



**SPP** *Southwest  
Power Pool*

*Preliminary  
System Impact Study  
SPP-2004-015-1P  
For The Designation of a New  
Network Resource  
Requested By  
Western Farmers Electric Cooperative*

*From WFEC to OKGE*

*For a Reserved Amount Of 75MW  
From 4/1/2004  
To 4/1/2005*

*SPP Engineering, Tariff Studies*

## **System Impact Study**

Western Farmers Electric Cooperative has requested a system impact study to designate a New Network Resource in the WFEC Control Area for 75 MW to serve Network Load in the OKGE Control Area. The period of the service requested is from 4/1/2004 to 4/1/2005. The OASIS reservation number is 641186. 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.

This study was performed for the WFEC to OKGE request in order to provide preliminary results identifying facility upgrades that may be required for the requested service. The preliminary study is performed with only confirmed reservations included in the models. The models do not include any reservations, even those with a higher priority, that are still in study mode. The results of the transfer analyses are documented in Tables 1 and 2 of the report. Table 1 summarizes the results of the Scenario 1 system impact analysis. Table 2 summarizes the results of the Scenario 2 system impact analysis. The results given in Tables 1 and 2 include upgrades that may be assigned to higher priority requests. If a facility identified for the WFEC to OKGE study is also identified for a study with higher priority, the facility will be assigned to the request with the highest priority. If the higher priority customer does not take service, the facility would then be assigned to the WFEC to OKGE request. The primary purpose of this preliminary study is to provide the customer with an estimated cost of the facility upgrades that may be required in order to accommodate the requested service. The preliminary study is performed by monitoring each facility at 90% of its rating. This is done to provide an estimate of possible overloads that may be assigned to the customer if requests with higher priority are accepted.

Eight seasonal models were used to study the WFEC to OKGE request for the requested service period. The SPP 2004 Series Cases Update 2, 2004 Summer Peak (04SP), 2004 Summer Shoulder (04SH), 2004 Fall Peak (04FA), 2004/05 Winter Peak (04WP), 2005 April Minimum (05AP), 2005 Spring Peak (05G), 2005 Summer Peak (05SP), and 2005 Summer Shoulder (05SH) were used to study the impact of the request on the SPP system during the requested service period of 7/1/2004 to 7/1/2005. 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 2004 base case series models. From the eight seasonal models, two system scenarios were developed. Scenario 1 includes confirmed West to East transfers not already included in the January 2004 base case series models, SPS Exporting, and the Lamar HVDC Tie flowing from SPS to Lamar, and ERCOT exporting. Scenario 2 includes confirmed East to West transfers not already included in the January 2004 base case series models, SPS Importing, and the Lamar HVDC Tie flowing from Lamar to SPS, and ERCOT importing.

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.

These study results are preliminary estimates only and are not intended for use in final determination of the granting of service. These results do not include an evaluation of potential constraints in the planning horizon beyond the reservation period that may limit the right to renew service. Any solutions, upgrades, and costs provided in the preliminary 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.

SPP will also review the possibility of curtailment of previously confirmed service and/or the redispatch of units as an option for relieving the additional impacts on the SPP facilities caused by the WFEC to OKGE request. It is the responsibility of the customer to reach an agreement with the applicable party concerning the curtailment of confirmed service and the redispatch of units. The curtailment and redispatch requirements would be called upon prior to implementing NERC TLR Level 5a. These options 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, cost assignments and available redispatch and curtailment options will be determined upon the completion of the facility study.

