SPP Southwest Power Pool

System Impact Study SPP-2001-298 For Transmission Service Requested By Western Resources Generation Services

From Western Resources to Kansas City Power & Light

For a Reserved Amount Of 100MW From 1/1/02 To 1/1/03

SPP Transmission Planning

Table of Contents

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 1/1/02 to 1/1/03. The request is for OASIS reservations 301724 and 301725 for a total of 100MW.

The principal objective of this study is to identify system problems and potential system modifications necessary to facilitate the additional 100MW transfer while maintaining system reliability.

New overloads caused by the 100MW transfer were identified along with determining the impact of the transfer on any previously assigned and identified facilities.

The WR to KCPL transfer impacts several facilities that have been identified as limiting constraints for previously studied transfers. Due to the inability to upgrade these limiting constraints within the reservation period using normal construction practices, the ATC is zero for the requested WR to KCPL 100MW 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 those facilities identified in this study, declined to participate in redispatching. There are no additional options available to relieve the impact on these facilities caused by the 100MW 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 100MW. 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 100MW 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 100MW.

3. Study Methodology

A. Description

Two analyses were conducted to determine the impact of the 100MW transfer on the system. The first analysis was conducted to identify any new overloads caused by the 100MW 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 100MW 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 three seasonal models to study the 100MW request. The SPP 2001 Series Cases 2001/02 Winter Peak, 2002 Summer Peak, and the 2002/03 Winter Peak were used to study the impact of the 100MW transfer on the SPP system during the transaction period of 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

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 100MW transfer. Upgrades associated with these new overloads can be directly assigned to the WR to KCPL 100MW transfer.

Table 2 documents overloads on Non SPP Regional Tariff participants' transmission systems caused by the 100MW transfer.

Table 3 documents the 100MW transfer impact on previously assigned and identified facilities. Available estimated in-service dates for the completion of the previously assigned upgrades are given in the table.

Table 1 – SPP Facility Overloads caused by the WR to KCPL 100MW Transfer

Study Year	From Area - To Area	Branch Over 100% Rate B	Rate B	BC % Loading	TC % Loading	Outaged Branch Causing Overload	ATC (MW)
		HALSTEAD TO MUD CREEK JUNCTION, 69KV				**HALSTEAD NORTH TO MOUNDRIDGE, 138KV**	
02SP	WERE-WERE	57736 HALSTED269.0 to 57744 MUDCRKJ269.0 CKT 1	59	99.9	100.5	57011 HALSTDN4 138 to 57013 MOUND 4 138 CKT1	11
		GILL ENERGY CENTER TO OATVILLE, 69KV				**GILL ENERGY CENTER TO HAYSVILLE JUNCTION, 69KV**	
02SP	WERE-WERE	57795 GILL E 269.0 to 57825 OATVILL269.0 CKT 1	72	97.7	104.0	57795 GILL E 269.0 to 57804 HAYSVLJ269.0 CKT1	36
		HOYT SWITCHING TO CIRCLEVILLE, 115KV				**JEFFERY ENERGY CENTER TO MORRIS COUNTY, 345KV**	
02SP	WERE-WERE	57165 HTI JCT3 115 to 57152 CIRCLVL3 115 CKT 1	92	99.3	101.1	56766 JEC N 7 345 to 56770 MORRIS 7 345 CKT1	38
		GILL ENERGY CENTER TO MACARTHUR, 69KV				**GILL ENERGY CENTER TO OATVILLE, 69KV**	
02SP	WERE-WERE	57795 GILL E 269.0 to 57813 MACARTH269.0 CKT 1	68	97.1	102.7	57795 GILL E 269.0 to 57825 OATVILL269.0 CKT1	52
		HOYT to HOYT SWITCHING, 115KV				**STILWELL TO LA CYGNE, 345KV TR**	
02SP	WERE-WERE	57163 HOYT 3 115 to 57165 HTI JCT3 115 CKT 1	92	98.6	100.4	57968 STILWEL7 345 to 57981 LACYGNE7 345 CKT1	76
		PECAN CREEK, 345/161KV TR				**MUSKOGEE TO FORT SMITH, 345KV**	
02WP	OKGE-OKGE	55235 PECANCK7 345 to 55234 PECANCK5 161 CKT 1	369	99.9	100.4	55224 MUSKOGE7 345 to 55302 FTSMITH7 345 CKT1	14
		HALSTEAD 138/69KV TR				**HALSTEAD NORTH TO HALSTEAD SOUTH, 138KV**	
02WP	WERE-WERE	57736 HALSTED269.0 to 57012 HALSTDS4 138 CKT 1	55	98.9	100.2	57011 HALSTDN4 138 to 57012 HALSTDS4 138 CKT1	86

Table 2 – Non - SPP Facility Overloads caused by the WR to KCPL 100MW Transfer

Study Year	From Area - To Area	Branch Over 100% Rate B	Rate B	BC % Loading	TC % Loading	Outaged Branch Causing Overload
02SP	NPPD-NPPD	64181 MAXWELL7 115 to 64039 CALAWAY7 115 CKT 1	105	99.6	100.1	64037 C.CREEK4 230 to 64203 N.PLATT4 230 CKT1
02WP	EES-EES	99146 3STERL 115 to 99232 3CROS-N 115 CKT 1	80	100.0	100.1	99338 3WOODW 115 to 99411 3PNBRG# 115 CKT1

Table 3 – Previously Assigned and Identified SPP Facilities Impacted by the WR to KCPL 100MW Transfer.

