SPP Southwest Power Pool

System Impact Study SPP-2001-115
For Transmission Service
Requested By
MidAmerican Energy Co.

From KCPL to OKGE

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

SPP Transmission Planning

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1. Executive Summary

MidAmerican Energy Company has requested a system impact study for long-term Firm Point-to-Point transmission service from KCPL to OKGE. The period of the transaction is from 1/1/02 to 1/1/03. The request is for reservations 246343 and 246344 for 100MW.

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.

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

2. Introduction

MidAmerican Energy Company has requested an impact study for transmission service from KCPL control area with a Point of Delivery of OKGE.

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 analysis considers 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 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.

Seasonal Case	2001/02 Winter Peak	2002 Summer Peak	2002/03 Winter Peak
Abbreviation	01WP	02SP	02WP

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

Table 1 shows the new facility overloads caused by the 100MW transfer. Upgrades associated with these new overloads can be directly assigned to the KCPL to OKGE 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.

Table 1 – Overloads Caused by 100MW KCPL to OKGE Transfer

Study Year	From Area - To Area	Branch Over 100% Rate B	RATEB	BC % Loading	TC %Loading	Outaged Branch That Caused Overload	ATC (MW)
		KRESS INTERCHANGE 115/69KV TR CKT2				**KRESS INTERCHANGE 115/69KV TR CKT1**	
01WP	SPS-SPS	51316 KRESS3 115 to 51315 KRESS2 69.0 CKT 2	56	99.9	100.1	51315 KRESS2 69.0 to 51316 KRESS3 115 CKT1	49
		HOLCOMB 345/230KV TR CKT1				**HOLCOMB TO SETAB, 345KV**	
02SP	SUNC-SUNC	56449 HOLCOMB7 345 to 56446 HLCXFMR6 230 CKT 1	336	99.7	101.0	56449 HOLCOMB7 345 to 56465 SETAB 7 345 CKT1	24
		STILWELL 345/161KV TR CKT1				**STILWELL 345/161KV TR CKT2**	
02SP	KACP-KACP	57968 STILWEL7 345 to 57969 STILWEL5 161 CKT 1	198	97.9	104.5	57968 STILWEL7 345 to 57969 STILWEL5 161 CKT2	31
		HOLCOMB 230/115KV TR				**HOLCOMB TO SETAB, 345KV**	
02SP	SUNC-SUNC	56446 HLCXFMR6 230 to 56448 HOLCOMB3 115 CKT 1	336	99.5	100.8	56449 HOLCOMB7 345 to 56465 SETAB 7 345 CKT1	39
		WEAVER TO ROSE HILL JCT, 69KV				**FARBER TO SUMNER CO.#10 BELLE PLAIN, 138KV**	
02SP	WERE-WERE	57604 WEAVER 269.0 to 57837 RH JCT 269.0 CKT 1	43	98.5	101.3	57042 FARBER 4 138 to 57063 SC10BEL4 138 CKT1	53
		OSAGE SS TO CANYON EAST, 115KV				**BC-EARTH TO PLANT X INTERCHANGES, 115KV**	
02SP	SPS-SPS	51014 OSAGE--3 115 to 51080 CANYNE3 115 CKT 1	90	99.9	100.1	51250 BC-EART3 115 to 51418 PLANTX3 115 CKT1	56
		WELEETKA 138/69KV TR CKT2				**WELEETKA 138/69KV TR CKT1**	
02SP	AEPW-AEPW	54028 WELETK4 138 to 54029 WELEETK269.0 CKT 2	36	99.6	100.1	54028 WELETK4 138 to 54029 WELEETK269.0 CKT1	71
		COUNTY LINE TO TECUM. HILL EAST BUS, 115KV				**TECUM. EC TO TECUM. HILL EAST BUS, 115KV**	
02WP	WERE-WERE	57153 COLINE 3 115 to 57182 TECHILE3 115 CKT 1	106	99.5	100.3	57180 TEC E 3 115 to 57182 TECHILE3 115 CKT1	61

