



***System Impact Study SPP-2000-044c  
For Transmission Service  
Requested By  
Constellation Power Source, Inc.***

***From Central and South West  
Services To Ameren***

***For a Reserved Amount Of 150MW  
From 12/1/02  
To 12/1/04***

***SPP Coordinated Planning***

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Revised August 14, 2001 to include the New Mountain to Diana 345kV limitations and the proposal of a 19-mile 345kV line from New Mountain to Wilkes to relieve the limitation.

## **1. Executive Summary**

Constellation Power Source, Inc. (CPS) has requested a system impact study for long-term Firm Point-to-Point transmission service from Central and South West Services to Ameren. The period of the transaction is from 12/1/02 to 12/1/04. The request is for OASIS reservations 194668 and 194669, totaling 150MW. This study includes the CPS 250MW transmission service from CSWS to Entergy, which is not confirmed.

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 CSWS to AMRN transfer overloads new facilities as well as impacts facilities that have been identified as limiting constraints for previously studied transfers. Tables 1 and 2 list the new overloads caused by the 150MW transfer. Table 3 lists the previously assigned and identified facilities impacted by the 150MW transfer.

Due to the loading of the New Mountain to Diana 345kV circuits found in Table 1, the ATC is limited to 90MW. As an alternative to reconductoring both 345kV circuits, a 19-mile 345kV line from New Mountain to Wilkes was studied. Tables 1a and 3a show the impact of the proposed line on the overloads found in Tables 1 and 3, respectively. The results of the analysis show that the proposed line relieves the New Mountain to Diana 345kV line overloads.

In addition to the transmission limitations identified, the SPP to AMRN interface is firm contract path limited to 1,287MW. Currently, SPP has reserved long-term firm transmission service equal to the firm contract capacity limit of 1,287MW during the requested transmission service period. To accommodate the additional 150MW to Ameren, transmission upgrades or additions will be required to increase the firm contract path capacity between SPP and AMRN.

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. CPS 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 and upgrades are available to CPS 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 receive the appropriate authorization to proceed from the SPP after receiving authorization from the transmission customer.

## **2. Introduction**

Constellation Power Source, Inc. has requested an impact study for transmission service from CSWS control area with a sink of AMRN.

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 show 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.

Further analysis was conducted to determine the impact of the proposed New Mountain to Wilkes 345kV line.

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

SPP used three seasonal models to study the 150MW request. The SPP 2001 Series Cases 2003 Spring Peak, 2004 Summer Peak, and 2004/05 Winter Peak were used to study the impact of the 150MW transfer on the SPP system during the transaction period of 12/1/02 to 12/1/04.

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 2001 base case series models. The 2003 Spring Peak (03G) model is representative of the Spring Seasons throughout the length of the reservation.

#### **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. Upgrades associated with these new overloads can be directly assigned to the CSWS to AMRN 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. The previously assigned and authorized upgrades for the IPC Jefferson to Lieberman 138kV line, the Tatum to Rockhill 138kV line, the Cherokee to Knox Lee 138kV line, and the Cherokee to Tatum 138kV line were modeled to determine whether additional upgrades would be required to accommodate the CSWS to AMRN 150MW transfer. Available estimated in-service dates for the completion of these previously assigned upgrades are given in the table. Other previously assigned facilities include the facility limitations identified for the previous CPS transmission request from CSWS to Entergy.

Tables 1a, 3a, and 4 contain the analysis results of adding a 345kV line from New Mountain to Wilkes. Tables 1a and 3a show the impact of the line on the facility overloads found in Tables 1 and 3, respectively. The tables show the transfer case contingent loading percentage of the circuit with and without the New Mountain to Wilkes 345kV line.

The proposed line relieves the New Mountain to Diana 345kV overloads and the Tatum to Rockhill 138kV overload. The IPC Jefferson to Lieberman 138kV line loading is also decreased.

The proposed line increases the loading on the Longwood to Noram 138kV line, Raines to Noram 138kV line, and the Wallace Lake to South Shreveport 138kV line overloads. In addition to increasing the loading on the above lines, the proposed line causes the overloads found in Table 4.

