



SPP *Southwest Power Pool*

System Impact Study SPP-2002-073

For Transmission Service

Requested By

PG&E Energy Trading

From WPEK To AMRN

For a Reserved Amount Of 105MW

From 6/1/2003

To 6/1/2018

SPP Coordinated Planning

System Impact Study

PG&E Energy Trading (PGET) has requested a system impact study for long-term Firm Point-to-Point transmission service from WPEK to AMRN. The period of the transaction is from 6/1/2003 to 6/1/2018. The request is for OASIS reservation 343658 for an amount of 105 MW.

The principal objective of this study is to identify constraints on the SPP Regional Tariff System and potential facility upgrades that may be necessary to facilitate the additional 105 MW of service requested.

The WPEK to AMRN transfer was studied to determine the facility upgrades required based on the actual queue position of the request with only those higher priority requests in Facility Study mode included in the models. Higher priority requests still in study that have not gone to facility study were not included in the models. These results are documented in Table 1 of the report. The results given in Table 1 include upgrades that may be assigned to higher priority requests. The results of this study give the customer an estimated cost of facility upgrades that may be required in order to accommodate the 105 MW WPEK to AMRN transfer.

SPP used eight seasonal models to study the WPEK to AMRN 105 MW transfer for the requested service period. The SPP 2002 Series Cases 2003 Summer Peak, 2003 Fall Peak, 2003/2004 Winter Peak, 2004 Spring Peak, 2005 Summer Peak, 2005/06 Winter Peak, 2008 Summer Peak and 2008/2009 Winter Peak were used to study the impact of the 100 MW transfer on the SPP system during the requested service period of 6/1/2003 to 6/1/2018. The Spring Peak models apply to April and May, the Summer Peak models apply to June through September, the Fall Peak models apply to October and November, and the Winter Peak models apply to December through March. 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 2002 base case series models.

With only the higher priority requests that have signed Facility Study Agreements included in the models, the study results of the WPEK to AMRN 105 MW show that limiting constraints exist. Due to the number of limiting constraints identified, the Transmission Service Request cannot be granted. 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. The upgrades and cost 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 that will be identified during the facility study process, and the final results of the full AC analysis. 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 upgrades identified for the WPEK to AMRN transfer

