	0.4505	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
05SP	AEPW	53754 DENVR-E4 138	0.4932	0.4525	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
05SP	AEPW	53990 S-MCALT4 138	0.6077	0.5785	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
05SP	AEPW	54032 SMCALTP4 138	0.6115	0.5824	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
05SP	AEPW	54034 MCALT-S4 138	0.6140	0.5851	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
05SP	AEPW	54024 MCALEST269.0	0.6636	0.6375	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
05SP	AEPW	54038 A.DEPOT269.0	0.7064	0.6826	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
05SP	AEPW	54039 SAVANNA269.0	0.7128	0.6894	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
05SP	AEPW	54010 PITTSB-269.0	0.7718	0.7517	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
05SH	AEPW	53851 46ST--E4 138	0.8462	0.8190	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
05SH	AEPW	53834 W.ED.-E4 138	0.8471	0.8199	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
05SH	AEPW	53757 DENVTAP4 138	0.8478	0.8207	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
05SH	AEPW	53754 DENVR-E4 138	0.8489	0.8219	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
05FA		NONE IDENTIFIED				107		
05WP		NONE IDENTIFIED				107		
06AP		NONE IDENTIFIED				107		
06G		NONE IDENTIFIED				107		
06SP	AEPW	53851 46ST--E4 138	0.4646	0.4283	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
06SP	AEPW	53834 W.ED.-E4 138	0.4661	0.4298	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
06SP	AEPW	53757 DENVTAP4 138	0.4673	0.4310	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
06SP	AEPW	53754 DENVR-E4 138	0.4693	0.4330	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
06SP	AEPW	53990 S-MCALT4 138	0.5892	0.5616	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
06SP	AEPW	54032 SMCALTP4 138	0.5930	0.5656	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
06SP	AEPW	54034 MCALT-S4 138	0.5955	0.5682	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
06SP	AEPW	54024 MCALEST269.0	0.6467	0.6223	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
06SP	AEPW	54038 A.DEPOT269.0	0.6912	0.6690	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
06SP	AEPW	54039 SAVANNA269.0	0.6979	0.6761	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
06SH	AEPW	53851 46ST--E4 138	0.8317	0.8089	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
06SH	AEPW	53834 W.ED.-E4 138	0.8326	0.8099	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
06SH	AEPW	53757 DENVTAP4 138	0.8333	0.8106	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
06SH	AEPW	53754 DENVR-E4 138	0.8345	0.8118	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
06SH	AEPW	53990 S-MCALT4 138	0.7284	0.7074	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
06SH	AEPW	54032 SMCALTP4 138	0.7311	0.7103	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
06SH	AEPW	54034 MCALT-S4 138	0.7329	0.7123	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
06FA		NONE IDENTIFIED				107		
06WP		NONE IDENTIFIED				107		
07SP	AEPW	53851 46ST--E4 138	0.4519	0.4175	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
07SP	AEPW	53834 W.ED.-E4 138	0.4534	0.4190	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
07SP	AEPW	53757 DENVTAP4 138	0.4546	0.4202	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
07SP	AEPW	53754 DENVR-E4 138	0.4566	0.4222	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
07SP	AEPW	53990 S-MCALT4 138	0.5812	0.5537	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
07SP	AEPW	54032 SMCALTP4 138	0.5850	0.5576	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
07SP	AEPW	54034 MCALT-S4 138	0.5875	0.5603	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
07SP	AEPW	54024 MCALEST269.0	0.6390	0.6147	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
07SP	AEPW	54038 A.DEPOT269.0	0.6842	0.6621	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
07SP	AEPW	54039 SAVANNA269.0	0.6910	0.6692	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
07WP		NONE IDENTIFIED				107		
10SP	AEPW	53851 46ST--E4 138	0.4034	0.3761	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
10SP	AEPW	53834 W.ED.-E4 138	0.4050	0.3778	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	

10SP	AEPW	53757 DENVTAP4 138	0.4062	0.3789	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
10SP	AEPW	53754 DENVR-E4 138	0.4082	0.3810	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
10SP	AEPW	53990 S-MCALT4 138	0.5940	0.5670	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
10SP	AEPW	54032 SMCALTP4 138	0.5976	0.5708	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
10SP	AEPW	54034 MCALT-S4 138	0.6001	0.5734	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
10SP	AEPW	54024 MCALEST269.0	0.6517	0.6279	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
10SP	AEPW	54038 A.DEPOT269.0	0.6978	0.6761	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
10SP	AEPW	54039 SAVANNA269.0	0.7045	0.6832	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
10WP	AEPW	53851 46ST--E4 138	0.8715	0.8509	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
10WP	AEPW	53834 W.ED.-E4 138	0.8722	0.8517	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
10WP	AEPW	53757 DENVTAP4 138	0.8727	0.8522	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
10WP	AEPW	53754 DENVR-E4 138	0.8735	0.8531	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
15SP	AEPW	53988 ALLENNG4 138	0.8492	0.7968	OPEN LINE FROM BUS 52800 TUPELO 4 138 TO BUS 54006 ALLENGT4 138 CKT1	41	Invalid Contingency	
15SP	AEPW	54062 EXPCOLG4 138	0.8494	0.7970	OPEN LINE FROM BUS 52800 TUPELO 4 138 TO BUS 54006 ALLENGT4 138 CKT1	41	Invalid Contingency	
15SP	AEPW	54061 EXPCOLT4 138	0.8495	0.7971	OPEN LINE FROM BUS 52800 TUPELO 4 138 TO BUS 54006 ALLENGT4 138 CKT1	41	Invalid Contingency	
15SP	AEPW	54006 ALLENGT4 138	0.8503	0.7980	OPEN LINE FROM BUS 52800 TUPELO 4 138 TO BUS 54006 ALLENGT4 138 CKT1	41	Invalid Contingency	
15SP	AEPW	53987 COALGAT4 138	0.8523	0.8003	OPEN LINE FROM BUS 52800 TUPELO 4 138 TO BUS 54006 ALLENGT4 138 CKT1	41	Invalid Contingency	
15SP	AEPW	54005 COALGTP4 138	0.8524	0.8004	OPEN LINE FROM BUS 52800 TUPELO 4 138 TO BUS 54006 ALLENGT4 138 CKT1	41	Invalid Contingency	
15SP	AEPW	54020 LEHIGH-4 138	0.8533	0.8014	OPEN LINE FROM BUS 52800 TUPELO 4 138 TO BUS 54006 ALLENGT4 138 CKT1	41	Invalid Contingency	
15SP	AEPW	54012 ATOKA--4 138	0.8555	0.8040	OPEN LINE FROM BUS 52800 TUPELO 4 138 TO BUS 54006 ALLENGT4 138 CKT1	42	Invalid Contingency	
15SP	AEPW	54007 ATOKA--269.0	0.8647	0.8175	OPEN LINE FROM BUS 52800 TUPELO 4 138 TO BUS 54006 ALLENGT4 138 CKT1	45	Invalid Contingency	
15SP	AEPW	54004 ATOKA P269.0	0.8646	0.8191	OPEN LINE FROM BUS 52800 TUPELO 4 138 TO BUS 54006 ALLENGT4 138 CKT1	47	Invalid Contingency	
15SP	AEPW	54016 LANE 269.0	0.8640	0.8218	OPEN LINE FROM BUS 52800 TUPELO 4 138 TO BUS 54006 ALLENGT4 138 CKT1	51	Invalid Contingency	
15SP	AEPW	53998 MCGEECK269.0	0.8742	0.8397	OPEN LINE FROM BUS 52800 TUPELO 4 138 TO BUS 54006 ALLENGT4 138 CKT1	62	Invalid Contingency	
15SP	AEPW	53999 MCGEETP269.0	0.8747	0.8402	OPEN LINE FROM BUS 52800 TUPELO 4 138 TO BUS 54006 ALLENGT4 138 CKT1	62	Invalid Contingency	
15SP	AEPW	54010 PITTSB-269.0	0.8964	0.8690	OPEN LINE FROM BUS 52800 TUPELO 4 138 TO BUS 54006 ALLENGT4 138 CKT1	78	Invalid Contingency	
15SP	AEPW	53997 ANTLERS269.0	0.9068	0.8835	OPEN LINE FROM BUS 52800 TUPELO 4 138 TO BUS 54006 ALLENGT4 138 CKT1	92	Invalid Contingency	
15SP	AEPW	54041 ANTLTAP269.0	0.9088	0.8856	OPEN LINE FROM BUS 52800 TUPELO 4 138 TO BUS 54006 ALLENGT4 138 CKT1	92	Invalid Contingency	
15SP	AEPW	53990 S-MCALT4 138	0.4822	0.4614	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
15SP	AEPW	54032 SMCALTP4 138	0.4857	0.4649	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
15SP	AEPW	54034 MCALT-S4 138	0.4881	0.4674	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
15SP	AEPW	54039 SAVANNA269.0	0.9155	0.8951	OPEN LINE FROM BUS 52800 TUPELO 4 138 TO BUS 54006 ALLENGT4 138 CKT1	105	Invalid Contingency	
							Total Estimated Engineering and Construction Cost	$0

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			NONE IDENTIFIED						107		
05SP	AEPW	WFEC	54122 ELKCTY-2 69 to 55897 ELKCITY2 69 CKT 1	39	92.6	102.8	3.7	54109 CL-AFTP4 138 to 54121 ELKCTY-4 138 CKT 1	77	Refer to Expansion Plan Phase I to Upgrade 4/0 to 795 ACSR Planned In Service date: 12/1/2005	
05SP	AEPW	WFEC	54122 ELKCTY-2 69 to 55897 ELKCITY2 69 CKT 1	39	90.9	101.1	3.7	54109 CL-AFTP4 138 to 54126 HOB-JCT4 138 CKT 1	96	"	
05SH			NONE IDENTIFIED						107		
05FA			NONE IDENTIFIED						107		
05WP			NONE IDENTIFIED						107		
06AP			NONE IDENTIFIED						107		
06G			NONE IDENTIFIED						107		
06SP			NONE IDENTIFIED						107		
06SH			NONE IDENTIFIED						107		
06FA			NONE IDENTIFIED						107		
06WP			NONE IDENTIFIED						107		
07SP	AEPW	WFEC	54122 ELKCTY-2 69 to 55897 ELKCITY2 69 CKT 1	39	90.9	101.2	3.7	54109 CL-AFTP4 138 to 54121 ELKCTY-4 138 CKT 1	107	Refer to Expansion Plan Phase I to Upgrade 4/0 to 795 ACSR Planned In Service date: 12/1/2005	
07WP			NONE IDENTIFIED						107		
10SP			NONE IDENTIFIED						107		
10WP			NONE IDENTIFIED						107		
15SP	AEPW	OKGE	54002 FIXCT4 138 to 55055 MAUD 4 138 CKT 1	107	123.9	127.0	3.2	55054 MAUD 269.0 to 55055 MAUD 4 138 to 55736 MAUD 113.2 CKT 1	0	Upgrade Current Transformer Ratio at Maud Tap to at least AEP's New Upgraded Line Conductor Limit of 191 MVA	$20,000
15SP	AEPW	OKGE	54002 FIXCT4 138 to 55055 MAUD 4 138 CKT 1	107	123.0	126.5	3.5	55913 FRANKLN4 138 to 55917 FRNKLNS4 138 CKT 1	0	See Previous Upgrade Specified For Facility	
15SP	AEPW	OKGE	54002 FIXCT4 138 to 55055 MAUD 4 138 CKT 1	107	119.8	123.3	3.5	55913 FRANKLN4 138 to 56028 PINK SW4 138 CKT 1	0	See Previous Upgrade Specified For Facility	
15SP	AEPW	OKGE	54002 FIXCT4 138 to 55055 MAUD 4 138 CKT 1	107	118.1	121.1	3.0	55055 MAUD 4 138 to 55075 FRSTHIL4 138 CKT 1	0	See Previous Upgrade Specified For Facility	
15SP	AEPW	OKGE	54002 FIXCT4 138 to 55055 MAUD 4 138 CKT 1	107	116.4	119.5	3.1	55054 MAUD 2 69 to 55088 LTRIVER2 69 CKT 1	0	See Previous Upgrade Specified For Facility	
										Total Estimated Engineering and Construction Cost	$20,000

