



**SPP**

*Southwest  
Power Pool*

***System Impact Study SPP-2000-043  
For Transmission Service  
Requested By  
Constellation Power Source, Inc.***

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

***For a Reserved Amount Of 250MW  
From 12/1/02  
To 12/1/04***

***SPP Coordinated Planning***

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Revised July 23, 2001

## **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 Entergy. The period of the transaction is from 12/1/02 to 12/1/04. The request is for OASIS reservations 194656 and 194657, totaling 250MW.

The principal objective of this study is to identify system problems and potential system modifications necessary to facilitate the additional 250MW transfer while maintaining system reliability.

New overloads caused by the 250MW transfer were identified along with determining the impact of the transfer on any previously assigned and identified facilities.

The CSWS to EES 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 250MW transfer. Table 3 lists the previously assigned and identified facilities impacted by the 250MW transfer.

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 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 250MW. 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 250MW 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 250MW.

### **3. Study Methodology**

#### **A. Description**

Two analyses were conducted to determine the impact of the 250MW transfer on the system. The first analysis was conducted to identify any new overloads caused by the 250MW 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 250MW 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 250MW 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 250MW 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 ATC 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 250MW transfer. Upgrades associated with these new overloads can be directly assigned to the CSWS to EES 250MW transfer.

Table 2 documents overloads on Non SPP Regional Tariff participants' transmission systems caused by the 250MW transfer.

Table 3 documents the 250MW transfer impact on previously assigned and identified facilities. The previously assigned 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 EES 250MW transfer. 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 CSWS to EES 250MW 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-AEPW	<b>LONGWOOD TO NORAM, 138KV</b> 53423 LONGWD 4 138 to 53473 NORAM 4 138 CKT1	234	100.8	103.8	<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	Reconductor 4.66 miles of 2-266 ACSR with 1590 ACSR
04SP	AEPW-EES	<b>FULTON TO PATMOS-WEST SS, 115KV</b> 53374 FULTON 3 115 to 99303 3PATMOS# 115 CKT 1	174	99.5	112.0	<b>SOUTHWEST SHREVEPORT TO DIANA, 345KV</b> 53454 SW SHV 7 345 to 53528 DIANA 7 345 CKT1	11	Reconductor 7.1 miles of 666 ACSR with 1272 ACSR
04SP	AEPW-AEPW	<b>RAINES TO NORAM, 138KV</b> 53439 RAINES 4 138 to 53473 NORAM 4 138 CKT1	234	99.3	102.2	<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	73	Rebuild 5.58 miles of 2-266 ACSR with 1590 ACSR
04SP	SWPA-AEPW	<b>BROKEN BOW TO BETHEL, 138KV</b> 52814 BRKN BW4 138 to 54054 BETHEL 4 138 CKT 1	95.6	94.8	105.1	<b>PITTSBURG TO VALLIANT, 345KV</b> 54033 PITTSB-7 345 to 54037 VALIANT7 345 CKT1	130	SWPA Upgrade: Reset 400/5 CTs @ Broken Bow
04SP	AEPW-SWPA	<b>EUREKA SPRINGS TO BEAVER, 161KV</b> 53136 EUREKA 5 161 to 52680 BEAVER 5 161 CKT 1	274	99.1	100.8	<b>MONETT TO BROOKLINE, 345KV</b> 59481 MON383 7 345 to 59984 BRKLNE 7 345 CKT1	131	AEPW-Reconductor 1.25 miles of 795ACSR to 1590ACSR SWPA-Reconnect CT's to 1000:5 Tap
04SP	AEPW-AEPW	<b>WALLACE LAKE TO SOUTH SHREVEPORT, 138KV</b> 53461 WALLAKE4 138 to 53446 S SHV 4 138 CKT 1	209	91.0	100.6	<b>DOLET HILLS 230/345 TRANSFORMER</b> 50045 DOLHILL7 345 to 50046 DOLHILL6 230 CKT1	250	Dolet Hills Operating Guide Monitor Line At 260MVA
04WP	AEPW-EES	<b>FULTON TO PATMOS-WEST SS, 115KV</b> 53374 FULTON 3 115 to 99303 3PATMOS# 115 CKT 1	197	99.0	109.1	<b>WELSH TO WILKES, 345KV</b> 53615 WELSH 7 345 to 53620 WILKES 7 345 CKT1	29	See Previous