Study Year	From Area - To Area	Branch Over 100% Rate B	Rate B	Outaged Branch Causing Overload	ATC	Solution	Estimated Cost
03SP	WERE-WERE	166Th Street - Jarbalo Jct Swi Sta. 115kV	97	Midland Jct - Pentagon 115kV	0	May be relieved due to Westar Transmission Operating Directive 1202	Not Available
03SP	AEPW-AEPW	Alumax Tap - Bann 138kV	261	Nw Texarkana-Bann T - Northwest Texarkana 138kV	0	Replace six (6) 138 kV switches, five at Bann & one at Alumax Tap. Rebuild 0.67 miles of 1024 ACAR with 2156 ACSR. Replace wavetrapp jumpers @ Bann. Replace breaker 3300 @ Bann.	\$ 630,000
03SP	AEPW-AEPW	Alumax Tap - Northwest Texarkana 138kV	261	Nw Texarkana-Bann T - Northwest Texarkana 138kV	0	Replace Switches Alumax Tap	\$ 30,000
03SP	WERE-WERE	Auburn Road - Jeffery Energy Center 230kV	565	Hoyt - Jeffery Energy Center 345kV	0	May be relieved due to Westar Transmission Operating Directive 400	Not Available
03SP	WERE-WERE	Auburn Road - South Gage (West) 115kV ckt 1	75	Hoyt - Jeffery Energy Center 345kV	0	May be relieved due to Westar Transmission Operating Directive 400	Not Available
03SP	WERE-WERE	Auburn Road - South Gage (West) 115kV ckt 2	97	Hoyt - Jeffery Energy Center 345kV Ckt 1	0	May be relieved due to Westar Transmission Operating Directive 400	Not Available
03SP	SWPA-EES	Bull Shoals - Midway 161kV	162	Bull Shoals - Buford Tap 161kV	0	Replace disconnect switches, metering CTs and wave trap at Bull Shoals	\$ 150,000
03SP	SWPA-EES	Carthage - Reed Springs 69kV	36	Sub 124 - Aurora H.T. - Sub 383 - Monett 161kV	0	Third Party Facility	\$
03SP	AEPW-AEPW	Cherokee Rec - Knox Lee 138kV	209	Multiple Outage Contingency SW Shreveport - Longwood 345kV SW Shreveport to Diana 345kV	0	Reconductor 3.25 miles of 666 ACSR with 1272 ACSR	\$ 981,000
03SP	AEPW-AEPW	Cherokee Rec - Tatum 138kV	209	Multiple Outage Contingency SW Shreveport - Longwood 345kV SW Shreveport to Diana 345kV	0	Reconductor 6.25 miles of 666 ACSR with 1272 ACSR	\$ 1,641,000
03SP	WERE-WERE	Circleville - Hoyt Hti Swi Jct 115kV	97	Hoyt - Stranger Creek 345kV	0	Replace 82 structures	\$ 742,000
03SP	WERE-WERE	Circleville - King Hill N.M. Coop 115kV	92	Hoyt - Stranger Creek 345kV	0	May be relieved due to Westar Transmission Operating Directive 803	Not Available
03SP	GRRD-GRRD	Claremore 161/69kV Transformer ckt 1	84	Claremore 161/69kV Transformer Ckt 2	0	Solution Undetermined	Not Available
03SP	GRRD-GRRD	Claremore 161/69kV Transformer ckt 2	84	Claremore 161/69kV Transformer Ckt 1	0	Solution Undetermined	Not Available
03SP	WERE-WERE	County Line - Hook Jct 115kV	92	Tecumseh Energy Center - Tecumseh Hill 115kV	0	Solution Undetermined	Not Available
03SP	AEPW-AEPW	Diana - Perdue 138kV	237	Harrison Road - Liberty City Tap 138kV	0	Replace Breaker 10070 @ Perdue	\$ 150,000
03SP	SWPA-AECI	Doniphan 161/69kV Transformer ckt 1	18.8	Doniphan 161/69kV Transformer Ckt 2	0	See Previous	See Previous
03SP	OKGE-OKGE	Draper Lake 138/345kV Transformer ckt 1	493	Draper Lake 138/345kV Transformer Ckt 2	55	May be relieved due to OKGE Operating Guide	Not Available
03SP	OKGE-OKGE	Draper Lake 138/345kV Transformer ckt 2	493	Draper Lake 138/345kV Transformer Ckt 1	55	May be relieved due to OKGE Operating Guide	Not Available
03SP	AEPW-AEPW	Dyess - Chamber Springs 161kV	244	Chamber Springs - Farmington Aecc 161kV	0	AEPW Planned Tontitown Project	\$
03SP	AEPW-AEPW	Dyess - East Rogers 161kV	244	Flint Creek - Gentry Rec 161kV	0	AEPW Planned Tontitown Project	\$
03SP	AEPW-AEPW	East Centerton - Gentry Rec 161kV	353	Flint Creek - Elm Springs Rec 161kV	0	Rebuild 19.16 miles of 2-397.5 ACSR with 2156 ACSR	\$ 8,000,000
03SP	AEPW-AEPW	Flint Creek - Elm Springs Rec 161kV	312	Flint Creek - Gentry Rec 161kV	0	AEPW Planned Tontitown Project	\$
03SP	AEPW-AEPW	Flint Creek - Gentry Rec 161kV	353	Flint Creek - Elm Springs Rec 161kV	0	Rebuild 1.09 miles of 2-397.5 ACSR with 2156 ACSR.	\$ 400,000
03SP	WERE-WERE	Gill Energy Center East - Macarthur 69kV	68	Gill Energy Center East - Oatville 69kV	0	Replace subSta. bus and jumpers at MacArthur 69 kV	\$ 22,000
03SP	WERE-WERE	Gill Energy Center East - Oatville 69kV	72	Gill Energy Center East - Macarthur 69kV	0	Replace disconnect switches at Gill 69 kV (use 800 A.), Replace line switch at Oatville 69 kV (use 800 A.)	\$ 45,000
03SP	WERE-WERE	Kelly - King Hill N.M. Coop 115kV	92	Hoyt - Stranger Creek 345kV	0	May be relieved due to Westar Transmission Operating Directive 803	Not Available
03SP	AEPW-AEPW	Marshall 138/69kV Transformer ckt 1	107	Marshall 138/69kV Transformer Ckt 2	0	Replace 755 ACAR Strain Bus	\$ 25,000
03SP	AEPW-AEPW	Marshall 138/69kV Transformer ckt 2	107	Marshall 138/69kV Transformer Ckt 1	0	Replace 755 ACAR Strain Bus	\$ 25,000
03SP	WERE-WERE	Mockingbird Hill Swi Sta. - Stull Swi Sta. 115kV	92	Hoyt - Stranger Creek 345kV	0	May be relieved due to Westar Transmission Operating Directive 803	Not Available

Table 1 – continued – SPP facility upgrades identified for the WPEK to AMRN transfer