**Table 1** – SPP Facility Overloads caused by the CSWS to AMRN 150MW Transfer

Study Year	From Area - To Area	Branch Over 100% RateB	RATEB	BC %Loading	TC %Loading	Outaged Branch That Caused Overload	ATC (MW)	Solution
03G		NONE						
04SP	AEPW-WERE	<b>COFFEYVILLE TAP TO DEARING, 138 KV</b> 53972 COFFEYT4 138 to 57002 DEARING4 138 CKT 1	210	100.0	102.2	<b>DELAWARE TO NEOSHO, 345KV</b> 53929 DELWARE7 345 to 56793 NEOSHO 7 345 CKT1	3	Replace Wavetrap @ Dearing
04SP	EMDE-EMDE	<b>SUB 383 - MONETT TO AURORA H.T., 161KV</b> 59480 MON383 5 161 to 59468 AUR124 5 161 CKT 1	157	99.9	100.7	<b>BUTLER_AEC TO ADRIAN, 161KV</b> 59216 BUTLER_5 161 to 59240 ADRIAN 5 161 CKT1	20	Solution Undetermined
04SP	AEPW-AEPW	<b>NEW MOUNTAIN TO DIANA, 345KV CKT 1</b> 53635 NWMOUNT7 to 53528 DIANA 7 345 CKT 1	1059	96.7	102.2	<b>NEW MOUNTAIN TO DIANA, 345KV CKT 2</b> 53635 NWMOUNT7 to 53528 DIANA 7 345 CKT2	90	Conductor Limited
04SP	AEPW-AEPW	<b>NEW MOUNTAIN TO DIANA, 345KV CKT 2</b> 53635 NWMOUNT7 to 53528 DIANA 7 345 CKT 2	1059	96.5	102.1	<b>NEW MOUNTAIN TO DIANA, 345KV CKT 1</b> 53635 NWMOUNT7 to 53528 DIANA 7 345 CKT1	94	Conductor Limited
04SP	OKGE-OKGE	<b>PECAN CREEK 345/161KV TRANSFORMER</b> 55235 PECANCK7 345 to 55234 PECANCK5 161 CKT 1	369	99.6	100.1	<b>MUSKOGEE TO FT SMITH, 345KV</b> 55224 MUSKOGEE7 345 to 55302 FTSMITH7 345 CKT1	113	Add Second 345/161KV Bus-Tie Transformer
04SP	GRRD-GRRD	<b>PENSACOLA TO GRAY TAP, 69KV</b> 54428 PENZA 269.0 to 54465 GRAY TP269.0 CKT 1	47	99.7	100.1	<b>MIAMI TO AFTON, 161KV</b> 54431 MIAMI 5 161 to 54432 AFTON 5 161 CKT1	122	Solution Undetermined
04WP	SWPA-AECI	<b>CARTHAGE TO REEDS, 69KV</b> 52690 CARTHG 269.0 to 96751 2REEDS 69.0 CKT 1	43	100.0	100.9	<b>HUBEN 345/161KV TRANSFORMER</b> 96042 7HUBEN 345 to 96088 5HUBEN 161 CKT1	6	Solution Undetermined

