SPP Southwest Power Pool

System Impact Study SPP-2004-084-1 For Transmission Service Requested By Xcel Energy Marketing

From SPS to EDDY

For a Reserved Amount Of 35 MW From 8/1/2005 To 1/1/2007

SPP Engineering, Tariff Studies

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1. Executive Summary

Xcel Energy Marketing has requested a system impact study for long-term Firm Point-to-Point transmission service from SPS to EDDY for 35 MW. The period of the service requested is from 1/1/2005 to 1/1/2007. The OASIS reservation number is 678686.

The principal objective of this study is to identify system problems and potential system modifications necessary to facilitate the additional 35 MW request while maintaining system reliability. The requested service was studied using two System Scenarios with SPS exporting and importing, respectively. The two 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 1/1/2007 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 and 1.2 list the SPP facility overloads caused or impacted by the transfer modeled for Scenario 1 and 2, respectively. Tables 2.1 and 2.2 lists the SPP voltage violations caused or impacted by the transfer modeled for Scenario 1 and 2, respectively. Tables 3.1 and 3.2 list the Non-SPP facility overloads caused or impacted by the transfer modeled, using Scenarios 1 and 2, respectively. Tables 4.1 and 4.2 list the Non-SPP voltage violations caused or impacted by the transfer modeled, using Scenarios 1 and 2, respectively. Table 5 lists the thermal limitations associated with load growth for the SPS area. Table 6 lists the voltage violations associated with load growth.

The study results of the SPS to EDDY 35 MW request show that limiting constraints exist. In order to avoid voltage collapse for the Tolk to Eddy 345 kV line outage during the 2006 Fall Peak season there is a Must Run of generation that is to be followed. For the 2006 Fall Peak, Maddox #1 should be run at 114 MW and Cunningham #4 should be run at 110 MW during system peak loads to prevent voltage collapse for the Tolk to Eddy 345 kV line outage. The 2006 Fall Peak Must Run requirement is due to scheduled maintenance outages of Cunningham #2 and #3 during that period. Rollover rights will be limited starting 12/1/2007 due to multiple facilities documented in this report.

2. Introduction

Xcel Energy Marketing has requested a system impact study for Point-to-Point Service from SPS to EDDY for 35 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, transformers, and generating units, and selected multiple transmission lines and transformers on the SPP system and first tier Non - SPP systems.

The requested service was studied using two System Scenarios with SPS exporting and importing, respectively. The two 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 SPS to EDDY 35 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), 2006 April Minimum (06AP), 2006 Spring Peak (06G), 2006 Summer Peak (06SP), 2006 Summer Shoulder (06SH), 2006 Fall Peak (06FA), 2006 Winter Peak (06WP) were used to study the impact of the 35 MW transfer on the system during the requested service period of 1/1/2005 to 1/1/2007. 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 35 MW transfer on the system during the remaining planning horizon from 1/1/2007 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, two system scenarios were developed. Scenario 1 includes SWPP OASIS transmission requests not already included in the SPP 2005 Series Update 2 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 Update 2

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 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 thermal overloads and voltage violations caused or impacted by the transfer. The PSS/E options chosen to conduct the analysis can be found in Appendix A.

D. Upgrade Analysis

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

4. Study Results

A. Study Analysis Results

Tables 1 through 4 contain the initial steady-state analysis results of the System Impact Study. The Tables are in the attached workbook *SPP-2004-084-1 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 and upgrades, 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 and 1.2 list the SPP facility overloads caused or impacted by the transfer modeled for Scenario 1 and 2, respectively. Tables 2.1 and 2.2 list the SPP voltage violations caused or impacted by the transfer modeled for Scenario 1 and 2, respectively. Tables 3.1 and 3.2 list the Non-SPP facility overloads caused or impacted by the transfer modeled, using Scenarios 1 and 2, respectively. Tables 4.1 and 4.2 list the Non-SPP voltage violations caused or impacted by the transfer modeled, using Scenarios 1 and 2, respectively. Selected solutions with known engineering and construction costs are provided for the SPP facility overloads and voltage violations found in the Tables. Table 5 lists the thermal limitations associated with load growth for the SPS area. Table 6 lists the voltage violations associated with load growth.

From the results in the Tables, a number of solutions for contingencies analyzed did not converge with the 35 MW added at the EDDY DC Tie. The non-convergence was caused by voltage collapse. The selected solutions proposed provide the voltage support needed to reliably facilitate the requested service.

Tables 1.1a and 1.2a document the modeling representation of the events identified in Tables 1.1 and 1.2 to include bus numbers and bus names. The load growth in the SPS region listed in Table 5 can be compared to the increase of monitored element loadings. The load growth in the SPS region listed in Table 6 can be compared to the voltage level at the Tolk 345 kV bus.

5. Conclusion

The study results of the SPS to EDDY 35 MW request show that limiting constraints do exist. In order to avoid voltage collapse for the Tolk to Eddy 345 kV line outage during the 2006 Fall Peak season there is a Must Run of generation that is to be followed. For the 2006 Fall Peak, Maddox #1 should be run at 114 MW and Cunningham #4 should be run at 110 MW during system peak loads to prevent voltage collapse for the Tolk to Eddy 345 kV line outage. The 2006 Fall Peak Must Run requirement is due to scheduled maintenance outages of Cunningham #2 and #3 during that period. Rollover rights will be limited starting 12/1/2007 due to multiple facilities documented in this report.

Due to the forecasted increase in native and network load included in this study, renewal of this service shall be unavailable on and after 12/1/07 in order to avoid voltage collapse that could result from an outage of the Tolk Interchange-Eddy County Interchange 345kv line. Table 6 lists the load growth in the SPS region associated with the Transfer Case voltage at the Eddy County Interchange for the outage of the Tolk to Eddy 345 kV line.