**Table 1 – SPP facility overloads identified for the WFEC to OKGE transfer using Scenario 1**

Study Case	From Area - To Area	Branch Overload	Rating <MW >	BC % Loading	TC % Loading	%TDF	Outaged Branch Causing Overload	ATC <MW>	Solution	Estimated Cost
04SP	OKGE-OKGE	55177 PARKLN 2 69 55181 VALYVUT2 69 1	71	95.1	104.7	9.0950	55054 MAUD 2 69 55090 STLOUIS2 69 1	38	Solution Undetermined	TBD
04SP	OKGE-OKGE	55177 PARKLN 2 69 55181 VALYVUT2 69 1	71	91.6	98.3	6.3460	55044 SEMINOL4 138 55055 MAUD 4 138 2	75	Solution Undetermined	TBD
04SP	WFEC-WFEC	55810 ANADARK2 69 55814 ANADARK4 138 1	111	90.1	95.0	7.2490	55814 ANADARK4 138 55923 GEORGIA4 138 1	75	Solution Undetermined	TBD
04SP	OKGE-OKGE	55228 5TRIBES5 161 55234 PECANCK5 161 1	220	89.4	92.0	7.8310	55230 AGENCY 5 161 55234 PECANCK5 161 1	75	May be able to increase CTR (if relays will coordinate) at Five Tribes sub.	\$ 5,000
04SP	OKGE-OKGE	55234 PECANCK5 161 *B415 PECANCK1 1 1	366	93.4	95.1	8.0880	55224 MUSKOGEE7 345 55302 FTSMITH7 345 1	75	Add 2nd 345/161 kV 369MVA transformer.	\$ 3,000,000
04SP	OKGE-OKGE	55235 PECANCK7 345 *B415 PECANCK1 1 1	362	94.4	96.1	8.0880	55224 MUSKOGEE7 345 55302 FTSMITH7 345 1	75	See Previous Upgrade Specified For Facility	
04SH	OKGE-OKGE	55235 PECANCK7 345 *B415 PECANCK1 1 1	364	98.8	100.5	8.3500	55224 MUSKOGEE7 345 55302 FTSMITH7 345 1	51	See Previous Upgrade Specified For Facility	
04SH	OKGE-OKGE	55228 5TRIBES5 161 55234 PECANCK5 161 1	221	98.0	100.8	8.1900	55230 AGENCY 5 161 55234 PECANCK5 161 1	54	See Previous Upgrade Specified For Facility	
04SH	OKGE-OKGE	55234 PECANCK5 161 *B415 PECANCK1 1 1	366	98.0	99.7	8.3500	55224 MUSKOGEE7 345 55302 FTSMITH7 345 1	75	See Previous Upgrade Specified For Facility	
04SH	OKGE-OKGE	55177 PARKLN 2 69 55181 VALYVUT2 69 1	71	89.1	95.8	6.4160	55177 PARKLN 2 69 55187 AHLOSTP2 69 1	75	Solution Undetermined	TBD
04FA	OKGE-OKGE	54861 MUSTANG4 138 54896 MORGAN 4 138 1	284	102.5	103.6	3.9450	54902 MCCLAIN4 138 54929 PLVALLY4 138 1	0	Increase CTR at Mustang sub.	\$ 20,000
04FA	OKGE-OKGE	55177 PARKLN 2 69 55181 VALYVUT2 69 1	71	83.6	91.5	7.5090	55177 PARKLN 2 69 55187 AHLOSTP2 69 1	75	Solution Undetermined	TBD
04WP	OKGE-OKGE	55177 PARKLN 2 69 55181 VALYVUT2 69 1	71	85.3	92.6	6.9090	55177 PARKLN 2 69 55187 AHLOSTP2 69 1	75	Solution Undetermined	TBD
04WP	OKGE-OKGE	54861 MUSTANG4 138 54896 MORGAN 4 138 1	284	93.6	94.7	4.0020	54902 MCCLAIN4 138 54929 PLVALLY4 138 1	75	Solution Undetermined	TBD
05AP		NONE IDENTIFIED						75		
05G		NONE IDENTIFIED						75		
05SP	OKGE-OKGE	55177 PARKLN 2 69 55187 AHLOSTP2 69 1	71	120.2	125.9	5.3300	55177 PARKLN 2 69 55182 VALLYVU2 69 1	0	Solution Undetermined	TBD
05SP	WFEC-WFEC	55810 ANADARK2 69 55814 ANADARK4 138 1	111	86.7	91.6	7.2600	55912 FLETCHR4 138 55923 GEORGIA4 138 1	75	Solution Undetermined	TBD
05SP	OKGE-OKGE	55177 PARKLN 2 69 55182 VALLYVU2 69 1	95	88.2	92.3	5.2250	55177 PARKLN 2 69 55187 AHLOSTP2 69 1	75	Solution Undetermined	TBD
05SP	OKGE-OKGE	55234 PECANCK5 161 *B423 PECANCK1 1 1	365	92.6	94.3	8.0390	55224 MUSKOGEE7 345 55302 FTSMITH7 345 1	75	See Previous Upgrade Specified For Facility	
05SP	OKGE-OKGE	55235 PECANCK7 345 *B423 PECANCK1 1 1	362	93.5	95.2	8.0390	55224 MUSKOGEE7 345 55302 FTSMITH7 345 1	75	See Previous Upgrade Specified For Facility	
05SH	OKGE-OKGE	55177 PARKLN 2 69 55187 AHLOSTP2 69 1	71	106.5	113.3	6.4130	55177 PARKLN 2 69 55182 VALLYVU2 69 1	0	Solution Undetermined	TBD
05SH	OKGE-OKGE	55234 PECANCK5 161 *B423 PECANCK1 1 1	366	100.5	102.1	7.6860	55224 MUSKOGEE7 345 55302 FTSMITH7 345 1	0	See Previous Upgrade Specified For Facility	
05SH	OKGE-OKGE	55235 PECANCK7 345 *B423 PECANCK1 1 1	363	101.5	103.1	7.6860	55224 MUSKOGEE7 345 55302 FTSMITH7 345 1	0	See Previous Upgrade Specified For Facility	
05SH	OKGE-OKGE	55228 5TRIBES5 161 55234 PECANCK5 161 1	221	99.3	101.9	7.4280	55230 AGENCY 5 161 55234 PECANCK5 161 1	20	See Previous Upgrade Specified For Facility	
05SH	OKGE-OKGE	54861 MUSTANG4 138 54896 MORGAN 4 138 1	284	97.6	98.7	4.0270	54902 MCCLAIN4 138 54929 PLVALLY4 138 1	75	Solution Undetermined	TBD
									The cost may be higher due to additional facilities whose solutions will be determined during the Facility Study process	\$*
									Total Estimated Cost with Facilities Monitored @ 90% Loading	\$ 3,025,000
									Total Estimated Cost with Facilities Monitored @ 100% Loading	\$ 20,000

