



SPP *Southwest Power Pool*

***System Impact Study SPP-2002-223
For Transmission Service
Requested By
Cargill - Alliant***

From MCLN To ERCOTN

***For a Reserved Amount Of 150 MW
From 2/01/2003 To 2/1/2004
With a Deferred Service Period
From 5/1/2005 To 5/1/2006***

SPP Tariff Studies

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ATTACHMENT: *SPP-2002-223 Tables*

1. Executive Summary

Cargill - Alliant (CRGL) has requested a system impact study for Point-to-Point Service from MCLN to ERCOTN for 150 MW. The requested period of service is from 2/1/03 to 2/1/04. The SWPP OASIS Reservation numbers are 453705, 453706, and 453708.

This study is a revision to a previous study conducted for this service using PTI's MUST FCITC DC Analysis where numerous limiting facilities were identified. The principal objective of this study is to identify current system limitations using AC analyses and to determine the system upgrades necessary to provide the requested service.

Table 1 lists the SPP Facility Overloads caused or impacted by the requested service and includes solutions with engineering and construction costs to alleviate the limiting facilities. Table 2 includes Non - SPP Facility Overloads caused or impacted by the requested service. Excluding any third party requirements and additional upgrades that may be required after modeling the assigned upgrades, the total engineering and construction cost to provide the requested service is determined in Table 1. For Non-SPP third-party facilities listed in Table 2, the facility limitations will be mitigated in accordance with Section 21 of the SWPP OATT.

Excluding any third party requirements and additional upgrades that may be required after modeling the assigned upgrades, the total engineering and construction cost required to provide the requested service is \$14,624,000. The ATC is determined to be zero until the majority of the assigned upgrades are constructed. The estimated in-service date of the upgrades to alleviate the most limiting Summer Peak and Winter Peak facilities is 5/1/2005. One facility was identified that limits the renewal rights of the requested service. A facility study may now be conducted to summarize the operating limits and to determine the financial characteristics associated with the requested service.

2. Introduction

Cargill - Alliant (CRGL) has requested a system impact study for Point-to-Point Service from MCLN to ERCOTN for 150 MW. The principal objective of this study is to identify the restraints on the SPP Regional Tariff System that may limit the requested service and determine the least cost solutions required to alleviate the limiting facilities.

This study includes steady-state contingency analyses (PSS/E function ACCC) and Available Transfer Capability (ATC) analyses. The steady-state analyses consider the impact of the 150 MW transfer and the impact of the required upgrades for service on transmission line loading and transmission bus voltages for outages of single and selected multiple transmission lines and transformers on the SPP systems and first tier Non - SPP systems.

3. Study Methodology

A. Description

The system impact analysis was conducted to determine the steady-state impact of the 150 MW transfer on the SPP and first tier Non - SPP systems. The steady-state analysis was done to ensure current SPP Criteria and NERC Planning Standards requirements are fulfilled. The Southwest Power Pool conforms to the NERC Planning Standards, which provide the strictest requirements, related to voltage violations and thermal overloads during normal conditions and during a contingency. It requires that all facilities be within normal operating ratings for normal system conditions and within emergency ratings after a contingency.

B. Model Updates

SPP used nine seasonal models to study the MCLN to ERCOTN 150 MW transfer for the requested service period. The SPP 2003 Series Cases 2003 Fall Peak (03FA), 2003 Winter Peak (03WP), 2004 April Minimum (04AP), 2004 Spring Peak (04G), 2004 Summer Peak (04SP), 2004 Fall Peak (04FA), 2004 Winter Peak (04WP), 2009 Summer Peak (09SP), and 2009/10 Winter Peak (09WP) were used to study the impact of the 150 MW transfer on the SPP system during the requested service period of 2/1/03 to 2/1/2004 and deferred service period of 5/1/2005 to 5/1/2006.

The chosen base case models were modified to reflect the most current modeling information. The Lamar HVDC Tie and Designated Network Resource were added to the 2004 models coupled with the 2009 models as a proxy for the study years not included in the SPP 2003 Series Cases. The base case models include confirmed East to West transfers not already included in the January 2003 base case series models, SPS Importing, and the Lamar HVDC Tie flowing from Lamar to SPS.

C. Transfer Analysis

Using the selected cases both with and without the requested transfer modeled, the PSS/E Activity ACCC was run on the cases and compared to determine the facility overloads caused or impacted by the transfer. The PSS/E options chosen to conduct the analysis can be found in Appendix A.

D. Upgrade Analysis

This system impact study does not include analysis with the assigned upgrades modeled. To determine the final cost and possible start date of the requested service, additional analysis will be performed to determine the impact of modeling the assigned upgrades for the 150 MW MCLN to ERCOTN transfer.

4. Study Results

A. Study Analysis Results

Tables 1 and 2 contain the steady-state analysis results of the System Impact Study. The Tables are in the attached workbook *SPP-2002-223 Tables*. The tables identify the seasonal case in which the event occurred, the facility control area location, applicable ratings of the overloaded facility, the loading percentage with and without the studied transfer, and the estimated ATC value using interpolation if calculated. Comments are provided in the tables to document any SPP or Non - SPP identification or assignment of the event, existing mitigations plans or criteria to disregard the event as a limiting constraint, upgrades and costs to mitigate a limiting constraint, or any specific study procedures associated with modeling an event.

Table 1 lists the SPP Facility Overloads caused or impacted by the 150 MW transfer. Solutions with engineering and construction costs are provided in the tables.

