



# **SPP** *Southwest Power Pool*

***System Impact Study SPP-2001-268  
For Transmission Service  
Requested By  
Southern Company Energy  
Marketing L.P.***

***From AEPW To  
Entergy***

***For a Reserved Amount Of 150MW  
From 1/1/02  
To 1/1/03***

***SPP Transmission Planning***

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## **1. Executive Summary**

Southern Company Energy Marketing L.P. has requested a system impact study for long-term Firm Point-to-Point transmission service from AEPW to Entergy. The period of the transaction is from 1/1/02 to 1/1/03. The request is for OASIS reservation 288003 in the amount of 150MW.

The principal objective of this study is to identify system problems and potential system modifications necessary to facilitate the additional 150MW transfer while maintaining system reliability.

New overloads caused by the 150MW transfer were identified along with determining the impact of the transfer on any previously assigned and identified facilities.

The AEPW to EES 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 AEPW to EES 150MW transfer.

## **2. Introduction**

Southern Company Energy Marketing L.P. has requested an impact study for transmission service from AEPW to EES.

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 150MW. 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 150MW 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 150MW.

### **3. Study Methodology**

#### **A. Description**

Two analyses were conducted to determine the impact of the 150MW transfer on the system. The first analysis was conducted to identify any new overloads caused by the 150MW 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 150MW 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 150MW 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 150MW 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 150MW transfer.

Table 2 documents overloads on Non SPP Regional Tariff participants' transmission systems caused by the 150MW transfer.

Table 3 documents the 150MW 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 AEPW to EES 150MW 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
01WP		NONE				NONE	100	
02SP	EES-SWPA	MIDWAY TO BULL SHOALS, 161KV 99825 5MIDWAY# 161 to 52660 BULL SH5 161 CKT 1	162	99.8	100.4	BULL SHOALS TO FLIPPIN, 161KV 99802 5BULLSH* 161 to 99809 5FLIPN 161 CKT1	44	Upgrade Assigned to SPP-2000-108 212202 04SP
02SP	AEPW-CELE	WALLACE LAKE TO INTERNATIONAL PAPER, 138KV 53461 WALLAKE4 138 to 50090 IPAPER 4 138 CKT 1	209	97.1	103.7	DOLET HILLS 345/230KV TR 50045 DOLHILL7 345 to 50046 DOLHILL6 230 CKT1	100	Dolet Hills Operating Guide
02WP		NONE				NONE	100	