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

Study Year	From Area - To Area	Branch Over 100% RateB	RATEB	BC %Loading	TC %Loading	Outaged Branch That Caused Overload
03G	AMRN-AMRN	31221 MOBERLY 161 to 31409 OVERTON 161 CKT 1	142	99.8	100.5	96044 7MCCRED 345 to 96049 7THOMHL 345 CKT1
03G	CELE-EES	50024 CARROLL4 138 to 99167 3RINGLD 115 CKT 1	125	96.3	101.9	50027 CLARN 6 230 to 50126 MESSICK6 230 CKT1
03G	EES-EES	97480 L558T485 138 to 97484 4HUNTSVL 138 CKT 1	206	96.7	101.6	97454 4WALDEN 138 to 97514 4GRIMES 138 CKT1
03G	EES-EES	97487 4MT.ZION 138 to 97480 L558T485 138 CKT 1	206	98.9	103.7	97454 4WALDEN 138 to 97469 4APRIL 138 CKT1
03G	EES-EES	97514 4GRIMES 138 to 97487 4MT.ZION 138 CKT 1	206	99.9	104.7	97470 4LFOREST 138 to 97539 4WDHAVN 138 CKT1
03G	EES-EES	99167 3RINGLD 115 to 99168 3SAILES 115 CKT 1	115	98.9	104.9	50027 CLARN 6 230 to 50126 MESSICK6 230 CKT1
03G	EES-EES	99179 3ADA 11 115 to 99168 3SAILES 115 CKT 1	115	99.5	101.2	99308 3MAG-E 115 to 99310 3MCNEIL 115 CKT1
04SP	CELE-EES	50024 CARROLL4 138 to 99167 3RINGLD 115 CKT 1	125	99.4	103.0	50031 COCODR 6 230 to 50203 VILPLT 6 230 CKT1
04SP	EES-EES	99167 3RINGLD 115 to 99168 3SAILES 115 CKT 1	115	99.6	104.6	53277 LYDIA 7 345 to 54037 VALIANT7 345 CKT1
04SP	EES-EES	99168 3SAILES 115 to 99179 3ADA 11 115 CKT 1	115	97.4	100.7	99294 7ELDEHV 345 to 99295 8ELDEHV 500 CKT1
04SP	EES-EES	99171 3SPRINGH 115 to 99280 3TAYLOR 115 CKT 1	120	98.9	101.2	99230 3COUCH 115 to 99310 3MCNEIL 115 CKT1
04SP	EES-EES	99230 3COUCH 115 to 99310 3MCNEIL 115 CKT 1	167	96.5	102.0	99230 3COUCH 115 to 99380 3HOPE E# 115 CKT1
04SP	EES-EES	99263 3LEWIS # 115 to 99230 3COUCH 115 CKT 1	159	99.9	107.0	97476 4JACINTO 138 to 97478 6JACINTO 230 CKT1
04SP	EES-EES	99303 3PATMOS# 115 to 99263 3LEWIS # 115 CKT 1	159	94.6	101.4	53615 WELSH 7 345 to 59992 EASTDC 7 345 CKT1
04SP	EES-EES	99380 3HOPE E# 115 to 99230 3COUCH 115 CKT 1	120	99.8	100.4	99349 3ARKA-N 115 to 99407 3FRIEND 115 CKT1
04SP	EES-EES	99389 4MURFRE 138 to 99387 3MURF-S 115 CKT 1	60	99.5	108.6	53277 LYDIA 7 345 to 54037 VALIANT7 345 CKT1
04SP	EES-EES	99782 5TRUMAN 161 to 99750 5HRSBRG* 161 CKT 1	148	100.0	101.1	99736 5CASH 1 161 to 99755 5JONES 161 CKT1
04SP	EES-EES	99782 5TRUMAN 161 to 99781 5TRUM-W# 161 CKT 1	148	99.0	100.1	99763 5NEW-IN 161 to 99764 5NEWPO 161 CKT1
04WP	CELE-EES	50024 CARROLL4 138 to 99167 3RINGLD 115 CKT 1	125	98.7	103.9	50027 CLARN 6 230 to 99116 6MONTGY 230 CKT1
04WP	EES-EES	99146 3STERL 115 to 99232 3CROS-N 115 CKT 1	80	99.9	101.0	99282 3WARR-E 115 to 99298 3CARMEL* 115 CKT1
04WP	EES-EES	99167 3RINGLD 115 to 99168 3SAILES 115 CKT 1	115	99.7	105.3	50027 CLARN 6 230 to 99116 6MONTGY 230 CKT1
04WP	EES-EES	99168 3SAILES 115 to 99179 3ADA 11 115 CKT 1	115	99.8	101.4	99171 3SPRINGH 115 to 99172 3SAREPT 115 CKT1
04WP	EES-EES	99230 3COUCH 115 to 99310 3MCNEIL 115 CKT 1	167	95.9	105.0	53424 LONGWD 7 345 to 99294 7ELDEHV 345 CKT1
04WP	EES-EES	99263 3LEWIS # 115 to 99230 3COUCH 115 CKT 1	159	99.9	106.6	53615 WELSH 7 345 to 59992 EASTDC 7 345 CKT1
04WP	EES-EES	99303 3PATMOS# 115 to 99263 3LEWIS # 115 CKT 1	159	97.8	104.7	53374 FULTON 3 115 to 53375 FULTGEN3 115 CKT1
04WP	EES-EES	99389 4MURFRE 138 to 99387 3MURF-S 115 CKT 1	60	99.7	107.7	53226 ASHWEST4 138 to 53306 PATTERS4 138 CKT1