Table 2 lists overloads on first tier Non - SPP Regional Tariff participants' transmission systems caused or impacted by the 150 MW transfer. Analysis was not conducted to determine the mitigating effects of the selected upgrades on the Non – SPP facilities listed in Table 2.

Table 1a documents the modeling representation of the events identified in Table 1 to include bus numbers and bus names.

One facility was identified as limiting the rollover rights of the transmission service. These facilities can be found in Table 1. The date provided with these identified limitations depicts at which point the facility is a limitation for the renewal of the requested transmission service.

5. Conclusion

Excluding any third party requirements and additional upgrades that may be required after modeling the assigned upgrades, the total engineering and construction cost required to provide the requested service is \$14,624,000. The ATC is determined to be zero until the majority of the assigned upgrades are constructed. The estimated in-service date of the upgrades to alleviate the most limiting Summer Peak and Winter Peak facilities is 5/1/2005. One facility was identified that limits the renewal rights of the requested service. A facility study may now be conducted to summarize the operating limits and to determine the financial characteristics associated with the requested service.

Appendix A

PSS/E CHOICES IN RUNNING LOAD FLOW PROGRAM AND ACCC

BASE CASES:

Solutions - Fixed slope decoupled Newton-Raphson solution (FDNS)

1. Tap adjustment – Stepping
2. Area interchange control – Tie lines only
3. Var limits – Apply immediately
4. Solution options - Phase shift adjustment
 - Flat start
 - Lock DC taps
 - Lock switched shunts

ACCC CASES:

Solutions – AC contingency checking (ACCC)

1. MW mismatch tolerance – 0.5
2. Contingency case rating – Rate B
3. Percent of rating – 100
4. Output code – Summary
5. Min flow change in overload report – 1mw
6. Excl'd cases w/ no overloads form report – YES
7. Exclude interfaces from report – NO
8. Perform voltage limit check – YES
9. Elements in available capacity table – 60000
10. Cutoff threshold for available capacity table – 99999.0
11. Min. contng. case Vltg chng for report – 0.02
12. Sorted output – None

Newton Solution:

1. Tap adjustment – Stepping
2. Area interchange control – Tie lines only
3. Var limits - Apply automatically
4. Solution options - Phase shift adjustment
 - Flat start
 - Lock DC taps
 - Lock switched shunts