**Table 2** – Non - SPP Facility Overloads caused by the CSWS to EES 250MW Transfer

Study Year	From Area - To Area	Branch Over 100% RateB	RATEB	BC %Loading	TC %Loading	Outaged Branch That Caused Overload
03G	EES-EES	97487 4MT.ZION 138 to 97480 L558T485 138 CKT 1	206	93.4	100.7	97454 4WALDEN 138 to 97514 4GRIMES 138 CKT1
03G	EES-EES	97514 4GRIMES 138 to 97487 4MT.ZION 138 CKT 1	206	96.8	104.1	97454 4WALDEN 138 to 97514 4GRIMES 138 CKT1
03G	EES-EES	99167 3RINGLD 115 to 99168 3SAILES 115 CKT 1	115	97.3	109.1	99294 7ELDEHV 345 to 99295 8ELDEHV 500 CKT1
03G	EES-EES	99167 3RINGLD 115 to 99168 3SAILES 115 CKT 1	115	97.2	109.0	53424 LONGWD 7 345 to 99294 7ELDEHV 345 CKT1
04SP	CELE-EES	50024 CARROLL4 138 to 99167 3RINGLD 115 CKT 1	125	96.1	104.5	50027 CLARN 6 230 to 50126 MESSICK6 230 CKT1
04SP	EES-EES	97768 4HLYSPG# 138 to 97698 4JASPER 138 CKT 1	112	98.4	102.4	53526 CROCKET7 345 to 97513 7GRIMES 345 CKT1
04SP	EES-EES	98229 4PT HUD 138 to 98230 2PT.HUD 69.0 CKT 1	100	100.0	100.2	98229 4PT HUD 138 to 98236 4THOMAS 138 CKT1
04SP	EES-EES	98273 4OAKGROV 138 to 98283 T300/331 138 CKT 1	135	99.7	100.9	50106 MADISON6 230 to 98555 6GYPSY 230 CKT1
04SP	EES-EES	99167 3RINGLD 115 to 99168 3SAILES 115 CKT 1	115	97.5	106.7	50023 CARROLL6 230 to 50126 MESSICK6 230 CKT1
04SP	EES-EES	99168 3SAILES 115 to 99167 3RINGLD 115 CKT 1	115	96.7	102.1	99173 3HAYNVL 115 to 99249 3EMERSN 115 CKT1
04SP	EES-EES	99179 3ADA 11 115 to 99170 3MINDEN 115 CKT 1	115	100.0	101.6	99309 8MCNEIL 500 to 99310 3MCNEIL 115 CKT1
04SP	EES-EES	99230 3COUCH 115 to 99310 3MCNEIL 115 CKT 1	167	89.2	103.1	53424 LONGWD 7 345 to 99294 7ELDEHV 345 CKT1
04SP	EES-EES	99230 3COUCH 115 to 99310 3MCNEIL 115 CKT 1	167	89.2	103.0	99294 7ELDEHV 345 to 99295 8ELDEHV 500 CKT1
04SP	EES-EES	99263 3LEWIS # 115 to 99230 3COUCH 115 CKT 1	159	99.8	112.9	55224 MUSKOGEE7 345 to 55302 FTSMITH7 345 CKT1
04SP	EES-EES	99280 3TAYLOR 115 to 99264 3MAG-DW 115 CKT 1	159	99.9	100.7	99266 3MAG-ST 115 to 99288 3KERLIN* 115 CKT1
04SP	EES-EES	99303 3PATMOS# 115 to 99263 3LEWIS # 115 CKT 1	159	100.0	112.9	97513 7GRIMES 345 to 97514 4GRIMES 138 CKT1
04SP	EES-EES	99303 3PATMOS# 115 to 99263 3LEWIS # 115 CKT 1	159	100.0	112.9	97513 7GRIMES 345 to 97514 4GRIMES 138 CKT2
04SP	EES-EES	99310 3MCNEIL 115 to 99230 3COUCH 115 CKT 1	167	95.5	101.2	99309 8MCNEIL 500 to 99310 3MCNEIL 115 CKT1
04SP	EES-EES	99554 3LR-SPR* 115 to 99552 3LR-S 1 115 CKT 1	159	100.0	100.3	99507 5MOR-E 161 to 99508 5GLEASN 161 CKT1
04SP	EES-EES	99554 3LR-SPR* 115 to 99552 3LR-S 1 115 CKT 1	159	99.9	100.2	99595 5BALNOB 161 to 99644 5PRICE 161 CKT1
04SP	EES-SWPA	99825 5MIDWAY# 161 to 52660 BULL SH5 161 CKT 1	162	99.7	100.5	99803 5CALCR 161 to 99824 5MELBRN 161 CKT1
04WP	EES-EES	99167 3RINGLD 115 to 99168 3SAILES 115 CKT 1	115	96.9	106.4	50027 CLARN 6 230 to 50126 MESSICK6 230 CKT1
04WP	EES-EES	99179 3ADA 11 115 to 99170 3MINDEN 115 CKT 1	115	99.5	101.7	99171 3SPRINGH 115 to 99280 3TAYLOR 115 CKT1
04WP	EES-EES	99263 3LEWIS # 115 to 99230 3COUCH 115 CKT 1	159	99.9	111.7	97917 6NELSN 230 to 97914 G4NELSON24.0 CKT1
04WP	EES-EES	99303 3PATMOS# 115 to 99263 3LEWIS # 115 CKT 1	159	93.2	100.4	99230 3COUCH 115 to 99310 3MCNEIL 115 CKT1