Study Case	AREA	Monitored Bus with Violation	BC Voltage (PU)	TC Voltage (PU)	Outaged Branch Causing Voltage Violation	ATC (MW)	Solution	Estimated Cost
05G		NONE IDENTIFIED				107		
05SP		NONE IDENTIFIED				107		
05SH		NONE IDENTIFIED				107		
05FA		NONE IDENTIFIED				107		
05WP		NONE IDENTIFIED				107		
06AP		NONE IDENTIFIED				107		
06G		NONE IDENTIFIED				107		
06SP	WFEC	55929 GYPSUM 269.0	0.9251	0.8952	OPEN LINE FROM BUS 55929 GYPSUM 269.0 TO BUS 56042 RUSSELL269.0 CKT1	72	Relieved by AEPW Mitigation to turn on Shunt Capacitance at Lake Pauline	
06SP	WFEC	55944 HOLLIS 269.0	0.9245	0.8944	OPEN LINE FROM BUS 55929 GYPSUM 269.0 TO BUS 56042 RUSSELL269.0 CKT1	71	"	
06SH		NONE IDENTIFIED				107		
06FA		NONE IDENTIFIED				107		
06WP		NONE IDENTIFIED				107		
07SP	WFEC	55929 GYPSUM 269.0	0.9243	0.8930	OPEN LINE FROM BUS 55929 GYPSUM 269.0 TO BUS 56042 RUSSELL269.0 CKT1	69	"	
07SP	WFEC	55944 HOLLIS 269.0	0.9235	0.8921	OPEN LINE FROM BUS 55929 GYPSUM 269.0 TO BUS 56042 RUSSELL269.0 CKT1	68	"	
07WP		NONE IDENTIFIED				107		
10SP		NONE IDENTIFIED				107		
10WP		NONE IDENTIFIED				107		
15SP		NONE IDENTIFIED				107		
							Total Estimated Engineering and Construction Cost	$0

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	AEPW	AEPW	EAST 61ST STREET - TULSA SOUTHEAST 138Kv	143	113.7	117.7	5.4	ORU EAST TAP - RIVERSIDE STATION 138Kv	107	Invalid Contingency	
05G	AEPW	AEPW	EAST 61ST STREET - TULSA SOUTHEAST 138Kv	143	100.8	104.3	4.7	ORU EAST TAP - WARNREN TAP 138KV	107	Invalid Contingency	
05SP	AEPW	GRDA	CATOOSA 161/138/13.8KV TRANSFORMER CKT 1	150	110.5	113.1	3.6	CATOOSA 161/138KV TRANSFORMER 2	107	GRDA has mitigation plan for outage of Catoosa 161/138kV Xfr Ckts 1 or 2	
05SP	AEPW	GRDA	CATOOSA 161/138/13.8KV TRANSFORMER CKT 2	150	110.9	113.5	3.6	CATOOSA 161/138KV TRANSFORMER 1	107	"	
05SP	GRDA	AEPW	CATOOSA 161/138/13.8KV TRANSFORMER CKT 1	150	110.4	113.0	3.6	CATOOSA 161/138KV TRANSFORMER 2	107	"	
05SP	GRDA	AEPW	CATOOSA 161/138/13.8KV TRANSFORMER CKT 2	150	110.7	113.3	3.6	CATOOSA 161/138KV TRANSFORMER 1	107	"	
05SP	AEPW	AEPW	EAST 61ST STREET - TULSA SOUTHEAST 138Kv	187	101.9	104.9	5.2	ORU EAST TAP - RIVERSIDE STATION 138Kv	107	Invalid Contingency	
05SH	AEPW	GRDA	CATOOSA 161/138/13.8KV TRANSFORMER CKT 2	150	100.2	102.7	3.6	CATOOSA 161/138KV TRANSFORMER 1	107	GRDA has mitigation plan for outage of Catoosa 161/138kV Xfr Ckts 1 or 2	
05SH	AEPW	AEPW	EAST 61ST STREET - TULSA SOUTHEAST 138Kv	143	111.3	115.1	5.1	ORU EAST TAP - RIVERSIDE STATION 138Kv	107	Invalid Contingency	
05SH	GRDA	AEPW	CATOOSA 161/138/13.8KV TRANSFORMER CKT 2	150	100.0	102.5	3.6	CATOOSA 161/138KV TRANSFORMER 1	107	GRDA has mitigation plan for outage of Catoosa 161/138kV Xfr Ckts 1 or 2	
05SH	AEPW	GRDA	CATOOSA 161/138/13.8KV TRANSFORMER CKT 1	150	99.8	102.4	3.6	CATOOSA 161/138KV TRANSFORMER 2	107	"	
05SH	GRDA	AEPW	CATOOSA 161/138/13.8KV TRANSFORMER CKT 1	150	99.6	102.2	3.6	CATOOSA 161/138KV TRANSFORMER 2	107	"	
05SH	AEPW	AEPW	EAST 61ST STREET - TULSA SOUTHEAST 138Kv	143	97.9	101.3	4.5	ORU EAST TAP - WARNREN TAP 138KV	107	Invalid Contingency	
05FA			NONE IDENTIFIED						107		
05WP	AEPW	GRDA	CATOOSA 161/138/13.8KV TRANSFORMER CKT 1	150	103.3	105.8	3.6	CATOOSA 161/138KV TRANSFORMER 2	107	GRDA has mitigation plan for outage of Catoosa 161/138kV Xfr Ckts 1 or 2	
05WP	AEPW	GRDA	CATOOSA 161/138/13.8KV TRANSFORMER CKT 2	150	103.6	106.2	3.6	CATOOSA 161/138KV TRANSFORMER 1	107	"	
05WP	GRDA	AEPW	CATOOSA 161/138/13.8KV TRANSFORMER CKT 1	150	103.1	105.6	3.6	CATOOSA 161/138KV TRANSFORMER 2	107	"	
05WP	GRDA	AEPW	CATOOSA 161/138/13.8KV TRANSFORMER CKT 2	150	103.4	106.0	3.6	CATOOSA 161/138KV TRANSFORMER 1	107	"	
06AP			NONE IDENTIFIED						107		
06G			NONE IDENTIFIED						107		
06SP	AEPW	GRDA	CATOOSA 161/138/13.8KV TRANSFORMER CKT 1	150	109.6	112.2	3.6	CATOOSA 161/138KV TRANSFORMER 2	107	GRDA has mitigation plan for outage of Catoosa 161/138kV Xfr Ckts 1 or 2	
06SP	AEPW	GRDA	CATOOSA 161/138/13.8KV TRANSFORMER CKT 2	150	110.1	112.5	3.5	CATOOSA 161/138KV TRANSFORMER 1	107	"	
06SP	GRDA	AEPW	CATOOSA 161/138/13.8KV TRANSFORMER CKT 1	150	109.5	112.1	3.6	CATOOSA 161/138KV TRANSFORMER 2	107	"	
06SP	GRDA	AEPW	CATOOSA 161/138/13.8KV TRANSFORMER CKT 2	150	109.9	112.4	3.5	CATOOSA 161/138KV TRANSFORMER 1	107	"	
06SP	AEPW	AEPW	EAST 61ST STREET - TULSA SOUTHEAST 138Kv	187	103.4	106.4	5.2	ORU EAST TAP - RIVERSIDE STATION 138Kv	107	Invalid Contingency	
06SH	AEPW	GRDA	CATOOSA 161/138/13.8KV TRANSFORMER CKT 1	150	101.0	103.6	3.7	CATOOSA 161/138KV TRANSFORMER 2	107	GRDA has mitigation plan for outage of Catoosa 161/138kV Xfr Ckts 1 or 2	
06SH	AEPW	GRDA	CATOOSA 161/138/13.8KV TRANSFORMER CKT 2	150	101.3	103.9	3.6	CATOOSA 161/138KV TRANSFORMER 1	107	"	
06SH	GRDA	AEPW	CATOOSA 161/138/13.8KV TRANSFORMER CKT 1	150	100.8	103.4	3.7	CATOOSA 161/138KV TRANSFORMER 2	107	"	
06SH	GRDA	AEPW	CATOOSA 161/138/13.8KV TRANSFORMER CKT 2	150	101.2	103.7	3.6	CATOOSA 161/138KV TRANSFORMER 1	107	"	
06SH	AEPW	AEPW	EAST 61ST STREET - TULSA SOUTHEAST 138Kv	143	112.9	116.7	5.1	ORU EAST TAP - RIVERSIDE STATION 138Kv	107	Invalid Contingency	
06SH	AEPW	AEPW	EAST 61ST STREET - TULSA SOUTHEAST 138Kv	143	99.3	102.6	4.5	ORU EAST TAP - WARNREN TAP 138KV	107	Invalid Contingency	
06FA			NONE IDENTIFIED						107		
06WP	AEPW	GRDA	CATOOSA 161/138/13.8KV TRANSFORMER CKT 1	150	102.6	105.1	3.5	CATOOSA 161/138KV TRANSFORMER 2	107	GRDA has mitigation plan for outage of Catoosa 161/138kV Xfr Ckts 1 or 2	
06WP	AEPW	GRDA	CATOOSA 161/138/13.8KV TRANSFORMER CKT 2	150	103.0	105.5	3.5	CATOOSA 161/138KV TRANSFORMER 1	107	"	
06WP	GRDA	AEPW	CATOOSA 161/138/13.8KV TRANSFORMER CKT 1	150	102.5	105.0	3.5	CATOOSA 161/138KV TRANSFORMER 2	107	"	
06WP	GRDA	AEPW	CATOOSA 161/138/13.8KV TRANSFORMER CKT 2	150	102.8	105.3	3.5	CATOOSA 161/138KV TRANSFORMER 1	107	"	
07SP	GRDA	AEPW	CATOOSA 161/138/13.8KV TRANSFORMER CKT 1	150	111.6	113.7	3.0	CATOOSA 161/138KV TRANSFORMER 2	107	"	
07SP	GRDA	AEPW	CATOOSA 161/138/13.8KV TRANSFORMER CKT 2	150	111.9	114.1	3.0	CATOOSA 161/138KV TRANSFORMER 1	107	"	
07SP	AEPW	AEPW	EAST 61ST STREET - TULSA SOUTHEAST 138Kv	187	110.5	113.7	5.6	ORU EAST TAP - RIVERSIDE STATION 138Kv	107	Invalid Contingency	
07SP	AEPW	AEPW	EAST 61ST STREET - TULSA SOUTHEAST 138Kv	187	98.1	100.9	5.0	ORU EAST TAP - WARNREN TAP 138KV	107	Invalid Contingency	
07WP			NONE IDENTIFIED						107		
10SP	AEPW	AEPW	53RD & GARNETT NORTH TAP - TULSA SOUTHEAST 138Kv	143	101.3	104.1	3.7	121ST & LYNN LANE - ONETA 138KV	107	Invalid Contingency	
10SP	AEPW	AEPW	EAST 61ST STREET - TULSA SOUTHEAST 138Kv	187	115.0	118.2	5.6	ORU EAST TAP - RIVERSIDE STATION 138Kv	107	Invalid Contingency	
10SP	AEPW	AEPW	EAST 61ST STREET - TULSA SOUTHEAST 138Kv	187	101.9	104.7	4.9	ORU EAST TAP - WARNREN TAP 138KV	107	Invalid Contingency	
10SP	AEPW	GRDA	CATOOSA 161/138/13.8KV TRANSFORMER CKT 2	150	98.3	100.8	3.6	CATOOSA 161/138KV TRANSFORMER 1	107	GRDA has mitigation plan for outage of Catoosa 161/138kV Xfr Ckts 1 or 2	
10SP	GRDA	AEPW	CATOOSA 161/138/13.8KV TRANSFORMER CKT 2	150	98.2	100.8	3.6	CATOOSA 161/138KV TRANSFORMER 1	107	"	
10SP	AEPW	GRDA	CATOOSA 161/138/13.8KV TRANSFORMER CKT 1	150	98.0	100.5	3.6	CATOOSA 161/138KV TRANSFORMER 2	107	"	
10SP	GRDA	AEPW	CATOOSA 161/138/13.8KV TRANSFORMER CKT 1	150	97.9	100.5	3.6	CATOOSA 161/138KV TRANSFORMER 2	107	"	
10WP			NONE IDENTIFIED						107		
15SP	AEPW	AEPW	53RD & GARNETT NORTH TAP - TULSA SOUTHEAST 138Kv	143	113.7	116.7	3.9	121ST & LYNN LANE - ONETA 138KV	107	Invalid Contingency	
15SP	AEPW	AEPW	EAST 61ST STREET - TULSA SOUTHEAST 138Kv	187	124.4	127.7	5.7	ORU EAST TAP - RIVERSIDE STATION 138Kv	107	Invalid Contingency	
15SP	AEPW	AEPW	EAST 61ST STREET - TULSA SOUTHEAST 138Kv	187	110.1	113.0	5.1	ORU EAST TAP - WARNREN TAP 138KV	107	Invalid Contingency	
										Total Estimated Engineering and Construction Cost	$0

