



*System Impact Study  
For Redirect of Transmission Service  
Requested By  
Southwestern Public Service Co.  
(SPSM)*

*From SPS To WR*

*For a Reserved Amount Of 25 MW  
From 1/1/02  
To 1/1/12*

*SPP Coordinated Planning*

# Table of Contents

<b>1. EXECUTIVE SUMMARY .....</b>	<b>3</b>
<b>2. INTRODUCTION .....</b>	<b>4</b>
<b>3. STUDY METHODOLOGY .....</b>	<b>5</b>
A. DESCRIPTION .....	5
B. MODEL UPDATES .....	5
C. TRANSFER ANALYSIS .....	5
<b>4. STUDY RESULTS.....</b>	<b>6</b>
TABLE 1 - SPP FACILITY OVERLOADS CAUSED BY THE SPS TO WR 25 MW TRANSFER .....	7
TABLE 2 – NON-SPP FACILITY OVERLOADS CAUSED BY THE SPS TO WR 25 MW TRANSFER.....	7
TABLE 3 – PREVIOUSLY ASSIGNED AND IDENTIFIED SPP FACILITIES IMPACTED BY THE SPS TO WR 25 MW TRANSFER .....	8
TABLE 4 – CONFIRMED TRANSFERS AVAILABLE FOR CURTAILMENT TO RELIEVE LA CYGNE TO STILWELL FLOWGATE .....	9
<b>5. CONCLUSION .....</b>	<b>10</b>
<b>APPENDIX A.....</b>	<b>11</b>

## **1. Executive Summary**

Southwestern Public Service Co. (SPSM) has requested a system impact study for long-term Firm Point-to-Point transmission service from Southwestern Public Service (SPS) to Western Resources (WR). The period of the transaction is from 1/1/02 to 1/1/12. The request is for OASIS reservation 297121 in the amount of 25 MW, which is a redirect of reservation 297076. Reservation 297076 is a SPS to AMRN 50 MW transfer with a confirmed reservation period from 1/1/02 to 1/1/12.

Due to the existence of higher priority requests starting on or after 1/1/2003, the SPSM Point-to-Point transmission service redirect can only be evaluated for the first year of service. In order to determine if service is available from the start date of 1/1/2002 through a period ending 1/1/2003, this study was performed. For the remaining period of the transaction from 1/1/2003 to 1/1/2012, higher priority requests exist and are currently being evaluated.

The principal objective of this study is to identify system problems and potential system modifications necessary to facilitate the additional 25 MW transfer while maintaining system reliability.

The SPS to WR transfer impacts facilities that have been identified as limiting constraints for previously studied transfers. Table 3 lists the previously assigned and identified facilities impacted by the 25 MW transfer. A facility found in Table 3 limits the ATC to zero. The La Cygne to Stillwell, La Cygne to West Gardner Flowgate limits the ATC to zero from 6/1/02 to 10/1/02. The Flowgate cannot be relieved through system upgrades until 1/1/2005.

In order to receive the first year of service, SPSM has agreed to curtail 4 MW of the remaining 25 MW of the original request, reservation 297076, if needed, to relieve the additional loading on the La Cygne to Stillwell, La Cygne to West Gardner Flowgate caused by the redirect.

## **2. Introduction**

Southwestern Public Service Co. (SPSM) requested an impact study for transmission service redirect from SPS to WR.

The principal objective of this study is to identify the restraints on the SPP Regional Tariff System that may limit the transfer to less than 25 MW. 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 25 MW transfer on transmission line loading and transmission bus voltages for outages of single and selected multiple transmission lines and transformers on the SPP system.

### **3. Study Methodology**

#### **A. Description**

Two analyses were conducted to determine the impact of the 25 MW transfer on the system. The first analysis was conducted to identify any new overloads caused by the 25 MW transfer. The second analysis was done to ensure that available capacity exists on previously identified circuits.