Study Year	From Area	To Area	Monitored Branch Over 100% Rate B	Rate B	BC % Loading	TC % Loading	Outaged Branch Causing Overload	ATC (MW)	Solution	Cost
03FA	WFEC	WFEC	ACME - FRANKLIN SW 69KV	34	122.3	126.2	CANADIAN SW 138/69KV TRANSFORMER	0	Acme Jct to Acme Sub: Upgrade From 3/0 To 795MCM. Upgrade by WFEC schedules for 04SP	\$ -
03FA	WFEC	WFEC	ACME - FRANKLIN SW 69KV	34	103.4	106.4	CANADIAN SW - GOLDSBY 69KV	0	See Previous	\$ -
03WP	WFEC	WFEC	ACME - FRANKLIN SW 69KV	34	152.4	156.7	CANADIAN SW 138/69KV TRANSFORMER	0	See Previous	\$ -
03WP	WFEC	WFEC	ACME - FRANKLIN SW 69KV	34	110.0	113.0	GOLDSBY - OKLAHOMA UNIVERSITY SW 69KV	0	See Previous	\$ -
04AP	WFEC	WFEC	ACME - FRANKLIN SW 69KV	34	131.0	135.3	CANADIAN SW 138/69KV TRANSFORMER	0	See Previous	\$ -
04AP	WFEC	WFEC	ACME - FRANKLIN SW 69KV	34	114.8	118.5	CANADIAN SW - GOLDSBY 69KV	0	See Previous	\$ -
04AP	WFEC	WFEC	ACME - FRANKLIN SW 69KV	34	102.2	106.0	GOLDSBY - OKLAHOMA UNIVERSITY SW 69KV	0	See Previous	\$ -
04G	WFEC	WFEC	ACME - FRANKLIN SW 69KV	34	121.8	125.9	CANADIAN SW 138/69KV TRANSFORMER	0	See Previous	\$ -
04G	WFEC	WFEC	ACME - FRANKLIN SW 69KV	34	107.3	110.5	CANADIAN SW - GOLDSBY 69KV	0	See Previous	\$ -
03WP	WFEC	WFEC	ACME - WEST NORMAN 69KV	38	118.6	122.6	CANADIAN SW 138/69KV TRANSFORMER	0	Acme Sub > West Norman: Upgrade from 3/0 to 795 ACSR. Upgrade by WFEC scheduled for 04WP	\$ -
04AP	WFEC	WFEC	ACME - WEST NORMAN 69KV	38	108.6	112.5	CANADIAN SW 138/69KV TRANSFORMER	0	See Previous	\$ -
04FA	WFEC	WFEC	ACME - WEST NORMAN 69KV	38	103.0	107.1	CANADIAN SW 138/69KV TRANSFORMER	0	See Previous	\$ -
04G	WFEC	WFEC	ACME - WEST NORMAN 69KV	38	100.3	104.0	CANADIAN SW 138/69KV TRANSFORMER	0	See Previous	\$ -
04SP	WFEC	WFEC	ACME - WEST NORMAN 69KV	38	140.1	143.9	CANADIAN SW 138/69KV TRANSFORMER	0	See Previous	\$ -
04SP	WFEC	WFEC	ACME - WEST NORMAN 69KV	38	118.1	120.8	CANADIAN SW - GOLDSBY 69KV	0	See Previous	\$ -
04SP	WFEC	WFEC	ACME - WEST NORMAN 69KV	38	101.4	104.5	GOLDSBY - OKLAHOMA UNIVERSITY SW 69KV	0	See Previous	\$ -
04SP	SPS	SPS	CANYON EAST - CANYON WEST 115KV	99	99.5	102.4	BUSHLAND INTRCHNG - DEAF SMITH INTRCHNG 230KV	25	Rebuild 4 miles of 115 kV circuit with 397 ACSR on T-0-102 structures.	\$ 590,000
04AP	SPS	SPS	CANYON EAST - OSAGE SWITCHING STA 115KV	99	98.7	101.4	BUSHLAND INTRCHNG - DEAF SMITH INTRCHNG 230KV	72	Rebuild 13 miles of 115 kV circuit with 397 ACSR on T-0-102 structures.	\$ 1,910,000
04G	SPS	SPS	CANYON EAST - OSAGE SWITCHING STA 115KV	99	97.7	100.5	BUSHLAND INTRCHNG - DEAF SMITH INTRCHNG 230KV	124	See Previous	\$ -
04SP	SPS	SPS	CANYON EAST - OSAGE SWITCHING STA 115KV	99	113.2	116.1	BUSHLAND INTRCHNG - DEAF SMITH INTRCHNG 230KV	0	See Previous	\$ -
09SP	SPS	SPS	CANYON EAST - OSAGE SWITCHING STA 115KV	99	106.1	109.1	BUSHLAND INTRCHNG - DEAF SMITH INTRCHNG 230KV	0	See Previous	\$ -
04FA	WERE	WERE	EXIDE JCT - N.A. PHILIPS 115KV	196	101.9	102.4	EAST MCPHERSON - SUMMIT 230KV	0	Relieved or Impact Removed by Selected Upgrades to be Assigned	\$ -
04FA	WERE	WERE	EXIDE JCT - SUMMIT 115KV	196	107.7	108.2	EAST MCPHERSON - SUMMIT 230KV	0	Relieved or Impact Removed by Selected Upgrades to be Assigned	\$ -
09WP	WERE	WERE	EXIDE JCT - SUMMIT 115KV	196	102.5	103.4	EAST MCPHERSON - SUMMIT 230KV	0	Relieved or Impact Removed by Selected Upgrades to be Assigned	\$ -
