



# **SPP** *Southwest Power Pool*

***System Impact Study  
SPP-2003-182-1  
For Transmission Service  
Requested By  
Tenaska Power Services Company***

***From OPD To EES***

***For a Redirected Amount Of  
50MW From 1/1/2004 To 1/1/2005***

***SPP Engineering, Tariff Studies***

## **System Impact Study**

Tenaska Power Services Company has requested a system impact study for long-term Firm Point-to-Point transmission service from OPPD to EES for 50 MW. The period of the service requested is from 1/1/2004 to 1/1/2005. The OASIS reservation number is 542893. This is a request to redirect the previously confirmed OASIS reservation 260693. Oasis Reservation 260693 is a 50MW transfer from ERCOTE to EES. The principal objective of this study is to identify system constraints on the SPP Regional Tariff System and potential system facility upgrades that may be necessary to provide the requested service.

The OPPD to EES request was studied to determine the facility upgrades required based on the actual queue position of the request. Only the higher priority requests in Facility Study mode were considered in developing the study models. The results of the transfer analysis are documented in Table 1. The results given in Table 1 include upgrades that may be assigned to higher priority requests. The results of this study gives the customer an estimated cost of the facility upgrades that may be required in order to accommodate the OPPD to EES request for redirected service.

Six seasonal models were used to study the OPPD to EES request for the requested service period. The SPP 2003 Series Cases 2003/04 Winter Peak (03WP), 2004 April Min (04AP), 2004 Spring Peak (04G), 2004 Summer Peak (04SP), 2004 Fall Peak (04FA) and 2004/05 Winter Peak (04WP) were used to study the impact of the request on the SPP system during the requested service period of 1/1/2004 to 1/1/2005. The chosen base case models were modified to reflect the most current modeling information. The cases were modified to reflect firm transfers during the requested service period that were not already included in the January 2003 base case series models.

PTI's MUST First Contingency Incremental Transfer Capability (FCITC) DC analysis was used to study the request. The MUST options chosen to conduct the System Impact Study analysis can be found in Appendix A. The MUST option to convert MVA branch ratings to estimated MW ratings was used to partially compensate for reactive loading.

The study results of the OPPD to EES transfer show that limiting constraints exist. Due to the limiting constraints identified, the Transmission Service Request cannot be granted. Any solutions, upgrades, and costs provided in the System Impact Study are planning estimates only. The final ATC and upgrades required may vary from these results due to the status of higher priority requests, unknown facility upgrades and proposed transmission plans that will be identified during the facility study process, and the final results of the full AC analysis. Evaluation of the right to renew for future years was not performed. Renewal rights will be evaluated as part of the facility study. Execution of a Facility Study Agreement is now required to maintain queue position. The final upgrade solutions and cost assignments will be determined upon the completion of the facility study.