Study Year	From Area - To Area	Branch Over 100% Rate B	Rate B	Outaged Branch Causing Overload	ATC	Solution	Estimated Cost
03SP	SWPA-SWPA	Norfolk 161/69kV Transformer ckt 1	25	Norfolk 161/69kV Transformer Ckt 2	0	Replace Norfolk Transformer by SWPA In-Service Date 6/1/2005	Not Available
03SP	MIDW-WEPL	Seward 69/115kV Transformer	44	Heizer 115/230kV Transformer	0	Solution Undetermined	Not Available
03SP	WERE-WERE	Tecumseh Energy Center - Hook Jct 115kV	160	Tecumseh Energy Center - Tecumseh Hill 115kV	0	Solution Undetermined	Not Available
03SP	WERE-WERE	Tecumseh Hill - 27Th & Croco 115kV ckt 1	68	Tecumseh Hill - 27Th & Croco 115kV Ckt 2	79	Solution Undetermined	Not Available
03SP	WERE-WERE	Tecumseh Hill - Stull Swi Sta. 115kV	92	Hoyt - Stranger Creek 345kV	0	May be relieved due to Westar Transmission Operating Directive 803	Not Available
03FA	WFEC-WFEC	Acme - Franklin Sw 69kV	34	Canadian Sw - Goldsby 69kV	36	Solution Undetermined	Not Available
03FA	WERE-WERE	Athens Swi Sta. - Coffey County No. 4 Vernon 69kV	45	Wolf Creek - Lacygne 345kV	64	May be relieved due to Westar Transmission Operating Directive 1304	Not Available
03FA	WERE-WERE	Auburn Road - Jeffery Energy Center 230kV	565	Hoyt - Jeffery Energy Center 345kV	0	See Previous	See Previous
03FA	WERE-WERE	Auburn Road - South Gage (West) 115kV ckt 1	75	Hoyt - Jeffery Energy Center 345kV	0	See Previous	See Previous
03FA	WERE-WERE	Auburn Road - South Gage (West) 115kV ckt 2	97	Hoyt - Jeffery Energy Center 345kV Ckt 1	0	See Previous	See Previous
03FA	WERE-WERE	Circleville - King Hill N.M. Coop 115kV	92	Hoyt - Stranger Creek 345kV	0	See Previous	See Previous
03FA	WERE-WERE	Coffey County No. 4 Vernon - Green 69kV	45	Wolf Creek - Lacygne 345kV	0	May be relieved due to Westar Transmission Operating Directive 1304	Not Available
03FA	SWPA-AECI	Doniphan 161/69kV Transformer ckt 1	18.7	Doniphan 161/69kV Transformer Ckt 2	0	Solution Undetermined	Not Available
03FA	WERE-WERE	El Paso - Gill Energy Center South 138kV	210	Evans Energy Ctr Nth - Evans Energy Ctr Sth 138kV	48	Solution Undetermined	Not Available
03FA	AEPW-AEPW	Greggton - Lake Lamond 69kV	107	Diana - Perdue 138kV	0	Solution Undetermined	Not Available
03FA	WERE-WERE	Kelly - King Hill N.M. Coop 115kV	92	Hoyt - Stranger Creek 345kV	0	See Previous	See Previous
03FA	WERE-WERE	Mockingbird Hill Swi Sta. - Stull Swi Sta. 115kV	92	Hoyt - Stranger Creek 345kV	69	See Previous	See Previous
03FA	WERE-WERE	Tecumseh Hill - Stull Swi Sta. 115kV	92	Hoyt - Stranger Creek 345kV	0	See Previous	See Previous
03WP	WERE-WERE	Auburn Road - Jeffery Energy Center 230kV	565	Hoyt - Jeffery Energy Center 345kV	0	See Previous	See Previous
03WP	WERE-WERE	Auburn Road - South Gage (West) 115kV ckt 1	75	Hoyt - Jeffery Energy Center 345kV	0	See Previous	See Previous
03WP	WERE-WERE	Auburn Road - South Gage (West) 115kV ckt 2	97	Hoyt - Jeffery Energy Center 345kV Ckt 1	75	See Previous	See Previous
03WP	WERE-WERE	Circleville - Hoyt Hti Swi Jct 115kV	97	Hoyt - Stranger Creek 345kV	0	See Previous	See Previous
03WP	WERE-WERE	Circleville - King Hill N.M. Coop 115kV	92	Hoyt - Stranger Creek 345kV	0	See Previous	See Previous
03WP	AEPW-AEPW	Diana - Perdue 138kV	237	Harrison Road - Liberty City Tap 138kV	0	See Previous	See Previous
03WP	SWPA-AECI	Doniphan 161/69kV Transformer ckt 1	18.7	Doniphan 161/69kV Transformer Ckt 2	0	See Previous	See Previous
03WP	WERE-WERE	Kelly - King Hill N.M. Coop 115kV	92	Hoyt - Stranger Creek 345kV	0	See Previous	See Previous
03WP	WERE-WERE	Mockingbird Hill Swi Sta. - Stull Swi Sta. 115kV	92	Hoyt - Stranger Creek 345kV	10	See Previous	See Previous
03WP	WERE-WERE	Tecumseh Hill - Stull Swi Sta. 115kV	92	Hoyt - Stranger Creek 345kV	0	See Previous	See Previous
04G	WERE-WERE	Athens Swi Sta. - Coffey County No. 4 Vernon 69kV	45	Wolf Creek - Lacygne 345kV	0	See Previous	See Previous
04G	WERE-WERE	Auburn Road - Jeffery Energy Center 230kV	565	Hoyt - Jeffery Energy Center 345kV	0	See Previous	See Previous
04G	WERE-WERE	Auburn Road - South Gage (West) 115kV ckt 1	75	Hoyt - Jeffery Energy Center 345kV	0	See Previous	See Previous
04G	WERE-WERE	Auburn Road - South Gage (West) 115kV ckt 2	97	Hoyt - Jeffery Energy Center 345kV Ckt 1	0	See Previous	See Previous
04G	WERE-WERE	Circleville - King Hill N.M. Coop 115kV	92	Hoyt - Stranger Creek 345kV	0	See Previous	See Previous
04G	WERE-WERE	Coffey County No. 4 Vernon - Green 69kV	45	Wolf Creek - Lacygne 345kV	0	See Previous	See Previous
04G	WERE-WERE	Kelly - King Hill N.M. Coop 115kV	92	Hoyt - Stranger Creek 345kV	0	See Previous	See Previous

Table 1 – continued – SPP facility upgrades identified for the WPEK to AMRN transfer