Study Case	AREA	Monitored Bus with Violation	BC Voltage (PU)	TC Voltage (PU)	Outaged Branch Causing Voltage Violation	ATC (MW)	Solution	Estimated Cost
05G		NONE IDENTIFIED				107		
05SP	AEPW	53851 46ST--E4 138	0.4869	0.4465	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
05SP	AEPW	53834 W.ED.-E4 138	0.4884	0.4479	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
05SP	AEPW	53757 DENVTAP4 138	0.4895	0.4491	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
05SP	AEPW	53754 DENVR-E4 138	0.4915	0.4511	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
05SP	AEPW	53990 S-MCALT4 138	0.6053	0.5775	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
05SP	AEPW	54032 SMCALTP4 138	0.6091	0.5814	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
05SP	AEPW	54034 MCALT-S4 138	0.6117	0.5841	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
05SP	AEPW	54024 MCALEST269.0	0.6613	0.6366	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
05SP	AEPW	54038 A.DEPOT269.0	0.7050	0.6825	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
05SP	AEPW	54039 SAVANNA269.0	0.7115	0.6894	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
05SH	AEPW	53851 46ST--E4 138	0.8455	0.8184	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
05SH	AEPW	53834 W.ED.-E4 138	0.8464	0.8193	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
05SH	AEPW	53757 DENVTAP4 138	0.8471	0.8201	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
05SH	AEPW	53754 DENVR-E4 138	0.8482	0.8213	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
05SH	AEPW	53990 S-MCALT4 138	0.7381	0.7131	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
05SH	AEPW	54032 SMCALTP4 138	0.7408	0.7160	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
05SH	AEPW	54034 MCALT-S4 138	0.7426	0.7179	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
05SH	AEPW	54024 MCALEST269.0	0.7785	0.7560	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
05FA		NONE IDENTIFIED				107		
05WP		NONE IDENTIFIED				107		
06AP		NONE IDENTIFIED				107		
06G		NONE IDENTIFIED				107		
06SP	AEPW	53851 46ST--E4 138	0.4631	0.4271	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
06SP	AEPW	53834 W.ED.-E4 138	0.4646	0.4286	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
06SP	AEPW	53757 DENVTAP4 138	0.4658	0.4298	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
06SP	AEPW	53754 DENVR-E4 138	0.4677	0.4318	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
06SP	AEPW	53990 S-MCALT4 138	0.5851	0.5588	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
06SP	AEPW	54032 SMCALTP4 138	0.5890	0.5628	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
06SP	AEPW	54034 MCALT-S4 138	0.5915	0.5655	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
06SP	AEPW	54024 MCALEST269.0	0.6429	0.6197	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
06SP	AEPW	54038 A.DEPOT269.0	0.6884	0.6672	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
06SP	AEPW	54039 SAVANNA269.0	0.6952	0.6744	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
06SH	AEPW	53851 46ST--E4 138	0.8344	0.8066	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
06SH	AEPW	53834 W.ED.-E4 138	0.8353	0.8076	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
06SH	AEPW	53757 DENVTAP4 138	0.8360	0.8084	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
06SH	AEPW	53754 DENVR-E4 138	0.8372	0.8096	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
06WP		NONE IDENTIFIED				107		
07SP	AEPW	53851 46ST--E4 138	0.4500	0.4164	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
07SP	AEPW	53834 W.ED.-E4 138	0.4515	0.4180	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
07SP	AEPW	53757 DENVTAP4 138	0.4527	0.4191	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
07SP	AEPW	53754 DENVR-E4 138	0.4547	0.4212	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
07SP	AEPW	53990 S-MCALT4 138	0.5830	0.5559	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
07SP	AEPW	54032 SMCALTP4 138	0.5868	0.5598	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
07SP	AEPW	54034 MCALT-S4 138	0.5893	0.5625	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
07SP	AEPW	54024 MCALEST269.0	0.6407	0.6168	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
07SP	AEPW	54038 A.DEPOT269.0	0.6868	0.6650	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
07SP	AEPW	54039 SAVANNA269.0	0.6936	0.6722	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
07WP		NONE IDENTIFIED				107		
10SP	AEPW	54276 JERICHO3 115	0.9242	0.8746	OPEN LINE FROM BUS 50932 KIRBY3 115 TO BUS 54276 JERICHO3 115 CKT1	52	Invalid Contingency	
10SP	AEPW	53990 S-MCALT4 138	0.5925	0.5645	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
10SP	AEPW	54032 SMCALTP4 138	0.5961	0.5683	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
10SP	AEPW	54034 MCALT-S4 138	0.5986	0.5709	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
10SP	AEPW	53851 46ST--E4 138	0.4023	0.3752	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
10SP	AEPW	53834 W.ED.-E4 138	0.4039	0.3769	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
10SP	AEPW	53757 DENVTAP4 138	0.4050	0.3780	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
10SP	AEPW	53754 DENVR-E4 138	0.4070	0.3801	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
10SP	AEPW	54024 MCALEST269.0	0.6503	0.6255	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
10SP	AEPW	54038 A.DEPOT269.0	0.6970	0.6747	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
10SP	AEPW	54039 SAVANNA269.0	0.7039	0.6819	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
10SP	AEPW	54278 CLARDON269.0	0.9505	0.8994	OPEN LINE FROM BUS 50932 KIRBY3 115 TO BUS 54276 JERICHO3 115 CKT1	106	Upgrade capacitor bank at NW Memphis from 6 MVAR to 12 MVAR and install +/- 10 MVAR DVAR device.	$2,500,000
10SP	AEPW	54278 CLARDON269.0	0.9509	0.8998	OPEN LINE FROM BUS 54276 JERICHO3 115 TO BUS 54277 JERIC2WT69.0 TO BUS 54303 JH2TERT 14.4 CKT1	107	See Previous Upgrade Specified For Facility	
10SP	AEPW	54279 CLARREA269.0	0.9508	0.8999	OPEN LINE FROM BUS 50932 KIRBY3 115 TO BUS 54276 JERICHO3 115 CKT1	107	See Previous Upgrade Specified For Facility	
10WP	AEPW	53851 46ST--E4 138	0.8707	0.8497	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
10WP	AEPW	53834 W.ED.-E4 138	0.8714	0.8504	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
10WP	AEPW	53757 DENVTAP4 138	0.8719	0.8510	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
10WP	AEPW	53754 DENVR-E4 138	0.8728	0.8519	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	