**Table 1** – SPP facility overloads identified for the OPPD to EES transfer as a redirect of ERCOTE to EES service

Study Case	From Area - To Area	Branch Overload	Rating <MW>	Pre Transfer Loading	OPPD to EES %TDF	ERCOTE to EES %TDF	Outaged Branch Causing Overload	ATC <MW>	Solution	Estimated Cost
03WP	WERE-WERE	57372 PHILIPS3 115 57374 SPHILPJ3 115 1	159	159	0.217	N/A	56872 EMCIPHER6 230 56873 SUMMIT 6 230 1	0	Rebuild 0.88 miles and reconductor with 1192.5 ACSR.	\$ 417,200
03WP	WERE-WERE	57374 SPHILPJ3 115 57438 WMCIPHER3 115 1	67	73	0.101	N/A	56872 EMCIPHER6 230 56873 SUMMIT 6 230 1	0	Tear down double circuit, build single circuit with 1192.5 ACSR.	\$ 7,800,000
04G	WERE-WERE	57342 WJCCTY 3 115 57343 WJCCTYE3 115 1	141	152	0.086	N/A	56873 SUMMIT 6 230 *B168 SUMMIT1X 1 1	0	May be relieved due to WERE Operating Guide 612 - Outage of Summit 230/115kV Transformer	
04G	WERE-WERE	57623 ATHENS 2 69 57631 CC4VERN2 69 1	43	43	0.376	N/A	56791 BENTON 7 345 56797 WOLFCRK7 345 1	0	May be relieved due to WERE Operating Guide 300 - Outage of Benton - Wolf Creek 345kV Line	
04G	WERE-WERE	57631 CC4VERN2 69 57636 GREEN 2 69 1	43	44	0.383	N/A	56794 ROSEHIL7 345 56797 WOLFCRK7 345 1	0	May be relieved due to WERE Operating Guide 301 - Outage of Rose Hill - Wolf Creek 345kV Line	
04SP	AEPW-AEPW	53133 ECNTRTN5 161 53187 GENTRYR5 161 1	353	360	0.399	0.347	53139 FLINTCR5 161 53170 TONTITN5 161 1	0	Rebuild 19.16 miles of 2-397.5 ACSR with 2156 ACSR. Replace East Centerton Wavetrap & jumpers	\$ 8,000,000
04SP	AEPW-AEPW	53139 FLINTCR5 161 53170 TONTITN5 161 1	311	408	0.704	0.104	53139 FLINTCR5 161 53187 GENTRYR5 161 1	0	Rebuild 16.3 miles of 2-297 ACSR with 2156 ACSR. Replace Flint Creek wavetrap & jumpers. Replace Flint Creek switch # 1K75	\$ 8,200,000
04SP	AEPW-AEPW	53139 FLINTCR5 161 53187 GENTRYR5 161 1	354	376	0.399	0.347	53139 FLINTCR5 161 53170 TONTITN5 161 1	0	Rebuild 1.09 miles of 2-397.5 ACSR with 2156 ACSR. Replace Flint Creek wavetrap & jumpers	\$ 450,000
04SP	AEPW-AEPW	53849 TERNITP4 138 53869 VERDIGS4 138 1	149	155	0.530	N/A	53857 OWASSOS4 138 53945 N.E.S.-4 138 1	0	Solution Undetermined	
04SP	AEPW-AEPW	54023 OKMULGE4 138 54049 EC.HEN-4 138 1	105	115	0.758	N/A	54023 OKMULGE4 138 54057 KELCO 4 138 1	0	Replace Okmulgee Wavetrap	\$ 40,000
04SP	AEPW-AEPW	54028 WELETK4 138 54049 EC.HEN-4 138 1	105	110	0.758	N/A	54023 OKMULGE4 138 54057 KELCO 4 138 1	0	Replace Weleetka Wavetrap	\$ 40,000
04SP	OKGE-OKGE	55177 PARKLN 2 69 55187 AHLOSTP2 69 1	72	77	0.272	N/A	55177 PARKLN 2 69 55182 VALLYVU2 69 1	0	Solution Undetermined	
04SP	OKGE-OKGE	55221 MUSKOG2 69 55222 MUSKOG5 161 2	41	42	0.073	0.038	55221 MUSKOG2 69 55222 MUSKOG5 161 3	0	Replace the existing 2- 41MVA 161/69 kV transformers with 1-100MVA in approximately 2005 at OKGE expense.	
04SP	WERE-WERE	57153 COLINE 3 115 *B034 COLINE5X 1 1	66	72	0.119	0.012	56772 STRANGR7 345 *B166 STRNGR1X 1 1	0	May be relieved due to WERE Operating Guide 612 - Outage of Stranger Creek 345/115kV Transformer	
04SP	WERE-WERE	57182 TECHILE3 115 57187 27CROCO3 115 1	67	70	0.175	N/A	57182 TECHILE3 115 57187 27CROCO3 115 2	0	Solution Undetermined	
04SP	WERE-WERE	57588 CHASE 2 69 57605 WHITE J2 69 1	43	50	0.184	N/A	56991 WEAVER 4 138 *B183 WEAVER2X 1 1	0	May be relieved due to WERE Operating Guide 634 - Outage of Weaver 138/69kV Transformer	
04SP	WERE-WERE	57604 WEAVER 2 69 57837 RH JCT 2 69 1	43	44	0.414	N/A	57039 ELPASO 4 138 57042 FARBER 4 138 1	0	Move Rose Hill Jct. 69 kV load to Rose Hill 345/138 kV substation. Requires new transformer bay and a new 25 MVA 138-12 kV transformer.	\$ 1,400,000
04SP	OKGE-OKGE	54852 SLVRLAK4 138 54854 PANTHER4 138 1	286	292	0.369	N/A	54873 LONEOAK4 138 54879 NORTWST4 138 1	50	Upgrade completed by OKGE. Rate A/B = 478/478MVA	
04FA	WERE-WERE	57301 EAST ST3 115 57309 WEMPOR13 115 1	92	97	0.174	N/A	57305 MORRIS 3 115 57309 WEMPOR13 115 1	0	May be relieved due to WERE Operating Guide 1209 - Outage of Morris - West Emporia 115kV Line	
04FA	WERE-WERE	57342 WJCCTY 3 115 57343 WJCCTYE3 115 1	141	163	0.083	N/A	56873 SUMMIT 6 230 *B168 SUMMIT1X 1 1	0	May be relieved due to WERE Operating Guide 612 - Outage of Summit 230/115kV Transformer	

**Table 1 - continued** – SPP facility overloads identified for the OPD to EES transfer as a redirect of ERCOTE to EES service

