SPP Southwest Power Pool

System Impact Study SPP-2003-249-2 For Transmission Service Requested By Southwestern Public Service Company

From SPS to EDDY

For a Reserved Amount Of 67 MW From 1/1/2005 To 1/1/2006

SPP Engineering, Tariff Studies

Table of Contents

1. Executive Summary

Southwestern Public Service Company has requested a system impact study for long-term Firm Point-to-Point transmission service from SPS to EDDY for 67 MW. The period of the service requested is from 1/1/2005 to 1/1/2006. The OASIS reservation numbers are 613909 and 613910.

The principal objective of this study is to identify system problems and potential system modifications necessary to facilitate the 67 MW request while maintaining system reliability. Analysis was conducted for the requested service period above and for the remaining planning horizon from 1/1/2006 to 4/1/2011. The additional evaluation of the planning horizon was conducted to determine any future constraints that may limit the future renewal of service.

Tables 1 and 2 lists the SPP facility overloads and voltage violations, respectively, caused or impacted by the requested service and include solutions with estimated engineering and construction costs to alleviate the limiting facilities. Tables 3 and 4 lists Non-SPP facility overloads and voltage violations, respectively, caused or impacted by the requested service.

Due to the inability to upgrade a limiting constraint identified within the reservation period, the ATC for the SPS to EDDY 67 MW transfer is limited to fifty. Curtailment of previously confirmed service from SPS to EDDY (Oasis Reservations 288310, 364570, or 364573) and SPS redispatch were evaluated as an option to obtain the full 67 MW. The amount and time period of curtailment required to obtain the full 67 MW is documented in Table 5. Generation shift factors and applicable redispatch relief pairs are documented in Tables 6 and 7, respectively. The curtailment or redispatch requirements would be called upon prior to implementing NERC TLR Level 5a.

If the customer agrees to curtail previously confirmed service or redispatch the applicable SPS units to relieve the impacts on the limiting constraint identified during the reservation period, the 67 MW request will be accepted.

2. Introduction

Southwestern Public Service has requested a system impact study for Point-to-Point Service from SPS to EDDY for 67 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 67 MW request on transmission line loading and transmission bus voltages for system intact and system outages of single and selected multiple transmission lines and transformers on the SPP systems and first tier Non - SPP systems.

3. Study Methodology

A. Description

The system impact analysis was conducted to determine the steady-state impact of the 67 MW transfer on the SPP and first tier Non - SPP control area systems. The steady-state analysis was done to ensure current SPP Criteria and NERC Planning Standards requirements are fulfilled. The Southwest Power Pool conforms to the NERC Planning Standards, which provide the strictest requirements, related to voltage violations and thermal overloads during normal conditions and during a contingency. It requires that all facilities be within normal operating ratings for normal system conditions and within emergency ratings after a contingency. Normal operating ratings and emergency operating ratings monitored are Rate A and B in the SPP MDWG models, respectively. The lower bound of the normal voltage range monitored is 95%. The lower bound of the emergency voltage range monitored is 90%.

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

A 3 % transfer distribution factor (TDF) cutoff was applied to all SPP control area facilities. For first tier Non – SPP control area facilities, a 3 % TDF cutoff was applied to 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 eleven seasonal models to study the SPS to EDDY 67 MW transfer for the requested service period and the remaining planning horizon. The SPP 2004 Series Cases 2004/05 Winter Peak (04WP), 2005 April Minimum (05AP), 2005 Spring Peak (05G), 2005 Summer Peak (05SP), 2005 Summer Shoulder (05SH), and 2005 Fall Peak (05FA) were used to study the impact of the 67 MW transfer on the system during the requested service period of 1/1/2005 to 1/1/2006. The SPP 2004 Series 2005/06 Winter Peak (05WP), 2007 Summer Peak (07SP), 2007/08 Winter Peak (07WP), 2010 Summer Peak (10SP), and 2010/11 Winter Peak (10WP) were used to study the impact of the 67 MW transfer on the system during the remaining planning horizon from 1/1/2006 to 4/1/2011. 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. The cases were modified to reflect firm transfers during the requested service period that were not already included in the SPP 2004 Series Cases.

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.

4. Study Results

A. Study Analysis Results

Tables 1, 2, 3, and 4 contain the steady-state analysis results of the System Impact Study. The Tables are in the attached workbook *SPP-2003-249-2 Tables*. The tables identify the seasonal case in which the event occurred, the facility control area location, applicable ratings of the overloaded facility, the loading percentage or voltage with and without the studied transfer, 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.

Table 1 lists the SPP facility overloads caused or impacted by the 67 MW transfer. Solutions with estimated engineering and construction costs are provided in the tables.

