



SPP *Southwest Power Pool*

*System Impact Study
SPP-2003-116-2
For The Designation of a New
Network Resource
Requested By
Empire District Electric Company*

*For a Reserved Amount Of 250 MW
From 6/1/2008
To 6/1/2028*

SPP Engineering, Tariff Studies

System Impact Study

Empire District Electric Company has requested a system impact study to designate a New Network Resource in the EDE Control Area for 250 MW to serve EDE Network Load in the EDE Control Area. The period of the service requested is from 6/1/2008 to 6/1/2028. The OASIS reservation number is 515018. 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 requested service was modeled as a 250 MW transfer from the New Network Resource to existing marginally dispatched EDE Network Resources in the EDE Control Area. The request 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 mode that have not gone to facility study mode were not included in the 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 EDE to EDE 250 MW request.

Seven seasonal models were used to study the EDE to EDE 250 MW request for the requested service period. The SPP 2003 Series Cases 2004 April Min (04AP), 2004 Spring Peak (04G), 2004 Summer Peak (04SP), 2004 Fall Peak (04FA), 2004/05 Winter Peak (04WP), 2009 Summer Peak (09SP), and 2009/10 Winter Peak (09WP) were used to study the impact of the 250 MW request on the SPP system during a the requested service period of 6/1/2008 to 6/1/2028. 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 option to convert MVA branch ratings to estimated MW ratings was used to partially compensate for reactive loading.

With only the higher priority requests that have signed Facility Study Agreements included in the models, the study results of the EDE to EDE 250 MW 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. 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 EDE to EDE 250 MW transfer