Study Case	From Area - To Area	Branch Overload	Rating <MW>	Pre Transfer Loading	OPPD to EES %TDF	ERCOTE to EES %TDF	Outaged Branch Causing Overload	ATC <MW>	Solution	Estimated Cost
04FA	WERE-WERE	57368 EXIDE J3 115 57372 PHILIPS3 115 1	196	198	0.139	N/A	56872 EMCIPHER6 230 56873 SUMMIT 6 230 1	0	Rebuild and reconductor 0.34 miles with 1192 ACSR.	\$ 95,200
04FA	WERE-WERE	57368 EXIDE J3 115 57381 SUMMIT 3 115 1	196	209	0.139	N/A	56872 EMCIPHER6 230 56873 SUMMIT 6 230 1	0	Rebuild and reconductor 4.94 miles with 1192 ACSR.	\$ 1,100,000
04FA	WERE-WERE	57372 PHILIPS3 115 57374 SPHILPJ3 115 1	156	180	0.214	N/A	56872 EMCIPHER6 230 56873 SUMMIT 6 230 1	0	See Previous Upgrade Specified for Facility	
04FA	WERE-WERE	57374 SPHILPJ3 115 57438 WMCPHER3 115 1	66	83	0.100	N/A	56872 EMCIPHER6 230 56873 SUMMIT 6 230 1	0	See Previous Upgrade Specified for Facility	
04FA	WERE-WERE	57374 SPHILPJ3 115 57438 WMCPHER3 115 2	90	97	0.115	N/A	56872 EMCIPHER6 230 56873 SUMMIT 6 230 1	0	See Previous Upgrade Specified for Facility	
04FA	AEPW-AEPW	53824 SHEFFD-4 138 53827 S.S.--4 138 1	139	139	0.848	N/A	53769 WEKIWA-4 138 53835 WED-TAP4 138 1	30	Replace Sand Springs switch 1306, 1307, & 1308	\$ 75,000
04FA	AEPW-AEPW	53783 LLAN ET4 138 53802 CATOOSA4 138 1	234	244	1.352	N/A	53819 ONETA--7 345 53955 N.E.S.-7 345 1	50	Incorrect rating in the non-summer cases. Rate A/B = 237/265MVA	
04FA	OKGE-OKGE	54852 SLVRLAK4 138 54854 PANTHER4 138 1	286	300	0.378	N/A	54873 LONEOAK4 138 54879 NORTWST4 138 1	50	Upgrade completed by OKGE. Rate A/B = 478/478MVA	
04WP	AEPW-AEPW	53139 FLINTCR5 161 53170 TONTITN5 161 1	334	340	0.714	0.118	53139 FLINTCR5 161 53187 GENTRYR5 161 1	0	See Previous Upgrade Specified for Facility	
04WP	WERE-WERE	57342 WJCCTY 3 115 57343 WJCCTYE3 115 1	141	144	0.085	N/A	56873 SUMMIT 6 230 *B167 SUMMIT1X 1 1	0	May be relieved due to WERE Operating Guide 612 - Outage of Summit 230/115kV Transformer	
04WP	WERE-WERE	57372 PHILIPS3 115 57374 SPHILPJ3 115 1	156	160	0.218	N/A	56872 EMCIPHER6 230 56873 SUMMIT 6 230 1	0	See Previous Upgrade Specified for Facility	
04WP	WERE-WERE	57374 SPHILPJ3 115 57438 WMCPHER3 115 1	66	74	0.101	N/A	56872 EMCIPHER6 230 56873 SUMMIT 6 230 1	0	See Previous Upgrade Specified for Facility	
04WP	AEPW-AEPW	53783 LLAN ET4 138 53802 CATOOSA4 138 1	234	238	1.353	N/A	53819 ONETA--7 345 53955 N.E.S.-7 345 1	50	Incorrect rating in the non-summer cases. Rate A/B = 237/265MVA	
04WP	OKGE-OKGE	54852 SLVRLAK4 138 54854 PANTHER4 138 1	287	292	0.377	N/A	54873 LONEOAK4 138 54879 NORTWST4 138 1	50	Upgrade completed by OKGE. Rate A/B = 478/478MVA	
									Total Estimated Cost	\$ 27,617,400

## **Appendix A**

### **MUST CHOICES IN RUNNING FCITC DC ANALYSIS**

#### **CONSTRAINTS/CONTINGENCY INPUT OPTIONS**

1. AC Mismatch Tolerance – 2 MW
2. Base Case Rating – Rate A
3. Base Case % of Rating – 100%
4. Contingency Case Rating – Rate B
5. Contingency Case % of Rating – 100%
6. Base Case Load Flow – PSS/E
7. Convert branch ratings to estimated MW ratings – Yes
8. Contingency ID Reporting – Labels
9. Maximum number of contingencies to process - 50000

#### **MUST CALCULATION OPTIONS**

1. Phase Shifters Model for DC Linear Analysis – Constant flow for Base Case and Contingencies
2. Report Base Case Violations with FCITC – Yes
3. Maximum number of violations to report in FCITC table - 50000
4. Distribution Factor (OTDF and PTDF) Cutoff – 0.0
5. Maximum times to report the same elements - 10
6. Apply Distribution Factor to Contingency Analysis – Yes
7. Apply Distribution Factor to FCITC Reports – Yes
8. Minimum Contingency Case flow change – 1 MW
9. Minimum Contingency Case Distribution Factor change – 0.0
10. Minimum Distribution Factor for Transfer Sensitivity Analysis – 0.0