**Table 2** – Non - SPP Facility Overloads caused by the AEPW to EES 150MW Transfer

Study Year	From Area - To Area	Branch Over 100% Rate B	Rate B	BC % Loading	TC % Loading	Outaged Branch Causing Overload
01WP	EES-EES	97919 6VERDINE 230 to 97917 6NELSN 230 CKT 1	470	99.5	100.5	97304 MOSBLF 6 230 to 97917 6NELSN 230 CKT1
01WP	EES-EES	99167 3RINGLD 115 to 99168 3SAILES 115 CKT 1	115	95.4	100.9	50027 CLARN 6 230 to 50126 MESSICK6 230 CKT1
01WP	EES-EES	99389 4MURFRE 138 to 99387 3MURF-S 115 CKT 1	60	98.6	107.8	53526 CROCKET7 345 to 97513 7GRIMES 345 CKT1
01WP	CELE-EES	50024 CARROLL4 138 to 99167 3RINGLD 115 CKT 1	125	100.0	105.1	50023 CARROLL6 230 to 50126 MESSICK6 230 CKT1
02SP	EES-EES	97514 4GRIMES 138 to 97487 4MT.ZION 138 CKT 1	206	94.7	102.8	97454 4WALDEN 138 to 97514 4GRIMES 138 CKT1
02SP	EES-EES	97768 4HLYSPG# 138 to 97698 4JASPER 138 CKT 1	112	98.0	100.4	53526 CROCKET7 345 to 97513 7GRIMES 345 CKT1
02SP	EES-EES	98273 4OAKGROV 138 to 98283 T300/331 138 CKT 1	135	99.8	100.5	50106 MADISON6 230 to 98555 6GYPSY 230 CKT1
02SP	EES-EES	99146 3STERL 115 to 99232 3CROS-N 115 CKT 1	80	99.7	100.2	99146 3STERL 115 to 99305 3MERIDN# 115 CKT1
02SP	EES-EES	99167 3RINGLD 115 to 99168 3SAILES 115 CKT 1	115	97.8	104.3	99294 7ELDEHV 345 to 99295 8ELDEHV 500 CKT1
02SP	EES-EES	99168 3SAILES 115 to 99167 3RINGLD 115 CKT 1	115	96.9	100.1	99308 3MAG-E 115 to 99310 3MCNEIL 115 CKT1
02SP	EES-EES	99179 3ADA 11 115 to 99168 3SAILES 115 CKT 1	115	98.8	100.1	99171 3SPRINGH 115 to 99280 3TAYLOR 115 CKT1
02SP	CELE-EES	50024 CARROLL4 138 to 99167 3RINGLD 115 CKT 1	125	97.0	102.2	50023 CARROLL6 230 to 50126 MESSICK6 230 CKT1
02SP	CELE-EES	50057 FISHER 4 138 to 99115 3FISHER 115 CKT 1	83	99.6	102.2	99112 3WINFLD 115 to 99113 6WINFLD 230 CKT1
02SP	EES-EES	97504 2BRYAN B69.0 to 97506 4BRYAN 138 CKT 1	50	99.7	100.3	97506 4BRYAN 138 to 97505 2BRYAN A69.0 CKT1
02SP	EES-EES	98229 4PT HUD 138 to 98230 2PT.HUD 69.0 CKT 1	100	99.9	100.1	98234 6FANCY 230 to 98308 6ENJAY 230 CKT1
02SP	EES-CELE	99115 3FISHER 115 to 50057 FISHER 4 138 CKT 1	83	99.5	102.2	99113 6WINFLD 230 to 99116 6MONTGY 230 CKT1
02SP	EES-EES	99389 4MURFRE 138 to 99387 3MURF-S 115 CKT 1	60	93.0	103.0	53424 LONGWD 7 345 to 99294 7ELDEHV 345 CKT1
02WP	EES-EES	97919 6VERDINE 230 to 97917 6NELSN 230 CKT 1	470	100.0	100.1	97304 MOSBLF 6 230 to 97917 6NELSN 230 CKT1
02WP	EES-EES	99167 3RINGLD 115 to 99168 3SAILES 115 CKT 1	115	99.1	104.8	50023 CARROLL6 230 to 50126 MESSICK6 230 CKT1
02WP	CELE-EES	50024 CARROLL4 138 to 99167 3RINGLD 115 CKT 1	125	98.6	103.7	50023 CARROLL6 230 to 50126 MESSICK6 230 CKT1
02WP	CELE-CELE	50039 COUGH 4 138 to 50031 COCODR 6 230 CKT 1	386	98.9	100.7	50203 VILPLT 6 230 to 50214 WSTFORK6 230 CKT1
02WP	EES-EES	99389 4MURFRE 138 to 99387 3MURF-S 115 CKT 1	60	97.8	106.9	53526 CROCKET7 345 to 97513 7GRIMES 345 CKT1