15SP	AEPW	53988 ALLENNG4 138	0.8689	0.8243	OPEN LINE FROM BUS 52800 TUPELO 4 138 TO BUS 54006 ALLENGT4 138 CKT1	48	Invalid Contingency	
15SP	AEPW	54062 EXPCOLG4 138	0.8690	0.8245	OPEN LINE FROM BUS 52800 TUPELO 4 138 TO BUS 54006 ALLENGT4 138 CKT1	48	Invalid Contingency	
15SP	AEPW	54061 EXPCOLT4 138	0.8691	0.8246	OPEN LINE FROM BUS 52800 TUPELO 4 138 TO BUS 54006 ALLENGT4 138 CKT1	48	Invalid Contingency	
15SP	AEPW	54006 ALLENGT4 138	0.8699	0.8255	OPEN LINE FROM BUS 52800 TUPELO 4 138 TO BUS 54006 ALLENGT4 138 CKT1	48	Invalid Contingency	
15SP	AEPW	53987 COALGAT4 138	0.8719	0.8277	OPEN LINE FROM BUS 52800 TUPELO 4 138 TO BUS 54006 ALLENGT4 138 CKT1	48	Invalid Contingency	
15SP	AEPW	54005 COALGTP4 138	0.8719	0.8277	OPEN LINE FROM BUS 52800 TUPELO 4 138 TO BUS 54006 ALLENGT4 138 CKT1	48	Invalid Contingency	
15SP	AEPW	54020 LEHIGH-4 138	0.8728	0.8287	OPEN LINE FROM BUS 52800 TUPELO 4 138 TO BUS 54006 ALLENGT4 138 CKT1	49	Invalid Contingency	
15SP	AEPW	54012 ATOKA--4 138	0.8750	0.8312	OPEN LINE FROM BUS 52800 TUPELO 4 138 TO BUS 54006 ALLENGT4 138 CKT1	49	Invalid Contingency	
15SP	AEPW	54007 ATOKA--269.0	0.8829	0.8428	OPEN LINE FROM BUS 52800 TUPELO 4 138 TO BUS 54006 ALLENGT4 138 CKT1	53	Invalid Contingency	
15SP	AEPW	54004 ATOKA P269.0	0.8817	0.8429	OPEN LINE FROM BUS 52800 TUPELO 4 138 TO BUS 54006 ALLENGT4 138 CKT1	55	Invalid Contingency	
15SP	AEPW	54016 LANE 269.0	0.8820	0.8461	OPEN LINE FROM BUS 52800 TUPELO 4 138 TO BUS 54006 ALLENGT4 138 CKT1	60	Invalid Contingency	
15SP	AEPW	53998 MCGEECK269.0	0.8909	0.8615	OPEN LINE FROM BUS 52800 TUPELO 4 138 TO BUS 54006 ALLENGT4 138 CKT1	73	Invalid Contingency	
15SP	AEPW	53999 MCGEETP269.0	0.8913	0.8619	OPEN LINE FROM BUS 52800 TUPELO 4 138 TO BUS 54006 ALLENGT4 138 CKT1	73	Invalid Contingency	
15SP	AEPW	54010 PITTSB-269.0	0.9055	0.8822	OPEN LINE FROM BUS 52800 TUPELO 4 138 TO BUS 54006 ALLENGT4 138 CKT1	92	Invalid Contingency	
15SP	AEPW	53990 S-MCALT4 138	0.4838	0.4634	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
15SP	AEPW	54032 SMCALTP4 138	0.4873	0.4670	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
15SP	AEPW	54034 MCALT-S4 138	0.4897	0.4695	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
							Total Estimated Engineering and Construction Cost	$2,500,000

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			NONE IDENTIFIED						107		
05SP			NONE IDENTIFIED						107		
05SH			NONE IDENTIFIED						107		
05FA			NONE IDENTIFIED						107		
05WP	AEPW	GRDA	53802 CATOOSA4 138 WND 1 CATAUTO2 2	150	103.6	106.2	3.6	53802 CATOOSA4 138 to 54438 CATSAGR5 161 to 54633 CATTER1 13.8 CKT 1	107	GRDA has mitigation plan for outage of Catoosa 161/138kV Xfr Ckts 1 or 2	
05WP	GRDA	AEPW	54438 CATSAGR5 161 WND 2 CATAUTO1 1	150	103.1	105.6	3.6	53802 CATOOSA4 138 to 54438 CATSAGR5 161 to 54634 CATTER2 13.8 CKT 2	107	"	
05WP	GRDA	AEPW	54438 CATSAGR5 161 WND 2 CATAUTO2 2	150	103.4	106.0	3.6	53802 CATOOSA4 138 to 54438 CATSAGR5 161 to 54633 CATTER1 13.8 CKT 1	107	"	
06AP			NONE IDENTIFIED						107		
06G			NONE IDENTIFIED						107		
06SP	AEPW	GRDA	53802 CATOOSA4 138 WND 1 CATAUTO1 1	150	109.6	112.2	3.6	53802 CATOOSA4 138 to 54438 CATSAGR5 161 to 54634 CATTER2 13.8 CKT 2	107	GRDA has mitigation plan for outage of Catoosa 161/138kV Xfr Ckts 1 or 2	
06SP	AEPW	GRDA	53802 CATOOSA4 138 WND 1 CATAUTO2 2	150	110.1	112.5	3.5	53802 CATOOSA4 138 to 54438 CATSAGR5 161 to 54633 CATTER1 13.8 CKT 1	107	"	
06SP	GRDA	AEPW	54438 CATSAGR5 161 WND 2 CATAUTO1 1	150	109.5	112.1	3.6	53802 CATOOSA4 138 to 54438 CATSAGR5 161 to 54634 CATTER2 13.8 CKT 2	107	"	
06SP	GRDA	AEPW	54438 CATSAGR5 161 WND 2 CATAUTO2 2	150	109.9	112.4	3.5	53802 CATOOSA4 138 to 54438 CATSAGR5 161 to 54633 CATTER1 13.8 CKT 1	107	"	
06SH	AEPW	GRDA	53802 CATOOSA4 138 WND 1 CATAUTO1 1	150	101.0	103.6	3.7	53802 CATOOSA4 138 to 54438 CATSAGR5 161 to 54634 CATTER2 13.8 CKT 2	107	"	
06SH	AEPW	GRDA	53802 CATOOSA4 138 WND 1 CATAUTO2 2	150	101.3	103.9	3.6	53802 CATOOSA4 138 to 54438 CATSAGR5 161 to 54633 CATTER1 13.8 CKT 1	107	"	
06SH	GRDA	AEPW	54438 CATSAGR5 161 WND 2 CATAUTO1 1	150	100.8	103.4	3.7	53802 CATOOSA4 138 to 54438 CATSAGR5 161 to 54634 CATTER2 13.8 CKT 2	107	"	
06SH	GRDA	AEPW	54438 CATSAGR5 161 WND 2 CATAUTO2 2	150	101.2	103.7	3.6	53802 CATOOSA4 138 to 54438 CATSAGR5 161 to 54633 CATTER1 13.8 CKT 1	107	"	
06FA			NONE IDENTIFIED						107		
06WP	AEPW	GRDA	53802 CATOOSA4 138 WND 1 CATAUTO1 1	150	102.6	105.1	3.5	53802 CATOOSA4 138 to 54438 CATSAGR5 161 to 54634 CATTER2 13.8 CKT 2	107	GRDA has mitigation plan for outage of Catoosa 161/138kV Xfr Ckts 1 or 2	
06WP	AEPW	GRDA	53802 CATOOSA4 138 WND 1 CATAUTO2 2	150	103.0	105.5	3.5	53802 CATOOSA4 138 to 54438 CATSAGR5 161 to 54633 CATTER1 13.8 CKT 1	107	"	
06WP	GRDA	AEPW	54438 CATSAGR5 161 WND 2 CATAUTO1 1	150	102.5	105.0	3.5	53802 CATOOSA4 138 to 54438 CATSAGR5 161 to 54634 CATTER2 13.8 CKT 2	107	"	
06WP	GRDA	AEPW	54438 CATSAGR5 161 WND 2 CATAUTO2 2	150	102.8	105.3	3.5	53802 CATOOSA4 138 to 54438 CATSAGR5 161 to 54633 CATTER1 13.8 CKT 1	107	"	
07SP	GRDA	AEPW	54438 CATSAGR5 161 WND 2 CATAUTO1 1	150	111.6	113.7	3.0	53802 CATOOSA4 138 to 54438 CATSAGR5 161 to 54634 CATTER2 13.8 CKT 2	107	"	
07SP	GRDA	AEPW	54438 CATSAGR5 161 WND 2 CATAUTO2 2	150	111.9	114.1	3.0	53802 CATOOSA4 138 to 54438 CATSAGR5 161 to 54633 CATTER1 13.8 CKT 1	107	"	
07WP			NONE IDENTIFIED						107		
10SP	AEPW	GRDA	53802 CATOOSA4 138 WND 1 CATAUTO1 1	150	98.0	100.5	3.6	53802 CATOOSA4 138 to 54438 CATSAGR5 161 to 54634 CATTER2 13.8 CKT 2	107	GRDA has mitigation plan for outage of Catoosa 161/138kV Xfr Ckts 1 or 2	
10SP	AEPW	GRDA	53802 CATOOSA4 138 WND 1 CATAUTO2 2	150	98.3	100.8	3.6	53802 CATOOSA4 138 to 54438 CATSAGR5 161 to 54633 CATTER1 13.8 CKT 1	107	"	
10SP	GRDA	AEPW	54438 CATSAGR5 161 WND 2 CATAUTO1 1	150	97.9	100.5	3.6	53802 CATOOSA4 138 to 54438 CATSAGR5 161 to 54634 CATTER2 13.8 CKT 2	107	"	
10SP	GRDA	AEPW	54438 CATSAGR5 161 WND 2 CATAUTO2 2	150	98.2	100.8	3.6	53802 CATOOSA4 138 to 54438 CATSAGR5 161 to 54633 CATTER1 13.8 CKT 1	107	"	
10WP			NONE IDENTIFIED						107		
15SP			NONE IDENTIFIED						107		
										Total Estimated Engineering and Construction Cost	$0

Study Case	AREA	Monitored Bus with Violation	BC Voltage (PU)	TC Voltage (PU)	Outaged Branch Causing Voltage Violation	ATC (MW)	Solution	Estimated Cost
05G		NONE IDENTIFIED				107		
05SP		NONE IDENTIFIED				107		
05SH		NONE IDENTIFIED				107		
05FA		NONE IDENTIFIED				107		
05WP		NONE IDENTIFIED				107		
06AP		NONE IDENTIFIED				107		
06G		NONE IDENTIFIED				107		
06SP		NONE IDENTIFIED				107		
06SH		NONE IDENTIFIED				107		
06FA	WERE	57013 MOUND 4 138	0.9145	0.8869	OPEN LINE FROM BUS 57011 HALSTDN4 138 TO BUS 57013 MOUND 4 138 CKT1	78	Relieved due to Westar Operating Procedure 1105 - Outage of the Moundridge to Halstead 138kV Line	
06WP		NONE IDENTIFIED				107		
07SP		NONE IDENTIFIED				107		
07WP		NONE IDENTIFIED				107		
10SP		NONE IDENTIFIED				107		
10WP		NONE IDENTIFIED				107		
15SP		NONE IDENTIFIED				107		
							Total Estimated Engineering and Construction Cost	$0