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

Study Year	From Area - To Area	Branch Over 100% Rate B	RATEB	BC % Loading	TC %Loading	Outaged Branch That Caused Overload	ATC (MW)
02SP	EES-EES	98107 8RICHARD 500 to 98430 8WEBRE 500 CKT 1	1732	100.0	100.2	98235 8MCKNT 500 to 99027 8FRKLIN 500 CKT1	0
02WP	AECI-AECI	96099 5MONTCT 161 to 96575 2MONTGY 69.0 CKT 1	56	99.7	100.6	30154 BLAND 345 to 96041 7FRANKS 345 CKT1	35
02WP	AECI-AECI	96071 5CLINTN 161 to 96692 2CLINTN 69.0 CKT 2	25	99.5	100.1	96071 5CLINTN 161 to 96692 2CLINTN 69.0 CKT3	82

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

Study Year	From Area - To Area	Branch Over 100% RateB	RATEB	BC % Loading	TC % Loading	ATC (MW)	Outaged Branch That Caused Overload	Assignment
		TUPELO TO TUPELO TAP, 138KV					**PITTSBURG TO VALLIANT, 345KV**	
01WP	SWPA-WFEC	52800 TUPELO 4 138 to 56071 TUPLOTP4 138 CKT 1	96	100.0	102.3		54033 PITTSB-7 345 to 54037 VALIANT7 345 CKT1	SPP Flowgate
		NA PHILIPS TO NA PHILIPS JCT S, 115KV					**EAST MCPHERSON TO SUMMIT, 230KV**	
01WP	WERE-WERE	57372 PHILIPS3 115 to 57374 SPHILPJ3 115 CKT 1	160	111.0	111.1	0	56873 SUMMIT 6 230 to 56872 EMCPHER6 230 CKT1	SPP Flowgate
		WELEETKA 138/69KV TR CKT2					**WELEETKA 138/69KV TR CKT1**	
02SP	AEPW-AEPW	54028 WELETK4 138 to 54029 WELEETK269.0 CKT 2	36	99.6	100.1	72	54028 WELETK4 138 to 54029 WELEETK269.0 CKT1	1999-017
		SUMMIT TO EXIDE JCT, 115KV					**EAST MCPHERSON TO SUMMIT, 230KV**	
02WP	WERE-WERE	57381 SUMMIT 3 115 to 57368 EXIDE J3 115 CKT 1	181	108.1	108.7	0	56872 EMCPHER6 230 to 56873 SUMMIT 6 230 CKT1	prev. assigned
		TUPELO TO TUPELO TAP, 138KV					**PITTSBURG TO VALLIANT, 345KV**	
02WP	SWPA-WFEC	52800 TUPELO 4 138 to 56071 TUPLOTP4 138 CKT 1	96	103.3	105.4	0	54037 VALIANT7 345 to 54033 PITTSB-7 345 CKT1	SPP Flowgate

5. Conclusion

The previously assigned and identified facilities limit the ATC to zero in the 2001/2002 Winter, 2002 Summer, and 2002/2003 Winter due to the inability to upgrade the thermal 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 Tupelo to Tupelo Tap and the Philips to South Philips, Summit to East McPherson Flowgate. Upgrades for these facilities cannot be completed by 12/1/01.

- For the 2002 Summer (6/1/02-10/1/02), the ATC is zero due to the Weleetka 138/69kV Transformer #2. Upgrade of this facility cannot be completed by 6/1/02.

- For the 2002/2003 Winter (12/1/02-4/1/03), the ATC is zero due to the loading of the Tupelo to Tupelo Tap and the Summit to Exide Junction to Philips 138kV line. The Summit to Exide Junction upgrade is not scheduled to be in service until 12/1/2003.

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 for the 2002 Summer. The participants owning units that would relieve the Weleetka 138/69kV Transformer #2 declined to participate in the redispatch of those units. No other options are available to provide the capacity needed for the 100MW transfer.

The KCPL to OKGE 100MW transfer is limited to zero ATC on one or more facilities, and the time frame of the limitation is such that facilities cannot be upgraded; therefore, the request for yearly service from KCPL to OKGE 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 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 –1.0
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