Due to the forecasted increase in native and network load specified in this study, renewal of this service shall be limited beginning 6/1/10 due to the transfer case overload of 100.5% for the Curry County Interchange-Roosevelt County Interchange 115kv Ckt 2 for the outage of Oasis Interchange-Roosevelt County Interchange 230kv Ckt 1. Available Transfer Capacity (ATC) is limited to 17MW for 6/1/2010 and ATC is 0MW beginning 6/1/2011. Table 5 lists the Curry County to Roosevelt County 115 kV line which causes this limitation.

Due to the forecasted increase in native and network load specified in this study, renewal of this service also shall be limited beginning 6/1/11. This limit is based on interpolation of model data resulting in a transfer case overload of 100.7% by 6/1/11 for the Roosevelt County Interchange 230/115kv Transformer for the outage of Oasis Interchange-Roosevelt County Interchange 230kv Ckt 1. Table 5 lists the Roosevelt County 230/115 kV Transformer which causes this limitation.

Due to the forecasted increase in native and network load specified in this study, renewal of this service also shall be limited beginning 6/1/13. This limit is based on interpolation of model data resulting in a transfer case overload of 101.3% by 6/1/13 for the Roosevelt County Interchange-Tolk Interchange 230 Ckt 2 for the outage of Roosevelt County Interchange-Tolk Interchange 230kv Ckt 1. Table 5 lists the Roosevelt County to Tolk 230 kV Ckt 1 line which causes this limitation.

Due to the forecasted increase in native and network load specified in this study, renewal of this service also shall be limited beginning 6/1/13. This limit is based on interpolation of model data resulting in a transfer case overload of 101.5% by 6/1/13 for the Roosevelt County Interchange-Tolk Interchange 230 Ckt 1 for the outage of Roosevelt County Interchange-Tolk Interchange 230kv Ckt 2. Table 5 lists the Roosevelt County to Tolk 230 kV Ckt 2 line which causes this limitation.

Due to the forecasted increase in native and network load specified in this study, renewal of this service also shall be limited beginning 6/1/15 due to the transfer case overload of 116.6% for the Lubbock East Interchange 230/115kv Transformer for the outage of the Lubbock South

Interchange 230/115kv Transformer. Table 5 lists the Lubbock East 230/115 kV Transformer line which causes this limitation.

If the customer agrees to redispatch the applicable SPS units to relieve the impacts on the limiting constraints identified during the reservation period, the 35 MW request will be accepted with a term of 8/1/05 to 1/1/07. Renewal rights will be limited starting 12/1/2007. The facility limiting renewal rights can be found in Table 1. The Available Transfer Capability beginning 6/1/2010 is 17 MW. The Available Transfer Capability by interpolation beginning 6/1/2011 is 0 MW.

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 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 - 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
2005 Spring			NONE IDENTIFIED						35		
2005 Summer Peak			NONE IDENTIFIED						35		
2005 Summer Shoulder			NONE IDENTIFIED						35		
2005 Fall Peak			NONE IDENTIFIED						35		
2005 Winter Peak			NONE IDENTIFIED						35		
2006 April Minimum			NONE IDENTIFIED						35		
2006 Spring Peak			NONE IDENTIFIED						35		
2006 Summer Peak			NONE IDENTIFIED						35		
2006 Summer Shoulder			NONE IDENTIFIED						35		
2006 Fall Peak			NONE IDENTIFIED						35		
2006 Winter Peak			NONE IDENTIFIED						35		
2007 Summer Peak			NONE IDENTIFIED						35		
2007 Winter Peak			NONE IDENTIFIED						35		
2010 Summer Peak	SPS	SPS	CURRY COUNTY INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 115KV CKT 2	161	99.5	100.5	4.8	OASIS INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 230KV CKT 1	17	Conductor Limited, Solution Undetermined, Limit Renewal Rights Starting 10/1//2006	
2010 Winter Peak			NONE IDENTIFIED						0		
2015 Summer Peak	SPS	SPS	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 1	541	104.2	105.2	16.4	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 2	0	Conductor Limited, Build a new 57 mile 345 kV line from Chaves County Interchange to a New Substation, on the Tolk to EDDY 345 kV line, which requires two 345 kV terminals and a 345/230 kV transformers.	$26,139,450
2015 Summer Peak	SPS	SPS	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 2	541	104.0	105.1	16.3	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 1	0	See Previous Upgrade Specified for Facility	
2015 Summer Peak	SPS	SPS	ROOSEVELT COUNTY INTERCHANGE 230/115KV TRANSFORMER	289.8	110.3	111.4	9.5	OASIS INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 230KV CKT 1	0	May be Relieved by new Chaves County Interchange to a New Substation 345 kV line	
2015 Summer Peak	SPS	SPS	LUBBOCK EAST INTERCHANGE 230/115KV TRANSFORMER	172.5	115.1	116.6	7.1	LUBBOCK SOUTH INTERCHANGE 230/115KV TRANSFORMER	0	Replace 230/115 kV auto with larger unit - 258 MVA max	$1,395,950
2015 Summer Peak	SPS	SPS	CURRY COUNTY INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 115KV CKT 2	161	113.7	114.7	4.2	OASIS INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 230KV CKT 1	0	Conductor Limited, May be Relieved by new Chaves County Interchange to a New Substation 345 kV line	
2015 Summer Peak			Contingency Solution Not Converged					TOLK INTERCHANGE - EDDY COUNTY INTERCHANGE 345 KV	N/A	Must run Cunn4 at Pmax and reduce Jones1 to 124MW	
2015 Summer Peak			Contingency Solution Not Converged					EDDY COUNTY INTERCHANGE 345/230/13.2 KV TRANSFORMER	N/A	Must run Cunn4 at Pmax and reduce Jones1 to 124MW	
										Total Estimated Engineering and Construction Cost	$27,535,400

