



# **SPP** *Southwest Power Pool*

*System Impact Study  
For Extension for the Commencement of  
Transmission Service  
Requested By  
PECO Energy Power Team*

*From AEPW to Entergy  
For a Reserved Amount Of 400MW  
From 6/1/01  
To 6/1/02*

*And From AEPW to Ameren  
For a Reserved Amount Of 400MW  
From 1/1/02  
To 1/1/03*

*SPP Transmission Planning*

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## **1. Executive Summary**

PECO Energy Power Team has requested system impact studies for extensions of commencement for long-term Firm Point-to-Point transmission service from AEPW to Entergy and AEPW to Ameren. The extension period of the AEPW to Entergy transaction is from 6/1/01 to 6/1/02. The request is for reservation 230097; totaling 400MW, replacing confirmed reservation 121376. The extension period of the AEPW to Ameren transaction is from 1/1/02 to 1/1/03. The request is for reservation 230098; totaling 400MW, replacing confirmed reservation 121377.

The principal objective of this study is to identify system problems and potential system modifications necessary to provide the 800MW of transfers while maintaining system reliability. The analysis completed in System Impact Study SPP-1999-012/013 for the 800MW of long-term Firm Point-to-Point transmission service from AEPW to Entergy and Ameren determined that the Network Facility Upgrades listed in Table 1 are required. The following results are found for the requested extensions:

1. No new Network Facility upgrades are required to accommodate the 400MW transfer from AEPW to Entergy extension from 6/1/01 to 6/1/02.
2. New Network Facility Upgrades are required to fix the overloads listed in Table 2 and Table 3 to accommodate the extension of a 400MW transfer from AEPW to Ameren from 1/1/02 to 1/1/03.

The SPP and effected member companies shall use due diligence to coordinate the addition of necessary facilities or transmission system upgrades to provide the requested transmission service. PECO is to compensate SPP for such costs pursuant to the terms of section 27 of the SPP Open Access Transmission Tariff. Expedited procedures for new facilities are available to PECO per section 19.8 of the SPP Open Access Transmission Service Tariff.

Engineering and construction of any new facilities or modifications will not start until after a transmission service agreement and/or construction agreement is in place and effected member companies receives the appropriate authorization to proceed from the SPP after they receive authorization from the transmission customer.

## **2. Introduction**

PECO Energy Power Team has requested two impact studies for transmission service from AEPW to Entergy and Ameren. The study results for the two requests are combined in this document.

The principal objective of the studies is to identify the restraints on the SPP Regional Tariff System that may limit the transfer to less than the 400MW transfers. This study includes a steady-state contingency analysis (PSS/E function ACCC) and Available Transfer Capability (ATC) analysis.

The steady-state analysis considers the impact of the 400MW transfers on transmission line loading and transmission bus voltages for outages of single and selected multiple transmission lines and transformers on the SPP system.

ATC analysis 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 the 400MW to Entergy from 6/1/01 to 6/1/02 and 400MW to Ameren from 1/1/02 to 1/1/03.

### **3. Study Methodology**

#### **A. Description**

The system impact study analyses were conducted to determine the impact of the 400MW transfer from AEPW to Entergy from 6/1/01 to 6/1/02 and 400MW transfer from AEPW to Ameren from 1/1/02 to 1/1/03 on the SPP system. The analyses were done using two steps. The first step was to study the steady-state analysis impact of the transfer. The second step was to study Available Transfer Capability (ATC) of the facilities identified in the steady-state analysis impact for the transfers.

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 ATC study portion was done using the requirements specified in the current SPP Criteria related to determination of ATC.

#### **B. Model Updates**

SPP used six seasonal models to study the two 400MW transfers. The SPP 2001 Series Cases 2001/02 Winter Peak, 2002 April (Spring Minimum), and 2002 Spring Peak were used to study the impact of the 400MW transfer to Entergy on the SPP system for a transaction period of 6/01/01 to 6/01/02. The SPP 2001 Series Cases 2001/02 Winter Peak, 2002 April (Spring Minimum), 2002 Spring Peak, 2002 Summer Peak, 2002 Fall Peak, and 2002/03 Winter Peak were used to study the impact of the 400MW transfer to Ameren on the SPP system during the transaction period of 1/01/02 to 1/01/03.

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

Table 1 includes the previously assigned facilities that are still the responsibility of the PECO Energy Power Team. No new limits were found in the 2001/02 Winter Peak, 2002 April and 2002 Spring Peak Models for the 400MW transfer from AEPW to Entergy. Tables 2 and 3 contain the new overloads found for the 400MW transfer from AEPW to Ameren. Table 2 contains the facility overloads on SPP Regional Tariff participants' transmission systems. Table 3 documents overloads on Non SPP Regional Tariff participants' transmission systems. 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 determined ATC value if calculated, any SPP identification or assignment of the event, and any solutions received from the transmission owners.

**Table 1** – Network Facility Upgrades Previously Assigned to the original 800MW of Transfers and still required for the 400MW Transfer from AEPW to Entergy and the 400MW Transfer from AEPW to Ameren.