Study Year	From Area - To Area	Branch Over 100% Rate B	Rate B	Outaged Branch Causing Overload	ATC	Solution	Estimated Cost
04G	AEPW-AEPW	Marshall 138/69kV Transformer ckt 2	107	Marshall 138/69kV Transformer Ckt 1	0	See Previous	See Previous
04G	WERE-WERE	Mockingbird Hill Swi Sta. - Stull Swi Sta. 115kV	92	Hoyt - Stranger Creek 345kV	0	See Previous	See Previous
04G	WERE-WERE	Tecumseh Hill - Stull Swi Sta. 115kV	92	Hoyt - Stranger Creek 345kV	0	See Previous	See Previous
05SP	WERE-WERE	166Th Street - Jarbalo Jct Swi Sta. 115kV	97	Midland Jct - Pentagon 115kV	0	See Previous	See Previous
05SP	AEPW-AEPW	Alumax Tap - Northwest Texarkana 138kV	261	Nw Texarkana-Bann T - Northwest Texarkana 138kV	0	See Previous	See Previous
05SP	WERE-WERE	Auburn Road - Jeffrey Energy Center 230kV	565	Hoyt - Jeffery Energy Center 345kV	0	See Previous	See Previous
05SP	AECI-AECI	Bristow 138/69kV Transformer ckt 1	56	Bristow 138/69kV Transformer Ckt 2	0	Solution Undetermined	Not Available
05SP	AECI-AECI	Bristow 138/69kV Transformer ckt 2	56	Bristow 138/69kV Transformer Ckt 1	0	Solution Undetermined	Not Available
05SP	SWPA-EES	Bull Shoals - Midway 161kV	162	Ises - Morefield 161kV	0	See Previous	See Previous
05SP	SWPA-EES	Carthage - Reed Springs 69kV	36	Sub 124 - Aurora H.T. - Sub 383 - Monett 161kV	0	See Previous	See Previous
05SP	AEPW-AEPW	Chamber Springs - Farmington Aecc 161kV	335	Chamber Springs - Tontitown 161kV	0	Replace Farmington switch	\$ 60,000
05SP	AEPW-AEPW	Chamber Springs - Tontitown 161kV	244	Flint Creek - Tontitown 161kV	0	Rebuild 12 miles with 2156ACSR	\$ 7,200,000
05SP	AEPW-AEPW	Cherokee Rec - Knox Lee 138kV	209	Georgia-Pacific - Logansport 138kV	0	See Previous	See Previous
05SP	AEPW-AEPW	Cherokee Rec - Tatum 138kV	209	Multiple Outage Contingency SW Shreveport - Longwood 345kV SW Shreveport to Diana 345kV	0	See Previous	See Previous
05SP	WERE-WERE	Circleville - Hoyt Hti Swi Jct 115kV	97	Hoyt - Stranger Creek 345kV	0	See Previous	See Previous
05SP	WERE-WERE	Circleville - King Hill N.M. Coop 115kV	92	Hoyt - Stranger Creek 345kV	0	See Previous	See Previous
05SP	GRRD-GRRD	Claremore 161/69kV Transformer ckt 1	84	Claremore 161/69kV Transformer Ckt 2	0	See Previous	See Previous
05SP	GRRD-GRRD	Claremore 161/69kV Transformer ckt 2	84	Claremore 161/69kV Transformer Ckt 1	0	See Previous	See Previous
05SP	AEPW-WFEC	Cornville - Corn Tap 138kV	105	SW Sta. - Anadarko 138kV	0	Solution Undetermined	Not Available
05SP	WERE-WERE	County Line - Hook Jct 115kV	92	Tecumseh Energy Center - Tecumseh Hill 115kV	0	See Previous	See Previous
05SP	AEPW-AEPW	East Centerton - Gentry Rec 161kV	353	Flint Creek - Tontitown 161kV	0	See Previous	See Previous
05SP	AEPW-AEPW	Elm Springs Rec - Tontitown 161kV	306	Dyess - Tontitown 161kV	0	Replace Switch and Elm Springs Strain Bus	\$ 100,000
05SP	AEPW-AEPW	Flint Creek - Gentry Rec 161kV	353	Flint Creek - Tontitown 161kV	0	See Previous	See Previous
05SP	AEPW-AEPW	Flint Creek - Tontitown 161kV	312	Flint Creek - Gentry Rec 161kV	0	Replace switch and jumpers	\$ 45,000
05SP	WERE-WERE	Gill Energy Center East - Macarthur 69kV	68	Gill Energy Center East - Oatville 69kV	0	See Previous	See Previous
05SP	WERE-WERE	Gill Energy Center East - Oatville 69kV	72	Gill Energy Center East - Macarthur 69kV	0	See Previous	See Previous
05SP	AEPW-AEPW	Hallsville - Longview Heights 69kV	48	Marshall - Marshall Auto 69kV	0	Rebuild 7.07 miles of 4/0 ACSR with 795 ACSR	\$ 3,000,000
05SP	WERE-WERE	Kelly - King Hill N.M. Coop 115kV	92	Hoyt - Stranger Creek 345kV	0	See Previous	See Previous
05SP	WERE-WERE	Lawrence Hill - Wren 115kV	141	Mockingbird Hill Swi Sta. - SW Lawrence 115kV	0	May be relieved due to Westar Transmission Operating Directive 1210	Not Available
05SP	AEPW-AEPW	Longwood - Noram 138kV	234	Multiple Outage Contingency SW Shreveport - Longwood 345kV SW Shreveport to Diana 345kV	0	Reconductor 4.66 miles of bundled 266 ACSR with 1590 ACSR and replace jumpers & Bus Riser jumpers	\$ 1,577,000
05SP	AEPW-AEPW	Marshall - North Marshall 69kV	72	Multiple Outage Contingency SW Shreveport - Longwood 345kV SW Shreveport to Diana 345kV	0	Replace 350 CU bus & jumpers @ North Marshall.	\$ 23,300

Table 1 – continued – SPP facility upgrades identified for the WPEK to AMRN transfer