Table 2 lists the SPP facility voltage violations caused or impacted by the 67 MW transfer. Solutions with estimated engineering and construction costs are provided in the tables.

Table 3 lists overloads on Non - SPP Regional Tariff participants' transmission systems caused or impacted by the 67 MW transfer.

Table 4 lists voltage violations on Non - SPP Regional Tariff participants' transmission system caused or impacted by the 67 MW transfer.

Table 5 documents the amount of SPS to EDDY curtailment required for the time period needed for each limiting constraint.

Table 6 lists SPS Generation Shift Factors for the CARLSBAD PLANT - POTASH JUNCTION INTERCHANGE 115KV line for the outage of CUNNINGHAM STATION - EDDY COUNTY INTERCHANGE 230KV line. These factors are provided for SPS redispatch to relieve the facility loading by 2 MW from 4/1/2005 to 6/1/2005.

Table 7 lists applicable relief pairs with redispatch amounts required to relieve facility by 2 MW.

Table 1a documents the modeling representation of the events identified in Table 1 to include bus numbers and bus names.

5. Conclusion

Due to the inability to upgrade a limiting constraint identified within the reservation period, the ATC for the SPS to EDDY 67 MW transfer is limited to fifty. Curtailment of previously confirmed service from SPS to EDDY (Oasis Reservations 288310, 364570, or 364573) and SPS redispatch were evaluated as an option to obtain the full 67 MW. The amount and time period of curtailment required to obtain the full 67 MW is documented in Table 5. Generation shift factors and applicable redispatch relief pairs are documented in Tables 6 and 7, respectively. The curtailment or redispatch requirements would be called upon prior to implementing NERC TLR Level 5a.

If the customer agrees to curtail previously confirmed service or redispatch the applicable SPS units to relieve the impacts on the limiting constraint identified during the reservation period, the 67 MW request will be accepted.

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	Outaged Branch Causing Overload	ATC (MW)	Solution	Estimated Cost
04WP			NONE IDENTIFIED					67		
05AP			NONE IDENTIFIED					67		
05G	SPS	SPS	CARLSBAD PLANT - POTASH JUNCTION INTERCHANGE 115KV	99	94.4	102.0	CUNNINGHAM STATION - EDDY COUNTY INTERCHANGE 230KV	50	Relieved by Curtailment of Existing Service or SPS Redispatch	
05SP			NONE IDENTIFIED					67		
05SH			NONE IDENTIFIED					67		
05FA			NONE IDENTIFIED					67		
05WP			NONE IDENTIFIED					67		
07SP			NONE IDENTIFIED					67		
07WP			NONE IDENTIFIED					67		
10SP			NONE IDENTIFIED					67		
10WP			NONE IDENTIFIED					67		
									Total Estimated 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
04WP		NONE IDENTIFIED				67		
05AP		NONE IDENTIFIED				67		
05G		NONE IDENTIFIED				67		
05SP		NONE IDENTIFIED				67		
05SH		NONE IDENTIFIED				67		
05FA		NONE IDENTIFIED				67		
05WP		NONE IDENTIFIED				67		
07SP		NONE IDENTIFIED				67		
07WP		NONE IDENTIFIED				67		
10SP		NONE IDENTIFIED				67		
10WP		NONE IDENTIFIED				67		
							Total Estimated Cost	$ -

Study Case	From Area	To Area	Monitored Branch Overload	Rate <MVA>	BC % Loading	TC % Loading	Outaged Branch Causing Overload	Comments
04WP			NONE IDENTIFIED					
05AP			NONE IDENTIFIED					
05G			NONE IDENTIFIED					
05SP			NONE IDENTIFIED					
05SH			NONE IDENTIFIED					
05FA			NONE IDENTIFIED					
05WP			NONE IDENTIFIED					
07SP			NONE IDENTIFIED					
07WP			NONE IDENTIFIED					
10SP			NONE IDENTIFIED					
10WP			NONE IDENTIFIED					

Study Case	Area	Monitored Bus with Violation	BC Voltage (PU)	TC Voltage (PU)	Outaged Branch Causing Voltage Violation	Comments
04WP		NONE IDENTIFIED				
05AP		NONE IDENTIFIED				
05G		NONE IDENTIFIED				
05SP		NONE IDENTIFIED				
05SH		NONE IDENTIFIED				
05FA		NONE IDENTIFIED				
05WP		NONE IDENTIFIED				
07SP		NONE IDENTIFIED				
07WP		NONE IDENTIFIED				
10SP		NONE IDENTIFIED				
10WP		NONE IDENTIFIED				