04SP	WFEC	OKGE	FRANKLIN SW - MIDWEST TAP 138KV	215	98.3	101.5	CROMWELL - WETUMKA 138KV	79	Replace 800 amp wavetrap with 2000 amp wavetrap at Franklin Switch and 795ACSR jumpers with 1590ACSR, connectors	\$ 24,000
04SP	WFEC	OKGE	FRANKLIN SW - MIDWEST TAP 138KV	215	98.2	101.4	PHAROAH - WETUMKA 138KV	85	See Previous	\$ -
09SP	WFEC	OKGE	FRANKLIN SW - MIDWEST TAP 138KV	215	111.7	114.8	CROMWELL - WETUMKA 138KV	0	See Previous	\$ -
09SP	WFEC	OKGE	FRANKLIN SW - MIDWEST TAP 138KV	215	111.5	114.7	PHAROAH - WETUMKA 138KV	0	See Previous	\$ -
09SP	WFEC	OKGE	FRANKLIN SW - MIDWEST TAP 138KV	215	108.9	112.1	CROMWELL - WEWOKA 138KV	0	See Previous	\$ -
09SP	WFEC	OKGE	FRANKLIN SW - MIDWEST TAP 138KV	215	106.7	108.8	ANADARKO - POCASSETT 138KV	0	See Previous	\$ -
09SP	WFEC	OKGE	FRANKLIN SW - MIDWEST TAP 138KV	215	105.1	107.0	POCASSETT - TUTTLE 138KV	0	See Previous	\$ -
09SP	WFEC	OKGE	FRANKLIN SW - MIDWEST TAP 138KV	215	100.4	104.0	DRAPER LAKE - SOONER TAP 138KV	0	See Previous	\$ -
09SP	WFEC	OKGE	FRANKLIN SW - MIDWEST TAP 138KV	215	100.8	102.9	SUNSHINE CANYON - TUTTLE 138KV	0	See Previous	\$ -
09SP	WFEC	OKGE	FRANKLIN SW - MIDWEST TAP 138KV	215	98.5	102.7	PHAROAH - WELEETKA 138KV	55	See Previous	\$ -
09SP	WFEC	OKGE	FRANKLIN SW - MIDWEST TAP 138KV	215	95.1	101.5	CANADIAN - CANADIAN SW 138KV	114	See Previous	\$ -
09SP	WFEC	OKGE	FRANKLIN SW - MIDWEST TAP 138KV	215	97.4	101.5	CEDAR LANE - SOONER TAP 138KV	95	See Previous	\$ -
09SP	WFEC	OKGE	FRANKLIN SW - MIDWEST TAP 138KV	215	95.9	101.1	HOLLYWOOD - STUBBEMAN 138KV	119	See Previous	\$ -
09SP	WFEC	OKGE	FRANKLIN SW - MIDWEST TAP 138KV	215	92.8	100.6	CIMARRON - LAWTON EASTSIDE 345KV	139	See Previous	\$ -
09SP	WFEC	WFEC	FRANKLIN SW 138/69KV TRANSFORMER	70	99.4	102.0	CANADIAN SW 138/69KV TRANSFORMER	37	Limits Rollover Rights 09SP	\$ -
09SP	WFEC	WFEC	FRANKLIN SW 138/69KV TRANSFORMER	70	99.6	101.0	CANADIAN SW - GOLDSBY 69KV CKT 1	46	Limits Rollover Rights 09SP	\$ -
04SP	SPS	SPS	HAPPY INTRCHNG - PALODU 115KV	99	100.8	104.6	AMARILLO S INTRCHNG - SWISHER CO INTRCHNG 230KV	0	Rebuild 24 miles of 115 kV circuit with 397 ACSR on T-0-102 structures.	\$ 3,130,000
09SP	SPS	SPS	HAPPY INTRCHNG - PALODU 115KV	99	96.3	100.5	AMARILLO S INTRCHNG - SWISHER CO INTRCHNG 230KV	131	See Previous	\$ -
04FA	WERE	WERE	N.A. PHILIPS - N.A. PHILIPS JCT (STH) 115KV	160	115.9	116.9	EAST MCPHERSON - SUMMIT 230KV	0	Relieved or Impact Removed by Selected Upgrades to be Assigned	\$ -
04WP	WERE	WERE	N.A. PHILIPS - N.A. PHILIPS JCT (STH) 115KV	160	110.8	111.8	EAST MCPHERSON - SUMMIT 230KV	0	Relieved or Impact Removed by Selected Upgrades to be Assigned	\$ -
09WP	WERE	WERE	N.A. PHILIPS - N.A. PHILIPS JCT (STH) 115KV	160	111.5	113.4	EAST MCPHERSON - SUMMIT 230KV	0	Relieved or Impact Removed by Selected Upgrades to be Assigned	\$ -
03WP	WERE	WERE	N.A. PHILIPS JCT (STH) - W MCPHERSON 115KV CKT 1	68	106.7	107.6	EAST MCPHERSON - SUMMIT 230KV	0	Tear down double circuit, build single circuit with 1192.5 ACSR.	\$ 7,800,000
04FA	WERE	WERE	N.A. PHILIPS JCT (STH) - W MCPHERSON 115KV CKT 1	68	125.1	126.2	EAST MCPHERSON - SUMMIT 230KV	0	See Previous	\$ -
04G	WERE	WERE	N.A. PHILIPS JCT (STH) - W MCPHERSON 115KV CKT 1	68	105.8	106.9	EAST MCPHERSON - SUMMIT 230KV	0	See Previous	\$ -