Study Case	From Area - To Area	Branch Overload	Rating <MW>	Pre Transfer Loading	%TDF	Outaged Branch Causing Overload	ATC <MW>	Solution	Estimated Cost
04AP	WERE-WERE	57631 CC4VERN2 69 57636 GREEN 2 69 1	44	44	0.5	56797 WOLFCKR7 345 57981 LACYGNE7 345 1	86	May be relieved due to Westar Transmission Operating Directive 1304 Overload of the Athens to Wolf Creek 69 kV line	-
04AP	SWPA-EMDE	52686 NEO SPA5 161 59471 NEO184 5 161 1	129	21	54.5	Base Case	199	Solution Undetermined	-
04AP	WERE-WERE	57623 ATHENS 2 69 57631 CC4VERN2 69 1	44	43	0.5	56797 WOLFCKR7 345 57981 LACYGNE7 345 1	201	May be relieved due to Westar Transmission Operating Directive 1304 Overload of the Athens to Wolf Creek 69 kV line	-
04AP	SWPA-EMDE	52686 NEO SPA5 161 59471 NEO184 5 161 1	156	34	58.3	59471 NEO184 5 161 96748 2NEOSAC 69 1	209	Solution Undetermined	-
04AP	SWPA-EMDE	52686 NEO SPA5 161 59471 NEO184 5 161 1	156	39	55.0	53929 DELWARE7 345 53955 N.E.S.-7 345 1	213	"	-
04AP	SWPA-EMDE	52686 NEO SPA5 161 59471 NEO184 5 161 1	156	37	55.4	59481 MON383 7 345 59984 BRKLINE 7 345 1	215	"	-
04AP	SWPA-EMDE	52686 NEO SPA5 161 59471 NEO184 5 161 1	156	37	55.4	Multiple Outage Contingency: 53140 FLINTCR7 345 59481 MON383 7 345 1 59481 MON383 7 345 59984 BRKLINE 7 345 1	215	"	-
04G	EMDE-EMDE	59561 NOL443 2 69 59566 AND322 2 69 1	49	18	13.3	59471 NEO184 5 161 59692 JANE 51 61 1	234	Solution Undetermined	-
04G	SWPA-EMDE	52686 NEO SPA5 161 59471 NEO184 5 161 1	157	21	56.5	59481 MON383 7 345 59984 BRKLINE 7 345 1	241	Solution Undetermined	-
04G	SWPA-EMDE	52686 NEO SPA5 161 59471 NEO184 5 161 1	157	21	56.5	Multiple Outage Contingency: 53140 FLINTCR7 345 59481 MON383 7 345 1 59481 MON383 7 345 59984 BRKLINE 7 345 1	241	"	-
04G	SWPA-EMDE	52686 NEO SPA5 161 59471 NEO184 5 161 1	157	14	59.2	59471 NEO184 5 161 96748 2NEOSAC 69 1	242	"	-
04G	SWPA-EMDE	52686 NEO SPA5 161 59471 NEO184 5 161 1	130	7	55.7	Base Case	246	"	-
04G	EMDE-EMDE	59471 NEO184 5 161 59692 JANE 51 61 1	218	54	66.6	Base Case	247	Solution Undetermined	-
04SP	AEPW-AEPW	53133 ECNTRTN5 161 53187 GENTRYR5 161 1	353	379	1.9	53139 FLINTCR5 161 53170 TONTITN5 161 1	0	Rebuild 19.16 miles of 2-397.5 ACSR with 2156 ACSR. Replace East Centernton Wavetrap & jumpers	\$8,000,000
04SP	AEPW-AEPW	53133 ECNTRTN5 161 53187 GENTRYR5 161 1	304	305	1.4	Base Case	0	See Previous	-
04SP	AEPW-AEPW	53139 FLINTCR5 161 53170 TONTITN5 161 1	311	414	2.6	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 53170 TONTITN5 161 1	311	407	2.6	53133 ECNTRTN5 161 53187 GENTRYR5 161 1	0	See Previous	-
04SP	AEPW-AEPW	53139 FLINTCR5 161 53170 TONTITN5 161 1	311	366	1.6	53154 CHAMSPR5 161 53170 TONTITN5 161 1	0	"	-
04SP	AEPW-AEPW	53139 FLINTCR5 161 53170 TONTITN5 161 1	311	356	1.1	53155 CHAMSPR7 345 53756 CLARKSV7 345 1	0	"	-
04SP	AEPW-AEPW	53139 FLINTCR5 161 53170 TONTITN5 161 1	311	356	1.1	53154 CHAMSPR5 161 53155 CHAMSPR7 345 1	0	"	-
04SP	AEPW-AEPW	53139 FLINTCR5 161 53187 GENTRYR5 161 1	353	396	1.9	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	53139 FLINTCR5 161 53187 GENTRYR5 161 1	353	365	1.5	53144 LOWELL 5 161 53170 TONTITN5 161 1	0	See Previous	-
04SP	AEPW-AEPW	53139 FLINTCR5 161 53187 GENTRYR5 161 1	353	358	1.5	53144 LOWELL 5 161 53152 ROGERS 5 161 1	0	"	-
04SP	AEPW-AEPW	53139 FLINTCR5 161 53187 GENTRYR5 161 1	303	323	1.4	Base Case	0	"	-
04SP	EMDE-EMDE	96748 2NEOSAC 69 96750 2NEOSHO 69 1	43	9	15.5	52686 NEO SPA5 161 59471 NEO184 5 161 1	219	Solution Undetermined	-
04SP	EMDE-EMDE	59561 NOL443 2 69 59566 AND322 2 69 1	49	20	13.0	59471 NEO184 5 161 59692 JANE 51 61 1	224	Solution Undetermined	-
04SP	EMDE-EMDE	59471 NEO184 5 161 59692 JANE 51 61 1	217	59	66.1	Base Case	240	Solution Undetermined	-
04SP	EMDE-EMDE	59496 NOL435 5 161 B141 NOEL 1 1	75	36	16.1	59471 NEO184 5 161 59692 JANE 51 61 1	241	Solution Undetermined	-
04SP	EMDE-EMDE	59610 NOL435 2 69 B141 NOEL 1 1	75	36	16.1	59471 NEO184 5 161 59692 JANE 51 61 1	242	"	-
04SP	EMDE-EMDE	59471 NEO184 5 161 96748 2NEOSAC 69 1	79	32	19.4	52686 NEO SPA5 161 59471 NEO184 5 161 1	242	Solution Undetermined	-
04FA	EMDE-EMDE	59561 NOL443 2 69 59566 AND322 2 69 1	49	21	13.2	59471 NEO184 5 161 59692 JANE 51 61 1	211	Solution Undetermined	-
04FA	SWPA-EMDE	52686 NEO SPA5 161 59471 NEO184 5 161 1	157	33	56.4	53140 FLINTCR7 345 59481 MON383 7 345 1	219	Solution Undetermined	-
04FA	SWPA-EMDE	52686 NEO SPA5 161 59471 NEO184 5 161 1	157	33	56.4	59481 MON383 7 345 59984 BRKLINE 7 345 1	219	"	-

Table 1 continued – SPP facility overloads identified for the EDE to EDE 250 MW transfer

