SPP Southwest Power Pool

System Impact Study SPP-2001-248r For Transmission Service Requested By Western Resources Generation Services

From Western Resources to Kansas City Power and Light

For a Reserved Amount Of 61MW From 5/1/02 To 5/1/03

SPP Transmission Planning

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Revision to SPP-2001-248 to reflect redispactch options for relieving the additional loading of the Hoyt to Circleville 115kV line.

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 and Light. The period of the transaction is from 5/1/02 to 5/1/03. The request is for OASIS reservation 280576 for 61MW.

The principal objective of this study is to identify system problems and potential system modifications necessary to facilitate the additional 61MW transfer while maintaining system reliability.

New overloads caused by the 61MW transfer were identified along with determining the impact of the transfer on any previously assigned and identified facilities.

The 61MW transfer from WR to KCPL causes additional loading on a previously identified facility. The Hoyt Hti Switching Junction to Circleville 115kV line was identified in the SPP-2001-227 study as the limiting constraint for the WR to AMRN 100MW transfer for the 2002 Spring, 2002 Summer and 2002/2003 Winter. It was determined that structural upgrades could be completed by the 2002 Summer that would relieve the additional loading on the line. This provides the additional capacity needed for the 2002 Summer and 2002/2003 Winter. However, due to the in-service date of these upgrades, this line is limited to an ATC of 0 for the current study during the 2002 Spring months. Redispatch was looked at as an option to relieving the additional loading on the Hoyt to Circleville 115kV line caused by the WR to KCPL 61MW 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 61MW. 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 61MW 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 61MW.

3. Study Methodology

A. Description

Two analyses were conducted to determine the impact of the 61MW transfer on the system. The first analysis was conducted to identify any new overloads caused by the 61MW 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 61MW 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 four seasonal models to study the 61MW request. The SPP 2001 Series Cases 2002 Spring, 2002 Summer Peak, 2002 Fall, and 2002/03 Winter Peak were used to study the impact of the 61MW transfer on the SPP system during the transaction period of 5/1/02 to 5/1/03.

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 61MW transfer. Upgrades associated with these new overloads can be directly assigned to the WR to KCPL 61MW transfer.

Table 2 documents overloads on Non SPP Regional Tariff participants' transmission systems caused by the 61MW transfer.

Table 3 documents the 61MW transfer impact on previously assigned and identified facilities.

Table 4 documents the possible Western Resources generators that may be used for redispatch.

Table 5 documents possible pairs for redispatch that may be used to relieve the additional loading of the Hoyt to Circleville 115kV line. Other combinations of sources and sinks may be used to provide relief on the overloaded facility.

Table 1 – SPP Facility Overloads caused by the WR to KCPL 61MW 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
02G	WERE-WERE	**HOYT HTI SWITCHING JUNCTION TO CIRCLEVILLE, 115KV** 57165 HTI JCT3 115 to 57152 CIRCLVL3 115 CKT 1	92	99.6	100.8	**CONCORDIA 230/115KV TR** 58757 CONCORD3 115 to 58758 CONCORD6 230 CKT1	20	Assigned to SPP-2001-227, Estimated In-Service Date 6/1/02
02G	WERE-WERE	**GOLDEN PLAINS JUNCTION TO HESSTON, 69KV** 57735 GOLDPLJ269.0 to 57737 HESSTON269.0 CKT 1	32	99.9	100.8	**MID AM JUNCTION TO MUD CREEK JUNCTION, 69KV** 57741 MID AMJ269.0 to 57744 MUDCRKJ269.0 CKT1	61	LOCAL AREA PROBLEM
02FA	WERE-WERE	**GOLDEN PLAINS JUNCTION TO HESSTON, 69KV** 57735 GOLDPLJ269.0 to 57737 HESSTON269.0 CKT 1	32	99.0	100.2	**HALSTEAD TO MUD CREEK JUNCTION, 69KV** 57736 HALSTED269.0 to 57744 MUDCRKJ269.0 CKT1	61	LOCAL AREA PROBLEM
02FA	WERE-WERE	**HOYT TO HOYT HTI SWITCHING JUNCTION, 115KV** 57163 HOYT 3 115 to 57165 HTI JCT3 115 CKT 1	92	99.6	100.9	**CLIFTON TO GREENLEAF, 115KV** 58756 CLIFTON3 115 to 58765 GRNLEAF3 115 CKT1	61	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	100.0	100.9	**S1280 TO COOPER, 161KV** 60033 S1280 5 161 to 64066 COOPER 5 161 CKT1	61	Assigned to SPP-2001-211, Estimated In-Service Date 6/1/02