**Table 2 – SPP facility overloads identified for the WFEC to OKGE transfer using Scenario 2**

Study Case	From Area - To Area	Branch Overload	Rating <MW>	BC % Loading	TC % Loading	%TDF	Outaged Branch Causing Overload	ATC <MW >	Solution	Estimated Cost
04SP	AEPW-AEPW	53142 HUNTING2 69 53202 MIDLREA2 69 1	36	104.1	111.1	3.3270	55262 AES 5 161 55264 TARBY 5 161 1	0	Solution Undetermined	TBD
04SP	AEPW-AEPW	53142 HUNTING2 69 53147 NHUNTNT2 69 1	47	95.5	100.8	3.3270	55262 AES 5 161 55264 TARBY 5 161 1	63	Rebuild 0.24 miles of 4/0 ACSR with 795 ACSR & replace 4/0 jumpers @ Huntington	\$ 100,000
04SP	OKGE-OKGE	55177 PARKLN 2 69 55181 VALYVUT2 69 1	71	87.5	97.1	9.0950	55091 KONOWAP2 69 55093 JUMPRCK2 69 1	75	Solution Undetermined	TBD
04SP	OKGE-OKGE	55305 FTSMITH8 500 *B255 FTSMITH3 1 1	467	97.6	99.2	9.9580	55302 FTSMITH7 345 *B256 FTSMITH5 1 1	75	Convert Ft. Smith 161kv to 1-1/2 breaker design and install 2nd 500-161kv transformer bank. To be completed by OKGE, Estimated In-service date 12/1/2004	
04SP	OKGE-OKGE	55300 FTSMITH5 161 *B255 FTSMITH3 1 1	472	96.3	97.9	9.9580	55302 FTSMITH7 345 *B256 FTSMITH5 1 1	75	See Previous Upgrade Specified For Facility	
04SH	AEPW-AEPW	53142 HUNTING2 69 53202 MIDLREA2 69 1	36	95.1	101.8	3.1720	55262 AES 5 161 55264 TARBY 5 161 1	55	Solution Undetermined	TBD
04FA	OKGE-OKGE	54861 MUSTANG4 138 54896 MORGAN 4 138 1	284	96.3	97.4	3.9450	54902 MCCLAIN4 138 54929 PLVALLY4 138 1	75	Solution Undetermined	TBD
04WP		NONE IDENTIFIED						75		
05AP		NONE IDENTIFIED						75		
05G		NONE IDENTIFIED						75		
05SP	OKGE-OKGE	55177 PARKLN 2 69 55187 AHLOSTP2 69 1	71	115.3	120.9	5.3300	55177 PARKLN 2 69 55182 VALLYVU2 69 1	0	Solution Undetermined	TBD
05SP	AEPW-AEPW	53142 HUNTING2 69 53202 MIDLREA2 69 1	36	101.9	108.9	3.3530	55262 AES 5 161 55264 TARBY 5 161 1	0	Solution Undetermined	TBD
05SP	AEPW-AEPW	53142 HUNTING2 69 53147 NHUNTNT2 69 1	47	94.5	99.8	3.3530	55262 AES 5 161 55264 TARBY 5 161 1	75	See Previous Upgrade Specified For Facility	
05SP	WFEC-WFEC	55810 ANADARK2 69 55814 ANADARK4 138 1	111	86.4	91.3	7.2600	55814 ANADARK4 138 55923 GEORGIA4 138 1	75	Solution Undetermined	TBD
05SH	OKGE-OKGE	55177 PARKLN 2 69 55187 AHLOSTP2 69 1	71	101.4	108.2	6.4130	55177 PARKLN 2 69 55182 VALLYVU2 69 1	0	Solution Undetermined	TBD
05SH	AEPW-AEPW	53142 HUNTING2 69 53202 MIDLREA2 69 1	36	98.8	106.2	3.5500	55262 AES 5 161 55264 TARBY 5 161 1	12	Solution Undetermined	TBD
05SH	AEPW-AEPW	53142 HUNTING2 69 53147 NHUNTNT2 69 1	47	89.0	94.6	3.5500	55262 AES 5 161 55264 TARBY 5 161 1	75	See Previous Upgrade Specified For Facility	
05SH	OKGE-OKGE	54861 MUSTANG4 138 54896 MORGAN 4 138 1	284	90.4	91.4	4.0270	54902 MCCLAIN4 138 54929 PLVALLY4 138 1	75	Solution Undetermined	TBD
									The cost may be higher due to additional facilities whose solutions will be determined during the Facility Study process	\$*
									Total Estimated Cost with Facilities Monitored @ 90% Loading	\$ 100,000
									Total Estimated Cost with Facilities Monitored @ 100% Loading	\$ 100,000

## **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 – 90%
4. Contingency Case Rating – Rate B
5. Contingency Case % of Rating – 90%
6. Base Case Load Flow – Do not solve AC
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 – 0.03
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