Study Case	From Area - To Area	Branch Overload	Rating <MW>	Pre Transfer Loading	%TDF	Outaged Branch Causing Overload	ATC <MW>	Solution	Estimated Cost
04FA	SWPA-EMDE	52686 NEO SPA5 161 59471 NEO184 5 161 1	157	33	56.4	Multiple Outage Contingency: 53140 FLINTCR7 345 59481 MON383 7 345 1 59481 MON383 7 345 59984 BRKLINE 7 345 1	219	Solution Undetermined	-
04FA	SWPA-EMDE	52686 NEO SPA5 161 59471 NEO184 5 161 1	157	25	59.2	59471 NEO184 5 161 96748 2NEOSAC 69 1	223	"	-
04FA	EMDE-EMDE	59471 NEO184 5 161 59692 JANE 51 61 1	218	65	66.6	Base Case	230	Solution Undetermined	-
04FA	SWPA-EMDE	52686 NEO SPA5 161 59471 NEO184 5 161 1	130	1	55.7	Base Case	231	Solution Undetermined	-
04WP	AEPW-AEPW	53139 FLINTCR5 161 53170 TONTITN5 161 1	334	345	2.6	53139 FLINTCR5 161 53187 GENTRYR5 161 1	0	See Previous	-
04WP	AEPW-AEPW	53139 FLINTCR5 161 53170 TONTITN5 161 1	334	340	2.6	53133 ECNTRTN5 161 53187 GENTRYR5 161 1	0	"	-
09SP	SWPA-SPRM	52692 SPRGFLD5 161 59969 BRKLINE 5 161 1	309	379	7.0	59954 SWPS 5 161 59960 SWDISP 5 161 1	0	Replace disconnect switches at Springfield.	\$60,000
09SP	SWPA-SPRM	52692 SPRGFLD5 161 59969 BRKLINE 5 161 1	309	376	7.0	59959 BATFLD 5 161 59960 SWDISP 5 161 1	0	See Previous	-
09SP	SWPA-SPRM	52692 SPRGFLD5 161 59969 BRKLINE 5 161 1	309	357	6.0	59955 JUNCTN 5 161 59969 BRKLINE 5 161 1	0	"	-
09SP	AEPW-AEPW	53133 ECNTRTN5 161 53187 GENTRYR5 161 1	353	438	2.1	53139 FLINTCR5 161 53170 TONTITN5 161 1	0	See Previous	-
09SP	AEPW-AEPW	53133 ECNTRTN5 161 53187 GENTRYR5 161 1	353	402	1.7	53144 LOWELL 5 161 53170 TONTITN5 161 1	0	"	-
09SP	AEPW-AEPW	53133 ECNTRTN5 161 53187 GENTRYR5 161 1	353	393	1.7	53144 LOWELL 5 161 53152 ROGERS 5 161 1	0	"	-
09SP	AEPW-AEPW	53133 ECNTRTN5 161 53187 GENTRYR5 161 1	353	384	1.5	53154 CHAMSPR5 161 53195 FARMGTN5 161 1	0	"	-
09SP	AEPW-AEPW	53133 ECNTRTN5 161 53187 GENTRYR5 161 1	353	382	1.4	53154 CHAMSPR5 161 53170 TONTITN5 161 1	0	"	-
09SP	AEPW-ENTR	53136 EUREKA 5 161 99832 5OSAGE # 161 1	244	245	1.7	52660 BULL SH5 161 99802 5BULLSH 161 1	0	Rebuild 5.34 miles of 666 ACSR with 1590 ACSR. Replace wavetrap jumpers @ Eureka Springs	\$2,400,000
09SP	AEPW-AEPW	53139 FLINTCR5 161 53154 CHAMSPR5 161 1	331	350	0.9	53155 CHAMSPR7 345 53756 CLARKSV7 345 1	0	Rebuild 14.33 Miles with 2156 ACSR and Replace Terminal Equipment	\$7,200,000
09SP	AEPW-AEPW	53139 FLINTCR5 161 53154 CHAMSPR5 161 1	331	349	0.9	53154 CHAMSPR5 161 53155 CHAMSPR7 345 1	0	See Previous	-
09SP	AEPW-AEPW	53139 FLINTCR5 161 53170 TONTITN5 161 1	305	479	2.8	53139 FLINTCR5 161 53187 GENTRYR5 161 1	0	See Previous	-
09SP	AEPW-AEPW	53139 FLINTCR5 161 53170 TONTITN5 161 1	305	468	2.8	53133 ECNTRTN5 161 53187 GENTRYR5 161 1	0	"	-
