



SPP *Southwest Power Pool*

***System Impact Study SPP-2001-306
For Transmission Service
Requested By
Western Resources Generation
Services***

***From Western Resources
to Kansas City Power & Light***

***For a Reserved Amount Of 50MW
From 12/5/01
To 12/5/02***

SPP Transmission Planning

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1. Executive Summary

Western Resources Generation Services has requested a system impact study for long-term Firm Point-to-Point transmission service from Western Resources to Kansas City Power & Light. The period of the transaction is from 12/5/01 to 12/5/02. The request is for OASIS reservation 304493 for 50MW.

The principal objective of this study is to identify system problems and potential system modifications necessary to facilitate the additional 50MW transfer while maintaining system reliability.

New overloads caused by the 50MW transfer were identified along with determining the impact of the transfer on any previously assigned and identified facilities.

The WR to KCPL transfer increases the loading on previously identified facilities, including the La Cygne to Stilwell, La Cygne to West Gardner 345kV flowgate. Redispatch was looked at as an option to relieving the additional loading on this facilities caused by the WR to KCPL 50MW transfer.

The Transmission Owners were given the opportunity to participate in the redispatch of their generation resources in order to relieve a system constraint caused by a transfer. Those companies owning units, which through increasing or decreasing generation will relieve the impact on the La Cygne to Stilwell, La Cygne to West Gardner flowgate, declined to participate in redispatching. There are no additional options available to relieve the impact on the La Cygne to Stilwell, La Cygne to West Gardner 345kV flowgate caused by the 50MW WR to KCPL transfer.

2. Introduction

Western Resources Generation Services has requested an impact study for transmission service from WR to KCPL.

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 50MW. This study includes steady-state contingency analyses (PSS/E function ACCC) and Available Transfer Capability (ATC) analyses.

The steady-state analysis considers the impact of the 50MW transfer on transmission line loading and transmission bus voltages for outages of single and selected multiple transmission lines and transformers on the SPP system.

ATC analyses shows the amount of First Contingency Incremental Transfer Capabilities (FCITC) between the given study systems and what the limitations are, if any, for transferring up to 50MW.

3. Study Methodology

A. Description

Two analyses were conducted to determine the impact of the 50MW transfer on the system. The first analysis was conducted to identify any new overloads caused by the 50MW 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 50MW 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 50MW request. The SPP 2001 Series Cases 2001/2002 Winter Peak, 2002 Spring, 2002 Summer Peak, 2002 Fall, and 2002/03 Winter Peak were used to study the impact of the 50MW transfer on the SPP system during the transaction period of 12/5/01 to 12/5/02.

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

A. Study Analysis 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 1 shows the new facility overloads caused by the 50MW transfer. Upgrades associated with these new overloads can be directly assigned to the WR to KCPL 50MW transfer.

Table 2 documents overloads on Non SPP Regional Tariff participants' transmission systems caused by the 50MW transfer.

Table 3 documents the 50MW transfer impact on previously assigned and identified facilities.

Table 1 – SPP Facility Overloads caused by the WR to KCPL 50MW Transfer

Study Year	From Area - To Area	Branch Over 100% Rate B	Rate B	BC % Loading	TC % Loading	Outaged Branch Causing Contingency	ATC (MW)	Assignment
01WP		NONE				NONE	50	
02G		NONE				NONE	50	
02SP	WERE-WERE	HOYT TO HOYT HTI SWITCHING JUNCTION, 115KV 57163 HOYT 3 115 to 57165 HTI JCT3 115 CKT 1	92	99.9	101.1	TECUMSEH HILL TO WILLIAMS BROTHERS PIPELINE, 161KV 56920 TECHILL5 161 to 56921 WM BROS5 161 CKT1	50	Assigned to SPP-2001-211, Estimated In-Service Date 6/1/02
02FA	WERE-WERE	HOYT TO HOYT HTI SWITCHING JUNCTION, 115KV 57163 HOYT 3 115 to 57165 HTI JCT3 115 CKT 1	92	99.2	100.6	JEFFERY ENERGY CENTER TO SUMMIT, 345KV 56766 JEC N 7 345 to 56773 SUMMIT 7 345 CKT1	50	Assigned to SPP-2001-211, Estimated In-Service Date 6/1/02
02WP	WERE-WERE	HOYT TO HOYT HTI SWITCHING JUNCTION, 115KV 57163 HOYT 3 115 to 57165 HTI JCT3 115 CKT 1	92	99.0	100.5	CLIFTON TO GREENLEAF, 115KV 58756 CLIFTON3 115 to 58765 GRNLEAF3 115 CKT1	50	Assigned to SPP-2001-211, Estimated In-Service Date 6/1/02

Table 2 – Non - SPP Facility Overloads caused by the WR to KCPL 50MW Transfer

Study Year	From Area - To Area	Branch Over 100% Rate B	Rate B	BC % Loading	TC % Loading	Outaged Branch Causing Overload	ATC (MW)
01WP	AMRN-AMRN	31408 OVERTON 345 to 31409 OVERTON 161 CKT 1	300	99.8	100.3	31221 MOBERLY 161 to 96120 5THMHIL 161 CKT1	18
02G		NONE				NONE	50
02SP		NONE				NONE	50
02FA		NONE				NONE	50
02WP	AECI-AECI	96063 5CALIF 161 to 96550 2CALIF 69.0 CKT 1	56	100.0	100.3	96057 5BARNET 161 to 96618 2BARNET 69.0 CKT1	0

Table 3 – Previously Assigned and Identified SPP Facilities Impacted by the WR to KCPL 50MW Transfer.