Study Case	AREA	Monitored Bus with Violation	BC Voltage (PU)	TC Voltage (PU)	Outaged Branch Causing Voltage Violation	ATC (MW)	Solution	Estimated Cost
2005 Spring		NONE IDENTIFIED				35		
2005 Summer Peak		NONE IDENTIFIED				35		
2005 Summer Shoulder		NONE IDENTIFIED				35		
2005 Fall Peak		NONE IDENTIFIED				35		
2005 Winter Peak		NONE IDENTIFIED				35		
2006 April Minimum		NONE IDENTIFIED				35		
2006 Spring Peak		NONE IDENTIFIED				35		
2006 Summer Peak		NONE IDENTIFIED				35		
2006 Summer Shoulder		NONE IDENTIFIED				35		
2006 Fall Peak		NONE IDENTIFIED				35		
2006 Winter Peak		NONE IDENTIFIED				35		
2007 Summer Peak		NONE IDENTIFIED				35		
2007 Winter Peak		NONE IDENTIFIED				35		
2010 Summer Peak		NONE IDENTIFIED				35		
2010 Winter Peak		NONE IDENTIFIED				35		
2015 Summer Peak		NONE IDENTIFIED				35		

Study Case	From Area	To Area	Monitored Branch Overload	Rate <MVA>	BC % Loading	TC % Loading	%TDF	Outaged Branch Causing Overload	Comments
2005 Spring			NONE IDENTIFIED						
2005 Summer Peak			NONE IDENTIFIED						
2005 Summer Shoulder			NONE IDENTIFIED						
2005 Fall Peak			NONE IDENTIFIED						
2005 Winter Peak			NONE IDENTIFIED						
2006 April Minimum			NONE IDENTIFIED						
2006 Spring Peak			NONE IDENTIFIED						
2006 Summer Peak			NONE IDENTIFIED						
2006 Summer Shoulder			NONE IDENTIFIED						
2006 Fall Peak			NONE IDENTIFIED						
2006 Winter Peak			NONE IDENTIFIED						
2007 Summer Peak			NONE IDENTIFIED						
2007 Winter Peak			NONE IDENTIFIED						
2010 Summer Peak			NONE IDENTIFIED						
2010 Winter Peak			NONE IDENTIFIED						
2015 Summer Peak			NONE IDENTIFIED						

Study Case	AREA	Monitored Bus with Violation	BC Voltage (PU)	TC Voltage (PU)	Outaged Branch Causing Voltage Violation	ATC (MW)	Solution	Estimated Cost
2005 Spring		NONE IDENTIFIED				35		
2005 Summer Peak		NONE IDENTIFIED				35		
2005 Summer Shoulder		NONE IDENTIFIED				35		
2005 Fall Peak		NONE IDENTIFIED				35		
2005 Winter Peak		NONE IDENTIFIED				35		
2006 April Minimum		NONE IDENTIFIED				35		
2006 Spring Peak		NONE IDENTIFIED				35		
2006 Summer Peak		NONE IDENTIFIED				35		
2006 Summer Shoulder		NONE IDENTIFIED				35		
2006 Fall Peak		NONE IDENTIFIED				35		
2006 Winter Peak		NONE IDENTIFIED				35		
2007 Summer Peak		NONE IDENTIFIED				35		
2007 Winter Peak		NONE IDENTIFIED				35		
2010 Summer Peak		NONE IDENTIFIED				35		
2010 Winter Peak		NONE IDENTIFIED				35		
2015 Summer Peak		NONE IDENTIFIED				35		