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	AEPW	AEPW	EAST 61ST STREET - TULSA SOUTHEAST 138KV	143	113.4	117.4	5.4	ORU EAST TAP - RIVERSIDE STATION 138KV	107	Invalid Contingency	
05G	AEPW	AEPW	EAST 61ST STREET - TULSA SOUTHEAST 138KV	143	100.6	104.1	4.7	ORU EAST TAP - WARNREN TAP 138KV	107	Invalid Contingency	
05SP	AEPW	AEPW	EAST 61ST STREET - TULSA SOUTHEAST 138KV	187	101.8	104.8	5.2	ORU EAST TAP - RIVERSIDE STATION 138KV	107	Invalid Contingency	
05SH	AEPW	AEPW	EAST 61ST STREET - TULSA SOUTHEAST 138KV	143	111.2	115.0	5.1	ORU EAST TAP - RIVERSIDE STATION 138KV	107	Invalid Contingency	
05SH	AEPW	AEPW	EAST 61ST STREET - TULSA SOUTHEAST 138KV	143	97.8	101.2	4.5	ORU EAST TAP - WARNREN TAP 138KV	107	Invalid Contingency	
05FA			NONE IDENTIFIED						107		
05WP			NONE IDENTIFIED						107		
06AP			NONE IDENTIFIED						107		
06G			NONE IDENTIFIED						107		
06SP	AEPW	AEPW	EAST 61ST STREET - TULSA SOUTHEAST 138KV	187	103.4	106.3	5.2	ORU EAST TAP - RIVERSIDE STATION 138KV	107	Invalid Contingency	
06SH	AEPW	AEPW	EAST 61ST STREET - TULSA SOUTHEAST 138KV	143	112.8	116.6	5.1	ORU EAST TAP - RIVERSIDE STATION 138KV	107	Invalid Contingency	
06SH	AEPW	AEPW	EAST 61ST STREET - TULSA SOUTHEAST 138KV	143	99.2	102.6	4.5	ORU EAST TAP - WARNREN TAP 138KV	107	Invalid Contingency	
06FA			NONE IDENTIFIED						107		
06WP			NONE IDENTIFIED						107		
07SP	AEPW	AEPW	EAST 61ST STREET - TULSA SOUTHEAST 138KV	187	110.4	113.6	5.5	ORU EAST TAP - RIVERSIDE STATION 138KV	107	Invalid Contingency	
07SP	AEPW	AEPW	EAST 61ST STREET - TULSA SOUTHEAST 138KV	187	98.0	100.8	4.9	ORU EAST TAP - WARNREN TAP 138KV	107	Invalid Contingency	
07WP			NONE IDENTIFIED						107		
10SP	AEPW	AEPW	53RD & GARNETT NORTH TAP - TULSA SOUTHEAST 138KV	143	101.3	104.1	3.7	121ST & LYNN LANE - ONETA 138KV	107	Invalid Contingency	
10SP	AEPW	AEPW	EAST 61ST STREET - TULSA SOUTHEAST 138KV	187	115.0	118.1	5.6	ORU EAST TAP - RIVERSIDE STATION 138KV	107	Invalid Contingency	
10SP	AEPW	AEPW	EAST 61ST STREET - TULSA SOUTHEAST 138KV	187	101.9	104.7	4.9	ORU EAST TAP - WARNREN TAP 138KV	107	Invalid Contingency	
10WP			NONE IDENTIFIED						107		
15SP	AEPW	AEPW	53RD & GARNETT NORTH TAP - TULSA SOUTHEAST 138KV	143	113.7	116.6	3.9	121ST & LYNN LANE - ONETA 138KV	107	Invalid Contingency	
15SP	AEPW	AEPW	ORU WEST TAP - RIVERSIDE STATION 138KV	304	102.7	105.3	7.4	ORU EAST TAP - RIVERSIDE STATION 138KV ORU EAST TAP - ORU EAST 138KV ORU EAST TAP - WARNREN TAP 138KV WARNREN TAP - 81ST & YALE SOUTH 138KV WARNREN TAP - 96TH & YALE 138KV 81ST & YALE SOUTH - WARREN WEST 138KV	0	See Previous Upgrade Specified For Facility	
15SP	AEPW	AEPW	EAST 61ST STREET - TULSA SOUTHEAST 138KV	187	124.4	127.6	5.7	ORU EAST TAP - RIVERSIDE STATION 138KV	107	Invalid Contingency	
15SP	AEPW	AEPW	EAST 61ST STREET - TULSA SOUTHEAST 138KV	187	110.1	113.0	5.0	ORU EAST TAP - WARNREN TAP 138KV	107	Invalid Contingency	
15SP	AEPW	OKGE	FIXICO TAP - MAUD 138KV	107	100.7	103.9	3.2	FRANKLIN - FRANKLIN SW 138KV	0	See Previous Upgrade Specified For Facility	
15SP	AEPW	OKGE	FIXICO TAP - MAUD 138KV	107	97.4	100.6	3.2	FRANKLIN - PINK SW 138KV	86	See Previous Upgrade Specified For Facility	
										Total Estimated Engineering and Construction Cost	$0

Study Case	AREA	Monitored Bus with Violation	BC Voltage (PU)	TC Voltage (PU)	Outaged Branch Causing Voltage Violation	ATC (MW)	Solution	Estimated Cost
05G	AEPW	53990 S-MCALT4 138	0.7634	0.7416	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
05G	AEPW	54032 SMCALTP4 138	0.7660	0.7444	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
05G	AEPW	54034 MCALT-S4 138	0.7677	0.7462	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
05SP	AEPW	53851 46ST--E4 138	0.4877	0.4471	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
05SP	AEPW	53834 W.ED.-E4 138	0.4891	0.4486	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
05SP	AEPW	53757 DENVTAP4 138	0.4903	0.4498	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
05SP	AEPW	53754 DENVR-E4 138	0.4922	0.4517	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
05SP	AEPW	53990 S-MCALT4 138	0.6117	0.5842	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
05SP	AEPW	54032 SMCALTP4 138	0.6155	0.5882	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
05SP	AEPW	54034 MCALT-S4 138	0.6180	0.5908	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
05SP	AEPW	54024 MCALEST269.0	0.6674	0.6430	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
05SP	AEPW	54038 A.DEPOT269.0	0.7120	0.6898	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
05SP	AEPW	54039 SAVANNA269.0	0.7186	0.6968	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
05SH	AEPW	53851 46ST--E4 138	0.8460	0.8190	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
05SH	AEPW	53834 W.ED.-E4 138	0.8469	0.8199	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
05SH	AEPW	53757 DENVTAP4 138	0.8475	0.8207	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
05SH	AEPW	53754 DENVR-E4 138	0.8487	0.8219	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
05FA		NONE IDENTIFIED				107		
05WP		NONE IDENTIFIED				107		
06AP		NONE IDENTIFIED				107		
06SP	AEPW	53851 46ST--E4 138	0.4638	0.4277	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
06SP	AEPW	53834 W.ED.-E4 138	0.4653	0.4292	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
06SP	AEPW	53757 DENVTAP4 138	0.4664	0.4304	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
06SP	AEPW	53754 DENVR-E4 138	0.4684	0.4324	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
06SP	AEPW	53990 S-MCALT4 138	0.5921	0.5651	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
06SP	AEPW	54032 SMCALTP4 138	0.5959	0.5691	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
06SP	AEPW	54034 MCALT-S4 138	0.5985	0.5718	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
06SP	AEPW	54024 MCALEST269.0	0.6496	0.6257	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
06SP	AEPW	54038 A.DEPOT269.0	0.6959	0.6742	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
06SP	AEPW	54039 SAVANNA269.0	0.7027	0.6814	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
06SH	AEPW	53851 46ST--E4 138	0.8304	0.8074	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
06SH	AEPW	53834 W.ED.-E4 138	0.8313	0.8083	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
06SH	AEPW	53757 DENVTAP4 138	0.8320	0.8091	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
06SH	AEPW	53754 DENVR-E4 138	0.8332	0.8103	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
06FA		NONE IDENTIFIED				107		
06WP		NONE IDENTIFIED				107		
07SP	AEPW	53851 46ST--E4 138	0.4518	0.4174	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
07SP	AEPW	53834 W.ED.-E4 138	0.4533	0.4189	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
07SP	AEPW	53757 DENVTAP4 138	0.4545	0.4201	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
07SP	AEPW	53754 DENVR-E4 138	0.4565	0.4221	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
07SP	AEPW	53990 S-MCALT4 138	0.5882	0.5615	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
07SP	AEPW	54032 SMCALTP4 138	0.5920	0.5654	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
07SP	AEPW	54034 MCALT-S4 138	0.5946	0.5681	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
07SP	AEPW	54024 MCALEST269.0	0.6458	0.6221	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
07SP	AEPW	54038 A.DEPOT269.0	0.6927	0.6712	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
07SP	AEPW	54039 SAVANNA269.0	0.6996	0.6784	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
07WP		NONE IDENTIFIED				107		
10SP	AEPW	54276 JERICHO3 115	0.9226	0.8742	OPEN LINE FROM BUS 50932 KIRBY3 115 TO BUS 54276 JERICHO3 115 CKT1	50	Invalid Contingency	
10SP	AEPW	53990 S-MCALT4 138	0.5977	0.5690	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
10SP	AEPW	54032 SMCALTP4 138	0.6013	0.5728	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
10SP	AEPW	54034 MCALT-S4 138	0.6038	0.5754	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
10SP	AEPW	53851 46ST--E4 138	0.4028	0.3757	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
10SP	AEPW	53834 W.ED.-E4 138	0.4044	0.3773	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
10SP	AEPW	53757 DENVTAP4 138	0.4056	0.3785	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
10SP	AEPW	53754 DENVR-E4 138	0.4076	0.3805	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
10SP	AEPW	54024 MCALEST269.0	0.6552	0.6298	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
10SP	AEPW	54038 A.DEPOT269.0	0.7027	0.6797	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
10SP	AEPW	54039 SAVANNA269.0	0.7095	0.6869	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
10SP	AEPW	54278 CLARDON269.0	0.9488	0.8990	OPEN LINE FROM BUS 50932 KIRBY3 115 TO BUS 54276 JERICHO3 115 CKT1	105	See Previous Upgrade Specified For Facility	
10SP	AEPW	54279 CLARREA269.0	0.9491	0.8995	OPEN LINE FROM BUS 50932 KIRBY3 115 TO BUS 54276 JERICHO3 115 CKT1	106	See Previous Upgrade Specified For Facility	
10SP	AEPW	54278 CLARDON269.0	0.9492	0.8997	OPEN LINE FROM BUS 54276 JERICHO3 115 TO BUS 54277 JERIC2WT69.0 TO BUS 54303 JH2TERT 14.4 CKT1	106	See Previous Upgrade Specified For Facility	
10SP	AEPW	54277 JERIC2WT69.0	0.9495	0.8997	OPEN LINE FROM BUS 50932 KIRBY3 115 TO BUS 54276 JERICHO3 115 CKT1	106	Invalid Contingency	
10WP	AEPW	53851 46ST--E4 138	0.8710	0.8495	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
10WP	AEPW	53834 W.ED.-E4 138	0.8717	0.8502	OPEN LINE FROM BUS 53829 T.NO.--4 138 TO BUS 53851 46ST--E4 138 CKT1	107	Invalid Contingency	
15SP	AEPW	53988 ALLENNG4 138	0.8775	0.8350	OPEN LINE FROM BUS 52800 TUPELO 4 138 TO BUS 54006 ALLENGT4 138 CKT1	107	Invalid Contingency	
15SP	AEPW	54062 EXPCOLG4 138	0.8777	0.8352	OPEN LINE FROM BUS 52800 TUPELO 4 138 TO BUS 54006 ALLENGT4 138 CKT1	107	Invalid Contingency	
15SP	AEPW	54061 EXPCOLT4 138	0.8777	0.8353	OPEN LINE FROM BUS 52800 TUPELO 4 138 TO BUS 54006 ALLENGT4 138 CKT1	107	Invalid Contingency	