Study Year	From Area	To Area	Monitored Branch Over 100% Rate B	Rate B	BC % Loading	TC % Loading	Outaged Branch Causing Overload	ATC (MW)	Solution	Cost
04WP	WERE	WERE	N.A. PHILIPS JCT (STH) - W MCPHERSON 115KV CKT 1	68	119.6	120.7	EAST MCPHERSON - SUMMIT 230KV	0	See Previous	\$ -
09WP	WERE	WERE	N.A. PHILIPS JCT (STH) - W MCPHERSON 115KV CKT 1	68	120.3	122.4	EAST MCPHERSON - SUMMIT 230KV	0	See Previous	\$ -
04FA	WERE	WERE	N.A. PHILIPS JCT (STH) - W MCPHERSON 115KV CKT 2	92	109.2	110.1	EAST MCPHERSON - SUMMIT 230KV CKT 1	0	Upgrade same as N.A. PHILIPS JCT (STH) - WEST MCPHERSON 115KV CKT 1	\$ -
04WP	WERE	WERE	N.A. PHILIPS JCT (STH) - W MCPHERSON 115KV CKT 2	92	104.3	105.3	EAST MCPHERSON - SUMMIT 230KV CKT 1	0	See Previous	\$ -
09WP	WERE	WERE	N.A. PHILIPS JCT (STH) - W MCPHERSON 115KV CKT 2	92	105.0	106.8	EAST MCPHERSON - SUMMIT 230KV CKT 1	0	See Previous	\$ -
04SP	SPS	SPS	PALODU - RANDALL CO INTRCHNG 115KV	99	102.7	106.4	AMARILLO S INTRCHNG - SWISHER CO INTRCHNG 230KV	0	Rebuild 9 miles of 115 kV circuit with 397 ACSR on T-0-102 structures.	\$ 1,170,000
09SP	SPS	SPS	PALODU - RANDALL CO INTRCHNG 115KV	99	98.0	102.3	AMARILLO S INTRCHNG - SWISHER CO INTRCHNG 230KV	70	See Previous	\$ -
04SP	SPS	SPS	RANDALL CO INTRCHNG 230/115KV TRANSFORMER	258.75	100.9	101.9	AMARILLO S INTRCHNG - NICHOLS STA 230KV CKT 1	0	Open Amarillo STH 230/115KV Transformer to Relieve Facility	\$ -
09SP	SPS	SPS	RANDALL CO INTRCHNG 230/115KV TRANSFORMER	258.75	103.8	104.9	AMARILLO S INTRCHNG - NICHOLS STA 230KV CKT 1	0	Open Amarillo STH 230/115KV Transformer to Relieve Facility	\$ -
09WP	WERE	WERE	WEST JCT CITY - WEST JCT CITY JCT (EAST) 115KV	141	115.4	116.1	JEFFERY ENERGY CENTER - SUMMIT 345KV	0	WERE Transmission Operating Directive 402 - Outage of the JEFFERY ENERGY CENTER - SUMMIT 345KV Line	\$ -
09WP	WERE	WERE	WEST JCT CITY - WEST JCT CITY JCT (WEST) 115KV	141	99.3	100.3	JEFFERY ENERGY CENTER - SUMMIT 345KV	109	WERE Transmission Operating Directive 402 - Outage of the JEFFERY ENERGY CENTER - SUMMIT 345KV Line	\$ -
										\$ 14,624,000