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
2005 Spring			NONE IDENTIFIED						35		
2005 Summer Peak			NONE IDENTIFIED						35		
2005 Summer Shoulder			NONE IDENTIFIED						35		
2005 Fall Peak			NONE IDENTIFIED						35		
2005 Winter Peak			NONE IDENTIFIED						35		
2006 April Minimum			NONE IDENTIFIED						35		
2006 Spring Peak			NONE IDENTIFIED						35		
2006 Summer Peak			NONE IDENTIFIED						35		
2006 Summer Shoulder			NONE IDENTIFIED						35		
2006 Fall Peak	SPS	SPS	MUSTANG STATION 230/115KV TRANSFORMER	150	100.4	102.2	7.6	LEA COUNTY INTERCHANGE - YOAKUM COUNTY INTERCHANGE 230KV	0	Relieved by Must Run Requirement during the 2006 Fall Peak of Cunningham #4 and Maddox #1 for the Tolk to Eddy 345 kV line outage	
2006 Fall Peak			Contingency Solution Not Converged					TOLK INTERCHANGE - EDDY COUNTY INTERCHANGE 345 KV	0	Due to Scheduled Maintenance Outage of Cunningham #2 and #3 Requires Must Run of Cunningham #4 at 110 MW and Maddox #1 at 114 MW to Prevent Voltage Collapse for the Tolk to Eddy 345 kV line Outage during the 2006 Fall Peak	
2006 Fall Peak			Contingency Solution Not Converged					EDDY COUNTY INTERCHANGE 345/230/13.2 KV TRANSFORMER	0	Due to Scheduled Maintenance Outage of Cunningham #2 and #3 Requires Must Run of Cunningham #4 at 110 MW and Maddox #1 at 114 MW to Prevent Voltage Collapse for the Tolk to Eddy 345 kV line Outage during the 2006 Fall Peak	
2006 Winter Peak			NONE IDENTIFIED						35		
2007 Summer Peak			NONE IDENTIFIED						35		
2007 Winter Peak			Contingency Solution Not Converged					TOLK INTERCHANGE - EDDY COUNTY INTERCHANGE 345 KV	0	Load Flow Solution Blown Up Due to Voltage Collapse	
2007 Winter Peak			Contingency Solution Not Converged					EDDY COUNTY INTERCHANGE 345/230/13.2 KV TRANSFORMER	0	Load Flow Solution Blown Up Due to Voltage Collapse	
2007 Winter Peak			NONE IDENTIFIED						35		
2010 Summer Peak			NONE IDENTIFIED						35		
2010 Winter Peak			NONE IDENTIFIED						35		
2015 Summer Peak			Contingency Solution Not Converged					TOLK INTERCHANGE - EDDY COUNTY INTERCHANGE 345 KV	N/A	Load Flow Solution Blown Up Due to Voltage Collapse	
2015 Summer Peak			Contingency Solution Not Converged					EDDY COUNTY INTERCHANGE 345/230/13.2 KV TRANSFORMER	N/A	Load Flow Solution Blown Up Due to Voltage Collapse	
2015 Summer Peak	SPS	SPS	CURRY COUNTY INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 115KV CKT 2	161	105.4	106.7	6.1	OASIS INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 230KV CKT 1	0	Conductor Limited, May be Relieved by new Chaves County Interchange to a New Substation 345 kV line	
2015 Summer Peak	SPS	SPS	ROOSEVELT COUNTY INTERCHANGE 230/115KV TRANSFORMER	289.8	105.3	106.8	12.5	OASIS INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 230KV	0	May be Relieved by new Chaves County Interchange to a New Substation 345 kV line	
2015 Summer Peak	SPS	SPS	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 2	541	101.1	102.5	21.1	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 1	0	See Previous Upgrade Specified for Facility in Scenario :	
2015 Summer Peak	SPS	SPS	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 1	541	101.3	102.6	20.1	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 2	0	See Previous Upgrade Specified for Facility in Scenario :	
2015 Summer Peak	SPS	SPS	MUSTANG STATION 230/115KV TRANSFORMER	150	101.2	102.1	3.9	REMOVE UNIT 1 FROM BUS 51971 [MUSTG1 113.800] DISPATCH	0	Loss of Combustion Turbine at a Combined-Cycle Plant Requires Redispatch of Steam Unit on 230 kV will Relieve Loading	
2015 Summer Peak	SPS	SPS	MUSTANG STATION 230/115KV TRANSFORMER	150	100.7	101.6	3.9	REMOVE UNIT 1 FROM BUS 51972 [MUSTG2 113.800] DISPATCH	0	Loss of Combustion Turbine at a Combined-Cycle Plant Requires Redispatch of Steam Unit on 230 kV will Relieve Loading	
										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
2005 Spring		NONE IDENTIFIED				35		
2005 Summer Peak		NONE IDENTIFIED				35		
2005 Summer Shoulder		NONE IDENTIFIED				35		
2005 Fall Peak	SPS	52293 7RIVER6 230	0.9902	0.8885	OPEN LINE FROM BUS 52185 EDDYCO 6 230 TO BUS 52293 7RIVER6 230 CKT1	35	Not a Load Serving Bus	
2005 Winter Peak		NONE IDENTIFIED				35		
2006 April Minimum		NONE IDENTIFIED				35		
2006 Spring Peak		NONE IDENTIFIED				35		
2006 Summer Peak		NONE IDENTIFIED				35		
2006 Summer Shoulder	SPS	52073 CHAVES6 230	0.9213	0.8800	OPEN LINE FROM BUS 51440 TOLK7 345.00 TO BUS 52186 EDDYCO7 345.00 CKT 1	35	Not a Load Serving Bus	
2006 Summer Shoulder	SPS	52073 CHAVES6 230	0.9273	0.8902	OPEN LINE FROM BUS 52185 EDDYCO 6230.00 TO BUS 52186 EDDYCO7 345.00 TO BUS 52187 EDDYCO 113.200 CKT 1	35	Not a Load Serving Bus	
2006 Fall Peak		NONE IDENTIFIED				35		
2006 Winter Peak		NONE IDENTIFIED				35		
2007 Summer Peak		NONE IDENTIFIED				35		
2007 Winter Peak		NONE IDENTIFIED				35		
2010 Summer Peak		NONE IDENTIFIED				35		
2010 Winter Peak		NONE IDENTIFIED				35		
2015 Summer Peak		NONE IDENTIFIED				35		

Study Case	From Area	To Area	Monitored Branch Overload	Rate <MVA>	BC % Loading	TC % Loading	%TDF	Outaged Branch Causing Overload	Comments
2005 Spring			NONE IDENTIFIED						
2005 Summer Peak			NONE IDENTIFIED						
2005 Summer Shoulder			NONE IDENTIFIED						
2005 Fall Peak			NONE IDENTIFIED						
2005 Winter Peak			NONE IDENTIFIED						
2006 April Minimum			NONE IDENTIFIED						
2006 Spring Peak			NONE IDENTIFIED						
2006 Summer Peak			NONE IDENTIFIED						
2006 Summer Shoulder			NONE IDENTIFIED						
2006 Fall Peak			NONE IDENTIFIED						
2006 Winter Peak			NONE IDENTIFIED						
2007 Summer Peak			NONE IDENTIFIED						
2007 Winter Peak			NONE IDENTIFIED						
2010 Summer Peak			NONE IDENTIFIED						
2010 Winter Peak			NONE IDENTIFIED						
2015 Summer Peak			NONE IDENTIFIED						

Study Case	AREA	Monitored Bus with Violation	BC Voltage (PU)	TC Voltage (PU)	Outaged Branch Causing Voltage Violation	ATC (MW)	Solution	Estimated Cost
2005 Spring		NONE IDENTIFIED				35		
2005 Summer Peak		NONE IDENTIFIED				35		
2005 Summer Shoulder		NONE IDENTIFIED				35		
2005 Fall Peak		NONE IDENTIFIED				35		
2005 Winter Peak		NONE IDENTIFIED				35		
2006 April Minimum		NONE IDENTIFIED				35		
2006 Spring Peak		NONE IDENTIFIED				35		
2006 Summer Peak		NONE IDENTIFIED				35		
2006 Summer Shoulder		NONE IDENTIFIED				35		
2006 Fall Peak		NONE IDENTIFIED				35		
2006 Winter Peak		NONE IDENTIFIED				35		
2007 Summer Peak		NONE IDENTIFIED				35		
2007 Winter Peak		NONE IDENTIFIED				35		
2010 Summer Peak		NONE IDENTIFIED				35		
2010 Winter Peak		NONE IDENTIFIED				35		
2015 Summer Peak		NONE IDENTIFIED				35		