Study Year	From Area - To Area	Branch Over 100% Rate B	Rate B	Outaged Branch Causing Overload	ATC	Solution	Estimated Cost
05SP	AEPW-AEPW	Marshall 138/69kV Transformer ckt 1	107	Marshall 138/69kV Transformer Ckt 2	0	See Previous	See Previous
05SP	WERE-WERE	Mockingbird Hill Swi Sta. - Stull Swi Sta. 115kV	92	Hoyt - Stranger Creek 345kV	0	See Previous	See Previous
05SP	SWPA-SWPA	Norfolk 161/69kV Transformer ckt 1	25	Norfolk 161/69kV Transformer Ckt 2	0	See Previous	See Previous
05SP	AEPW-AEPW	Rock Hill - Tatum 138kV	209	Multiple Outage Contingency SW Shreveport - Longwood 345kV SW Shreveport to Diana 345kV	0	Reconductor 0.81 miles 666MCM to 1272 ACSR - Reconductor other 5.76 miles of 795 ACSR with 1272 ACSR. Reset CTs and relay settings @ Rock Hill	\$ 342,970
05SP	MIDW-WEPL	Seward 69/115kV Transformer	44	Heizer 115/230kV Transformer	0	See Previous	See Previous
05SP	WERE-WERE	SW Lawrence - Wakarusa Jct Swi Sta. 115kV	92	Ku Campus - 19Th Street Jct 115kV	53	Solution Undetermined	Not Available
05SP	AEPW-WFEC	SW Sta. - Anadarko 138kV	203	Cornville - Corn Tap 138kV	0	Replace bus, jumpers, switches, supports and foundations at Anadarko Switch Sta.	\$ 450,000
05SP	SWPA-SPRM	Springfield - Brookline 161kV	323	SW - SW Disposal 161kV	0	Solution Undetermined	Not Available
05SP	WERE-WERE	Tecumseh Energy Center - Hook Jct 115kV	160	Tecumseh Energy Center - Tecumseh Hill 115kV	0	See Previous	See Previous
05SP	WERE-WERE	Tecumseh Hill - Stull Swi Sta. 115kV	92	Hoyt - Stranger Creek 345kV	0	See Previous	See Previous
05WP	WERE-WERE	Auburn Road - Jeffery Energy Center 230kV	565	Hoyt - Jeffery Energy Center 345kV	0	See Previous	See Previous
05WP	WERE-WERE	Circleville - King Hill N.M. Coop 115kV	92	Hoyt - Stranger Creek 345kV	0	See Previous	See Previous
05WP	SWPS-SWPS	Curry County - Roosevelt County 115kV ckt 2	161	Oasis Interchange 115/230kV Transformer Ckt 1	0	Solution Undetermined	Not Available
05WP	WERE-WERE	Fort Jct Swi Sta. - West Jct City Jct (East) 115kV ckt 1	68	Fort Jct Sta. - West Jct City Jct (East) 115kV Ckt 2	43	May be relieved due to Westar Transmission Operating Directive 1217	Not Available
05WP	WERE-WERE	Kelly - King Hill N.M. Coop 115kV	92	Hoyt - Stranger Creek 345kV	0	See Previous	See Previous
05WP	WERE-WERE	Mockingbird Hill Swi Sta. - Stull Swi Sta. 115kV	92	Hoyt - Stranger Creek 345kV	0	See Previous	See Previous
05WP	SWPA-SWPA	Norfolk 161/69kV Transformer ckt 1	25	Norfolk 161/69kV Transformer Ckt 2	0	See Previous	See Previous
05WP	WERE-WERE	Tecumseh Hill - Stull Swi Sta. 115kV	92	Hoyt - Stranger Creek 345kV	0	See Previous	See Previous
08SP	WERE-WERE	166Th Street - Jarbalo Jct Swi Sta. 115kV	97	Midland Jct - Pentagon 115kV	0	See Previous	See Previous
08SP	GRRD-GRRD	412Sub - Kansas Tap 161kV	338	Flint Creek - Grda1 345kV	0	Reconductor 9.7 miles with 1590MCM ACSR	\$ 1,488,000
08SP	AEPW-AEPW	Alumax Tap - Bann 138kV	261	Nw Texarkana-Bann T - Northwest Texarkana 138kV	0	See Previous	See Previous
08SP	AEPW-AEPW	Alumax Tap - Northwest Texarkana 138kV	261	Nw Texarkana-Bann T - Northwest Texarkana 138kV	0	See Previous	See Previous
08SP	WERE-WERE	Auburn Road - Indian Hills 115kV	223	Hoyt - Jeffery Energy Center 345kV	0	May be relieved due to Westar Transmission Operating Directive 400	Not Available
08SP	WERE-WERE	Auburn Road - Jeffery Energy Center 230kV	565	Hoyt - Jeffery Energy Center 345kV	0	See Previous	See Previous
08SP	AEPW-OKGE	Bonanza - Bonanza Tap 161kV	177	Aes - Tarby 161kV	0	Rebuild 0.06 miles of 397.5 ACSR with 795MCM ACSR	\$ 50,000
08SP	AECI-AECI	Bristow 138/69kV Transformer ckt 1	56	Bristow 138/69kV Transformer Ckt 2	0	See Previous	See Previous
08SP	AECI-AECI	Bristow 138/69kV Transformer ckt 2	56	Bristow 138/69kV Transformer Ckt 1	0	See Previous	See Previous
08SP	AEPW-AEPW	Broken Arrow 101St North - Oneta 138kV	210	Muskogee - Ft Smith 345kV	0	Replace wavetrap	\$ 30,000
08SP	AEPW-AEPW	Broken Arrow 81St - Broken Arrow 101St North 138kV	235	Broken Arrow North - North Tap - Oneta 138kV	35	Rebuild 2.05 miles of 795 ACSR with 1590 ACSR	\$ 1,100,000
08SP	AEPW-AEPW	Broken Arrow North - North Tap - Oneta 138kV	235	Broken Arrow 101St North - Oneta 138kV	51	Solution Undetermined	Not Available
08SP	AEPW-AEPW	Broken Arrow North - South Tap - Lynn Lane Tap 138kV	235	Tulsa North - Northeast Sta. 345kV	0	Rebuild 4.63 miles of 795 ACSR with 1590 ACSR	\$ 2,600,000
08SP	AEPW-AEPW	Broken Arrow North - South Tap - Oneta 138kV	235	Tulsa North - Northeast Sta. 345kV	0	Rebuild 4.31 miles of 795 ACSR with 1590 ACSR.	\$ 2,370,500
08SP	SWPA-EES	Bull Shoals - Midway 161kV	162	Ises - Morefield 161kV	0	See Previous	See Previous

