



SPP *Southwest Power Pool*

***System Impact Study SPP-2001-032
For Transmission Service
Requested By
Aquila Energy Marketing
Corporation***

From KCPL To EES

***For a Reserved Amount Of 50 MW
From 1/1/03
To 1/1/04***

SPP Coordinated Planning

Table of Contents

1. EXECUTIVE SUMMARY	3
2. INTRODUCTION	4
3. STUDY METHODOLOGY	5
A. DESCRIPTION	5
B. MODEL UPDATES	5
C. TRANSFER ANALYSIS	5
4. STUDY RESULTS	6
A. STUDY ANALYSIS RESULTS	6
TABLE 1 – SPP FACILITY OVERLOADS CAUSED BY THE KCPL TO EES 50 MW TRANSFER	7
TABLE 2 – NON - SPP FACILITY OVERLOADS CAUSED BY THE KCPL TO EES 50 MW TRANSFER	7
TABLE 3 – PREVIOUSLY ASSIGNED AND IDENTIFIED SPP FACILITIES IMPACTED BY THE KCPL TO EES 50 MW TRANSFER	8
5. CONCLUSION	9
APPENDIX A	10

1. Executive Summary

Aquila Energy Marketing Corporation (AEMC) has requested a system impact study for long-term Firm Point-to-Point transmission service from KCPL to EES. The period of the transaction is from 1/1/03 to 1/1/04. The request is for OASIS reservation 236315, totaling 50 MW.

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

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

The KCPL to EES transfer impacts a facility that has been identified as a limiting constraint for previously studied transfers. Table 3 lists the previously identified facility impacted by the 50 MW transfer.

The Bull Shoals to Midway 161 kV tie line limits the ATC to zero in the 2003 Summer (6/1/03-10/1/03). Entergy owns the tie line. The SPP limitation is the Southwestern Power Administration (SWPA) terminal equipment at Bull Shoals. Upgrades at Bull Shoals are required to relieve the limitation. The facility upgrades are assigned to SPP-2000-108, for an AEPW to EES 670 MW transfer, and are required to be in service by 6/1/05. The facility upgrades at Bull Shoals are required to be in service by 6/1/03 for the KCPL to EES 50 MW transfer. The lead-time of the facility upgrades is 12 months, resulting in a possible in-service date of 4/1/03.

2. Introduction

Aquila Energy Marketing Corporation (AEMC) has requested an impact study for transmission service from KCPL to Entergy.

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 50 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 50 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 50 MW transfer on the system. The first analysis was conducted to identify any new overloads caused by the 50 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 50 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 six seasonal models to study the KCPL to EES 50 MW transfer. The SPP 2002 Series Cases: 2002/03 Winter Peak, 2003 April Minimum, 2003 Spring Peak, 2003 Summer Peak, 2003 Fall Peak, and 2003/04 Winter Peak were used to study the impact of the 50 MW transfer on the SPP system during the transaction period of 1/1/03 to 1/1/04.

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 2002 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 SPP facility overloads caused by the 50 MW transfer. Available solutions are given in the table.

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

Table 3 documents the 50 MW transfer impact on previously assigned and identified SPP facilities. Available solutions are given in the table.

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

Study Year	From Area To Area	Branch Over 100% Rate B	Rate B	BC %Loading	TC %Loading	Outaged Branch That Caused Overload	ATC	Solution
02WP		No Branches Identified					50	
03AP		No Branches Identified					50	
03G	WERE-WERE	GREEN TO COFFEY COUNTY NO. 4 VERNON, 69 KV 57636 GREEN 269.0 to 57631 CC4VERN269.0 CKT 1	45	99.8	100.1	BENTON TO WOLF CREEK, 345 KV 56791 BENTON 7 345 to 56797 WOLFCKR7 345 CKT1	50	Westar Transmission Operating Directive 1304
03SP		No Branches Identified					50	
03FA		No Branches Identified					50	
03WP		No Branches Identified					50	

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

Study Year	From Area To Area	Branch Over 100% Rate B	Rate B	BC %Loading	TC %Loading	Outaged Branch That Caused Overload
02WP	AECI-AECI	96126 5MOBTAP 161 to 96120 5THMHIL 161 CKT 1	386	99.8	100.1	96044 7MCCRED 345 to 96049 7THOMHL 345 CKT1
03AP		No Branches Identified				
03G		No Branches Identified				
03SP	SWPA-EES	52660 BULL SH5 161 to 99825 5MIDWAY# 161 CKT 1	162	112.9	113.4	52660 BULL SH5 161 to 52661 BUFRDTP5 161 CKT1
03SP	AECI-AECI	96071 5CLINTN 161 to 96692 2CLINTN 69.0 CKT 2	25	99.8	100.1	96071 5CLINTN 161 to 96692 2CLINTN 69.0 CKT3
03FA	SWPA-EES	52660 BULL SH5 161 to 99825 5MIDWAY# 161 CKT 1	162	99.8	100.4	52660 BULL SH5 161 to 52661 BUFRDTP5 161 CKT1
03FA	EES-EES	97454 4WALDEN 138 to 97469 4APRIL 138 CKT 1	206	99.8	100.2	97480 L558T485 138 to 97484 4HUNTSVL 138 CKT1
03FA	EES-EES	97469 4APRIL 138 to 97470 4LFOREST 138 CKT 1	206	99.8	100.3	97487 4MT.ZION 138 to 97514 4GRIMES 138 CKT1
03FA	EES-EES	97513 7GRIMES 345 to 97514 4GRIMES 138 CKT 1	525	99.1	100.1	97513 7GRIMES 345 to 97514 4GRIMES 138 CKT2
03FA	EES-EES	97513 7GRIMES 345 to 97514 4GRIMES 138 CKT 2	525	99.1	100.1	97513 7GRIMES 345 to 97514 4GRIMES 138 CKT1
03WP		No Branches Identified				

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

Study Year	From Area To Area	Branch Over 100% Rate B	Rate B	BC %Loading	TC %Loading	Outaged Branch That Caused Overload	ATC	Assignment	Estimated Cost
02WP		No Branches Identified					50		
03AP		No Branches Identified					50		
03G		No Branches Identified					50		
03SP	SWPA-EES	BULL SHOALS TO MIDWAY, 161 KV 52660 BULL SH5 161 to 99825 5MIDWAY# 161 CKT 1	167	109.5	110.0	BULL SHOALS TO BUFFORD TAP, 161 KV 52660 BULL SH5 161 to 52661 BUFRDTP5 161 CKT1	0	Entergy Owned Tie Line, SWPA Limitation at Bull Shoals, Upgrade Assigned to SPP-2000- 108: Replace 600 Amp disconnect switches, metering CTs and wave trap	150,000
03FA		No Branches Identified					50		
03WP		No Branches Identified					50		

5. Conclusion

The results of the study show that before the KCPL to EES 50 MW transfer can take place system improvements will need to be completed.

The Bull Shoals to Midway 161 kV tie line limits the ATC to zero in the 2003 Summer (6/1/03-10/1/03). The SWPA terminal equipment at Bull Shoals requires upgrades to relieve the SPP limitation. The facility upgrades are assigned to SPP-2000-108, for an AEPW to EES 670 MW transfer, and is required to be in service by 6/1/05. The facility upgrades at Bull Shoals are required to be in service by 6/1/03 for the KCPL to EES 50 MW transfer. The lead-time of the facility upgrades is 12 months, resulting in a possible in-service date of 4/1/03.

A Facility Study is required to determine the details and cost to accelerate the in-service date of the facility upgrade.

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 – 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