Study Case	Monitored Branch Overload	Rate <MVA>	BC % Loading	TC % Loading	Zonal Load (MW)	Outaged Branch Causing Overload
2005 Spring	CURRY COUNTY INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 115KV CKT 2	161	59.5	60.1	3921.8	OASIS INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 230KV CKT 1
2005 Summer Peak	CURRY COUNTY INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 115KV CKT 2	161	86.8	88.2	4594.4	OASIS INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 230KV CKT 1
2005 Summer Shoulder	CURRY COUNTY INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 115KV CKT 2	161	62.6	63.4	3905.0	OASIS INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 230KV CKT 1
2005 Fall Peak	CURRY COUNTY INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 115KV CKT 2	195	44.6	45.1	3327.8	OASIS INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 230KV CKT 1
2005 Winter Peak	CURRY COUNTY INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 115KV CKT 2	195	42.1	42.7	3304.1	OASIS INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 230KV CKT 1
2006 April Minimum	CURRY COUNTY INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 115KV CKT 2	161	35.9	37.0	2455.2	OASIS INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 230KV CKT 1
2006 Spring Peak	CURRY COUNTY INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 115KV CKT 2	161	63.6	64.5	4066.5	OASIS INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 230KV CKT 1
2006 Summer Peak	CURRY COUNTY INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 115KV CKT 2	161	89.0	90.3	4679.5	OASIS INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 230KV CKT 1
2006 Summer Shoulder	CURRY COUNTY INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 115KV CKT 2	161	64.4	64.8	3978.0	OASIS INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 230KV CKT 1
2006 Fall Peak	CURRY COUNTY INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 115KV CKT 2	195	45.9	46.4	3407.2	OASIS INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 230KV CKT 1
2006 Winter Peak	CURRY COUNTY INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 115KV CKT 2	195	37.4	38.0	3384.0	OASIS INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 230KV CKT 1
2007 Summer Peak	CURRY COUNTY INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 115KV CKT 2	161	92.8	94.1	4767.1	OASIS INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 230KV CKT 1
2007 Winter Peak	CURRY COUNTY INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 115KV CKT 2	195	46.0	46.5	3466.2	OASIS INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 230KV CKT 1
2010 Summer Peak	CURRY COUNTY INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 115KV CKT 2	161	99.5	100.5	5034.5	OASIS INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 230KV CKT 1
2010 Winter Peak	CURRY COUNTY INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 115KV CKT 2	195	49.7	50.2	3713.4	OASIS INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 230KV CKT 1
2015 Summer Peak	CURRY COUNTY INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 115KV CKT 2	161	113.7	114.7	5407.6	OASIS INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 230KV CKT 1
2005 Spring	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 1	541	70.9	71.9	3921.8	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 2
2005 Summer Peak	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 1	541	86.9	88.2	4594.4	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 2
2005 Summer Shoulder	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 1	541	72.0	73.1	3905.0	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 2
2005 Fall Peak	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 1	638	55.5	56.3	3327.8	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 2
2005 Winter Peak	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 1	638	55.2	56.0	3304.1	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 2
2006 April Minimum	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 1	541	56.3	57.4	2455.2	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 2
2006 Spring Peak	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 1	541	73.9	74.9	4066.5	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 2
2006 Summer Peak	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 1	541	87.9	89.2	4679.5	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 2
2006 Summer Shoulder	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 1	541	73.3	74.3	3978.0	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 2
2006 Fall Peak	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 1	638	59.4	60.2	3407.2	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 2
2006 Winter Peak	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 1	638	52.6	53.4	3384.0	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 2
2007 Summer Peak	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 1	541	90.2	91.5	4767.1	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 2
2007 Winter Peak	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 1	638	58.0	58.9	3466.2	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 2
2010 Summer Peak	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 1	541	94.9	95.9	5034.5	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 2
2010 Winter Peak	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 1	638	59.7	60.5	3713.4	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 2
2015 Summer Peak	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 1	541	104.2	105.2	5407.6	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 2
2005 Spring	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 2	541	70.8	71.7	3921.8	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 1
2005 Summer Peak	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 2	541	86.8	88.0	4594.4	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 1
2005 Summer Shoulder	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 2	541	71.9	72.9	3905.0	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 1
2005 Fall Peak	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 2	638	55.4	56.1	3327.8	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 1
2005 Winter Peak	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 2	638	55.1	55.9	3304.1	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 1
2006 April Minimum	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 2	541	56.1	57.2	2455.2	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 1
2006 Spring Peak	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 2	541	73.7	74.7	4066.5	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 1
2006 Summer Peak	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 2	541	87.7	89.0	4679.5	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 1
2006 Summer Shoulder	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 2	541	73.2	74.1	3978.0	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 1
2006 Fall Peak	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 2	638	59.3	60.1	3407.2	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 1
2006 Winter Peak	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 2	638	52.5	53.3	3384.0	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 1
2007 Summer Peak	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 2	541	90.0	91.3	4767.1	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 1
2007 Winter Peak	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 2	638	57.9	58.7	3466.2	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 1
2010 Summer Peak	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 2	541	94.7	95.7	5034.5	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 1
2010 Winter Peak	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 2	638	59.6	60.4	3713.4	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 1
2015 Summer Peak	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 2	541	104.0	105.1	5407.6	ROOSEVELT COUNTY INTERCHANGE - TOLK INTERCHANGE 230KV CKT 1
2005 Spring	ROOSEVELT COUNTY INTERCHANGE 230/115KV TRANSFORMER	290	60.5	61.5	3921.8	OASIS INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 230KV CKT 1
2005 Summer Peak	ROOSEVELT COUNTY INTERCHANGE 230/115KV TRANSFORMER	290	84.2	85.7	4594.4	OASIS INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 230KV CKT 1
2005 Summer Shoulder	ROOSEVELT COUNTY INTERCHANGE 230/115KV TRANSFORMER	290	62.4	63.5	3905.0	OASIS INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 230KV CKT 1
2005 Fall Peak	ROOSEVELT COUNTY INTERCHANGE 230/115KV TRANSFORMER	315	49.4	50.4	3327.8	OASIS INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 230KV CKT 1
2005 Winter Peak	ROOSEVELT COUNTY INTERCHANGE 230/115KV TRANSFORMER	315	48.5	49.5	3304.1	OASIS INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 230KV CKT 1
2006 April Minimum	ROOSEVELT COUNTY INTERCHANGE 230/115KV TRANSFORMER	290	37.1	38.5	2455.2	OASIS INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 230KV CKT 1
2006 Spring Peak	ROOSEVELT COUNTY INTERCHANGE 230/115KV TRANSFORMER	290	64.4	65.6	4066.5	OASIS INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 230KV CKT 1
2006 Summer Peak	ROOSEVELT COUNTY INTERCHANGE 230/115KV TRANSFORMER	290	86.0	87.5	4679.5	OASIS INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 230KV CKT 1
2006 Summer Shoulder	ROOSEVELT COUNTY INTERCHANGE 230/115KV TRANSFORMER	290	64.3	65.1	3978.0	OASIS INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 230KV CKT 1
2006 Fall Peak	ROOSEVELT COUNTY INTERCHANGE 230/115KV TRANSFORMER	315	53.0	54.0	3407.2	OASIS INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 230KV CKT 1
2006 Winter Peak	ROOSEVELT COUNTY INTERCHANGE 230/115KV TRANSFORMER	315	43.3	44.3	3384.0	OASIS INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 230KV CKT 1