Table 1 – continued – SPP facility upgrades identified for the WPEK to AMRN transfer

Study Year	From Area - To Area	Branch Over 100% Rate B	Rate B	Outaged Branch Causing Overload	ATC	Solution	Estimated Cost
08SP	WFEC-WFEC	Carter Jct - Dill Jct 69kV	26	Pine Ridge - Washita 69kV	0	Solution Undetermined	Not Available
08SP	SWPA-EES	Carthage - Jasper 69kV	47	Milo - Clark 69kV	0	Third Party Facility	\$
08SP	SWPA-EES	Carthage - Reed Springs 69kV	36	Springfield - Sub 382 - Larussel 161kV	0	See Previous	See Previous
08SP	SWPA-SWPA	Carthage 161/69kV Transformer ckt 1	84	Carthage 161/69kV Transformer Ckt 2	0	Third Party Facility	\$
08SP	SWPA-SWPA	Carthage 161/69kV Transformer ckt 2	84	Carthage 161/69kV Transformer Ckt 1	0	Third Party Facility	\$
08SP	AEPW-AEPW	Chamber Springs - Tontitown 161kV	244	East Rogers - Rogers West Rec 161kV	0	See Previous	See Previous
08SP	AEPW-AEPW	Chamber Springs 161/345kV Transformer	660	Flint Creek - Grda1 345kV	0	Install 2nd 345/161 kV Auto-transformer	\$ 4,000,000
08SP	AEPW-AEPW	Cherokee Rec - Knox Lee 138kV	209	SW Shreveport - Diana 345kV	0	See Previous	See Previous
08SP	AEPW-AEPW	Cherokee Rec - Tatum 138kV	209	Multiple Outage Contingency SW Shreveport - Longwood 345kV SW Shreveport to Diana 345kV	0	See Previous	See Previous
08SP	WERE-WERE	Circleville - Hoyt Hti Swi Jct 115kV	97	Hoyt - Stranger Creek 345kV	0	See Previous	See Previous
08SP	WERE-WERE	Circleville - King Hill N.M. Coop 115kV	92	Hoyt - Stranger Creek 345kV	0	See Previous	See Previous
08SP	GRRD-GRRD	Claremore 161/69kV Transformer ckt 1	84	Claremore 161/69kV Transformer Ckt 2	0	See Previous	See Previous
08SP	GRRD-GRRD	Claremore 161/69kV Transformer ckt 2	84	Claremore 161/69kV Transformer Ckt 1	0	See Previous	See Previous
08SP	SPRM-AECI	Clay - Logan 161kV	185	Multiple Outage Contingency Franks - Huben 345kV Huben - Morgan 345kV	0	Replace transmission line structures to allow operation at 100C	\$ 250,000
08SP	WERE-WERE	County Line - Hook Jct 115kV	92	Tecumseh Energy Center - Tecumseh Hill 115kV	0	See Previous	See Previous
08SP	WERE-WERE	County Line - Rock Creek 69kV	41	Stranger Creek 345/951kV Transformer	0	Solution Undetermined	Not Available
08SP	WERE-WERE	County Line - Tecumseh Hill 115kV	106	Tecumseh Energy Center - Tecumseh Hill 115kV	0	May be relieved due to Westar Transmission Operating Directive 1203	Not Available
08SP	KACP-KACP	Craig - College 161kV	335	Stilwell - Antioch 161kV	0	Solution Undetermined	Not Available
08SP	AEPW-AEPW	Diana - Perdue 138kV	237	Harrison Road - Liberty City Tap 138kV	0	See Previous	See Previous
08SP	AEPW-AEPW	East Centerton - Gentry Rec 161kV	353	Flint Creek - East Centerton 345kV	0	See Previous	See Previous
08SP	AEPW-AEPW	Elm Springs Rec - Tontitown 161kV	306	Dyess - Tontitown 161kV	0	See Previous	See Previous
08SP	AEPW-AEPW	Flint Creek - Gentry Rec 161kV	353	Flint Creek - East Centerton 345kV	0	See Previous	See Previous
08SP	AEPW-AEPW	Flint Creek - Tontitown 161kV	312	Chamber Springs - Tontitown 161kV	0	See Previous	See Previous
08SP	AEPW-EES	Fulton - Patmos 115kV	174	Lydia - Valliant 345kV	0	Using 1590MCM ACSR, reconductor 7.1 miles	\$ 2,300,000
08SP	WERE-WERE	Gill Energy Center East - Interstate 138kV	210	Evans Energy Center South - Lakeridge 138kV	0	Solution Undetermined	Not Available
08SP	WERE-WERE	Gill Energy Center East - Macarthur 69kV	68	Gill Energy Center East - Oatville 69kV	0	See Previous	See Previous
08SP	WERE-WERE	Gill Energy Center West - Haysville Jct 69kV	80	Canal 138/211kV Transformer	0	Solution Undetermined	Not Available
08SP	AEPW-AEPW	Hallsville - Longview Heights 69kV	48	Marshall - Marshall Auto 69kV	0	See Previous	See Previous
08SP	AEPW-AEPW	Jacksonville (Swe-Rc-Etec) - Overton 138kV	235	Crockett - Tenaska Rusk County 345kV	0	Reset relays at Jacksonville & Overton	\$ 15,000
08SP	WERE-WERE	Kelly - King Hill N.M. Coop 115kV	92	Hoyt - Stranger Creek 345kV	0	See Previous	See Previous
08SP	GRRD-GRRD	Kerr - 412Sub 161kV	338	Flint Creek - Grda1 345kV	0	Reconductor 12.5 miles with 1590MCM ACSR.	\$ 1,918,000
08SP	AEPW-AEPW	Knox Lee - Oak Hill #2 138kV	210	Knox Lee - Monroe Corners Rec 138kV	0	Replace wavetraps @ Knoxlee	\$ 20,000