Overloaded Facility	Contingency Causing Overload	Date Curtailment Needed	SPS to EDDY %Response	SPS to EDDY %Response	*ATC (MW) Needed	**Amount of SPS to EDDY transfer (Oasis Reservations 288310, 364570, or 364573) Needed for Curtailment (MW)
CARLSBAD PLANT - POTASH JUNCTION INTERCHANGE 115KV	CUNNINGHAM STATION - EDDY COUNTY INTERCHANGE 230KV	4/1/05-6/1/05	11.245	11.245	17	17(1)

* ATC (MW) Needed = 67 MW - ATC (MW) from Table 1
** Amount (MW) Needed for Curtailment = ATC (MW) Needed * SPS to EDDY %Response / SPS to EDDY %Response
(1) SPS Unit Redispatch is better option to remove 2 MW additional impact of Redirect Path

Limiting Facility: CARLSBAD PLANT - POTASH JUNCTION INTERCHANGE 115KV
Line Outage: CUNNINGHAM STATION - EDDY COUNTY INTERCHANGE 230KV
Date Redispatch Needed: 4/1/05-6/1/05
Relief Amount: 2 MW

Source	Sink	GSF
SPS_HARRNG1124.0	System Swing	-0.00351
SPS_HARRNG2124.0	System Swing	-0.00351
SPS_HARRNG3124.0	System Swing	-0.00351
SPS_NICHOL1113.8	System Swing	-0.00342
SPS_NICHOL2113.8	System Swing	-0.00342
SPS_NICHOL3122.0	System Swing	-0.00347
SPS_PLNTX1 113.8	System Swing	-0.00565
SPS_PLNTX2 113.8	System Swing	-0.00565
SPS_PLNTX3 113.8	System Swing	-0.00565
SPS_PLNTX4 120.0	System Swing	-0.00875
SPS_TOLK1 124.0	System Swing	-0.01251
SPS_TOLK2 124.0	System Swing	-0.01247
SPS_JONES1 122.0	System Swing	0.01351
SPS_JONES2 121.0	System Swing	0.01351
SPS_MUSTG1 113.8	System Swing	0.05497
SPS_MUSTG2 113.8	System Swing	0.05503
SPS_MUSTG3 122.0	System Swing	0.0459
SPS_CUNN1 113.8	System Swing	0.10727
SPS_CUNN2 120.0	System Swing	0.12378
SPS_CUNN4 122.0	System Swing	0.12378
SPS_CUNN3 122.0	System Swing	0.10727
SPS_MADDX1 113.8	System Swing	0.10194
SPS_MADDX2 113.8	System Swing	0.10194

Relief Amount = ATC (MW) Needed * SPS to EDDY %Response

Limiting Facility: CARLSBAD PLANT - POTASH JUNCTION INTERCHANGE 115KV
Line Outage: CUNNINGHAM STATION - EDDY COUNTY INTERCHANGE 230KV
Date Redispatch Needed: 4/1/05-6/1/05
Relief Amount: 2 MW

Source	Sink	Factor	Redispatch Amount (MW)
SPS_NICHOL3122.0	SPS_CUNN1 113.8	-0.11074	18
SPS_NICHOL3122.0	SPS_CUNN2 120.0	-0.12725	16
SPS_NICHOL3122.0	SPS_CUNN4 122.0	-0.12725	16
SPS_NICHOL3122.0	SPS_CUNN3 122.0	-0.11074	18
SPS_NICHOL3122.0	SPS_MADDX1 113.8	-0.10541	19
SPS_NICHOL3122.0	SPS_MADDX2 113.8	-0.10541	19

Factor = Source GSF Referenced to System Swing - Sink GSF Referenced to System Swing
Transaction = Relief Amount / Factor

Study Case	From Area	To Area	Monitored Branch Overload	Rate <MVA>	BC % Loading	TC % Loading	Outaged Branch Causing Overload	ATC (MW)	Solution	Estimated Cost
04WP			NONE IDENTIFIED					67		
05AP			NONE IDENTIFIED					67		
05G	SPS	SPS	52252 POTJCT3 115 to 52310 CARLSBD3 115 CKT 1	99	94.4	102.0	52185 EDDYCO 6 230 to 52209 CUNNINH6 230 CKT 1	50	Relieved by Curtailment of Existing Service or SPS Redispatch	
05SP			NONE IDENTIFIED					67		
05SH			NONE IDENTIFIED					67		
05FA			NONE IDENTIFIED					67		
05WP			NONE IDENTIFIED					67		
07SP			NONE IDENTIFIED					67		
07WP			NONE IDENTIFIED					67		
10SP			NONE IDENTIFIED					67		
10WP			NONE IDENTIFIED					67		
									Total Estimated Cost	$0