Table 2 – Non - SPP Facility Overloads caused by the WR to KCPL 61MW Transfer

Study Year	From Area - To Area	Branch Over 100% Rate B	Rate B	BC % Loading	TC % Loading	Outaged Branch Causing Overload	ATC (MW)
02G		NONE				NONE	61
02SP	SWPA-AECI	52690 CARTHG 269.0 to 96751 2REEDS 69.0 CKT 1	36	99.6	100.6	59479 LAR382 5 161 to 59480 MON383 5 161 CKT1	22
02FA	MEC-MEC	69544 AVO MID869.0 to 62484 AVOCA 5 161 CKT 2	50	99.7	100.5	62435 ATLANTC5 161 to 62484 AVOCA 5 161 CKT1	21
02WP	AMRN-AMRN	31221 MOBERLY 161 to 31222 MOBERLY 69.0 CKT 1	75	99.9	100.1	31221 MOBERLY 161 to 96120 5THMHIL 161 CKT1	32
02WP	AECI-AECI	96099 5MONTCT 161 to 96575 2MONTGY 69.0 CKT 1	56	100.0	100.1	96113 5SRIVER 161 to 96349 2SRIVER 69.0 CKT2	0

Table 3 – Previously Assigned and Identified SPP Facilities Impacted by the WR to KCPL 61MW 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
02G	WERE-WERE	**HOYT HTI SWITCHING JUNCTION TO CIRCLEVILLE, 115KV** 57165 HTI JCT3 115 to 57152 CIRCLVL3 115 CKT 1	92	102.6	104.4	**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 HTI SWITCHING JUNCTION TO CIRCLEVILLE, 115KV** 57165 HTI JCT3 115 to 57152 CIRCLVL3 115 CKT 1	92	104.4	105.7	**JEFFERY ENERGY CENTER TO EAST MANHATTAN, 230KV** 56852 JEC 6 230 to 56861 EMANHAT6 230 CKT1	47	Assigned to SPP-2001-227, 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	102.0	103.4	**CLIFTON TO CONCORDIA, 115KV** 58756 CLIFTON3 115 to 58757 CONCORD3 115 CKT1	61	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	102.3	103.5	**CONCORDIA 230/115KV TR** 58757 CONCORD3 115 to 58758 CONCORD6 230 CKT1	61	Assigned to SPP-2001-227, Estimated In-Service Date 6/1/02

Table 4 – Possible Generators that May be Used for Redispatch

Source	
Bus Name	**Bus Number**
NEC U3	56711
GEC U1	56731
GEC U2	56732
GEC U3	56733
GEC U4	56734
WACO 4	57072
EEC U1	56721
EEC U2	56722
EEC GT1	56723
EEC GT2	56724
EEC GT3	56725

Sink	
Bus Name	**Bus Number**
TEC U7	56671
TEC U8	56672
JEC U1	56651
JEC U2	56652
JEC U3	56653
LEC U3	56661
LEC U4	56662
LEC U5	56663

Table 5 – Possible Pairs Available for Redispatch

Source		Sink		% Response	Relief Needed on Hoyt to Circleville 115kV Line (MW), 2002 Spring	Amount Needed for Transfer (MW)
Bus Name	Bus Number	Bus Name	Bus Number			
NEC U3	56711	TEC U7	56671	-4.14	1.65	40
GEC U1	56731	TEC U7	56671	-4.14	1.65	40
GEC U2	56732	TEC U8	56672	-4.14	1.65	40
WACO 4	57072	TEC U7	56671	-4.14	1.65	40
EEC U1	56721	TEC U8	56672	-3.94	1.65	42
EEC U2	56722	TEC U8	56672	-3.94	1.65	42
EEC GT1	56723	TEC U7	56671	-3.94	1.65	42
NEC U3	56711	JEC U2	56652	-3.45	1.65	48
GEC U1	56731	JEC U2	56652	-3.45	1.65	48
GEC U2	56732	JEC U3	56653	-3.45	1.65	48
WACO 4	57072	JEC U2	56652	-3.45	1.65	48
EEC U1	56721	JEC U3	56653	-3.31	1.65	50
EEC U2	56722	JEC U3	56653	-3.31	1.65	50
EEC GT1	56723	JEC U2	56652	-3.31	1.65	50
NEC U3	56711	JEC U1	56651	-3.12	1.65	53
GEC U1	56731	JEC U1	56651	-3.12	1.65	53
WACO 4	57072	JEC U1	56651	-3.12	1.65	53
EEC U1	56721	JEC U1	56651	-3.01	1.65	55
EEC GT1	56723	JEC U1	56651	-3.01	1.65	55
NEC U3	56711	LEC U3	56661	-2.67	1.65	62
GEC U1	56731	LEC U5	56663	-2.67	1.65	62
GEC U2	56732	LEC U5	56663	-2.67	1.65	62
WACO 4	57072	LEC U3	56661	-2.67	1.65	62
EEC U1	56721	LEC U5	56663	-2.55	1.65	65
EEC U2	56722	LEC U4	56662	-2.55	1.65	65
EEC GT1	56723	LEC U3	56661	-2.55	1.65	65

5. Conclusion

The WR to KCPL transfer increases the loading on a previously assigned facility. The acceptance of the WR to KCPL request is dependant on the following:

- 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.

- 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). This upgrade must be completed by the summer of 2002.

- The WR to KCPL 61MW 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.

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