Table 1 – continued – SPP facility upgrades identified for the WPEK to AMRN transfer

Study Year	From Area - To Area	Branch Over 100% Rate B	Rate B	Outaged Branch Causing Overload	ATC	Solution	Estimated Cost
08SP	WERE-WERE	Lawrence Hill - Wren 115kV	141	Bismark Jct Swi Sta. - Farmer's Consumer 115kV	0	See Previous	See Previous
08SP	AEPW-AEPW	Lieberman - IPC Jefferson 138kV	136	Longwood - Wilkes 345kV	0	Reconductor 26.35 miles of 336 ACSR with 795 ACSR, Replace Switches @ Lieberman, Reset Relays @ Jefferson IPC, & Reconductor 0.65 miles 397MCM to 795MCM	\$ 7,411,000
08SP	AEPW-AEPW	Longwood - Noram 138kV	234	Multiple Outage Contingency SW Shreveport - Longwood 345kV SW Shreveport to Diana 345kV	0	See Previous	See Previous
08SP	AEPW-AEPW	Marshall - North Marshall 69kV	72	Multiple Outage Contingency SW Shreveport - Longwood 345kV SW Shreveport to Diana 345kV	0	See Previous	See Previous
08SP	AEPW-AEPW	Marshall 138/69kV Transformer ckt 1	107	Marshall 138/69kV Transformer Ckt 2	0	See Previous	See Previous
08SP	AEPW-AEPW	Marshall 138/69kV Transformer ckt 2	107	Marshall 138/69kV Transformer Ckt 1	0	See Previous	See Previous
08SP	OKGE-WFEC	Midwest Tap - Franklin Sw 138kV	215	Anadarko - Pocassett 138kV	0	Replace 600A metering CTs with 1200A	\$ 55,000
08SP	WERE-WERE	Mockingbird Hill Swi Sta. - Stull Swi Sta. 115kV	92	Hoyt - Stranger Creek 345kV	0	See Previous	See Previous
08SP	SWPA-SWPA	Norfolk 161/69kV Transformer ckt 1	25	Norfolk - West Plains 161kV	0	See Previous	See Previous
08SP	SWPA-SWPA	Norfolk 161/69kV Transformer ckt 2	25	Norfolk 161/69kV Transformer Ckt 1	0	Replace Norfolk Transformer by SWPA In-Service Date 6/1/2005	Not Available
08SP	WERE-WERE	NA Philips - NA Philips Jct (South) 115kV	160	East Mcherson - Summit 230kV	73	Solution Undetermined	Not Available
08SP	WERE-WERE	NA Philips Jct (North) - Smoky Hill 115kV ckt 1	68	NA Philips Jct (North) - Smoky Hill 115kV Ckt 2	0	Solution Undetermined	Not Available
08SP	WERE-WERE	NA Philips Jct (South) - West Mcherson 115kV	68	East Mcherson - Summit 230kV	0	May be relieved due to Westar Transmission Operating Directive 613	Not Available
08SP	WERE-WERE	NA Philips Jct (South) - West Mcherson 115kV ckt 1	68	NA Philips Jct (South) - West Mcherson 115kV Ckt 2	31	May be relieved due to Westar Transmission Operating Directive 613	Not Available
08SP	AEPW-AEPW	North Marshall - Woodlawn 69kV	51	Multiple Outage Contingency SW Shreveport - Longwood 345kV SW Shreveport to Diana 345kV	0	Replace 3/0 CU jumpers @ North Marshall	\$ 15,000
08SP	OKGE-OKGE	Pecan Creek 161/345kV Transformer	369	Muskogee - Ft Smith 345kV	0	Add 2nd 345/161 kV 369MVA transformer.	\$ 3,000,000
08SP	WEPL-WEPL	Phillipsburg - Smith Center 115kV	40	Saline River - Plainville 115kV	68	Solution Undetermined	Not Available
08SP	AEPW-AEPW	Raines - Noram 138kV	234	Multiple Outage Contingency SW Shreveport - Longwood 345kV SW Shreveport to Diana 345kV	0	Rebuild 5.58 miles of 2-266 ACSR with 1590 ACSR	\$ 2,000,000
08SP	AEPW-AEPW	Rock Hill - Tatum 138kV	209	Multiple Outage Contingency SW Shreveport - Longwood 345kV SW Shreveport to Diana 345kV	0	See Previous	See Previous
08SP	WFEC-WFEC	Russell 69/138kV Transformer	25	Anadarko - Paradise 138kV	0	Solution Undetermined	Not Available
08SP	MIDW-WEPL	Seward 69/115kV Transformer	44	Heizer 115/230kV Transformer	0	See Previous	See Previous
08SP	AEPW-AEPW	South Fayetteville - Farmington Aecc 161kV	313	Chamber Springs - Tontitown 161kV	0	Solution Undetermined	Not Available
08SP	WERE-WERE	SW Lawrence - Wakarusa Jct Swi Sta. 115kV	92	Ku Campus - 19Th Street Jct 115kV	0	See Previous	See Previous
08SP	SWPA-SPRM	Springfield - Brookline 161kV	323	SW - SW Disposal 161kV	0	See Previous	See Previous
08SP	WERE-WERE	Tecumseh Energy Center - Hook Jct 115kV	160	Tecumseh Energy Center - Tecumseh Hill 115kV	0	See Previous	See Previous
08SP	WERE-WERE	Tecumseh Energy Center - Tecumseh Hill 115kV	236	Hoyt - Stranger Creek 345kV	0	May be relieved due to Westar Transmission Operating Directive 803	Not Available
08SP	WERE-WERE	Tecumseh Hill - 27Th & Croco 115kV ckt 1	68	Tecumseh Hill - 27Th & Croco 115kV Ckt 2	4	See Previous	See Previous