2007 Summer Peak	ROOSEVELT COUNTY INTERCHANGE 230/115KV TRANSFORMER	290	89.5	91.0	4767.1	OASIS INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 230KV CKT 1
2007 Winter Peak	ROOSEVELT COUNTY INTERCHANGE 230/115KV TRANSFORMER	315	52.4	53.4	3466.2	OASIS INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 230KV CKT 1
2010 Summer Peak	ROOSEVELT COUNTY INTERCHANGE 230/115KV TRANSFORMER	290	96.8	98.0	5034.5	OASIS INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 230KV CKT 1
2010 Winter Peak	ROOSEVELT COUNTY INTERCHANGE 230/115KV TRANSFORMER	315	56.3	57.3	3713.4	OASIS INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 230KV CKT 1
2015 Summer Peak	ROOSEVELT COUNTY INTERCHANGE 230/115KV TRANSFORMER	290	110.3	111.4	5407.6	OASIS INTERCHANGE - ROOSEVELT COUNTY INTERCHANGE 230KV CKT 1

2005 Spring	LUBBOCK EAST INTERCHANGE 230/115KV TRANSFORMER	173	77.4	77.0	3921.8	LUBBOCK SOUTH INTERCHANGE 230/115KV TRANSFORMER
2005 Summer Peak	LUBBOCK EAST INTERCHANGE 230/115KV TRANSFORMER	173	99.4	99.3	4594.4	LUBBOCK SOUTH INTERCHANGE 230/115KV TRANSFORMER
2005 Summer Shoulder	LUBBOCK EAST INTERCHANGE 230/115KV TRANSFORMER	173	83.4	85.1	3905.0	LUBBOCK SOUTH INTERCHANGE 230/115KV TRANSFORMER
2005 Fall Peak	LUBBOCK EAST INTERCHANGE 230/115KV TRANSFORMER	188	60.8	60.5	3327.8	LUBBOCK SOUTH INTERCHANGE 230/115KV TRANSFORMER
2005 Winter Peak	LUBBOCK EAST INTERCHANGE 230/115KV TRANSFORMER	188	45.7	45.4	3304.1	LUBBOCK SOUTH INTERCHANGE 230/115KV TRANSFORMER
2006 April Minimum	LUBBOCK EAST INTERCHANGE 230/115KV TRANSFORMER	173	54.9	54.8	2455.2	LUBBOCK SOUTH INTERCHANGE 230/115KV TRANSFORMER
2006 Spring Peak	LUBBOCK EAST INTERCHANGE 230/115KV TRANSFORMER	173	79.8	81.6	4066.5	LUBBOCK SOUTH INTERCHANGE 230/115KV TRANSFORMER
2006 Summer Peak	LUBBOCK EAST INTERCHANGE 230/115KV TRANSFORMER	173	101.8	101.7	4679.5	LUBBOCK SOUTH INTERCHANGE 230/115KV TRANSFORMER
2006 Summer Shoulder	LUBBOCK EAST INTERCHANGE 230/115KV TRANSFORMER	173	85.9	85.6	3978.0	LUBBOCK SOUTH INTERCHANGE 230/115KV TRANSFORMER
2006 Fall Peak	LUBBOCK EAST INTERCHANGE 230/115KV TRANSFORMER	188	58.7	58.4	3407.2	LUBBOCK SOUTH INTERCHANGE 230/115KV TRANSFORMER
2006 Winter Peak	LUBBOCK EAST INTERCHANGE 230/115KV TRANSFORMER	188	60.8	60.5	3384.0	LUBBOCK SOUTH INTERCHANGE 230/115KV TRANSFORMER
2007 Summer Peak	LUBBOCK EAST INTERCHANGE 230/115KV TRANSFORMER	173	103.1	102.9	4767.1	LUBBOCK SOUTH INTERCHANGE 230/115KV TRANSFORMER
2007 Winter Peak	LUBBOCK EAST INTERCHANGE 230/115KV TRANSFORMER	188	57.8	57.4	3466.2	LUBBOCK SOUTH INTERCHANGE 230/115KV TRANSFORMER
2010 Summer Peak	LUBBOCK EAST INTERCHANGE 230/115KV TRANSFORMER	173	101.5	101.3	5034.5	LUBBOCK SOUTH INTERCHANGE 230/115KV TRANSFORMER
2010 Winter Peak	LUBBOCK EAST INTERCHANGE 230/115KV TRANSFORMER	188	54.9	54.5	3713.4	LUBBOCK SOUTH INTERCHANGE 230/115KV TRANSFORMER
2015 Summer Peak	LUBBOCK EAST INTERCHANGE 230/115KV TRANSFORMER	173	115.1	116.6	5407.6	LUBBOCK SOUTH INTERCHANGE 230/115KV TRANSFORMER