15SP	AEPW	54006 ALLENGT4 138	0.8785	0.8361	OPEN LINE FROM BUS 52800 TUPELO 4 138 TO BUS 54006 ALLENGT4 138 CKT1	107	Invalid Contingency	
15SP	AEPW	53987 COALGAT4 138	0.8805	0.8383	OPEN LINE FROM BUS 52800 TUPELO 4 138 TO BUS 54006 ALLENGT4 138 CKT1	107	Invalid Contingency	
15SP	AEPW	54005 COALGTP4 138	0.8805	0.8383	OPEN LINE FROM BUS 52800 TUPELO 4 138 TO BUS 54006 ALLENGT4 138 CKT1	107	Invalid Contingency	
15SP	AEPW	54020 LEHIGH-4 138	0.8813	0.8393	OPEN LINE FROM BUS 52800 TUPELO 4 138 TO BUS 54006 ALLENGT4 138 CKT1	107	Invalid Contingency	
15SP	AEPW	54012 ATOKA--4 138	0.8835	0.8417	OPEN LINE FROM BUS 52800 TUPELO 4 138 TO BUS 54006 ALLENGT4 138 CKT1	107	Invalid Contingency	
15SP	AEPW	54007 ATOKA--269.0	0.8909	0.8526	OPEN LINE FROM BUS 52800 TUPELO 4 138 TO BUS 54006 ALLENGT4 138 CKT1	107	Invalid Contingency	
15SP	AEPW	54004 ATOKA P269.0	0.8890	0.8520	OPEN LINE FROM BUS 52800 TUPELO 4 138 TO BUS 54006 ALLENGT4 138 CKT1	107	Invalid Contingency	
15SP	AEPW	54016 LANE 269.0	0.8903	0.8561	OPEN LINE FROM BUS 52800 TUPELO 4 138 TO BUS 54006 ALLENGT4 138 CKT1	107	Invalid Contingency	
15SP	AEPW	53998 MCGEECK269.0	0.8987	0.8706	OPEN LINE FROM BUS 52800 TUPELO 4 138 TO BUS 54006 ALLENGT4 138 CKT1	107	Invalid Contingency	
15SP	AEPW	53999 MCGEETP269.0	0.8991	0.8710	OPEN LINE FROM BUS 52800 TUPELO 4 138 TO BUS 54006 ALLENGT4 138 CKT1	107	Invalid Contingency	
15SP	AEPW	54010 PITTSB-269.0	0.9091	0.8868	OPEN LINE FROM BUS 52800 TUPELO 4 138 TO BUS 54006 ALLENGT4 138 CKT1	107	Invalid Contingency	
15SP	AEPW	53990 S-MCALT4 138	0.4886	0.4678	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
15SP	AEPW	54032 SMCALTP4 138	0.4921	0.4714	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
15SP	AEPW	54034 MCALT-S4 138	0.4945	0.4739	OPEN LINE FROM BUS 54022 LONEOAK4 138 TO BUS 54032 SMCALTP4 138 CKT1	107	Invalid Contingency	
							Total Estimated Engineering and Construction Cost	$0

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			NONE IDENTIFIED						107		
05SP			NONE IDENTIFIED						107		
05SH			NONE IDENTIFIED						107		
05FA			NONE IDENTIFIED						107		
05WP			NONE IDENTIFIED						107		
06AP			NONE IDENTIFIED						107		
06G			NONE IDENTIFIED						107		
06SP			NONE IDENTIFIED						107		
06SH			NONE IDENTIFIED						107		
06FA			NONE IDENTIFIED						107		
06WP			NONE IDENTIFIED						107		
07SP			NONE IDENTIFIED						107		
07WP			NONE IDENTIFIED						107		
10SP			NONE IDENTIFIED						107		
10WP			NONE IDENTIFIED						107		
15SP	AEPW	OKGE	54002 FIXCT4 138 to 55055 MAUD 4 138 CKT 1	107	100.7	103.9	3.2	55913 FRANKLN4 138 to 55917 FRNKLNS4 138 CKT 1	0	See Previous Upgrade Specified For Facility	
15SP	AEPW	OKGE	54002 FIXCT4 138 to 55055 MAUD 4 138 CKT 1	107	97.4	100.6	3.2	55913 FRANKLN4 138 to 56028 PINK SW4 138 CKT 1	3	See Previous Upgrade Specified For Facility	
										Total Estimated Engineering and Construction Cost	$0

Study Case	AREA	Monitored Bus with Violation	BC Voltage (PU)	TC Voltage (PU)	Outaged Branch Causing Voltage Violation	ATC (MW)	Solution	Estimated Cost
05G		NONE IDENTIFIED				107		
05SP		NONE IDENTIFIED				107		
05SH		NONE IDENTIFIED				107		
05FA		NONE IDENTIFIED				107		
05WP		NONE IDENTIFIED				107		
06AP		NONE IDENTIFIED				107		
06G	WERE	57013 MOUND 4 138	0.9140	0.8859	OPEN LINE FROM BUS 57011 HALSTDN4 138 TO BUS 57013 MOUND 4 138 CKT1	76	Relieved due to Westar Operating Procedure 1105 - Outage of the Moundridge to Halstead 138kV Line	
06SP		NONE IDENTIFIED				107		
06SH		NONE IDENTIFIED				107		
06FA		NONE IDENTIFIED				107		
06WP		NONE IDENTIFIED				107		
07SP		NONE IDENTIFIED				107		
07WP		NONE IDENTIFIED				107		
10SP		NONE IDENTIFIED				107		
10WP		NONE IDENTIFIED				107		
15SP		NONE IDENTIFIED				107		
							Total Estimated Engineering and Construction Cost	$0

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	AEPW	AEPW	53823 T.S.E.-4 138 to 53844 E.61ST-4 138 CKT 1	143	113.4	117.4	5.4	53795 R.S.S.-4 138 to 53863 ORU ETP4 138 CKT 1	107	Invalid Contingency	
05G	AEPW	AEPW	53823 T.S.E.-4 138 to 53844 E.61ST-4 138 CKT 1	143	100.6	104.1	4.7	53863 ORU ETP4 138 to 53873 WARNTAP4 138 CKT 1	107	Invalid Contingency	
05SP	AEPW	AEPW	53823 T.S.E.-4 138 to 53844 E.61ST-4 138 CKT 1	187	101.8	104.8	5.2	53795 R.S.S.-4 138 to 53863 ORU ETP4 138 CKT 1	107	Invalid Contingency	
05SP	AEPW	WFEC	54122 ELKCTY-2 69 to 55897 ELKCITY2 69 CKT 1	39	92.6	102.8	3.7	54109 CL-AFTP4 138 to 54121 ELKCTY-4 138 CKT 1	77	Refer to Expansion Plan Phase I to Upgrade 4/0 to 795 ACSR Planned In Service date: 12/1/2005	
05SP	AEPW	WFEC	54122 ELKCTY-2 69 to 55897 ELKCITY2 69 CKT 1	39	90.9	101.1	3.7	54109 CL-AFTP4 138 to 54126 HOB-JCT4 138 CKT 1	96	"	
05SH	AEPW	AEPW	53823 T.S.E.-4 138 to 53844 E.61ST-4 138 CKT 1	143	111.2	115.0	5.1	53795 R.S.S.-4 138 to 53863 ORU ETP4 138 CKT 1	107	Invalid Contingency	
05SH	AEPW	AEPW	53823 T.S.E.-4 138 to 53844 E.61ST-4 138 CKT 1	143	97.8	101.2	4.5	53863 ORU ETP4 138 to 53873 WARNTAP4 138 CKT 1	107	Invalid Contingency	
05FA			NONE IDENTIFIED						107		
05WP			NONE IDENTIFIED						107		
06AP			NONE IDENTIFIED						107		
06G			NONE IDENTIFIED						107		
06SP	AEPW	AEPW	53823 T.S.E.-4 138 to 53844 E.61ST-4 138 CKT 1	187	103.4	106.4	5.2	53795 R.S.S.-4 138 to 53863 ORU ETP4 138 CKT 1	107	Invalid Contingency	
06SH	AEPW	AEPW	53823 T.S.E.-4 138 to 53844 E.61ST-4 138 CKT 1	143	112.8	116.6	5.1	53795 R.S.S.-4 138 to 53863 ORU ETP4 138 CKT 1	107	Invalid Contingency	
06SH	AEPW	AEPW	53823 T.S.E.-4 138 to 53844 E.61ST-4 138 CKT 1	143	99.2	102.5	4.5	53863 ORU ETP4 138 to 53873 WARNTAP4 138 CKT 1	107	Invalid Contingency	
06FA			NONE IDENTIFIED						107		
06WP			NONE IDENTIFIED						107		
07SP	AEPW	AEPW	53823 T.S.E.-4 138 to 53844 E.61ST-4 138 CKT 1	187	110.4	113.6	5.6	53795 R.S.S.-4 138 to 53863 ORU ETP4 138 CKT 1	107	Invalid Contingency	
07SP	AEPW	AEPW	53823 T.S.E.-4 138 to 53844 E.61ST-4 138 CKT 1	187	98.0	100.8	5.0	53863 ORU ETP4 138 to 53873 WARNTAP4 138 CKT 1	107	Invalid Contingency	
07SP	AEPW	WFEC	54122 ELKCTY-2 69 to 55897 ELKCITY2 69 CKT 1	39	90.9	101.2	3.7	54109 CL-AFTP4 138 to 54121 ELKCTY-4 138 CKT 1	107	Refer to Expansion Plan Phase I to Upgrade 4/0 to 795 ACSR Planned In Service date: 12/1/2005	
07WP			NONE IDENTIFIED						107		
10SP	AEPW	AEPW	53774 53GARNT4 138 to 53823 T.S.E.-4 138 CKT 1	143	101.3	104.1	3.7	53818 ONETA--4 138 to 53884 121LYNN4 138 CKT 1	107	Invalid Contingency	
10SP	AEPW	AEPW	53795 R.S.S.-4 138 to 53867 ORU-WTP4 138 CKT 1	304	100.8	103.3	7.1	53795 R.S.S.-4138 to 53863 ORU ETP4138 CKT 1 53863 ORU ETP4138 to 53749 ORU E4138 CKT 1 53863 ORU ETP4138 to 53873 WARNTAP4138 CKT 1 53873 WARNTAP4138 53822 81YALES4138 CKT 1 53873 WARNTAP4138 to 53861 96YALE-4138 CKT 1 53822 81YALES4138 to 53872 W	0	Replace wavetrap jumpers @ Riverside	$10,000
10SP	AEPW	AEPW	53823 T.S.E.-4 138 to 53844 E.61ST-4 138 CKT 1	187	115.0	118.2	5.6	53795 R.S.S.-4 138 to 53863 ORU ETP4 138 CKT 1	107	Invalid Contingency	
10SP	AEPW	AEPW	53823 T.S.E.-4 138 to 53844 E.61ST-4 138 CKT 1	187	101.9	104.8	5.0	53863 ORU ETP4 138 to 53873 WARNTAP4 138 CKT 1	107	Invalid Contingency	
10WP			NONE IDENTIFIED						107		
15SP	AEPW	AEPW	53774 53GARNT4 138 to 53823 T.S.E.-4 138 CKT 1	143	113.8	116.8	4.0	53818 ONETA--4 138 to 53884 121LYNN4 138 CKT 1	107	Invalid Contingency	
15SP	AEPW	AEPW	53795 R.S.S.-4 138 to 53867 ORU-WTP4 138 CKT 1	304	109.6	112.2	7.4	53795 R.S.S.-4138 to 53863 ORU ETP4138 CKT 1 53863 ORU ETP4138 to 53749 ORU E4138 CKT 1 53863 ORU ETP4138 to 53873 WARNTAP4138 CKT 1 53873 WARNTAP4138 53822 81YALES4138 CKT 1 53873 WARNTAP4138 to 53861 96YALE-4138 CKT 1 53822 81YALES4138 to 53872 W	0	See Previous Upgrade Specified For Facility	
15SP	AEPW	AEPW	53823 T.S.E.-4 138 to 53844 E.61ST-4 138 CKT 1	187	124.7	128.0	5.8	53795 R.S.S.-4 138 to 53863 ORU ETP4 138 CKT 1	107	Invalid Contingency	
15SP	AEPW	AEPW	53823 T.S.E.-4 138 to 53844 E.61ST-4 138 CKT 1	187	110.3	113.3	5.1	53863 ORU ETP4 138 to 53873 WARNTAP4 138 CKT 1	107	Invalid Contingency	
15SP	AEPW	OKGE	54002 FIXCT4 138 to 55055 MAUD 4 138 CKT 1	107	123.9	127.0	3.2	55054 MAUD 269.0 to 55055 MAUD 4 138 to 55736 MAUD 113.2 CKT 1	0	Rebuild 11.83 miles of 3/0 shielded Copperweld with 795 ACSR.	$3,305,000
15SP	AEPW	OKGE	54002 FIXCT4 138 to 55055 MAUD 4 138 CKT 1	107	123.0	126.5	3.5	55913 FRANKLN4 138 to 55917 FRNKLNS4 138 CKT 1	0	See Previous Upgrade Specified For Facility	
15SP	AEPW	OKGE	54002 FIXCT4 138 to 55055 MAUD 4 138 CKT 1	107	119.8	123.3	3.5	55913 FRANKLN4 138 to 56028 PINK SW4 138 CKT 1	0	See Previous Upgrade Specified For Facility	
15SP	AEPW	OKGE	54002 FIXCT4 138 to 55055 MAUD 4 138 CKT 1	107	118.1	121.1	3.0	55055 MAUD 4 138 to 55075 FRSTHIL4 138 CKT 1	0	See Previous Upgrade Specified For Facility	
15SP	AEPW	OKGE	54002 FIXCT4 138 to 55055 MAUD 4 138 CKT 1	107	116.4	119.5	3.1	55054 MAUD 2 69 to 55088 LTRIVER2 69 CKT 1	0	See Previous Upgrade Specified For Facility	
15SP	AEPW	AEPW	53795 R.S.S.-4 138 to 53867 ORU-WTP4 138 CKT 1	304	98.8	101.1	6.7	53795 R.S.S.-4 138 to 53863 ORU ETP4 138 CKT 1	107	Invalid Contingency	
										Total Estimated Engineering and Construction Cost	$3,315,000