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

Study Year	From Area - To Area	Branch Over 100% RateB	RATEB	BC %Loading	TC %Loading	Outaged Branch That Caused Overload	ATC (MW)	Assignment
03G	AEPW-AEPW	IPC JEFFERSON TO LIEBERMAN, 138KV 53548 IPCJEFF4 138 to 53420 LIEBERM4 138 CKT 1	143	96.6	102.0	LONGWOOD TO WILKES, 345KV 53424 LONGWD 7 345 to 53620 WILKES 7 345 CKT1	94	Upgrade Modeled is Assigned to SPP-2000-086 150680 Est. In-Service Date 2/1/2004 Additional Upgrades Required for SPP-2000-043 194656 194657 New Spring Emergency Rating is 179MVA 25.2% Increase
03G	SWPA-AEPW	BROKEN BOW TO BETHEL, 138KV 52814 BRKN BW4 138 to 54054 BETHEL 4 138 CKT 1	95.6	93.6	102.1	PITTSBURG TO VALLIANT, 345KV 54033 PITTSB-7 345 to 54037 VALIANT7 345 CKT1	113	Upgrade is Assigned to SPP-2000-043 194656 194657 New Spring Emergency Rating is 122MVA 27.6% Increase
04SP	KACP-KACP	STILWELL TO LACYGNE, 345KV 57968 STILWEL7 345 to 57981 LACYGNE7 345 CKT 1	1202	115.5	116.5	WEST GARDNER TO LACYGNE, 345KV 57965 W.GRDNR7 345 to 57981 LACYGNE7 345 CKT1	0	SPP Flowgate
04SP	AEPW-AEPW	IPC JEFFERSON TO LIEBERMAN, 138KV 53548 IPCJEFF4 138 to 53420 LIEBERM4 138 CKT 1	143	100.6	105.8	LONGWOOD TO WILKES, 345KV 53424 LONGWD 7 345 to 53620 WILKES 7 345 CKT1	0	Upgrade Modeled is Assigned to SPP-2000-086 150680 Est. In-Service Date 2/1/2004 Additional Upgrades Required for SPP-2000-043 194656 194657 New Summer Emergency Rating is 179MVA 25.2% Increase
04SP	AEPW-AEPW	LONGWOOD TO NORAM, 138KV 53423 LONGWD 4 138 to 53473 NORAM 4 138 CKT1	234	103.6	105.0	Multiple Outage Contingency SOUTHWEST SHREVEPORT TO LONGWOOD, 345KV 53454 SW SHV 7 345 to 53424 LONGWD 7 345 CKT 1 SOUTHWEST SHREVEPORT TO DIANA, 345KV 53454 SW SHV 7 345 to 53528 DIANA 7 345 CKT 1	0	Upgrade is Assigned to SPP-2000-043 194656 194657 New Summer Emergency Rating is 262MVA 12.0% Increase
04SP	AEPW-EES	FULTON TO PATMOS-WEST SS, 115KV 53374 FULTON 3 115 to 99303 3PATMOS# 115 CKT 1	174	111.1	118.3	SOUTHWEST SHREVEPORT TO DIANA, 345KV 53454 SW SHV 7 345 to 53528 DIANA 7 345 CKT1	0	Upgrade is Assigned to SPP-2000-043 194656 194657 New Summer Emergency Rating is 239MVA 37.4% Increase