Table 6 - SPP Voltage Violations Compared to Load Growth in the SPS Region

Study Case	TC Voltage (PU)	Zonal Load (MW)	Outaged Branch
2005 Spring	0.991	3921.8	TOLK INTERCHANGE - EDDY COUNTY INTERCHANGE 345 KV
2005 Summer Peak	0.9968	4594.4	TOLK INTERCHANGE - EDDY COUNTY INTERCHANGE 345 KV
2005 Summer Shoulder	0.9997	3905.0	TOLK INTERCHANGE - EDDY COUNTY INTERCHANGE 345 KV
2005 Fall Peak	1.0171	3327.8	TOLK INTERCHANGE - EDDY COUNTY INTERCHANGE 345 KV
2005 Winter Peak	1.0147	3304.1	TOLK INTERCHANGE - EDDY COUNTY INTERCHANGE 345 KV
2006 April Minimum	0.9986	2455.2	TOLK INTERCHANGE - EDDY COUNTY INTERCHANGE 345 KV
2006 Spring Peak	0.9984	4066.5	TOLK INTERCHANGE - EDDY COUNTY INTERCHANGE 345 KV
2006 Summer Peak	0.996	4679.5	TOLK INTERCHANGE - EDDY COUNTY INTERCHANGE 345 KV
2006 Summer Shoulder	0.9969	3978.0	TOLK INTERCHANGE - EDDY COUNTY INTERCHANGE 345 KV
2006 Fall Peak	*	3407.2	TOLK INTERCHANGE - EDDY COUNTY INTERCHANGE 345 KV
2006 Winter Peak	0.995	3384.0	TOLK INTERCHANGE - EDDY COUNTY INTERCHANGE 345 KV
2007 Summer Peak	0.9952	4767.1	TOLK INTERCHANGE - EDDY COUNTY INTERCHANGE 345 KV
2007 Winter Peak	*	3466.2	TOLK INTERCHANGE - EDDY COUNTY INTERCHANGE 345 KV
2010 Summer Peak	0.9962	5034.5	TOLK INTERCHANGE - EDDY COUNTY INTERCHANGE 345 KV
2010 Winter Peak	1.0148	3713.4	TOLK INTERCHANGE - EDDY COUNTY INTERCHANGE 345 KV
2015 Summer Peak	*	5407.6	TOLK INTERCHANGE - EDDY COUNTY INTERCHANGE 345 KV

* Load Flow Case would not solve due to voltage colapse.

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
2005 Spring			NONE IDENTIFIED						35		
2005 Summer Peak			NONE IDENTIFIED						35		
2005 Summer Shoulder			NONE IDENTIFIED						35		
2005 Fall Peak			NONE IDENTIFIED						35		
2005 Winter Peak			NONE IDENTIFIED						35		
2006 April Minimum			NONE IDENTIFIED						35		
2006 Spring Peak			NONE IDENTIFIED						35		
2006 Summer Peak			NONE IDENTIFIED						35		
2006 Summer Shoulder			NONE IDENTIFIED						35		
2006 Fall Peak			NONE IDENTIFIED						35		
2006 Winter Peak			NONE IDENTIFIED						35		
2007 Summer Peak			NONE IDENTIFIED						35		
2007 Winter Peak			NONE IDENTIFIED						35		
2010 Summer Peak	SPS	SPS	51176 CURRY3 115 to 51202 ROOSEVL3 115 CKT 2	161	99.4835	100.5	4.8	51195 OASIS6 230 to 51203 ROOSEVL6 230 CKT 1	17	Conductor Limited, Solution Undetermined	
2010 Winter Peak			NONE IDENTIFIED						0		
2015 Summer Peak	SPS	SPS	51203 ROOSEVL6 230 to 51437 TOLKW6 230 CKT 1	541	104.2	105.2	16.4	51203 ROOSEVL6 230 to 51435 TOLKE6 230 CKT 2	0	Conductor Limited, Build a new 57 mile 345 kV line from Chaves County Interchange to a New Substation, on the Tolk to EDDY 345 kV line, which requires two 345 kV terminals and a 345/230 kV transformers.	$26,139,450
2015 Summer Peak	SPS	SPS	51203 ROOSEVL6 230 to 51435 TOLKE6 230 CKT 2	541	104.022	105.1	16.3	51203 ROOSEVL6 230 to 51437 TOLKW6 230 CKT 1	0	See Previous Upgrade Specified for Facility	
2015 Summer Peak	SPS	SPS	51202 ROOSEVL3 115 to 51203 ROOSEVL6 230 CKT 1	289.8	110.3	111.4	9.5	51195 OASIS6 230 to 51203 ROOSEVL6 230 CKT 1	0	May be Relieved by new Chaves County Interchange to a New Substation 345 kV line	
2015 Summer Peak	SPS	SPS	51688 LUBE3 115 to 51689 LUBE6 230 CKT 1	172.5	115.1	116.6	7.1	51680 LUBS3 115 to 51681 LUBS6 230 CKT 1	0	Replace 230/115 kV auto with larger unit - 258 MVA max	$1,395,950
2015 Summer Peak	SPS	SPS	51176 CURRY3 115 to 51202 ROOSEVL3 115 CKT 2	161	113.7	114.7	4.2	51195 OASIS6 230 to 51203 ROOSEVL6 230 CKT 1	0	Conductor Limited, May be Relieved by new Chaves County Interchange to a New Substation 345 kV line	

