SPP Southwest Power Pool

System Impact Study SPP-2003-204-3 For Transmission Service Requested By Southwestern Public Service Company

From SPS To MPS

For a Redirected Amount Of 200MW From 6/1/2005 To 6/1/2010

SPP Engineering, Tariff Studies

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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 MPS for 200 MW. The period of the service requested is from 6/1/2005 to 6/1/2010. The OASIS reservation numbers are 571175, 571178, 571179, and 571180. This is a request to redirect the previously confirmed OASIS reservations 381154, 381165, 297069, and 297076, which total a 200 MW transfer from SPS to AMRN.

The principal objective of this study is to identify current system limitations using AC analyses and applying a 3 % transfer distribution factor cutoff on all SPP control area facilities and to determine the system upgrades necessary to provide the requested 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.

The SPS to MPS 200 MW transfer does not create any new violations or impacts on facilities requiring upgrades. Therefore, the service will be accepted.

2. Introduction

Southwestern Public Service Company has requested a system impact study for Point-to-Point Service from SPS to MPS for 200 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 200 MW transfer and the impact of the required upgrades for service on transmission line loading and transmission bus voltages for outages of single and selected multiple transmission lines and transformers on the SPP systems and first tier Non – SPP control area systems.

3. Study Methodology

A. Description

The system impact analysis was conducted to determine the steady-state impact of the 200 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 eight seasonal models to study the SPS to MPS 200 MW transfer for the requested service period. The SPP 2004 Series Cases 2005 Summer Peak (05SP), 2005 Summer Shoulder (05SH), 2005 Fall Peak (05FA), 2005/2006 Winter Peak (05WP), 2007 Summer Peak (07SP), 2007/2008 Winter Peak (07WP), 2010 Summer Peak (10SP) and 2010 Winter Peak (10WP) were used to study the impact of the 200 MW transfer on the SPP system during the requested service period of 6/1/2005 to 6/1/2010. 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 future firm transfers during the requested service period that were not already included in the January 2004 base case series models.

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-2003-204-3 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 200 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 200 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 200 MW transfer.

Table 4 lists voltage violations on Non - SPP Regional Tariff participants' transmission system caused or impacted by the 200 MW transfer.

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

5. Conclusion

The SPS to MPS 200 MW transfer does not create any new violations or impacts on facilities requiring upgrades. Therefore, the service 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

Table 1 - SPP Facility Overloads
Caused or Impacted by Redirect Path
with Impact of Original Path Provided

Study Case	From Area	To Area	Monitored Branch Over 100% Rate B	Rate <MVA>	SPS to MPS BC % Loading	SPS to MPS TC % Loading	SPS to AMRN BC % Loading	SPS to AMRN TC % Loading	Outaged Branch Causing Overload	ATC (MW)	Solution	Estimated Cost
05SP	WERE	WERE	AUBURN ROAD - JEFFREY ENERGY CENTER 230KV	565	108.5	110.1	108.5	109.8	HOYT - JEFFREY ENERGY CENTER 345KV	200	Westar Operating Procedure 400 - Outage of the Jeffrey Energy Center to Hoyt 345kV Line	
05SH	WERE	WERE	AUBURN ROAD - JEFFREY ENERGY CENTER 230KV	565	100.0	101.5	100.0	101.2	HOYT - JEFFREY ENERGY CENTER 345KV	200	Westar Operating Procedure 400 - Outage of the Jeffrey Energy Center to Hoyt 345kV Line	
05FA			NONE IDENTIFIED							200		
05WP	WERE	WERE	AUBURN ROAD - JEFFREY ENERGY CENTER 230KV	565	100.6	102.1	100.6	101.7	HOYT - JEFFREY ENERGY CENTER 345KV	200	Westar Operating Procedure 400 - Outage of the Jeffrey Energy Center to Hoyt 345kV Line	
07SP			NONE IDENTIFIED							200		
07WP	WERE	WERE	AUBURN ROAD - JEFFREY ENERGY CENTER 230KV	565	98.9	101.2	98.9	100.8	HOYT - JEFFREY ENERGY CENTER 345KV	200	Westar Operating Procedure 400 - Outage of the Jeffrey Energy Center to Hoyt 345kV Line	
10SP	WERE	WERE	AUBURN ROAD - JEFFREY ENERGY CENTER 230KV	565	106.4	108.0	106.4	107.6	HOYT - JEFFREY ENERGY CENTER 345KV	200	Westar Operating Procedure 400 - Outage of the Jeffrey Energy Center to Hoyt 345kV Line	
10SP	KACP	KACP	AVONDALE - GLADSTONE 161KV CKT 2	224	94.6	100.3	94.6	94.3	NEAST - RIVERSIDE 161KV CKT 1	200	Facility is not a limit to service until 2010 Summer Peak, Redirect Request period ends 6/1/2010.	
10WP			NONE IDENTIFIED							200		
											Total Estimated Cost	$ -