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	AEPW	AEPW	53823 T.S.E.-4 138 to 53844 E.61ST-4 138 CKT 1	143	113.7	117.7	5.4	53795 R.S.S.-4 138 to 53863 ORU ETP4 138 CKT 1	107	Invalid Contingency	
05G	AEPW	AEPW	53823 T.S.E.-4 138 to 53844 E.61ST-4 138 CKT 1	143	100.8	104.3	4.7	53863 ORU ETP4 138 to 53873 WARNTAP4 138 CKT 1	107	Invalid Contingency	
05SP	AEPW	GRDA	53802 CATOOSA4 138 WND 1 CATAUTO1 1	150	110.5	113.1	3.6	53802 CATOOSA4 138 to 54438 CATSAGR5 161 to 54634 CATTER2 13.8 CKT 2	107	GRDA has mitigation plan for outage of Catoosa 161/138kV Xfr Ckts 1 or 2	
05SP	AEPW	GRDA	53802 CATOOSA4 138 WND 1 CATAUTO2 2	150	110.9	113.5	3.6	53802 CATOOSA4 138 to 54438 CATSAGR5 161 to 54633 CATTER1 13.8 CKT 1	107	"	
05SP	GRDA	AEPW	54438 CATSAGR5 161 WND 2 CATAUTO1 1	150	110.4	113.0	3.6	53802 CATOOSA4 138 to 54438 CATSAGR5 161 to 54634 CATTER2 13.8 CKT 2	107	"	
05SP	GRDA	AEPW	54438 CATSAGR5 161 WND 2 CATAUTO2 2	150	110.7	113.3	3.6	53802 CATOOSA4 138 to 54438 CATSAGR5 161 to 54633 CATTER1 13.8 CKT 1	107	"	
05SP	AEPW	AEPW	53823 T.S.E.-4 138 to 53844 E.61ST-4 138 CKT 1	187	101.9	104.9	5.2	53795 R.S.S.-4 138 to 53863 ORU ETP4 138 CKT 1	107	Invalid Contingency	
05SH	AEPW	GRDA	53802 CATOOSA4 138 WND 1 CATAUTO2 2	150	100.2	102.7	3.6	53802 CATOOSA4 138 to 54438 CATSAGR5 161 to 54633 CATTER1 13.8 CKT 1	107	GRDA has mitigation plan for outage of Catoosa 161/138kV Xfr Ckts 1 or 2	
05SH	AEPW	AEPW	53823 T.S.E.-4 138 to 53844 E.61ST-4 138 CKT 1	143	111.3	115.1	5.1	53795 R.S.S.-4 138 to 53863 ORU ETP4 138 CKT 1	107	Invalid Contingency	
05SH	GRDA	AEPW	54438 CATSAGR5 161 WND 2 CATAUTO2 2	150	100.0	102.5	3.6	53802 CATOOSA4 138 to 54438 CATSAGR5 161 to 54633 CATTER1 13.8 CKT 1	107	GRDA has mitigation plan for outage of Catoosa 161/138kV Xfr Ckts 1 or 2	
05SH	AEPW	GRDA	53802 CATOOSA4 138 WND 1 CATAUTO1 1	150	99.8	102.4	3.6	53802 CATOOSA4 138 to 54438 CATSAGR5 161 to 54634 CATTER2 13.8 CKT 2	107	"	
05SH	GRDA	AEPW	54438 CATSAGR5 161 WND 2 CATAUTO1 1	150	99.6	102.2	3.6	53802 CATOOSA4 138 to 54438 CATSAGR5 161 to 54634 CATTER2 13.8 CKT 2	107	"	
05SH	AEPW	AEPW	53823 T.S.E.-4 138 to 53844 E.61ST-4 138 CKT 1	143	97.9	101.3	4.5	53863 ORU ETP4 138 to 53873 WARNTAP4 138 CKT 1	107	Invalid Contingency	
05FA			NONE IDENTIFIED						107		
05WP	AEPW	GRDA	53802 CATOOSA4 138 WND 1 CATAUTO1 1	150	103.3	105.8	3.6	53802 CATOOSA4 138 to 54438 CATSAGR5 161 to 54634 CATTER2 13.8 CKT 2	107	GRDA has mitigation plan for outage of Catoosa 161/138kV Xfr Ckts 1 or 2	
05WP	AEPW	GRDA	53802 CATOOSA4 138 WND 1 CATAUTO2 2	150	103.6	106.2	3.6	53802 CATOOSA4 138 to 54438 CATSAGR5 161 to 54633 CATTER1 13.8 CKT 1	107	"	
05WP	GRDA	AEPW	54438 CATSAGR5 161 WND 2 CATAUTO1 1	150	103.1	105.6	3.6	53802 CATOOSA4 138 to 54438 CATSAGR5 161 to 54634 CATTER2 13.8 CKT 2	107	"	
05WP	GRDA	AEPW	54438 CATSAGR5 161 WND 2 CATAUTO2 2	150	103.4	106.0	3.6	53802 CATOOSA4 138 to 54438 CATSAGR5 161 to 54633 CATTER1 13.8 CKT 1	107	"	
06AP			NONE IDENTIFIED						107		
06G			NONE IDENTIFIED						107		
06SP	AEPW	GRDA	53802 CATOOSA4 138 WND 1 CATAUTO1 1	150	109.6	112.2	3.6	53802 CATOOSA4 138 to 54438 CATSAGR5 161 to 54634 CATTER2 13.8 CKT 2	107	GRDA has mitigation plan for outage of Catoosa 161/138kV Xfr Ckts 1 or 2	
06SP	AEPW	GRDA	53802 CATOOSA4 138 WND 1 CATAUTO2 2	150	110.1	112.5	3.5	53802 CATOOSA4 138 to 54438 CATSAGR5 161 to 54633 CATTER1 13.8 CKT 1	107	"	
06SP	GRDA	AEPW	54438 CATSAGR5 161 WND 2 CATAUTO1 1	150	109.5	112.1	3.6	53802 CATOOSA4 138 to 54438 CATSAGR5 161 to 54634 CATTER2 13.8 CKT 2	107	"	
06SP	GRDA	AEPW	54438 CATSAGR5 161 WND 2 CATAUTO2 2	150	109.9	112.4	3.5	53802 CATOOSA4 138 to 54438 CATSAGR5 161 to 54633 CATTER1 13.8 CKT 1	107	"	
06SP	AEPW	AEPW	53823 T.S.E.-4 138 to 53844 E.61ST-4 138 CKT 1	187	103.4	106.4	5.2	53795 R.S.S.-4 138 to 53863 ORU ETP4 138 CKT 1	107	Invalid Contingency	
06SH	AEPW	GRDA	53802 CATOOSA4 138 WND 1 CATAUTO1 1	150	101.0	103.6	3.7	53802 CATOOSA4 138 to 54438 CATSAGR5 161 to 54634 CATTER2 13.8 CKT 2	107	GRDA has mitigation plan for outage of Catoosa 161/138kV Xfr Ckts 1 or 2	
06SH	AEPW	GRDA	53802 CATOOSA4 138 WND 1 CATAUTO2 2	150	101.3	103.9	3.6	53802 CATOOSA4 138 to 54438 CATSAGR5 161 to 54633 CATTER1 13.8 CKT 1	107	"	
06SH	GRDA	AEPW	54438 CATSAGR5 161 WND 2 CATAUTO1 1	150	100.8	103.4	3.7	53802 CATOOSA4 138 to 54438 CATSAGR5 161 to 54634 CATTER2 13.8 CKT 2	107	"	
06SH	GRDA	AEPW	54438 CATSAGR5 161 WND 2 CATAUTO2 2	150	101.2	103.7	3.6	53802 CATOOSA4 138 to 54438 CATSAGR5 161 to 54633 CATTER1 13.8 CKT 1	107	"	
06SH	AEPW	AEPW	53823 T.S.E.-4 138 to 53844 E.61ST-4 138 CKT 1	143	112.9	116.7	5.1	53795 R.S.S.-4 138 to 53863 ORU ETP4 138 CKT 1	107	Invalid Contingency	
06SH	AEPW	AEPW	53823 T.S.E.-4 138 to 53844 E.61ST-4 138 CKT 1	143	99.3	102.6	4.5	53863 ORU ETP4 138 to 53873 WARNTAP4 138 CKT 1	107	Invalid Contingency	
06FA			NONE IDENTIFIED						107		
06WP	AEPW	GRDA	53802 CATOOSA4 138 WND 1 CATAUTO1 1	150	102.6	105.1	3.5	53802 CATOOSA4 138 to 54438 CATSAGR5 161 to 54634 CATTER2 13.8 CKT 2	107	GRDA has mitigation plan for outage of Catoosa 161/138kV Xfr Ckts 1 or 2	
06WP	AEPW	GRDA	53802 CATOOSA4 138 WND 1 CATAUTO2 2	150	103.0	105.5	3.5	53802 CATOOSA4 138 to 54438 CATSAGR5 161 to 54633 CATTER1 13.8 CKT 1	107	"	
06WP	GRDA	AEPW	54438 CATSAGR5 161 WND 2 CATAUTO1 1	150	102.5	105.0	3.5	53802 CATOOSA4 138 to 54438 CATSAGR5 161 to 54634 CATTER2 13.8 CKT 2	107	"	
06WP	GRDA	AEPW	54438 CATSAGR5 161 WND 2 CATAUTO2 2	150	102.8	105.3	3.5	53802 CATOOSA4 138 to 54438 CATSAGR5 161 to 54633 CATTER1 13.8 CKT 1	107	"	
07SP	GRDA	AEPW	54438 CATSAGR5 161 WND 2 CATAUTO1 1	150	111.6	113.7	3.0	53802 CATOOSA4 138 to 54438 CATSAGR5 161 to 54634 CATTER2 13.8 CKT 2	107	"	
07SP	GRDA	AEPW	54438 CATSAGR5 161 WND 2 CATAUTO2 2	150	111.9	114.1	3.0	53802 CATOOSA4 138 to 54438 CATSAGR5 161 to 54633 CATTER1 13.8 CKT 1	107	"	
07SP	AEPW	AEPW	53823 T.S.E.-4 138 to 53844 E.61ST-4 138 CKT 1	187	110.5	113.7	5.6	53795 R.S.S.-4 138 to 53863 ORU ETP4 138 CKT 1	107	Invalid Contingency	
07SP	AEPW	AEPW	53823 T.S.E.-4 138 to 53844 E.61ST-4 138 CKT 1	187	98.1	100.9	5.0	53863 ORU ETP4 138 to 53873 WARNTAP4 138 CKT 1	107	Invalid Contingency	
07WP			NONE IDENTIFIED						107		
10SP	AEPW	AEPW	53774 53GARNT4 138 to 53823 T.S.E.-4 138 CKT 1	143	101.3	104.1	3.7	53818 ONETA--4 138 to 53884 121LYNN4 138 CKT 1	107	Invalid Contingency	
10SP	AEPW	AEPW	53823 T.S.E.-4 138 to 53844 E.61ST-4 138 CKT 1	187	115.0	118.2	5.6	53795 R.S.S.-4 138 to 53863 ORU ETP4 138 CKT 1	107	Invalid Contingency	
10SP	AEPW	AEPW	53823 T.S.E.-4 138 to 53844 E.61ST-4 138 CKT 1	187	101.9	104.7	4.9	53863 ORU ETP4 138 to 53873 WARNTAP4 138 CKT 1	107	Invalid Contingency	
10SP	AEPW	GRDA	53802 CATOOSA4 138 WND 1 CATAUTO2 2	150	98.3	100.8	3.6	53802 CATOOSA4 138 to 54438 CATSAGR5 161 to 54633 CATTER1 13.8 CKT 1	107	GRDA has mitigation plan for outage of Catoosa 161/138kV Xfr Ckts 1 or 2	
10SP	GRDA	AEPW	54438 CATSAGR5 161 WND 2 CATAUTO2 2	150	98.2	100.8	3.6	53802 CATOOSA4 138 to 54438 CATSAGR5 161 to 54633 CATTER1 13.8 CKT 1	107	"	
10SP	AEPW	GRDA	53802 CATOOSA4 138 WND 1 CATAUTO1 1	150	98.0	100.5	3.6	53802 CATOOSA4 138 to 54438 CATSAGR5 161 to 54634 CATTER2 13.8 CKT 2	107	"	
10SP	GRDA	AEPW	54438 CATSAGR5 161 WND 2 CATAUTO1 1	150	97.9	100.5	3.6	53802 CATOOSA4 138 to 54438 CATSAGR5 161 to 54634 CATTER2 13.8 CKT 2	107	"	
10WP			NONE IDENTIFIED						107		
15SP	AEPW	AEPW	53774 53GARNT4 138 to 53823 T.S.E.-4 138 CKT 1	143	113.7	116.7	3.9	53818 ONETA--4 138 to 53884 121LYNN4 138 CKT 1	107	Invalid Contingency	
15SP	AEPW	AEPW	53823 T.S.E.-4 138 to 53844 E.61ST-4 138 CKT 1	187	124.4	127.7	5.7	53795 R.S.S.-4 138 to 53863 ORU ETP4 138 CKT 1	107	Invalid Contingency	
15SP	AEPW	AEPW	53823 T.S.E.-4 138 to 53844 E.61ST-4 138 CKT 1	187	110.1	113.0	5.1	53863 ORU ETP4 138 to 53873 WARNTAP4 138 CKT 1	107	Invalid Contingency	
										Total Estimated Engineering and Construction Cost	$0