Study Year	From Area - To Area	Branch Over 100% Rate B	Rate B	BC % Loading	TC % Loading	Outaged Branch Causing Overload	ATC (MW)	Assignment
01WP		NONE				NONE	50	
02G	WERE-WERE	HOYT HTI SWITCHING JUNCTION TO CIRCLEVILLE, 115KV 57165 HTI JCT3 115 to 57152 CIRCLVL3 115 CKT 1	92	106.6	107.9	IATAN TO ST. JOE, 345KV 57982 IATAN 7 345 to 69702 ST JOE 3 345 CKT1	0	Assigned to SPP-2001-227, Estimated In-Service Date 6/1/02
02SP	WERE-WERE	HOYT TO HOYT HTI SWITCHING JUNCTION, 115KV 57163 HOYT 3 115 to 57165 HTI JCT3 115 CKT 1	92	101.7	103.1	JEFFERY ENERGY CENTER TO SUMMIT, 345KV 56766 JEC N 7 345 to 56773 SUMMIT 7 345 CKT1	50	Assigned to SPP-2001-211, Estimated In-Service Date 6/1/02
02SP	WERE-WERE	HOYT HTI SWITCHING JUNCTION TO CIRCLEVILLE, 115KV 57165 HTI JCT3 115 to 57152 CIRCLVL3 115 CKT 1	92	108.3	109.7	JEFFERY ENERGY CENTER TO EAST MANHATTAN, 230KV 56852 JEC 6 230 to 56861 EMANHAT6 230 CKT1	0	Assigned to SPP-2001-227, Estimated In-Service Date 6/1/02
02SP	WERE-WERE	MIDLAND JUNCTION 230/115KV TR 56855 MIDLAND6 230 to 57252 MIDLAND3 115 CKT 1	308	101.8	102.9	LAWRENCE HILL 230/115KV TR 56853 LAWHILL6 230 to 57250 LWRNCHL3 115 CKT1	0	Previously Identified
02SP	KACP-KACP	LA CYGNE TO STILWELL, 345KV 57968 STILWEL7 345 to 57981 LACYGNE7 345 CKT 1	1251	102.7	102.9	WEST GARDNER TO LA CYGNE, 345KV 57965 W.GRDNR7 345 to 57981 LACYGNE7 345 CKT1	0	Assigned to SPP-2000-108, Estimated In-Service Date 11/14/2004
02FA	WERE-WERE	HOYT TO HOYT HTI SWITCHING JUNCTION, 115KV 57163 HOYT 3 115 to 57165 HTI JCT3 115 CKT 1	92	105.6	107.1	CLIFTON TO CONCORDIA, 115KV 58756 CLIFTON3 115 to 58757 CONCORD3 115 CKT1	50	Assigned to SPP-2001-211, Estimated In-Service Date 6/1/02
02WP	WERE-WERE	HOYT HTI SWITCHING JUNCTION TO CIRCLEVILLE, 115KV 57165 HTI JCT3 115 to 57152 CIRCLVL3 115 CKT 1	92	105.3	108.5	CONCORDIA 230/115KV TR 58757 CONCORD3 115 to 58758 CONCORD6 230 CKT1	50	Assigned to SPP-2001-227, Estimated In-Service Date 6/1/02

5. Conclusion

The WR to KCPL transfer increases the loading on previously identified facilities. Redispatch was looked at as an option to relieving the additional loading on these facilities caused by the WR to KCPL 50MW transfer.

- 2002 Spring (4/1/2002 – 6/1/2002) – The WR to AMRN 29MW transfer increases the loading on the previously overloaded Hoyt to Circleville 115kV line. To provide the needed capacity on this facility, Western Resources must agree to redispatch generation as needed to relieve the additional loading caused by the transfer.
- 2002 Summer Peak (6/1/2002 – 10/1/2002) – The WR to KCPL 29MW transfer increases the loading on the previously overloaded Hoyt to Circleville 115kV line and Midland 230/115kV transformer. To provide the needed capacity on these facilities, Western Resources must agree to redispatch generation as needed to relieve the additional loading caused by the transfer. The WR to AMRN transfer also causes an increase in loading on the previously identified La Cygne to Stilwell, La Cygne to West Gardner flowgate. Due to the impact on this facility, the WR to KCPL transfer is limited to an ATC of 0MW.
- 2002 Fall (10/1/2002 – 12/1/2002) - Upgrades must be completed for the Hoyt to Hoyt Hti Switching Junction 115kV line assigned to the previously studied WR to EES 100MW transfer (SPP-2001-211). The required in-service date of this upgrade is the fall of 2002.
- 2002/2003 Winter (12/1/2002 – 4/1/2003) - Upgrades must be completed for the Hoyt Hti Switching Junction to Circleville 115kV line assigned to the previously studied WR to AMRN 100MW transfer (SPP-2001-227). The scheduled in-service date of this upgrade is the summer of 2002.

Due to the impact on the previously identified La Cygne to Stilwell, La Cygne to West Gardner flowgate, the ATC is zero for the WR to KCPL request for the 2002 Summer. Previous studies have determined that upgrades to this facility cannot be completed until November 2004. The SPP Regional Tariff participants were given the opportunity to include their units for redispatch in order to relieve a system constraint caused by a certain transaction. Those participants owning units that would relieve the impact on the La Cygne to Stilwell, La Cygne to West Gardner flowgate declined to participate in the redispatch of those units. No other options are available to provide the capacity needed for the 50MW transfer. Therefore, the 50MW transfer from WR to KCPL will be refused.

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 automatically
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 – 1mw
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