The first analysis was to study the steady-state analysis impact of the 25 MW transfer on the SPP system. The second step was to study Available Transfer Capability (ATC) of the facilities identified in the steady-state analysis impact. The steady-state analysis was done to ensure current SPP Criteria and NERC Planning Standards requirements are fulfilled. The Southwest Power Pool (SPP) conforms to the NERC Planning Standards, which provide the strictest requirements, related to thermal overloads with a contingency. It requires that all facilities be within emergency ratings after a contingency.

The second analysis was done to determine the impact of the transfer on previously assigned and identified facilities.

#### **B. Model Updates**

SPP used five seasonal models to study the 25 MW request. The SPP 2001 Series Cases: 2001/02 Winter Peak, 2002 Spring Peak, 2002 Summer Peak, 2002 Fall Peak, and 2002/03 Winter Peak were used to study the impact of the 25 MW transfer on the SPP system during the first year of service from 1/1/02 to 1/1/03.

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 request period that were not already included in the January 2001 base case series models.

#### **C. Transfer Analysis**

Using the created models and the ACCC function of PSS/E, single and select double contingency outages were analyzed. Then full AC solution was used to obtain the most accurate results possible. Any facility overloaded, using MVA ratings, in the transfer case and not overloaded in the base case was flagged. The PSS/E options chosen to conduct the Impact Study analysis can be found in Appendix A.

## **4. Study Results**

Tables 1, 2, and 3 contain the analysis results of the System Impact Study. The tables identify the seasonal case in which the event occurred; the emergency rating of the overloaded circuit (Rate B), the contingent loading percentage of circuit with and without the studied transfer, the estimated ATC value using interpolation if calculated, any SPP identification or assignment of the event, and any solutions received from the transmission owners.

Table 4 shows the amount of curtailment needed from previously confirmed requests to provide the capacity needed for the SPS to WR transfer. The tables identify the reservations available for curtailment and the amount of curtailment needed based on the response of the transfer on the overloaded facility.

Table 1 shows the new facility overloads caused by the 25 MW transfer. No new overloads were identified.

Table 2 documents overloads on Non SPP Regional Tariff participants' transmission systems caused by the 25 MW transfer.

Table 3 documents the 25 MW transfer impact on previously assigned and identified facilities.

Table 4 documents the available confirmed reservations that, when curtailed, will relieve the loading on the La Cygne to Stilwell Flowgate caused by the SPS to WR 25 MW transfer.

**Table 1** - SPP Facility Overloads caused by the SPS to WR 25 MW Transfer

Study Year	From Area To Area	Branch Over 100% Rate B	Rate B <MVA>	No Transfer %Loading	Transfer Case %Loading	Outaged Branch That Caused Overload	ATC	Solution
01WP		NONE					50	
02G		NONE					50	
02SP		NONE					50	
02FA		NONE					50	
02WP		NONE					50	

**Table 2** – Non-SPP Facility Overloads caused by the SPS to WR 25 MW Transfer

Study Year	From Area To Area	Branch Over 100% Rate B	Rate B <MVA>	No Transfer %Loading	Transfer Case %Loading	Outaged Branch That Caused Overload
01WP		NONE				
02G		NONE				
02SP		NONE				
02FA		NONE				
02WP		NONE				