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	AEPW	AEPW	53823 T.S.E.-4 138 to 53844 E.61ST-4 138 CKT 1	143	113.4	117.4	5.4	53795 R.S.S.-4 138 to 53863 ORU ETP4 138 CKT 1	107	Invalid Contingency	
05G	AEPW	AEPW	53823 T.S.E.-4 138 to 53844 E.61ST-4 138 CKT 1	143	100.6	104.1	4.7	53863 ORU ETP4 138 to 53873 WARNTAP4 138 CKT 1	107	Invalid Contingency	
05SP	AEPW	AEPW	53823 T.S.E.-4 138 to 53844 E.61ST-4 138 CKT 1	187	101.8	104.8	5.2	53795 R.S.S.-4 138 to 53863 ORU ETP4 138 CKT 1	107	Invalid Contingency	
05SH	AEPW	AEPW	53823 T.S.E.-4 138 to 53844 E.61ST-4 138 CKT 1	143	111.2	115.0	5.1	53795 R.S.S.-4 138 to 53863 ORU ETP4 138 CKT 1	107	Invalid Contingency	
05SH	AEPW	AEPW	53823 T.S.E.-4 138 to 53844 E.61ST-4 138 CKT 1	143	97.8	101.2	4.5	53863 ORU ETP4 138 to 53873 WARNTAP4 138 CKT 1	107	Invalid Contingency	
05FA			NONE IDENTIFIED						107		
05WP			NONE IDENTIFIED						107		
06AP			NONE IDENTIFIED						107		
06G			NONE IDENTIFIED						107		
06SP	AEPW	AEPW	53823 T.S.E.-4 138 to 53844 E.61ST-4 138 CKT 1	187	103.4	106.3	5.2	53795 R.S.S.-4 138 to 53863 ORU ETP4 138 CKT 1	107	Invalid Contingency	
06SH	AEPW	AEPW	53823 T.S.E.-4 138 to 53844 E.61ST-4 138 CKT 1	143	112.8	116.6	5.1	53795 R.S.S.-4 138 to 53863 ORU ETP4 138 CKT 1	107	Invalid Contingency	
06SH	AEPW	AEPW	53823 T.S.E.-4 138 to 53844 E.61ST-4 138 CKT 1	143	99.2	102.6	4.5	53863 ORU ETP4 138 to 53873 WARNTAP4 138 CKT 1	107	Invalid Contingency	
06FA			NONE IDENTIFIED						107		
06WP			NONE IDENTIFIED						107		
07SP	AEPW	AEPW	53823 T.S.E.-4 138 to 53844 E.61ST-4 138 CKT 1	187	110.4	113.6	5.5	53795 R.S.S.-4 138 to 53863 ORU ETP4 138 CKT 1	107	Invalid Contingency	
07SP	AEPW	AEPW	53823 T.S.E.-4 138 to 53844 E.61ST-4 138 CKT 1	187	98.0	100.8	4.9	53863 ORU ETP4 138 to 53873 WARNTAP4 138 CKT 1	107	Invalid Contingency	
07WP			NONE IDENTIFIED						107		
10SP	AEPW	AEPW	53774 53GARNT4 138 to 53823 T.S.E.-4 138 CKT 1	143	101.3	104.1	3.7	53818 ONETA--4 138 to 53884 121LYNN4 138 CKT 1	107	Invalid Contingency	
10SP	AEPW	AEPW	53823 T.S.E.-4 138 to 53844 E.61ST-4 138 CKT 1	187	115.0	118.1	5.6	53795 R.S.S.-4 138 to 53863 ORU ETP4 138 CKT 1	107	Invalid Contingency	
10SP	AEPW	AEPW	53823 T.S.E.-4 138 to 53844 E.61ST-4 138 CKT 1	187	101.9	104.7	4.9	53863 ORU ETP4 138 to 53873 WARNTAP4 138 CKT 1	107	Invalid Contingency	
10WP			NONE IDENTIFIED						107		
15SP	AEPW	AEPW	53774 53GARNT4 138 to 53823 T.S.E.-4 138 CKT 1	143	113.7	116.6	3.9	53818 ONETA--4 138 to 53884 121LYNN4 138 CKT 1	107	Invalid Contingency	
15SP	AEPW	AEPW	53795 R.S.S.-4 138 to 53867 ORU-WTP4 138 CKT 1	304	102.7	105.3	7.4	53795 R.S.S.-4138 to 53863 ORU ETP4138 CKT 1 53863 ORU ETP4138 to 53749 ORU E4138 CKT 1 53863 ORU ETP4138 to 53873 WARNTAP4138 CKT 1 53873 WARNTAP4138 53822 81YALES4138 CKT 1 53873 WARNTAP4138 to 53861 96YALE-4138 CKT 1 53822 81YALES4138 to 53872 W	0	See Previous Upgrade Specified For Facility	
15SP	AEPW	AEPW	53823 T.S.E.-4 138 to 53844 E.61ST-4 138 CKT 1	187	124.4	127.6	5.7	53795 R.S.S.-4 138 to 53863 ORU ETP4 138 CKT 1	107	Invalid Contingency	
15SP	AEPW	AEPW	53823 T.S.E.-4 138 to 53844 E.61ST-4 138 CKT 1	187	110.1	113.0	5.0	53863 ORU ETP4 138 to 53873 WARNTAP4 138 CKT 1	107	Invalid Contingency	
15SP	AEPW	OKGE	54002 FIXCT4 138 to 55055 MAUD 4 138 CKT 1	107	100.7	103.9	3.2	55913 FRANKLN4 138 to 55917 FRNKLNS4 138 CKT 1	0	See Previous Upgrade Specified For Facility	
15SP	AEPW	OKGE	54002 FIXCT4 138 to 55055 MAUD 4 138 CKT 1	107	97.4	100.6	3.2	55913 FRANKLN4 138 to 56028 PINK SW4 138 CKT 1	86	See Previous Upgrade Specified For Facility	
										Total Estimated Engineering and Construction Cost	$0