**Table 3** – Previously Assigned and Identified SPP Facilities Impacted by the AEPW to EES 150MW Transfer.

Study Year	From Area - To Area	Branch Over 100% Rate B	Rate B	BC % I Loading	TC % I Loading	Outaged Branch Causing Overload	ATC (MW)	Assignment
01WP	AEPW-AEPW	<b>DYESS TO EAST ROGERS, 161KV</b> 53131 DYESS 5 161 to 53135 EROGERS5 161 CKT 1	245	107.0	107.5	<b>FLINT CREEK TO GENTRY, 161KV</b> 53139 FLINTCR5 161 to 53187 GENTRYR5 161 CKT1	0	Previously Identified
02SP	SWPA-AECI	<b>CARTHAGE TO REEDS, 69KV</b> 52690 CARTHG 269.0 to 96751 2REEDS 69.0 CKT 1	36	100.0	100.4	<b>JAMES TO NIXA, 161KV</b> 96089 5JAMESV 161 to 96678 5NIXA-1 161 CKT1	0	Upgrade Assigned to SPP-2000-108 212202 04SP
02SP	EMDE-EMDE	<b>TIPTON FORD TO MONETT, 161KV</b> 59472 TIP292 5 161 to 59480 MON383 5 161 CKT 1	157	107.0	107.5	<b>LARUSSEL TO MONETT, 161KV</b> 59479 LAR382 5 161 to 59480 MON383 5 161 CKT1	0	Upgrade Assigned to SPP-2000-086 150680 Est. In-Service Date 5/1/2003
02SP	KACP-KACP	<b>STILWELL TO LACYGNE, 345KV</b> 57968 STILWEL7 345 to 57981 LACYGNE7 345 CKT 1	1251	104.5	104.8	<b>WEST GARDNER TO LACYGNE, 345KV</b> 57965 W.GRDNR7 345 to 57981 LACYGNE7 345 CKT1	0	SPP Flowgate
02SP	OKGE-OKGE	<b>PECAN CREEK 345/161KV TR</b> 55235 PECANCK7 345 to 55234 PECANCK5 161 CKT 1	369	113.5	114.4	<b>MUSKOGEE TO FORT SMITH, 345KV</b> 55224 MUSKOG7 345 to 55302 FTSMITH7 345 CKT1	0	Upgrade Assigned to SPP-2000-108 212202 03G, 04SP, 04WP, 06SP Est. In-Service Date 12/1/2004
02SP	SWPA-SWPA	<b>ROBERT S. KERR TO VAN BUREN, 161KV</b> 52782 RS KERR5 161 to 52722 VAN BUR5 161 CKT 1	167	113.1	113.9	<b>BONANZA TAP TO AES, 161KV</b> 55261 BONANZT5 161 to 55262 AES 5 161 CKT1	0	Previously Identified
02SP	SWPA-SWPA	<b>GORE TO SALISAW, 161KV</b> 52752 GORE 5 161 to 52750 SALISAW5 161 CKT 1	167	102.9	104.4	<b>MUSKOGEE TO FORT SMITH, 345KV</b> 55224 MUSKOG7 345 to 55302 FTSMITH7 345 CKT1	0	Upgrade Assigned to SPP-2000-108 212202 04SP Est. In-Service Date 6/1/2005
02SP	SWPA-SWPA	<b>BUFORD TAP TO BULL SHOALS, 161KV</b> 52661 BUFRDTP5 161 to 52660 BULL SH5 161 CKT 1	167	109.7	110.8	<b>BULL SHOALS TO MIDWAY, 161KV</b> 52660 BULL SH5 161 to 99825 5MIDWAY# 161 CKT1	0	Upgrade Assigned to SPP-2000-108 212202 04SP Est. In-Service Date 6/1/2005
02SP	AEPW-AEPW	<b>DYESS TO EAST ROGERS, 161KV</b> 53131 DYESS 5 161 to 53135 EROGERS5 161 CKT 1	244	106.2	106.7	<b>FLINT CREEK TO GENTRY, 161KV</b> 53139 FLINTCR5 161 to 53187 GENTRYR5 161 CKT1	0	Previously Identified
02WP	AEPW-AEPW	<b>DYESS TO EAST ROGERS, 161KV</b> 53131 DYESS 5 161 to 53135 EROGERS5 161 CKT 1	245	102.7	103.1	<b>FLINT CREEK TO GENTRY, 161KV</b> 53139 FLINTCR5 161 to 53187 GENTRYR5 161 CKT1	0	Previously Identified
02WP	OKGE-OKGE	<b>PECAN CREEK 345/161KV TR</b> 55235 PECANCK7 345 to 55234 PECANCK5 161 CKT 1	369	104.0	104.9	<b>MUSKOGEE TO FORT SMITH, 345KV</b> 55224 MUSKOG7 345 to 55302 FTSMITH7 345 CKT1	0	Upgrade Assigned to SPP-2000-108 212202 03G, 04SP, 04WP, 06SP Est. In-Service Date 12/1/2004



## **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 2002 Summer (6/1/02-10/1/02), the ATC is zero due the loading of the following facilities:

- Tipton Ford to Monett 161kV line. The estimated in-service date of the Tipton Ford to Monett 161kV line upgrade is 5/1/2003.
- La Cygne to Stillwell 345kV line. No upgrades have been assigned for the La Cygne to Stillwell overload.
- Pecan Creek 345/161kV Tr. The estimated in-service date of the Pecan Creek 345/161kV Tr upgrade is 12/1/2004.
- R.S. Kerr to Van Buren 161kV line. No upgrades have been assigned for the R.S. Kerr to Van Buren overload.
- Eureka to Beaver 161kV line. The estimated in-service date of the Pecan Creek 345/161kV Tr upgrade is 6/1/2004.
- Gore to Salisaw 161kV line. The estimated in-service date of the Gore to Salisaw 161kV line is 6/1/2005.

≠! For the 2002/2003 Winter (12/1/02-4/1/03), the ATC is zero due to the loading of the Pecan Creek 345/161kV Tr. The estimated in-service date of the Pecan Creek 345/161kV Tr upgrade is 12/1/2004.

Given the estimated in service dates of these upgrades, the ATC of the existing transmission system cannot be increased as required to provide continuous service over the reservation period.

Due to these limitations, the requested reservation will 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 -  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. 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