Study Year	From Area	To Area	Monitored Branch Over 100% Rate B	Rate B	BC % Loading	TC % Loading	Outaged Branch Causing Overload
09SP	AECI	AECI	96983 2STILWEL 69 to 96986 2TITANTP 69 CKT 1	36	111.7	111.8	54452 SALSWGR2 69 to 96859 2BRUSHY 69 CKT 1
04SP	AECI	AECI	96984 2TENKILR 69 to 96879 2VIAN 69 CKT 1	36	102.5	102.6	54447 TAHLOH 2 69 to 96961 2PARK 69 CKT 1
09SP	AECI	AECI	96943 2SILVCTY 69 to 96945 2YALE 69 CKT 1	35	104.9	105.0	96890 2BRISTW 69 to 96903 2KWIKSET 69 CKT 1
09SP	AECI	AECI	96943 2SILVCTY 69 to 96945 2YALE 69 CKT 1	35	109.5	109.6	96890 2BRISTW 69 to 96921 2BRISWES 69 CKT 1
09SP	AECI	AECI	96124 5HOLDEN 161 to 96110 5PITTSV 161 CKT 1	227	100.6	100.7	96071 SCLINTN 161 to 96124 5HOLDEN 161 CKT 1
09WP	AECI	AMRN	96079 5FREDTN 161 to 30583 FRED TAP 161 CKT 1	56	119.2	119.3	96054 7WWEAST 345 to 97274 5WWEAST 161 CKT 1
09SP	AECI	GRRD	96986 2TITANTP 69 to 54447 TAHLOH 2 69 CKT 1	47	102.1	102.2	54452 SALSWGR2 69 to 96859 2BRUSHY 69 CKT 1
09WP	CELE	AEPW	50090 IPAPER 4 138 to 53461 WALLAKE 4 138 CKT 1	236	120.9	121.2	50045 DOLHILL 7 345 to 53454 SW SHV 7 345 CKT 1
09WP	CELE	CELE	50012 BC PST 4 138 to 50013 BEACRK 4 138 CKT 1	120	101.0	101.1	50033 COLFAX 6 230 to 99116 6MONTGY 230 CKT 1
09WP	CELE	CELE	50113 MANSFLD4 138 to 50090 IPAPER 4 138 CKT 1	232	133.0	133.3	50045 DOLHILL 7 345 to 53454 SW SHV 7 345 CKT 1
09SP	DENL	ENTR	99581 3NLR-LV 115 to 99570 3MAUMEL* 115 CKT 1	239	108.4	108.5	99571 3MAYFL 115 to 99587 3SYLVN 115 CKT 1
04SP	MEC	MEC	64096 BEACON 5 161 to 64627 BEAC MDR 69 CKT 1	90	105.1	105.2	64096 BEACON 5 161 to 64628 BEACMID8 69 CKT 2
09WP	MEC	MEC	64220 WRIGHT 5 161 to 64646 WRI MID8 69 CKT 1	83	142.7	142.8	63719 HOPE 5 161 to 64648 HOPE MDR 69 CKT 1
09SP	MIDW	WEPL	56565 SEWARD 2 69 to 58792 SEWARD 3 115 CKT 1	44	101.9	102.1	56601 HEIZER 3 115 to 58779 MULGRENE 230 CKT 1
09SP	NPPD	NPPD	64749 BEVERLY7 115 to 64750 BEVERLY8 69 CKT 2	16	227.4	227.5	64749 BEVERLY7 115 to 64750 BEVERLY8 69 CKT 1
03WP	OPPD	OPPD	65627 W BROCK8 69 to 65390 S1263T1T 161 CKT 1	53	109.2	109.3	64863 HUMBOLT5 161 to 65391 S975T4 T 161 CKT 1
03WP	OPPD	OPPD	65390 S1263T1T 161 to 65627 W BROCK8 69 CKT 1	53	109.2	109.3	65391 S975T4 T 161 to 65575 S975 8 69 CKT 1
04WP	OPPD	OPPD	65390 S1263T1T 161 to 65627 W BROCK8 69 CKT 1	53	112.1	112.2	64863 HUMBOLT5 161 to 65391 S975T4 T 161 CKT 1
04WP	OPPD	OPPD	65390 S1263T1T 161 to 65627 W BROCK8 69 CKT 1	53	112.1	112.2	65391 S975T4 T 161 to 65575 S975 8 69 CKT 1
09WP	OPPD	OPPD	65390 S1263T1T 161 to 65627 W BROCK8 69 CKT 1	53	109.7	110.2	64863 HUMBOLT5 161 to 65480 S1280 5 161 CKT 1
04G	SWPA	AECI	52640 DONIPHNS 161 to 97201 2DONIPH 69 CKT 1	19	123.6	123.7	52640 DONIPHNS 161 to 97201 2DONIPH 69 CKT 2

