SPP Southwest Power Pool

# *System Impact Study SPP-2002-118 For Transmission Service Requested By Aquila Energy Marketing Corporation*

# *From CLEC To ERCOTE*

# *For a Reserved Amount Of 100 MW From 1/20/02 To 1/1/05*

***SPP Coordinated Planning***

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## 1. Executive Summary

Aquila Energy Marketing Corporation (AEMC) has requested a system impact study for long-term Firm Point-to-Point transmission service from CLEC to ERCOTE. The period of the transaction is from 1/20/03 to 1/1/05. The request is for OASIS reservation 369808 and 369809 totaling 100 MW. OASIS reservation 369808 and 368809 are the renewals of OASIS reservation 239061 and 239062 respectively.

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

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

No facilities in SPP restrict the requested CLEC to ERCOTE 100 MW transfer; therefore, the reservations will be accepted.

## 2. Introduction

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

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 100 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 100 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 100 MW transfer on the system. The first analysis was conducted to identify any new overloads caused by the 100 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 100 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 seven seasonal models to study the CLEC to ERCOTE 100 MW transfer for the requested service period. The SPP 2002 Series Cases 2002/03 Winter Peak, 2003 April Minimum, and 2003 Spring Peak, 2003 Summer Peak, 2003 Fall Peak, 2003/04 Winter Peak, and 2004 Spring Peak were used to study the impact of the 100 MW transfer on the SPP system during the requested service period of 1/20/03 to 1/1/05.

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 requested service 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 100 MW transfer. Available solutions are given in the table.

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

Table 3 documents the 100 MW transfer impact on previously assigned and identified SPP facilities. Available solutions are given in the table.

Tables 1a and 3a of Appendix B documents the modeling representation of the events identified in Tables 1 and 3 respectively to include bus numbers and bus names.

**Table 1** – SPP Facility Overloads caused by the CLEC to ERCOTE 100 MW Transfer

| Study Year | From Area To Area | Branch Over 100% RateB | RATE B | BC %Loading | TC %Loading | Outaged Branch That Caused Overload | ATC | Comments |
|---|---|---|---|---|---|---|---|---|
| 02WP | | **NONE** | | | | | 100 | |
| 03AP | | **NONE** | | | | | 100 | |
| 03G | | **NONE** | | | | | 100 | |
| 03SP | | **NONE** | | | | | 100 | |
| 03FA | | **NONE** | | | | | 100 | |
| 03WP | | **NONE** | | | | | 100 | |
| 04G | | **NONE** | | | | | 100 | |

**Table 2** – Non - SPP Facility Overloads caused by the CLEC to ERCOTE 100 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 | CELE-CELE | 50024 CARROLL4 138 to 50023 CARROLL6 230 CKT 1 | 336 | 99.5 | 101.8 | 50045 DOLHILL7 345 to 53454 SW SHV 7 345 CKT1 |
| 03AP | | NONE | | | | |
| 03G | AECI-AECI | 96096 5MARIES 161 to 97184 2MARIES 69.0 CKT 1 | 25 | 100.0 | 100.1 | 96080 5FTWOOD 161 to 97055 2FTWOOD 69.0 CKT1 |
| 03SP | EES-EES | 97929 4MOSSVL 138 to 97918 4NELSON 138 CKT 1 | 282 | 100.0 | 100.5 | 97922 4CARLYSS 138 to 97926 4CTCON W 138 CKT1 |
| 03SP | EES-EES | 98489 3BOGLSA 115 to 99066 3DEXTER* 115 CKT 1 | 80 | 99.9 | 100.5 | 98481 3AMITE 115 to 98484 3HAMMND 115 CKT99 |
| 03SP | EES-EES | 98489 3BOGLSA 115 to 99066 3DEXTER* 115 CKT 1 | 80 | 99.9 | 100.4 | 99028 3FRKLIN 115 to 99036 3BROKHV 115 CKT98 |
| 03SP | EES-EES | 98489 3BOGLSA 115 to 99066 3DEXTER* 115 CKT 1 | 80 | 99.9 | 100.4 | 98930 8R.BRAS 500 to 98937 8B.WLSN 500 CKT1 |
| 03SP | EES-EES | 98489 3BOGLSA 115 to 99066 3DEXTER* 115 CKT 1 | 80 | 99.5 | 100.2 | 97916 8NELSON 500 to 98107 8RICHARD 500 CKT1 |
| 03SP | EES-LAGN | 99146 3STERL 115 to 97303 3MRIONLG 115 CKT 1 | 96 | 99.1 | 101.1 | 99148 8STERL 500 to 99295 8ELDEHV 500 CKT1 |
| 03FA | | NONE | | | | |
| 03WP | | NONE | | | | |
| 04G | | NONE | | | | |

**Table 3** – Previously Assigned and Identified SPP Facilities Impacted by the CLEC to ERCOTE 100 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 | Comments |
|---|---|---|---|---|---|---|---|---|
| 02WP | | **NONE** | | | | | 100 | |
| 03AP | | **NONE** | | | | | 100 | |
| 03G | | **NONE** | | | | | 100 | |
| 03SP | | **NONE** | | | | | 100 | |
| 03FA | | **NONE** | | | | | 100 | |
| 03WP | | **NONE** | | | | | 100 | |
| 04G | | **NONE** | | | | | 100 | |

## 5. Conclusion

No facilities in SPP restrict the requested CLEC to ERCOTE 100 MW transfer; therefore, the reservations will be accepted.

# 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 – 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

# Appendix B

**Table 1a** – Model Data for SPP Facility Overloads caused by the CLEC to ERCOTE 100 MW Transfer

| Study Year | From Area To Area | Branch Over 100% RateB | RATE B | BC %Loading | TC %Loading | Outaged Branch That Caused Overload | ATC | Comments |
|---|---|---|---|---|---|---|---|---|
| 02WP | | NONE | | | | | 100 | |
| 03AP | | NONE | | | | | 100 | |
| 03G | | NONE | | | | | 100 | |
| 03SP | | NONE | | | | | 100 | |
| 03FA | | NONE | | | | | 100 | |
| 03WP | | NONE | | | | | 100 | |
| 04G | | NONE | | | | | 100 | |

**Table 3a** – Model Data for SPP Facility Overloads caused by the CLEC to ERCOTE 100 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 | Comments |
|---|---|---|---|---|---|---|---|---|
| 02WP | | NONE | | | | | 100 | |
| 03AP | | NONE | | | | | 100 | |
| 03G | | NONE | | | | | 100 | |
| 03SP | | NONE | | | | | 100 | |
| 03FA | | NONE | | | | | 100 | |
| 03WP | | NONE | | | | | 100 | |
| 04G | | NONE | | | | | 100 | |