**Table 3 continued** – Previously Assigned and Identified SPP Facilities Impacted by the CSWS to AMRN 150MW Transfer.

Study Year	From Area - To Area	Branch Over 100% RateB	RATEB	BC %Loading	TC %Loading	Outaged Branch That Caused Overload	ATC (MW)	Assignment
04SP	AEPW-AEPW	<b>RAINES TO NORAM, 138KV</b> 53439 RAINES 4 138 to 53473 NORAM 4 138 CKT1	234	102.0	103.4	<b>Multiple Outage Contingency</b> <b>SOUTHWEST SHREVEPORT TO LONGWOOD, 345KV</b> 53454 SW SHV 7 345 to 53424 LONGWD 7 345 CKT 1 <b>SOUTHWEST SHREVEPORT TO DIANA, 345KV</b> 53454 SW SHV 7 345 to 53528 DIANA 7 345 CKT 1	0	Upgrade is Assigned to SPP-2000-043 194656 194657 New Summer Emergency Rating is 268MVA 14.5% Increase
04SP	AEPW-SWPA	<b>EUREKA SPRINGS TO BEAVER, 161KV</b> 53136 EUREKA 5 161 to 52680 BEAVER 5 161 CKT 1	274	102.4	103.7	<b>MONETT TO BROOKLINE, 345KV</b> 59481 MON383 7 345 to 59984 BRKLINE 7 345 CKT1	0	Upgrade is Assigned to SPP-2000-043 194656 194657 New Summer Emergency Rating is 286MVA 4.4% Increase
04SP	AEPW-AEPW	<b>TATUM TO ROCKHILL, 138KV</b> 53611 TATUM 4 138 to 53598 ROKHILL4 138 CKT 1	235	98.1	101.4	<b>Multiple Outage Contingency</b> <b>SOUTHWEST SHREVEPORT TO LONGWOOD, 345KV</b> 53454 SW SHV 7 345 to 53424 LONGWD 7 345 CKT 1 <b>SOUTHWEST SHREVEPORT TO DIANA, 345KV</b> 53454 SW SHV 7 345 to 53528 DIANA 7 345 CKT 1	86	Upgrade Modeled is Assigned to SPP-2000-086 150680 Est. In-Service Date 4/1/2002 Additional Upgrades Required
04SP	SWPA-AEPW	<b>BROKEN BOW TO BETHEL, 138KV</b> 52814 BRKN BW4 138 to 54054 BETHEL 4 138 CKT 1	95.6	104.0	112.6	<b>PITTSBURG TO VALLIANT, 345KV</b> 54033 PITTSB-7 345 to 54037 VALIANT7 345 CKT1	138	Upgrade is Assigned to SPP-2000-043 194656 194657 New Summer Emergency Rating is 107MVA 11.9% Increase Additional Upgrade Required

**Table 3 continued** – Previously Assigned and Identified SPP Facilities Impacted by the CSWS to AMRN 150MW Transfer.

Study Year	From Area - To Area	Branch Over 100% RateB	RATEB	BC %Loading	TC %Loading	Outaged Branch That Caused Overload	ATC (MW)	Assignment
04SP	AEPW-AEPW	53522 CHEROKEE4 138 to 53557 KNOXLEE4 138 CKT 1	287	85.9	88.6	<p><b>Multiple Outage Contingency</b></p> <p><b>SOUTHWEST SHREVEPORT TO LONGWOOD, 345KV</b></p> <p>53454 SW SHV 7 345 to 53424 LONGWD 7 345 CKT 1</p> <p><b>SOUTHWEST SHREVEPORT TO DIANA, 345KV</b></p> <p>53454 SW SHV 7 345 to 53528 DIANA 7 345 CKT 1</p>	150	Upgrade Modeled is Assigned to SPP-2000-086 150680 Est. In-Service Date 4/1/2002
04SP	AEPW-AEPW	53522 CHEROKEE4 138 to 53611 TATUM 4 138 CKT 1	287	81.6	84.3	<p><b>Multiple Outage Contingency</b></p> <p><b>SOUTHWEST SHREVEPORT TO LONGWOOD, 345KV</b></p> <p>53454 SW SHV 7 345 to 53424 LONGWD 7 345 CKT 1</p> <p><b>SOUTHWEST SHREVEPORT TO DIANA, 345KV</b></p> <p>53454 SW SHV 7 345 to 53528 DIANA 7 345 CKT 1</p>	150	Upgrade Modeled is Assigned to SPP-2000-086 150680 Est. In-Service Date 2/1/2003
04SP	AEPW-AEPW	53461 WALLAKE4 138 to 53446 S SHV 4 138 CKT 1	209	99.9	104.8	<p><b>DOLET HILLS 230/345 TRANSFORMER</b></p> <p>50045 DOLHILL7 345 to 50046 DOLHILL6 230 CKT1</p>	150	Dolet Hills Operating Guide Monitor Line At 260MVA
04WP	KACP-KACP	57968 STILWEL7 345 to 57981 LACYGNE7 345 CKT 1	1315	100.2	101.2	<p><b>WEST GARDNER TO LACYGNE, 345KV</b></p> <p>57965 W.GRDNR7 345 to 57981 LACYGNE7 345 CKT1</p>	0	SPP Flowgate
04WP	AEPW-EES	53374 FULTON 3 115 to 99303 3PATMOS# 115 CKT 1	197	108.8	117.8	<p><b>WELSH TO WILKES, 345KV</b></p> <p>53615 WELSH 7 345 to 53620 WILKES 7 345 CKT1</p>	0	Upgrade is Assigned to SPP-2000-043 194656 194657 New Winter Emergency Rating is 239MVA 21.3% Increase