**Table 3** – Previously Assigned and Identified SPP Facilities Impacted by the CSWS to EES 250MW 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		NONE						
04SP	KACP-KACP	<b>STILWELL TO LACYGNE, 345KV</b> 57968 STILWEL7 345 to 57981 LACYGNE7 345 CKT 1	1202	114.8	115.4	<b>WEST GARDNER TO LACYGNE, 345KV</b> 57965 W.GRDNR7 345 to 57981 LACYGNE7 345 CKT1	0	SPP Flowgate
04SP	AEPW-AEPW	<b>IPC JEFFERSON TO LIEBERMAN, 138KV</b> 53548 IPCJEFF4 138 to 53420 LIEBERM4 138 CKT 1	143	93.3	102.3	<b>LONGWOOD TO WILKES, 345KV</b> 53424 LONGWD 7 345 to 53620 WILKES 7 345 CKT1	186	Upgrade Modeled is Assigned to SPP-2000-086 150680 Est. In-Service Date 2/1/2004 Additional Upgrades Required
04SP	AEPW-AEPW	<b>TATUM TO ROCKHILL, 138KV</b> 53611 TATUM 4 138 to 53598 ROKHILL4 138 CKT 1	235	92.6	98.4	<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	250	Upgrade Modeled is Assigned to SPP-2000-086 150680 Est. In-Service Date 4/1/2002
04SP	AEPW-AEPW	<b>CHEROKEE REC TO KNOX LEE, 138KV</b> 53522 CHEROKE4 138 to 53557 KNOXLEE4 138 CKT 1	287	81.4	86.2	<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	250	Upgrade Modeled is Assigned to SPP-2000-086 150680 Est. In-Service Date 4/1/2002
04SP	AEPW-AEPW	<b>CHEROKEE REC TO TATUM, 138KV</b> 53522 CHEROKE4 138 to 53611 TATUM 4 138 CKT 1	287	77.1	81.9	<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	250	Upgrade Modeled is Assigned to SPP-2000-086 150680 Est. In-Service Date 2/1/2003
04WP	KACP-KACP	<b>STILWELL TO LACYGNE, 345KV</b> 57968 STILWEL7 345 to 57981 LACYGNE7 345 CKT 1	1315	99.6	100.1	<b>WEST GARDNER TO LACYGNE, 345KV</b> 57965 W.GRDNR7 345 to 57981 LACYGNE7 345 CKT1	238	SPP Flowgate

## **5. Conclusion**

The results of the study show that before the 250MW 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 La Cygne to Stilwell 345kV line overload will be required.

Due to the delay in construction of the La Cygne to Stilwell 345kV line upgrade, continuous service cannot be provided until February 1, 2004. Therefore the customer will be offered deferred service starting February 1, 2004 and ending February 1, 2006, 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