Table 1 – continued – SPP facility upgrades identified for the WPEK to AMRN transfer

Study Year	From Area - To Area	Branch Over 100% Rate B	Rate B	Outaged Branch Causing Overload	ATC	Solution	Estimated Cost
08SP	WERE-WERE	Tecumseh Hill - Stull Swi Sta. 115kV	92	Stranger Creek 345/951kV Transformer	0	See Previous	See Previous
08WP	WERE-WERE	166Th Street - Jarbalo Jct Swi Sta. 115kV	97	Midland Jct - Pentagon 115kV	0	See Previous	See Previous
08WP	WERE-WERE	Auburn Road - Jeffrey Energy Center 230kV	565	Hoyt - Jeffery Energy Center 345kV	0	See Previous	See Previous
08WP	SWPA-EES	Carthage - Reed Springs 69kV	43	Sub 124 - Aurora H.T. - Sub 383 - Monett 161kV	0	See Previous	See Previous
08WP	AEPW-AEPW	Chamber Springs - Tontitown 161kV	275	Chamber Springs - Farmington Aecc 161kV	0	See Previous	See Previous
08WP	WERE-WERE	Circleville - Hoyt Hti Swi Jct 115kV	97	Hoyt - Stranger Creek 345kV	0	See Previous	See Previous
08WP	WERE-WERE	Circleville - King Hill N.M. Coop 115kV	92	Hoyt - Stranger Creek 345kV	0	See Previous	See Previous
08WP	WERE-WERE	County Line - Hook Jct 115kV	92	Tecumseh Energy Center - Tecumseh Hill 115kV	0	See Previous	See Previous
08WP	AEPW-AEPW	Diana - Perdue 138kV	237	Harrison Road - Liberty City Tap 138kV	0	See Previous	See Previous
08WP	SWPA-AECI	Doniphan 161/69kV Transformer ckt 1	18.8	Doniphan 161/69kV Transformer Ckt 2	0	See Previous	See Previous
08WP	AEPW-AEPW	Jacksonville (Swe-Rc-Etec) - Overton 138kV	265	Crockett - Tenaska Rusk County 345kV	0	See Previous	See Previous
08WP	WERE-WERE	Kelly - King Hill N.M. Coop 115kV	92	Hoyt - Stranger Creek 345kV	0	See Previous	See Previous
08WP	AEPW-AEPW	Marshall 138/69kV Transformer ckt 1	121	Marshall 138/69kV Transformer Ckt 2	0	See Previous	See Previous
08WP	AEPW-AEPW	Marshall 138/69kV Transformer ckt 2	121	Marshall 138/69kV Transformer Ckt 1	0	See Previous	See Previous
08WP	WERE-WERE	Mockingbird Hill Swi Sta. - Stull Swi Sta. 115kV	92	Hoyt - Stranger Creek 345kV	0	See Previous	See Previous
08WP	SWPA-SWPA	Norfolk 161/69kV Transformer ckt 1	25	Norfolk - West Plains 161kV	0	See Previous	See Previous
08WP	WERE-WERE	SW Lawrence - Wakarusa Jct Swi Sta. 115kV	92	Ku Campus - 19Th Street Jct 115kV	0	See Previous	See Previous
08WP	WERE-WERE	Tecumseh Energy Center - Hook Jct 115kV	160	Tecumseh Energy Center - Tecumseh Hill 115kV	0	See Previous	See Previous
08WP	WERE-WERE	Tecumseh Hill - Stull Swi Sta. 115kV	92	Hoyt - Stranger Creek 345kV	0	See Previous	See Previous
						Total (Excludes Costs Unavailable)	\$ 54,261,770