**Table 1a** – Impact of the New Mountain to Wilkes 345kV line Addition on SPP Facility Overloads Found in Table 1

Study Year	From Area - To Area	Branch Over 100% RateB	RATEB	TC %Loading Without New Line	TC %Loading With New Line	Outaged Branch That Caused Overload
03G		NONE				
04SP	AEPW-WERE	<b>COFFEYVILLE TAP TO DEARING, 138 KV</b> 53972 COFFEYT4 138 to 57002 DEARING4 138 CKT 1	210	102.2	102.1	<b>DELWARE TO NEOSHO, 345KV</b> 53929 DELWARE7 345 to 56793 NEOSHO 7 345 CKT1
04SP	EMDE-EMDE	<b>SUB 383 - MONETT TO AURORA H.T., 161KV</b> 59480 MON383 5 161 to 59468 AUR124 5 161 CKT 1	157	100.7	100.7	<b>BUTLER_AEC TO ADRIAN, 161KV</b> 59216 BUTLER_5 161 to 59240 ADRIAN 5 161 CKT1
04SP	AEPW-AEPW	<b>NEW MOUNTAIN TO DIANA, 345KV CKT 1</b> 53635 NWMOUNT7 to 53528 DIANA 7 345 CKT 1	1059	102.2	95.3	<b>NEW MOUNTAIN TO DIANA, 345KV CKT 2</b> 53635 NWMOUNT7 to 53528 DIANA 7 345 CKT2
04SP	AEPW-AEPW	<b>NEW MOUNTAIN TO DIANA, 345KV CKT 2</b> 53635 NWMOUNT7 to 53528 DIANA 7 345 CKT 2	1059	102.1	95.0	<b>NEW MOUNTAIN TO DIANA, 345KV CKT 1</b> 53635 NWMOUNT7 to 53528 DIANA 7 345 CKT1
04SP	OKGE-OKGE	<b>PECAN CREEK 345/161KV TRANSFORMER</b> 55235 PECANCK7 345 to 55234 PECANCK5 161 CKT 1	369	100.1	100.0	<b>MUSKOGEE TO FT SMITH, 345KV</b> 55224 MUSKOGEE7 345 to 55302 FTSMITH7 345 CKT1
04SP	GRRD-GRRD	<b>PENSACOLA TO GRAY TAP, 69KV</b> 54428 PENZA 269.0 to 54465 GRAY TP269.0 CKT 1	47	100.1	100.1	<b>MIAMI TO AFTON, 161KV</b> 54431 MIAMI 5 161 to 54432 AFTON 5 161 CKT1
04WP	SWPA-AECI	<b>CARTHAGE TO REEDS, 69KV</b> 52690 CARTHG 269.0 to 96751 2REEDS 69.0 CKT 1	43	100.9	100.9	<b>HUBEN 345/161KV TRANSFORMER</b> 96042 7HUBEN 345 to 96088 5HUBEN 161 CKT1