09SP	AEPW-AEPW	53139 FLINTCR5 161 53170 TONTITN5 161 1	305	423	1.8	53154 CHAMSPR5 161 53170 TONTITN5 161 1	0	"	-
09SP	AEPW-AEPW	53139 FLINTCR5 161 53170 TONTITN5 161 1	305	415	1.2	53155 CHAMSPR7 345 53756 CLARKSV7 345 1	0	"	-
09SP	AEPW-AEPW	53139 FLINTCR5 161 53170 TONTITN5 161 1	305	415	1.2	53154 CHAMSPR5 161 53155 CHAMSPR7 345 1	0	"	-
09SP	AEPW-AEPW	53139 FLINTCR5 161 53187 GENTRYR5 161 1	350	463	2.1	53139 FLINTCR5 161 53170 TONTITN5 161 1	0	See Previous	-
09SP	AEPW-AEPW	53139 FLINTCR5 161 53187 GENTRYR5 161 1	350	426	1.7	53144 LOWELL 5 161 53170 TONTITN5 161 1	0	"	-
09SP	AEPW-AEPW	53139 FLINTCR5 161 53187 GENTRYR5 161 1	350	417	1.7	53144 LOWELL 5 161 53152 ROGERS 5 161 1	0	"	-
09SP	AEPW-AEPW	53139 FLINTCR5 161 53187 GENTRYR5 161 1	350	408	1.5	53154 CHAMSPR5 161 53195 FARMGTN5 161 1	0	"	-
09SP	AEPW-AEPW	53139 FLINTCR5 161 53187 GENTRYR5 161 1	350	406	1.4	53154 CHAMSPR5 161 53170 TONTITN5 161 1	0	"	-
09SP	AEPW-AEPW	53170 TONTITN5 161 53194 ELMSPRR5 161 1	335	357	0.7	53131 DYESS 5 161 53170 TONTITN5 161 1	0	Rebuild 1.6 miles of 2-397 ACSR with 2156 ACSR. Replace Elm Springs Switch and Strain Bus	\$1,000,000
09SP	EMDE-EMDE	59483 JOP389 5 161 B094 JOPLINSW 1 1	75	78	1.1	59472 TIP292 5 161 59483 JOP389 5 161 1	0	Replace 161/69 KV Transformer with a 150 MVA Transformer.	\$1,565,000
09SP	EMDE-EMDE	59592 JOP389 2 69 B094 JOPLINSW 1 1	75	78	1.1	59472 TIP292 5 161 59483 JOP389 5 161 1	0	See Previous	-
09SP	EMDE-EMDE	59483 JOP389 5 161 B094 JOPLINSW 1 1	75	74	3.5	59483 JOP389 5 161 59607 JOP422 5 161 1	18	"	-
09SP	EMDE-EMDE	59592 JOP389 2 69 B094 JOPLINSW 1 1	75	74	3.5	59483 JOP389 5 161 59607 JOP422 5 161 1	22	"	-
09SP	EMDE-EMDE	59500 RNM393 5 161 B150 REINMILL 1 1	75	74	0.5	59472 TIP292 5 161 59483 JOP389 5 161 1	39	Replace 161/69 KV Transformer with a 150 MVA Transformer.	\$1,565,000
09SP	AEPW-ENTR	53136 EUREKA 5 161 99832 5OSAGE # 161 1	244	243	1.7	99802 5BULLSH 161 99809 5FLIPN 161 1	48	See Previous	-
09SP	SWPA-SPRM	52692 SPRGFLD5 161 59969 BRKLINE 5 161 1	309	306	5.9	59955 JUNCTN 5 161 59956 NICHOLS5 161 1	53	See Previous	-
09SP	EMDE-EMDE	59483 JOP389 5 161 B094 JOPLINSW 1 1	75	71	3.5	59593 JOP391 5 161 59607 JOP422 5 161 1	114	See Previous	-
09SP	EMDE-EMDE	59592 JOP389 2 69 B094 JOPLINSW 1 1	75	71	3.5	59593 JOP391 5 161 59607 JOP422 5 161 1	118	"	-
09SP	SWPA-SPRM	52692 SPRGFLD5 161 59969 BRKLINE 5 161 1	309	299	7.8	52692 SPRGFLD5 161 59959 BATFLD 5 161 1	125	See Previous	-
09SP	EMDE-EMDE	59483 JOP389 5 161 B094 JOPLINSW 1 1	75	70	3.9	59470 JOP145 5 161 59498 STL439 5 161 1	132	See Previous	-
09SP	EMDE-EMDE	59592 JOP389 2 69 B094 JOPLINSW 1 1	75	70	3.9	59470 JOP145 5 161 59498 STL439 5 161 1	135	"	-

