



SPP *Southwest Power Pool*

***System Impact Study SPP-2002-072
For Transmission Service***

***Requested By
PG&E Energy Trading***

From WPEK To WR

***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 WR. The period of the transaction is from 6/1/2003 to 6/1/2018. The request is for OASIS reservation 343657 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 WR 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 WR transfer.

SPP used eight seasonal models to study the WPEK to WR 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 WR 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 WR transfer

Study Year	From Area - To Area	Branch Over 100% Rate B	Rate B	Outaged Branch Causing Overload	ATC	Solution	Estimated Cost
03SP	GRRD-GRRD	Afton 161/69kV Transformer	50	Miami - Afton 161kV	0	Replace 50 MVA Transformer with 84 MVA unit	\$ 833,000
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 wavetrap 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 - South Gage (West) 115kV	75	Auburn Road - Indian Hills 115kV	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	Auburn Road - South Gage (West) 115kV Ckt 2	0	May be relieved due to Westar Transmission Operating Directive 400	Not Available
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	County Line - Hook Jct 115kV	92	Tecumseh Energy Center - Tecumseh Hill 115kV	47	Solution Undetermined	Not Available
03SP	AEPW-AEPW	Dyess - Chamber Springs 161kV	244	Chamber Springs - Farmington Aecc 161kV	0	AEPW Planned Tontitown Project	\$ -
03SP	AEPW-AEPW	East Centerton - Gentry Rec 161kV	353	Dyess - East Rogers 161kV	0	Rebuild 19.16 miles of 2-397.5 ACSR with 2156 ACSR	\$ 8,000,000
03SP	AEPW-AEPW	Flint Creek - Gentry Rec 161kV	353	Dyess - East Rogers 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	Kereford Jct - Northwest Leavenworth 115kV	68	Arnold - Stranger Creek 115kV	0	Solution Undetermined	Not Available
03SP	WERE-WERE	Sandhill Ark Valley Co-Op - 3Rd & Van Buren 115kV	68	Circle - Davis 115kV	0	Solution Undetermined	Not Available
03SP	WERE-WERE	Sandhill Ark Valley Co-Op D.P. Jct - Circle 115kV	68	Circle - Davis 115kV	0	Solution Undetermined	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	90	Solution Undetermined	Not Available
03SP	OKGE-OKGE	Tinker #4 - Tinker #2 138kV	100	Horseshoe Lake - Midway 138kV	0	Invalid Overload	\$ -
03FA	WFEC-WFEC	Acme - Franklin Sw 69kV	34	Canadian Sw - Goldsby 69kV	41	Solution Undetermined	Not Available
03FA	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
03FA	WERE-WERE	Circleville - Hoyt Hti Swi Jct 115kV	97	Iatan - St Joe 345kV	61	Replace 82 structures	\$ 742,000
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	WERE-WERE	El Paso - Gill Energy Center South 138kV	210	Evans Energy Ctr Nth - Evans Energy Ctr Sth 138kV	56	Solution Undetermined	Not Available
03WP	WERE-WERE	Coffey County No. 4 Vernon - Green 69kV	45	Wolf Creek - Lacygne 345kV	0	See Previous	See Previous
03WP	WFEC-WFEC	Lexington - Paoli 69kV	34	Canadian Sw 69/138kV Transformer	0	Solution Undetermined	Not Available
04G	WERE-WERE	Athens Swi Sta. - Coffey County No. 4 Vernon 69kV	45	Wolf Creek - Lacygne 345kV	0	May be relieved due to Westar Transmission Operating Directive 1304	Not Available
04G	AEPW-AEPW	Cherokee Rec - Knox Lee 138kV	209	Multiple Outage Contingency SW Shreveport - Longwood 345kV SW Shreveport to Diana 345kV	0	See Previous	See Previous
04G	WERE-WERE	Circleville - Hoyt Hti Swi Jct 115kV	97	Iatan - St Joe 345kV	93	See Previous	See Previous
05SP	GRRD-GRRD	Afton 161/69kV Transformer	50	Miami - Afton 161kV	0	See Previous	See Previous