Study Year	From Area - To Area	Branch Over 100% Rate B	Rate B	BC % Loading	TC % Loading	Outaged Branch Causing Overload	Assignment	ATC (MW)
01WP	AEPW-AEPW	**EAST ROGERS TO DYESS, 161KV** 53135 EROGERS5 161 to 53131 DYESS 5 161 CKT 1	245	102.5	102.9	**FLINT CREEK TO GENTRY, 161KV** 53139 FLINTCR5 161 to 53187 GENTRYR5 161 CKT1	SPP Flowgate	0
02SP	AEPW-AEPW	**EAST ROGERS TO DYESS, 161KV** 53135 EROGERS5 161 to 53131 DYESS 5 161 CKT 1	244	101.1	101.4	**FLINT CREEK TO GENTRY, 161KV** 53139 FLINTCR5 161 to 53187 GENTRYR5 161 CKT1	SPP Flowgate	0
02SP	SWPA-SWPA	**ROBERT S. KERR TO VAN BUREN** 52782 RS KERR5 161 to 52722 VAN BUR5 161 CKT 1	167	104.9	105.4	**BONANZA TAP TO AES, 161KV** 55261 BONANZT5 161 to 55262 AES 5 161 CKT1	Previously Identified	0
02SP	AEPW-AEPW	**GENTRY REC TO FLINT CREEK, 161KV** 53187 GENTRYR5 161 to 53139 FLINTCR5 161 CKT 1	354	100.2	100.4	**DYESS TO E. ROGERS, 161KV** 53131 DYESS 5 161 to 53135 EROGERS5 161 CKT1	Upgrade Assigned to SPP-2000-003 163958 Est. In-Service Date 6/1/2004	0
02SP	KACP-KACP	**STILWELL TO LA CYGNE, 345KV** 57968 STILWEL7 345 to 57981 LACYGNE7 345 CKT 1	1251	103.8	105.0	**WEST GARDNER TO LA CYGNE, 345KV** 57965 W.GRDNR7 345 to 57981 LACYGNE7 345 CKT1	SPP Flowgate	0
02SP	EMDE-EMDE	**TIPTON FORD TO MONETT, 161KV** 59472 TIP292 5 161 to 59480 MON383 5 161 CKT 1	157	101.9	102.5	**LARUSSEL TO MONETT, 161KV** 59479 LAR382 5 161 to 59480 MON383 5 161 CKT1	Upgrade Assigned to SPP-2000-086 150680 Est. In-Service Date 5/1/2003	0
02SP	AEPW-AEPW	**EAST CENTERTON TO GENTRY REC, 161KV** 53133 ECNTRTN5 161 to 53187 GENTRYR5 161 CKT 1	335	103.9	104.1	**DYESS TO E. ROGERS, 161KV** 53131 DYESS 5 161 to 53135 EROGERS5 161 CKT1	Upgrade Assigned to SPP-2000-086 150680 Est. In-Service Date 4/1/2002	100
02WP	AEPW-AEPW	**EAST CENTERTON TO GENTRY REC, 161KV** 53133 ECNTRTN5 161 to 53187 GENTRYR5 161 CKT 1	335	100.7	101.0	**FLINT CREEK TO ELM SPRINGS, 161KV** 53139 FLINTCR5 161 to 53194 ELMSPRR5 161 CKT1	Upgrade Assigned to SPP-2000-086 150680 Est. In-Service Date 4/1/2002	100

5. Conclusion

The previously assigned and identified facilities limit the ATC to zero due to the inability to upgrade the constraints as required. Those facilities that have an ATC of zero are given below.

- For the 2001/2002 Winter (12/1/01 – 4/1/02), the ATC is zero due to the loading of the East Rogers to Dyess 161kV line.

- For the 2002 Summer (6/1/02 – 10/1/02), the ATC is zero due the loading of the East Rogers to Dyess 161kV line, the Gentry REC to Flint Creek 161kV line, the Tipton Ford to Monett 161kV line, and the Robert S. Kerr to Van Buren 161kV line. The La Cygne to Stilwell flowgate also limits the ATC to zero.

Due to the inability to upgrade these facilities in the time period allowed, the ATC of the existing transmission system cannot be increased as required to provide continuous service over the reservation period.

The Transmission Owners were given the opportunity to include their units for redispatch in order to provide relief on the facilities impacted by a certain transaction. The participants owning units that would relieve those facilities impacted by this transfer declined to participate in the redispatch of those units. No other options are available to provide the capacity needed for the 100MW transfer. Therefore the request for yearly service from WR to KCPL must 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 - 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