Table 1 continued – SPP facility overloads identified for the EDE to EDE 250 MW transfer

Study Case	From Area - To Area	Branch Overload	Rating <MW>	Pre Transfer Loading	%TDF	Outaged Branch Causing Overload	ATC <MW>	Solution	Estimated Cost
09SP	EMDE-EMDE	59483 JOP389 5 161 B094 JOPLINSW 1 1	75	69	4.6	59539 JOP145 2 69 B095 JOPLINW 1 1	136	See Previous	-
09SP	EMDE-EMDE	59592 JOP389 2 69 B094 JOPLINSW 1 1	75	68	4.6	59539 JOP145 2 69 B095 JOPLINW 1 1	139	"	-
09SP	EMDE-EMDE	59595 RNM393 2 69 B150 REINMILL 1 1	75	74	0.5	59472 TIP292 5 161 59483 JOP389 5 161 1	174	See Previous	-
09SP	EMDE-EMDE	59554 BAX271 2 69 59601 HOC404 2 69 1	61	36	10.3	59539 JOP145 2 69 B095 JOPLINW 1 1	238	Solution Undetermined	-
09SP	EMDE-EMDE	59554 BAX271 2 69 59601 HOC404 2 69 1	61	36	10.3	59470 JOP145 5 161 B095 JOPLINW 1 1	238	"	-
09SP	EMDE-EMDE	59610 NOL435 2 69 B142 NOEL 1 1	75	36	15.9	59471 NEO184 5 161 59692 JANE 51 61 1	246	Solution Undetermined	-
09SP	EMDE-EMDE	59496 NOL435 5 161 B142 NOEL 1 1	75	36	15.9	59471 NEO184 5 161 59692 JANE 51 61 1	247	"	-
09WP	SWPA-SPRM	52692 SPRGFLD5 161 59969 BRKLINE 5 161 1	318	337	3.2	59954 SWPS 5 161 59960 SWDISP 5 161 1	0	See Previous	-
09WP	SWPA-SPRM	52692 SPRGFLD5 161 59969 BRKLINE 5 161 1	318	335	3.2	59959 BATFLD 5 161 59960 SWDISP 5 161 1	0	"	-
09WP	SWPA-SPRM	52692 SPRGFLD5 161 59969 BRKLINE 5 161 1	318	321	2.7	59955 JUNCTN 5 161 59969 BRKLINE 5 161 1	0	"	-
09WP	AEPW-AEPW	53133 ECNTRTN5 161 53187 GENTRYR5 161 1	367	387	1.9	53139 FLINTCR5 161 53170 TONTITN5 161 1	0	See Previous	-
09WP	AEPW-AEPW	53139 FLINTCR5 161 53170 TONTITN5 161 1	330	408	2.6	53139 FLINTCR5 161 53187 GENTRYR5 161 1	0	See Previous	-
09WP	AEPW-AEPW	53139 FLINTCR5 161 53170 TONTITN5 161 1	330	400	2.6	53133 ECNTRTN5 161 53187 GENTRYR5 161 1	0	"	-
09WP	AEPW-AEPW	53139 FLINTCR5 161 53170 TONTITN5 161 1	330	354	1.6	53154 CHAMSPR5 161 53170 TONTITN5 161 1	0	"	-
09WP	AEPW-AEPW	53139 FLINTCR5 161 53170 TONTITN5 161 1	330	346	1.0	53155 CHAMSPR7 345 53756 CLARKSV7 345 1	0	"	-
09WP	AEPW-AEPW	53139 FLINTCR5 161 53170 TONTITN5 161 1	330	346	1.0	53154 CHAMSPR5 161 53155 CHAMSPR7 345 1	0	"	-
09WP	AEPW-AEPW	53139 FLINTCR5 161 53187 GENTRYR5 161 1	360	406	1.9	53139 FLINTCR5 161 53170 TONTITN5 161 1	0	See Previous	-
09WP	AEPW-AEPW	53139 FLINTCR5 161 53187 GENTRYR5 161 1	360	381	1.4	53144 LOWELL 5 161 53170 TONTITN5 161 1	0	"	-
09WP	AEPW-AEPW	53139 FLINTCR5 161 53187 GENTRYR5 161 1	360	374	1.4	53144 LOWELL 5 161 53152 ROGERS 5 161 1	0	"	-
09WP	AEPW-AEPW	53139 FLINTCR5 161 53187 GENTRYR5 161 1	360	361	2.0	Multiple Outage Contingency: 53140 FLINTCR7 345 59481 MON383 7 345 1 59481 MON383 7 345 59984 BRKLINE 7 345 1	0	"	-
09WP	AEPW-AEPW	53139 FLINTCR5 161 53187 GENTRYR5 161 1	360	361	2.0	53140 FLINTCR7 345 59481 MON383 7 345 1	0	"	-
Total Estimated Cost									\$30,440,000