Table 1 - continued – SPP facility upgrades identified for the WPEK to WR 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	Alumax Tap - Northwest Texarkana 138kV	261	Nw Texarkana-Bann T - Northwest Texarkana 138kV	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	AEPW-AEPW	Broken Arrow 101St North - Oneta 138kV	210	Riverside Sta. Auto 138/345kV Transformer	0	Replace wavetrapp	\$ 30,000
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 - Tatum 138kV	209	Multiple Outage Contingency SW Shreveport - Longwood 345kV SW Shreveport to Diana 345kV	0	See Previous	See Previous
05SP	WERE-WERE	Circle - Hutchinson Gas Turbine Sta. 115kV	152	HEC Gas Turbine 1 13.8/69kV Transformer	77	Solution Undetermined	Not Available
05SP	WERE-WERE	Circleville - Hoyt Hti Swi Jct 115kV	97	Knob Hill - Greenleaf 115kV	101	See Previous	See Previous
05SP	AEPW-WFEC	Cornville - Corn Tap 138kV	105	SW Sta. - Anadarko 138kV	0	Solution Undetermined	Not Available
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	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	AEPW-WFEC	SW Sta. - Anadarko 138kV	203	Sunnyside 138/345kV Transformer	0	Replace bus, jumpers, switches, supports and foundations at Anadarko Switch Sta.	\$ 450,000
05SP	WERE-WERE	Tecumseh Hill - Stull Swi Sta. 115kV	92	Stranger Creek 345/951kV Transformer	0	May be relieved due to Westar Transmission Operating Directive 803	Not Available
05SP	OKGE-OKGE	Tinker #4 - Tinker #2 138kV	100	Horseshoe Lake - Midway 138kV	0	See Previous	See Previous
05WP	WERE-WERE	Circleville - King Hill N.M. Coop 115kV	92	Iatan - St Joe 345kV	17	May be relieved due to Westar Transmission Operating Directive 803	Not Available
05WP	AEPW-AEPW	Elm Springs Rec - Tontitown 161kV	306	Chamber Springs - Farmington Aecc 161kV	0	Replace Switch and Elm Springs Strain Bus	\$ 100,000
05WP	WERE-WERE	Fort Jct Swi Sta. - West Jct City Jct (East) 115kV ckt 1	68	Fort Jct Swi Sta. - West Jct City Jct (East) 115kV Ckt 2	41	May be relieved due to Westar Transmission Operating Directive 1217	Not Available
08SP	GRRD-GRRD	412Sub - Kansas Tap 161kV	338	Flint Creek - Grda1 345kV	0	Reconductor 9.7 miles with 1590MCM ACSR	\$ 1,488,000
08SP	GRRD-GRRD	Afton 161/69kV Transformer	50	Miami - Afton 161kV	0	See Previous	See Previous
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	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	Delaware - Neosho 345kV	0	See Previous	See Previous
08SP	AEPW-AEPW	Broken Arrow 81St - Broken Arrow 101St North 138kV	235	Riverside Sta. Auto 138/345kV Transformer	0	Rebuild 2.05 miles of 795 ACSR with 1590 ACSR	\$ 1,100,000
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	WFEC-WFEC	Carter Jct - Dill Jct 69kV	26	Pine Ridge - Washita 69kV	0	Solution Undetermined	Not Available
08SP	AEPW-AEPW	Chamber Springs - Tontitown 161kV	244	Tulsa North - Northeast Sta. 345kV	0	See Previous	See Previous

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

Study Year	From Area - To Area	Branch Over 100% Rate B	Rate B	Outaged Branch Causing Overload	ATC	Solution	Estimated Cost
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	Multiple Outage Contingency SW Shreveport - Longwood 345kV SW Shreveport to 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	Circle - Hutchinson Gas Turbine Sta. 115kV	245	Hutchinson Energy Center 69/431kV Transformer	33	Solution Undetermined	Not Available
08SP	AEPW-WERE	Coffeyville Tap - Dearing 138kV	210	Delaware - Neosho 345kV	45	Replace wave trap to increase rating to conductor rating (2000 A)	\$ 20,000
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	66	May be relieved due to Westar Transmission Operating Directive 1203	Not Available
08SP	SWPS-SWPS	Curry County - Roosevelt County 115kV ckt 2	161	Oasis Interchange 115/230kV Transformer Ckt 1	0	Solution Undetermined	Not Available
08SP	AEPW-AEPW	Elm Springs Rec - Tontitown 161kV	306	South Fayetteville - Farmington Aecc 161kV	0	See Previous	See Previous
08SP	AEPW-EES	Fulton - Patmos 115kV	174	Ft Smith - ANO 500kV	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	AEPW-AEPW	Jacksonville (Swe-Rc-Etec) - Overton 138kV	235	Crockett - Tenaska Rusk County 345kV	0	Reset relays at Jacksonville & Overton	\$ 15,000
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	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	Reconductor 4.66 miles of bundled 266 ACSR with 1590 ACSR and replace jumpers & Bus Riser jumpers	\$ 1,577,000
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	Lawrence Hill 230/561kV Transformer	0	May be relieved due to Westar Transmission Operating Directive 803	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 Mcpherson 115kV	68	East Mcpherson - Summit 230kV	0	May be relieved due to Westar Transmission Operating Directive 613	Not Available
08SP	WERE-WERE	NA Philips Jct (South) - West Mcpherson 115kV	68	NA Philips Jct (South) - West Mcpherson 115kV Ckt 2	60	See Previous	See Previous
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

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

Study Year	From Area - To Area	Branch Over 100% Rate B	Rate B	Outaged Branch Causing Overload	ATC	Solution	Estimated Cost
08SP	AECI-AECI	Stilwell - Titantic Tap 69kV	36	Sallisaw - Brushy 69kV	0	Line Owned by GRDA - Solution Undetermined	Not Available
08SP	WERE-WERE	Tecumseh Hill - 27Th & Croco 115kV ckt 1	68	Tecumseh Hill - 27Th & Croco 115kV Ckt 2	6	Solution Undetermined	Not Available
08SP	WERE-WERE	Tecumseh Hill - Stull Swi Sta. 115kV	92	Lawrence Hill 230/561kV Transformer	0	See Previous	See Previous
08WP	SWPA-EES	Carthage - Reed Springs 69kV	43	Carthage - Jasper 69kV	0	Third Party Facility	\$ -
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	Clifton - Concordia 115kV	25	See Previous	See Previous
08WP	WERE-WERE	County Line - Hook Jct 115kV	92	Tecumseh Energy Center - Tecumseh Hill 115kV	95	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	Iatan - St Joe 345kV	28	May be relieved due to Westar Transmission Operating Directive 803	Not Available
						Total (Excludes Costs Not Available)	\$ 51,361,470