**Table 3a** – Impact of the New Mountain to Wilkes 345kV line Addition on SPP Facility Overloads Found in Table 3

Study Year	From Area - To Area	Branch Over 100% RateB	RATEB	TC %Loading Without New Line	TC %Loading With New Line	Outaged Branch That Caused Overload
03G	AEPW-AEPW	<b>IPC JEFFERSON TO LIEBERMAN, 138KV</b> 53548 IPCJEFF4 138 to 53420 LIEBERM4 138 CKT 1	143	102.0	99.0	<b>LONGWOOD TO WILKES, 345KV</b> 53424 LONGWD 7 345 to 53620 WILKES 7 345 CKT1
03G	SWPA-AEPW	<b>BROKEN BOW TO BETHEL, 138KV</b> 52814 BRKN BW4 138 to 54054 BETHEL 4 138 CKT 1	95.6	102.1	101.4	<b>PITTSBURG TO VALLIANT, 345KV</b> 54033 PITTSB-7 345 to 54037 VALIANT7 345 CKT1
04SP	KACP-KACP	<b>STILWELL TO LACYGNE, 345KV</b> 57968 STILWEL7 345 to 57981 LACYGNE7 345 CKT 1	1202	116.5	116.5	<b>WEST GARDNER TO LACYGNE, 345KV</b> 57965 W.GRDNR7 345 to 57981 LACYGNE7 345 CKT1
04SP	AEPW-AEPW	<b>IPC JEFFERSON TO LIEBERMAN, 138KV</b> 53548 IPCJEFF4 138 to 53420 LIEBERM4 138 CKT 1	143	105.8	100.8	<b>LONGWOOD TO WILKES, 345KV</b> 53424 LONGWD 7 345 to 53620 WILKES 7 345 CKT1
04SP	AEPW-AEPW	<b>LONGWOOD TO NORAM, 138KV</b> 53423 LONGWD 4 138 to 53473 NORAM 4 138 CKT1	234	105.0	106.7	<b>Multiple Outage Contingency</b> <b>SOUTHWEST SHREVEPORT TO LONGWOOD, 345KV</b> 53454 SW SHV 7 345 to 53424 LONGWD 7 345 CKT 1 <b>SOUTHWEST SHREVEPORT TO DIANA, 345KV</b> 53454 SW SHV 7 345 to 53528 DIANA 7 345 CKT 1
04SP	AEPW-EES	<b>FULTON TO PATMOS-WEST SS, 115KV</b> 53374 FULTON 3 115 to 99303 3PATMOS# 115 CKT 1	174	118.3	116.3	<b>SOUTHWEST SHREVEPORT TO DIANA, 345KV</b> 53454 SW SHV 7 345 to 53528 DIANA 7 345 CKT1
04SP	AEPW-AEPW	<b>RAINES TO NORAM, 138KV</b> 53439 RAINES 4 138 to 53473 NORAM 4 138 CKT1	234	103.4	105.1	<b>Multiple Outage Contingency</b> <b>SOUTHWEST SHREVEPORT TO LONGWOOD, 345KV</b> 53454 SW SHV 7 345 to 53424 LONGWD 7 345 CKT 1 <b>SOUTHWEST SHREVEPORT TO DIANA, 345KV</b> 53454 SW SHV 7 345 to 53528 DIANA 7 345 CKT 1
04SP	AEPW-SWPA	<b>EUREKA SPRINGS TO BEAVER, 161KV</b> 53136 EUREKA 5 161 to 52680 BEAVER 5 161 CKT 1	274	103.7	103.6	<b>MONETT TO BROOKLINE, 345KV</b> 59481 MON383 7 345 to 59984 BRKLN 7 345 CKT1
04SP	AEPW-AEPW	<b>TATUM TO ROCKHILL, 138KV</b> 53611 TATUM 4 138 to 53598 ROKHILL4 138 CKT 1	235	101.4	98.6	<b>Multiple Outage Contingency</b> <b>SOUTHWEST SHREVEPORT TO LONGWOOD, 345KV</b> 53454 SW SHV 7 345 to 53424 LONGWD 7 345 CKT 1 <b>SOUTHWEST SHREVEPORT TO DIANA, 345KV</b> 53454 SW SHV 7 345 to 53528 DIANA 7 345 CKT 1

**Table 3a continued** – Impact of the New Mountain to Wilkes 345kV line Addition on SPP Facility Overloads Found in Table 3