Study Year	From Area	To Area	Monitored Branch Over 100% Rate B	Rate B	BC % Loading	TC % Loading	Outaged Branch Causing Overload	ATC (MW)	Solution	Cost
03FA	WFEC	WFEC	55802 ACME 2 69 to 55916 FRNKLS2 69 CKT 1	34	122.3	126.2	55841 CANADNS2 69 to 55842 CANADNS4 138 CKT 1	0	Acme Jct to Acme Sub: Upgrade From 3/0 To 795MCM. Upgrade by WFEC schedules for 04SP	\$ -
03FA	WFEC	WFEC	55916 FRNKLS2 69 to 55802 ACME 2 69 CKT 1	34	103.4	106.4	55841 CANADNS2 69 to 55924 GOLDSBY2 69 CKT 1	0	See Previous	\$ -
03WP	WFEC	WFEC	55802 ACME 2 69 to 55916 FRNKLS2 69 CKT 1	34	152.4	156.7	55841 CANADNS2 69 to 55842 CANADNS4 138 CKT 1	0	See Previous	\$ -
03WP	WFEC	WFEC	55916 FRNKLS2 69 to 55802 ACME 2 69 CKT 1	34	110.0	113.0	55924 GOLDSBY2 69 to 56018 OU SW 2 69 CKT 1	0	See Previous	\$ -
04AP	WFEC	WFEC	55802 ACME 2 69 to 55916 FRNKLS2 69 CKT 1	34	131.0	135.3	55841 CANADNS2 69 to 55842 CANADNS4 138 CKT 1	0	See Previous	\$ -
04AP	WFEC	WFEC	55916 FRNKLS2 69 to 55802 ACME 2 69 CKT 1	34	114.8	118.5	55841 CANADNS2 69 to 55924 GOLDSBY2 69 CKT 1	0	See Previous	\$ -
04AP	WFEC	WFEC	55916 FRNKLS2 69 to 55802 ACME 2 69 CKT 1	34	102.2	106.0	55924 GOLDSBY2 69 to 56018 OU SW 2 69 CKT 1	0	See Previous	\$ -
04G	WFEC	WFEC	55802 ACME 2 69 to 55916 FRNKLS2 69 CKT 1	34	121.8	125.9	55841 CANADNS2 69 to 55842 CANADNS4 138 CKT 1	0	See Previous	\$ -
04G	WFEC	WFEC	55916 FRNKLS2 69 to 55802 ACME 2 69 CKT 1	34	107.3	110.5	55841 CANADNS2 69 to 55924 GOLDSBY2 69 CKT 1	0	See Previous	\$ -
03WP	WFEC	WFEC	56095 WNORMAN2 69 to 55802 ACME 2 69 CKT 1	38	118.6	122.6	55841 CANADNS2 69 to 55842 CANADNS4 138 CKT 1	0	Acme Sub > West Norman: Upgrade from 3/0 to 795 ACSR. Upgrade by WFEC scheduled for 04WP	\$ -
04AP	WFEC	WFEC	56095 WNORMAN2 69 to 55802 ACME 2 69 CKT 1	38	108.6	112.5	55841 CANADNS2 69 to 55842 CANADNS4 138 CKT 1	0	See Previous	\$ -
04FA	WFEC	WFEC	56095 WNORMAN2 69 to 55802 ACME 2 69 CKT 1	38	103.0	107.1	55841 CANADNS2 69 to 55842 CANADNS4 138 CKT 1	0	See Previous	\$ -
04G	WFEC	WFEC	56095 WNORMAN2 69 to 55802 ACME 2 69 CKT 1	38	100.3	104.0	55841 CANADNS2 69 to 55842 CANADNS4 138 CKT 1	0	See Previous	\$ -
04SP	WFEC	WFEC	56095 WNORMAN2 69 to 55802 ACME 2 69 CKT 1	38	140.1	143.9	55841 CANADNS2 69 to 55842 CANADNS4 138 CKT 1	0	See Previous	\$ -
04SP	WFEC	WFEC	56095 WNORMAN2 69 to 55802 ACME 2 69 CKT 1	38	118.1	120.8	55841 CANADNS2 69 to 55924 GOLDSBY2 69 CKT 1	0	See Previous	\$ -
04SP	WFEC	WFEC	55802 ACME 2 69 to 56095 WNORMAN2 69 CKT 1	38	101.4	104.5	55924 GOLDSBY2 69 to 56018 OU SW 2 69 CKT 1	0	See Previous	\$ -
04SP	SPS	SPS	51080 CANYNE3 115 to 51078 CANYNW3 115 CKT 1	99	99.5	102.4	50993 BUSHLND6 230 to 51111 DFSMTH6 230 CKT 1	25	Rebuild 4 miles of 115 kV circuit with 397 ACSR on T-0-102 structures.	\$ 590,000
04AP	SPS	SPS	51014 OSAGE--3 115 to 51080 CANYNE3 115 CKT 1	99	98.7	101.4	50993 BUSHLND6 230 to 51111 DFSMTH6 230 CKT 1	72	Rebuild 13 miles of 115 kV circuit with 397 ACSR on T-0-102 structures.	\$ 1,910,000
04G	SPS	SPS	51014 OSAGE--3 115 to 51080 CANYNE3 115 CKT 1	99	97.7	100.5	50993 BUSHLND6 230 to 51111 DFSMTH6 230 CKT 1	124	See Previous	\$ -
04SP	SPS	SPS	51014 OSAGE--3 115 to 51080 CANYNE3 115 CKT 1	99	113.2	116.1	50993 BUSHLND6 230 to 51111 DFSMTH6 230 CKT 1	0	See Previous	\$ -
08SP	SPS	SPS	51014 OSAGE--3 115 to 51080 CANYNE3 115 CKT 1	99	106.1	109.1	50993 BUSHLND6 230 to 51111 DFSMTH6 230 CKT 1	0	See Previous	\$ -
04FA	WERE	WERE	57368 EXIDE J3 115 to 57372 PHILIPS3 115 CKT 1	196	101.9	102.4	56872 EMCIPHER6 230 to 56873 SUMMIT 6 230 CKT 1	0	Relieved or Impact Removed by Selected Upgrades to be Assigned	\$ -
04FA	WERE	WERE	57368 EXIDE J3 115 to 57381 SUMMIT 3 115 CKT 1	196	107.7	108.2	56872 EMCIPHER6 230 to 56873 SUMMIT 6 230 CKT 1	0	Relieved or Impact Removed by Selected Upgrades to be Assigned	\$ -
09WP	WERE	WERE	57381 SUMMIT 3 115 to 57368 EXIDE J3 115 CKT 1	196	102.5	103.4	56872 EMCIPHER6 230 to 56873 SUMMIT 6 230 CKT 1	0	Relieved or Impact Removed by Selected Upgrades to be Assigned	\$ -
04SP	WFEC	OKGE	55917 FRNKLS4 138 to 54946 MIDWEST4 138 CKT 1	215	98.3	101.5	55869 CROMWEL4 138 to 56084 WETUMKA4 138 CKT 1	79	Replace 800 amp wavetrap with 2000 amp wavetrap at Franklin Switch and 795ACSR jumpers with 1590ACSR, connectors	\$ 24,000
04SP	WFEC	OKGE	55917 FRNKLS4 138 to 54946 MIDWEST4 138 CKT 1	215	98.2	101.4	56026 PHAROAH4 138 to 56084 WETUMKA4 138 CKT 1	85	See Previous	\$ -
08SP	WFEC	OKGE	55917 FRNKLS4 138 to 54946 MIDWEST4 138 CKT 1	215	111.7	114.8	55869 CROMWEL4 138 to 56084 WETUMKA4 138 CKT 1	0	See Previous	\$ -
09SP	WFEC	OKGE	55917 FRNKLS4 138 to 54946 MIDWEST4 138 CKT 1	215	111.5	114.7	56026 PHAROAH4 138 to 56084 WETUMKA4 138 CKT 1	0	See Previous	\$ -