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
2005 Spring			NONE IDENTIFIED						35		
2005 Summer Peak			NONE IDENTIFIED						35		
2005 Summer Shoulder			NONE IDENTIFIED						35		
2005 Fall Peak			NONE IDENTIFIED						35		
2005 Winter Peak			NONE IDENTIFIED						35		
2006 April Minimum			NONE IDENTIFIED						35		
2006 Spring Peak			NONE IDENTIFIED						35		
2006 Summer Peak			NONE IDENTIFIED						35		
2006 Summer Shoulder			NONE IDENTIFIED						35		
2006 Fall Peak	SPS	SPS	51966 MUSTGN3 115 to 51969 MUSTANG6 230 CKT 1	150	100.4	102.2	7.6	51891 YOAKUM6 230 to 52205 LEACO6 230 CKT 1	0	Relieved by Curtailment of Existing Service or SPS Redispatch, See Tables 5, 6, and 7	
2006 Fall Peak			Contingency Solution Not Converged					51440 TOLK7 345.00 TO BUS 52186 EDDYCO7 345.00 CKT 1	N/A	Due to Scheduled Maintenance Outage of Cunningham #2 and #3 Requires Must Run of Cunningham #4 at 110 MW and Maddox #1 at 114 MW to Prevent Voltage Collapse for the Tolk to Eddy 345 kV line Outage during the 2006 Fall Peak	
2006 Fall Peak			Contingency Solution Not Converged					52185 EDDYCO 6230.00 TO BUS 52186 EDDYCO7 345.00 TO BUS 52187 EDDYCO 113.200 CKT 1	N/A	Due to Scheduled Maintenance Outage of Cunningham #2 and #3 Requires Must Run of Cunningham #4 at 110 MW and Maddox #1 at 114 MW to Prevent Voltage Collapse for the Tolk to Eddy 345 kV line Outage during the 2006 Fall Peak	
2006 Winter Peak			NONE IDENTIFIED						35		
2007 Summer Peak			NONE IDENTIFIED						35		
2007 Winter Peak			Contingency Solution Not Converged					51440 TOLK7 345.00 TO BUS 52186 EDDYCO7 345.00 CKT 1	N/A	Load Flow Solution Blown Up Due to Voltage Collapse	
2007 Winter Peak			Contingency Solution Not Converged					52185 EDDYCO 6230.00 TO BUS 52186 EDDYCO7 345.00 TO BUS 52187 EDDYCO 113.200 CKT 1	N/A	Load Flow Solution Blown Up Due to Voltage Collapse	
2010 Summer Peak			NONE IDENTIFIED						35		
2010 Winter Peak			NONE IDENTIFIED						35		
2015 Summer Peak			Contingency Solution Not Converged					51440 TOLK7 345.00 TO BUS 52186 EDDYCO7 345.00 CKT 1	N/A	Load Flow Solution Blown Up Due to Voltage Collapse	
2015 Summer Peak			Contingency Solution Not Converged					52185 EDDYCO 6230.00 TO BUS 52186 EDDYCO7 345.00 TO BUS 52187 EDDYCO 113.200 CKT 1	N/A	Load Flow Solution Blown Up Due to Voltage Collapse	
2015 Summer Peak	SPS	SPS	51176 CURRY3 115 to 51202 ROOSEVL3 115 CKT 2	161	105.4	106.7	6.1	51195 OASIS6 230 to 51203 ROOSEVL6 230 CKT 1	0	Conductor Limited, May be Relieved by new Chaves County Interchange to a New Substation 345 kV line	
2015 Summer Peak	SPS	SPS	51202 ROOSEVL3 115 to 51203 ROOSEVL6 230 CKT 1	289.8	105.3	106.8	12.5	51195 OASIS6 230 to 51203 ROOSEVL6 230 CKT 1	0	May be Relieved by new Chaves County Interchange to a New Substation 345 kV line	
2015 Summer Peak	SPS	SPS	51203 ROOSEVL6 230 to 51435 TOLKE6 230 CKT 2	541	101.1	102.5	21.1	51203 ROOSEVL6 230 to 51437 TOLKW6 230 CKT 1	0	See Previous Upgrade Specified for Facility in Scenario 1	
2015 Summer Peak	SPS	SPS	51203 ROOSEVL6 230 to 51437 TOLKW6 230 CKT 1	541	101.3	102.6	20.1	51203 ROOSEVL6 230 to 51435 TOLKE6 230 CKT 2	0	See Previous Upgrade Specified for Facility in Scenario 1	
2015 Summer Peak	SPS	SPS	51966*MUSTGN3 115 51969 MUSTANG6 230 1	150	101.2	102.1	3.9	REMOVE UNIT 1 FROM BUS 51971 [MUSTG1 113.800] DISPATCH	0	Loss of Combustion Turbine at a Combined-Cycle Plant, Requires Redispatch of Steam Unit on 230 kV will Relieve Loading	
2015 Summer Peak	SPS	SPS	51966*MUSTGN3 115 51969 MUSTANG6 230 1	150	100.7	101.6	3.9	REMOVE UNIT 1 FROM BUS 51972 [MUSTG2 113.800] DISPATCH	0	Loss of Combustion Turbine at a Combined-Cycle Plant, Requires Redispatch of Steam Unit on 230 kV will Relieve Loading	
										Total Estimated Engineering and Construction Cost	$0