**Table 3** – Previously Assigned and Identified SPP Facilities Impacted by the SPS to WR 25 MW Transfer

Study Year	From Area To Area	Branch Over 100% Rate B	Rate B <MVA>	No Transfer %Loading	Transfer Case %Loading	Outaged Branch That Caused Overload	ATC	Assignment	Solution	Estimated Cost	New Rating	% Increase In Rating
01WP		NONE										
02G		NONE										
02SP	KACP-KACP	LA CYGNE TO STILWELL, 345KV 57981 LACYGNE7 to 57968 STILWEL7 CKT 1	1251	100.1	100.3	WEST GARDNER TO LA CYGNE, 345KV 57965 W.GRDNR7 345 to 57981 LACYGNE7 345 CKT1	0	SPP Flowgate	#2 Add Second LaCygne-Stilwell 345kV line and add LaCygne and Stilwell Terminals	17,000,000	N/A	N/A
02SP	SPS-SPS	KINGSMILL 115/69KV TRANSFORMER 50808 KNGSML3 115 to 50807 KNGSML2 69.0 CKT 1	75	111.2	112.0	GRAPEVINE TO NICHOLS, 230KV 50827 GRAPEVN6 230 to 50915 NICHOL6 230 CKT1	25	New Summer Emergency Rating 86.3MVA 15.1% Increase				
02SP	WFEC-WFEC	MOREWOOD SW 161/69KV TRANSFORMER 56001 MORWODS4 138 to 56000 MORWODS269.0 CKT 1	33	100.2	100.5	ELK CITY 138/69KV TRANSFORMER 54121 ELKCTY-4 138 to 54122 ELKCTY-269.0 CKT1	25	Assigned To 2001-198 Estimated In-Service Date 6/1/02				
02FA		NONE										
02WP	SPS-SPS	KINGSMILL 115/69KV TRANSFORMER 50808 KNGSML3 115 to 50807 KNGSML2 69.0 CKT 1	75	99.6	100.5	GRAPEVINE TO NICHOLS, 230KV 50827 GRAPEVN6 230 to 50915 NICHOL6 230 CKT1	25	New Winter Emergency Rating 86.3MVA 15.1% Increase				



**Table 4** – Confirmed Transfers Available for Curtailment to Relieve La Cygne to Stilwell Flowgate

OASIS Reservation	Dates Curtailment Needed	Customer	POR	POD	Amount (MW)	% Response of SPS to AMRN Transfer on LaCygne to Stilwell Flowgate	% Response of SPS to WR Transfer on LaCygne to Stilwell Flowgate	Amount of Curtailment Needed to Relieve Loading on LaCygne to Stilwell Flowgate
297076	6/1/02 - 10/1/02	SPSM	SPS	AMRN	50	11.2%	12.8%	4 MW of Remaining 25 MW

## **5. Conclusion**

The La Cygne to Stilwell Flowgate limits the ATC to zero due to the inability to upgrade the constraint as required. For the 2002 Summer (6/1/02-10/1/02), the ATC is zero due the loading of the La Cygne to Stilwell, La Cygne to West Gardner Flowgate. The estimated lead-time of the Flowgate upgrade is 36 months, putting the estimated in service date at 1/1/2005.

In order to receive the first year of service, SPSM has agreed to curtail 4 MW of the remaining 25 MW of the original request, reservation 297076, if needed, to relieve the additional loading on the La Cygne to Stillwell, La Cygne to West Gardner Flowgate caused by the redirect.

Therefore, with the agreement to curtail previously confirmed service to relieve the La Cygne to Stilwell, La Cygne to West Gardner Flowgate, the requested SPS to WR redirect will be accepted for the first year of service from 1/1/2002 to 1/1/2003.

## **Appendix A**

### PSS/E CHOICES IN RUNNING LOAD FLOW PROGRAM AND ACCC

#### BASE CASES:

Solutions - Fixed slope decoupled Newton-Raphson solution (FDNS)

1. Tap adjustment – Stepping
2. Area interchange control – Tie lines only
3. Var limits – Apply immediately
4. Solution options -  Phase shift adjustment
  - Flat start
  - Lock DC taps
  - Lock switched shunts

#### ACCC CASES:

Solutions – AC contingency checking (ACCC)

1. MW mismatch tolerance –0.5
2. Contingency case rating – Rate B
3. Percent of rating – 100
4. Output code – Summary
5. Min flow change in overload report – 1 MW
6. Excl'd cases w/ no overloads form report – YES
7. Exclude interfaces from report – NO
8. Perform voltage limit check – YES
9. Elements in available capacity table – 60000
10. Cutoff threshold for available capacity table – 99999.0
11. Min. contng. case Vltg chng for report – 0.02
12. Sorted output – None

#### Newton Solution:

1. Tap adjustment – Stepping
2. Area interchange control – Tie lines only
3. Var limits - Apply automatically
4. Solution options -  Phase shift adjustment
  - Flat start
  - Lock DC taps
  - Lock switched shunts