Study Case	Area	Monitored Bus with Violation	SPS to MPS BC Voltage (PU)	SPS to MPS TC Voltage (PU)	SPS to AMRN BC Voltage (PU)	SPS to AMRN TC Voltage (PU)	Outaged Branch Causing Voltage Violation	ATC (MW)	Solution	Estimated Cost
05SP		NONE IDENTIFIED						200		
05SH		NONE IDENTIFIED						200		
05FA		NONE IDENTIFIED						200		
05WP		NONE IDENTIFIED						200		
07SP		NONE IDENTIFIED						200		
07WP		NONE IDENTIFIED						200		
10SP		NONE IDENTIFIED						200		
10WP		NONE IDENTIFIED						200		
									Total Estimated Cost	$ -

Study Case	From Area	To Area	Monitored Branch Over 100% Rate B	Rate <MVA>	SPS to MPS BC % Loading	SPS to MPS TC % Loading	SPS to AMRN BC % Loading	SPS to AMRN TC % Loading	Outaged Branch Causing Overload	Comments
05SP			NONE IDENTIFIED							
05SH			NONE IDENTIFIED							
05FA			NONE IDENTIFIED							
05WP			NONE IDENTIFIED							
07SP			NONE IDENTIFIED							
07WP			NONE IDENTIFIED							
10SP			NONE IDENTIFIED							
10WP			NONE IDENTIFIED							

Table 4 - Non-SPP Voltage Violations
Caused or Impacted by Redirect Path
with Impact of Original Path Provided

Study Case	Area	Monitored Bus with Violation	SPS to MPS BC Voltage (PU)	SPS to MPS TC Voltage (PU)	SPS to AMRN BC Voltage (PU)	SPS to AMRN TC Voltage (PU)	Outaged Branch Causing Voltage Violation	Comments
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	From Area	To Area	Monitored Branch Over 100% Rate B	Rate <MVA>	SPS to MPS BC % Loading	SPS to MPS TC % Loading	SPS to AMRN BC % Loading	SPS to AMRN TC % Loading	Outaged Branch Causing Overload	ATC (MW)	Solution	Estimated Cost
05SP	WERE	WERE	56851 AUBURN 6 230 to 56852 JEC 6 230 CKT 1	565	108.5	110.1	108.5	109.8	56765 HOYT 7 345 to 56766 JEC N 7 345 CKT 1	200	Westar Operating Procedure 400 - Outage of the Jeffrey Energy Center to Hoyt 345kV Line	
05SH	WERE	WERE	56851 AUBURN 6 230 to 56852 JEC 6 230 CKT 1	565	100.0	101.5	100.0	101.2	56765 HOYT 7 345 to 56766 JEC N 7 345 CKT 1	200	Westar Operating Procedure 400 - Outage of the Jeffrey Energy Center to Hoyt 345kV Line	
05FA			NONE IDENTIFIED							200		
05WP	WERE	WERE	56851 AUBURN 6 230 to 56852 JEC 6 230 CKT 1	565	100.6	102.1	100.6	101.7	56765 HOYT 7 345 to 56766 JEC N 7 345 CKT 1	200	Westar Operating Procedure 400 - Outage of the Jeffrey Energy Center to Hoyt 345kV Line	
07SP			NONE IDENTIFIED							200		
07WP	WERE	WERE	56851 AUBURN 6 230 to 56852 JEC 6 230 CKT 1	565	98.9	101.2	98.9	100.8	56765 HOYT 7 345 to 56766 JEC N 7 345 CKT 1	200	Westar Operating Procedure 400 - Outage of the Jeffrey Energy Center to Hoyt 345kV Line	
10SP	WERE	WERE	56851 AUBURN 6 230 to 56852 JEC 6 230 CKT 1	565	106.4	108.0	106.4	107.6	56765 HOYT 7 345 to 56766 JEC N 7 345 CKT 1	200	Westar Operating Procedure 400 - Outage of the Jeffrey Energy Center to Hoyt 345kV Line	
10SP	KACP	KACP	58016 GLADSTN5 161 to 58015 AVONDAL5 161 CKT 2	224	94.6	100.3	94.6	94.3	57985 NEAST 5 161 to 58021 RIVRSID5 161 CKT 1	200	Facility is not a limit to service until 2010 Summer Peak, Redirect Request period ends 6/1/2010.	
10WP			NONE IDENTIFIED							200		