NETWORK SYSTEM IMPROVEMENT	ENGINEERING & CONSTRUCTION COSTS (\$ 1999 )	ENGINEERING & CONSTRUCTION LEAD TIME
Change out three(3) 138kV 600A disconnect switches at Tulsa Power Station (CB 1333A) with new 2000A switches (TPS to Carson Tap overload)	\$55,000	Complete
Change out three(3) 138kV 600A disconnect switches at Tulsa Power Station (CB 1329A) with new 2000A switches (TPS to Oaks overload)	\$55,000	Complete
Change out three(3) 138kV 600A disconnect switches at Tulsa Power Station (CB 1313A) with new 2000A switches (TPS to Riverside overload)	\$55,000	Complete
Change out 500 CU jumpers at Dyess substation with 750 Cu jumpers (Dyess to East Rogers overload)	\$10,000	Complete
Reconductor & Rebuild Riverside -Beeline (OG&E) 138kV line 81-523. Reconductor 1.9 miles owned by PSO & rebuild 2.81 miles of OG&E owned line.	\$600,000	Complete
<b>TOTAL</b>	<b>\$775,000</b>	

**Table 2** - SPP Facility overloads caused by the 400MW AEPW to AMRN transfer.

Study Year	From -To Area(s)	Branch Over 100% Rate B	RATE B <MVA>	No Transfer Case %Loading	Transfer Case %Loading	Branch Outage That Caused Overload	ATC <MW>	Limiting Element, Available Solution and Cost, or Previous Assignment
01WP	OKGE-OKGE	<b>OSAGE TO CONTINENTAL BLACKS, 69KV</b> 54742 OSAGE 269.0 to 54763 CONBLKS269.0 CKT 1	72	95.5	100.6	<b>KILDARE TAP TO WHITE EAGLE 138KV</b> 54760 KILDARE4 138 to 54761 WHEAGLE4 138 CKT1	355	Replace 600A Switches with 1200A
02SP	AEPW-AEPW	<b>EAST CENTERTON to GENTRY REC, 161KV</b> 53133 ECNTRTN5 161 to 53187 GENTRYR5 161 CKT 1	335	99.6	101.0	<b>DYESS TO ELM SPRINGS REC, 161KV</b> 53131 DYESS 5 161 to 53194 ELMSPRR5 161 CKT1	119	Assigned To 1999-010 2008SP E.Centeron 161kV Breaker & Switch Replacements, Gentry Tap 161kV Line Switch Replacement \$167,960 Accelerated construction required.
02FA	OKGE-OKGE	<b>OSAGE TO CONTINENTAL BLACKS, 69KV</b> 54742 OSAGE 269.0 to 54763 CONBLKS269.0 CKT 1	72	97.2	102.2	<b>KILDARE TAP TO WHITE EAGLE 138KV</b> 54760 KILDARE4 138 to 54761 WHEAGLE4 138 CKT1	227	Replace 600A Switches with 1200A
02WP	OKGE-OKGE	<b>OSAGE TO CONTINENTAL BLACKS, 69KV</b> 54742 OSAGE 269.0 to 54763 CONBLKS269.0 CKT 1	72	96.3	101.5	<b>KILDARE TAP TO WHITE EAGLE 138KV</b> 54760 KILDARE4 138 to 54761 WHEAGLE4 138 CKT1	294	Replace 600A Switches with 1200A

**Table 3** - Non-SPP Facility overloads caused by the 400MW AEPW to AMRN transfer.

Study Year	From -To Area(s)	Branch Over 100% Rate B	RATE B <MVA>	No Transfer Case %Loading	Transfer Case %Loading	Branch Outage That Caused Overload	ATC <MW>
01WP	SWPA-AECI	CARTHAGE TO REEDS, 69KV 52690 CARTHG 269.0 to 96751 2REEDS 69.0 CKT 1	36	98.9	104.9	CARTHAGE TO JASPER, 69KV 52690 CARTHG 269.0 to 96649 2JASPER 69.0 CKT 1	81
02SP	SWPA-AECI	CARTHAGE TO JASPER, 69KV 52690 CARTHG 269.0 to 96649 2JASPER 69.0 CKT 1	47	97.7	101.9	BUTLER TO ADRIAN, 161KV 59216 BUTLER_5 161 to 59240 ADRIAN 5 161 CKT1	100
02SP	SWPA-AECI	CARTHAGE TO REEDS, 69KV 52690 CARTHG 269.0 to 96751 2REEDS 69.0 CKT 1	36	98.7	105.5	AURORA TO MONETT, 161KV 59468 AUR124 5 161 to 59480 MON383 5 161 CKT1	79
02WP	SWPA-AECI	CARTHAGE TO REEDS, 69KV 52690 CARTHG 269.0 to 96751 2REEDS 69.0 CKT 1	43	95.2	101.4	CARTHAGE TO JASPER, 69KV 52690 CARTHG 269.0 to 96649 2JASPER 69.0 CKT1	326



## **5. Conclusion**

The results of the study show that:

1. The 400MW transfer from AEPW to Entergy from 6/01/01 to 6/01/02 can be accepted without any additional Network Facility Upgrades.
2. The 400MW transfer to Ameren from 1/01/02 to 1/01/03 can take place, system improvements will need to be completed. The facilities identified in the System Impact Study will be required before the 400MW transmission service to Ameren can take place in order to maintain system reliability.

The final cost assignment of the additional Network Facilities Upgrades found in Table 2 will be determined upon the completion of a facility study. The Associated Electric Coop's Carthage to Jasper and Reeds lines found in Table 3 are third-party lines. For these third-party facilities, the transmission customer is responsible for obtaining arrangements for any construction upgrades on the facility per Section 21.1 of the SPP OATT. If requested, SPP is willing to undertake reasonable efforts to assist the transmission customer in making any arrangements for necessary engineering, permitting, and construction of transmission limiting facilities.

## 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 –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