Study Year	From Area - To Area	Branch Over 100% RateB	RATEB	TC %Loading Without New Line	TC %Loading With New Line	Outaged Branch That Caused Overload
04SP	SWPA-AEPW	<b>BROKEN BOW TO BETHEL, 138KV</b> 52814 BRKN BW4 138 to 54054 BETHEL 4 138 CKT 1	95.6	112.6	112.2	<b>PITTSBURG TO VALLIANT, 345KV</b> 54033 PITTSB-7 345 to 54037 VALIANT7 345 CKT1
04SP	AEPW-AEPW	<b>CHEROKEE REC TO KNOX LEE, 138KV</b> 53522 CHEROKE4 138 to 53557 KNOXLEE4 138 CKT 1	287	88.6	86.4	<b>Multiple Outage Contingency</b> <b>SOUTHWEST SHREVEPORT TO LONGWOOD, 345KV</b> 53454 SW SHV 7 345 to 53424 LONGWD 7 345 CKT 1 <b>SOUTHWEST SHREVEPORT TO DIANA, 345KV</b> 53454 SW SHV 7 345 to 53528 DIANA 7 345 CKT 1
04SP	AEPW-AEPW	<b>CHEROKEE REC TO TATUM, 138KV</b> 53522 CHEROKE4 138 to 53611 TATUM 4 138 CKT 1	287	84.3	82.1	<b>Multiple Outage Contingency</b> <b>SOUTHWEST SHREVEPORT TO LONGWOOD, 345KV</b> 53454 SW SHV 7 345 to 53424 LONGWD 7 345 CKT 1 <b>SOUTHWEST SHREVEPORT TO DIANA, 345KV</b> 53454 SW SHV 7 345 to 53528 DIANA 7 345 CKT 1
04SP	AEPW-AEPW	<b>WALLACE LAKE TO SOUTH SHREVEPORT, 138KV</b> 53461 WALLAKE4 138 to 53446 S SHV 4 138 CKT 1	209	104.8	105.0	<b>DOLET HILLS 230/345 TRANSFORMER</b> 50045 DOLHILL7 345 to 50046 DOLHILL6 230 CKT1
04WP	KACP-KACP	<b>STILWELL TO LACYGNE, 345KV</b> 57968 STILWEL7 345 to 57981 LACYGNE7 345 CKT 1	1315	101.2	101.1	<b>WEST GARDNER TO LACYGNE, 345KV</b> 57965 W.GRDNR7 345 to 57981 LACYGNE7 345 CKT1
04WP	AEPW-EES	<b>FULTON TO PATMOS-WEST SS, 115KV</b> 53374 FULTON 3 115 to 99303 3PATMOS# 115 CKT 1	197	117.8	108.8	<b>WELSH TO WILKES, 345KV</b> 53615 WELSH 7 345 to 53620 WILKES 7 345 CKT1

**Table 4** – New Overloads caused by the New Mountain to Wilkes 345kV line Addition

Study Year	From Area - To Area	Branch Over 100% RateB	RATEB	TC %Loading With New Line	Outaged Branch That Caused Overload
04SP	AEPW-AEPW	<b>LONE STAR SOUTH TO WILKES, 138KV</b> 53276 LSSOUTH4 138 to 53619 WILKES 4 138 CKT 1	316	100.2	<b>WILKES TO WELSH REC, 138KV</b> 53619 WILKES 4138 to 53622 WELSHRE4138 CKT1
04SP	EMDE-EMDE	<b>LONE STAR SOUTH TO PITTSBURG, 138KV</b> 53276 LSSOUTH4 138 to 53311 PITTSB_4 138 CKT 1	236	100.2	<b>CHAPEL HILL REC TO WELSH REC, 138KV</b> 53521 CHAPELH4138 to 53622 WELSHRE4138 CKT1

## **5. Conclusion**

The results of the study show that before the 150MW transfer can take place system improvements will need to be completed.

1. The upgrades associated with the facility overloads identified in Table 1 will be required before the start of service.
2. Any previously assigned upgrades and additional upgrades associated with the facilities in Table 3 will be required.
3. The upgrade associated with the La Cygne to Stilwell 345kV line overload will be required.
4. The firm contract path capacity between SPP and AMRN will need to be increased through transmission upgrades or additions.
5. Third-party system additions will need to be reviewed with affected transmission owners.

The study includes the proposal and analysis of a new 19-mile 345kV line from New Mountain to Wilkes as an alternative to reconductoring the two 345kV lines from New Mountain to Diana.

Due to the delay in construction of transmission upgrades, continuous service cannot be provided by December 1, 2002. Therefore the customer will be offered deferred service starting when continuous service can be provided, under Section 15.5 of the SPP OATT.

The final cost assignment of facilities and ATC granted to CPS will be determined upon the completion of a revised facility study.



## **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