09SP	WFEC	OKGE	55917 FRNKLS4 138 to 54946 MIDWEST4 138 CKT 1	215	108.9	112.1	55869 CROMWEL4 138 to 56094 WEWOKA 4 138 CKT 1	0	See Previous	\$ -
09SP	WFEC	OKGE	55917 FRNKLS4 138 to 54946 MIDWEST4 138 CKT 1	215	106.7	108.8	55814 ANADARK4 138 to 56031 POCASET4 138 CKT 1	0	See Previous	\$ -
09SP	WFEC	OKGE	55917 FRNKLS4 138 to 54946 MIDWEST4 138 CKT 1	215	105.1	107.0	56031 POCASET4 138 to 56072 TUTTLE 4 138 CKT 1	0	See Previous	\$ -
09SP	WFEC	OKGE	55917 FRNKLS4 138 to 54946 MIDWEST4 138 CKT 1	215	100.4	104.0	54933 DRAPER 4 138 to 54949 SOONRTP4 138 CKT 1	0	See Previous	\$ -
09SP	WFEC	OKGE	55917 FRNKLS4 138 to 54946 MIDWEST4 138 CKT 1	215	100.8	102.9	56059 SUNSHIN4 138 to 56072 TUTTLE 4 138 CKT 1	0	See Previous	\$ -
09SP	WFEC	OKGE	55917 FRNKLS4 138 to 54946 MIDWEST4 138 CKT 1	215	98.5	102.7	52792 VELEETK4 138 to 56026 PHAROAH4 138 CKT 1	55	See Previous	\$ -
09SP	WFEC	OKGE	55917 FRNKLS4 138 to 54946 MIDWEST4 138 CKT 1	215	95.1	101.5	54947 CANADN-4 138 to 55842 CANADNS4 138 CKT 1	114	See Previous	\$ -
09SP	WFEC	OKGE	55917 FRNKLS4 138 to 54946 MIDWEST4 138 CKT 1	215	97.4	101.5	54948 CEDARLN4 138 to 54949 SOONRTP4 138 CKT 1	95	See Previous	\$ -
09SP	WFEC	OKGE	55917 FRNKLS4 138 to 54946 MIDWEST4 138 CKT 1	215	95.9	101.1	54952 STUBMAN4 138 to 54953 HOLLYWD4 138 CKT 1	119	See Previous	\$ -
09SP	WFEC	OKGE	55917 FRNKLS4 138 to 54946 MIDWEST4 138 CKT 1	215	92.8	100.6	54131 L.E.S.-7 345 to 54901 CIMARON7 345 CKT 1	139	See Previous	\$ -
08SP	WFEC	WFEC	55917 FRNKLS4 138 to 55916 FRNKLS2 69 CKT 1	70	99.4	102.0	55841 CANADNS2 69 to 55842 CANADNS4 138 CKT 1	37	Limits Rollover Rights 09SP	\$ -
08SP	WFEC	WFEC	55917 FRNKLS4 138 to 55916 FRNKLS2 69 CKT 1	70	99.6	101.0	55841 CANADNS2 69 to 55924 GOLDSBY2 69 CKT 1	46	Limits Rollover Rights 09SP	\$ -
04SP	SPS	SPS	51082 PALODU 3 115 to 51302 HAPPY3 115 CKT 1	99	100.8	104.6	51041 AMARLS6 230 to 51321 SWISHER6 230 CKT 1	0	Rebuild 24 miles of 115 kV circuit with 397 ACSR on T-0-102 structures.	\$ 3,130,000
09SP	SPS	SPS	51082 PALODU 3 115 to 51302 HAPPY3 115 CKT 1	99	96.3	100.5	51041 AMARLS6 230 to 51321 SWISHER6 230 CKT 1	131	See Previous	\$ -
04FA	WERE	WERE	57372 PHILIPS3 115 to 57374 SPHILPJ3 115 CKT 1	160	115.9	116.9	56872 EMCIPHER6 230 to 56873 SUMMIT 6 230 CKT 1	0	Relieved or Impact Removed by Selected Upgrades to be Assigned	\$ -
04WP	WERE	WERE	57372 PHILIPS3 115 to 57374 SPHILPJ3 115 CKT 1	160	110.8	111.8	56872 EMCIPHER6 230 to 56873 SUMMIT 6 230 CKT 1	0	Relieved or Impact Removed by Selected Upgrades to be Assigned	\$ -
09WP	WERE	WERE	57372 PHILIPS3 115 to 57374 SPHILPJ3 115 CKT 1	160	111.5	113.4	56872 EMCIPHER6 230 to 56873 SUMMIT 6 230 CKT 1	0	Relieved or Impact Removed by Selected Upgrades to be Assigned	\$ -
03WP	WERE	WERE	57374 SPHILPJ3 115 to 57438 WMCIPHER3 115 CKT 1	68	106.7	107.6	56872 EMCIPHER6 230 to 56873 SUMMIT 6 230 CKT 1	0	Tear down double circuit, build single circuit with 1192.5 ACSR.	\$ 7,800,000
04FA	WERE	WERE	57374 SPHILPJ3 115 to 57438 WMCIPHER3 115 CKT 1	68	125.1	126.2	56872 EMCIPHER6 230 to 56873 SUMMIT 6 230 CKT 1	0	See Previous	\$ -
04G	WERE	WERE	57374 SPHILPJ3 115 to 57438 WMCIPHER3 115 CKT 1	68	105.8	106.9	56872 EMCIPHER6 230 to 56873 SUMMIT 6 230 CKT 1	0	See Previous	\$ -
04WP	WERE	WERE	57374 SPHILPJ3 115 to 57438 WMCIPHER3 115 CKT 1	68	119.6	120.7	56872 EMCIPHER6 230 to 56873 SUMMIT 6 230 CKT 1	0	See Previous	\$ -
09WP	WERE	WERE	57374 SPHILPJ3 115 to 57438 WMCIPHER3 115 CKT 1	68	120.3	122.4	56872 EMCIPHER6 230 to 56873 SUMMIT 6 230 CKT 1	0	See Previous	\$ -
04FA	WERE	WERE	57374 SPHILPJ3 115 to 57438 WMCIPHER3 115 CKT 2	92	109.2	110.1	56872 EMCIPHER6 230 to 56873 SUMMIT 6 230 CKT 1	0	Upgrade same as NORTH AMERICAN PHILIPS JUNCTION (SOUTH) - WEST MCPHERSON 115KV CKT 1	\$ -
04WP	WERE	WERE	57374 SPHILPJ3 115 to 57438 WMCIPHER3 115 CKT 2	92	104.3	105.3	56872 EMCIPHER6 230 to 56873 SUMMIT 6 230 CKT 1	0	See Previous	\$ -
09WP	WERE	WERE	57374 SPHILPJ3 115 to 57438 WMCIPHER3 115 CKT 2	92	105.0	106.8	56872 EMCIPHER6 230 to 56873 SUMMIT 6 230 CKT 1	0	See Previous	\$ -
04SP	SPS	SPS	51020 RANDALL3 115 to 51082 PALODU 3 115 CKT 1	99	102.7	106.4	51041 AMARLS6 230 to 51321 SWISHER6 230 CKT 1	0	Rebuild 9 miles of 115 kV circuit with 397 ACSR on T-0-102 structures.	\$ 1,170,000
08SP	SPS	SPS	51020 RANDALL3 115 to 51082 PALODU 3 115 CKT 1	99	98.0	102.3	51041 AMARLS6 230 to 51321 SWISHER6 230 CKT 1	70	See Previous	\$ -

Study Year	From Area	To Area	Monitored Branch Over 100% Rate B	Rate B	BC % Loading	TC % Loading	Outaged Branch Causing Overload	ATC (MW)	Solution	Cost
04SP	SPS	SPS	51021 RANDALL6 230 to 51020 RANDALL3 115 CKT 1	258.75	100.9	101.9	50915 NICHOL6 230 to 51041 AMARLS6 230 CKT 1	0	Open Amarillo South 230/115KV Transformer to Relieve Facility	\$ -
08SP	SPS	SPS	51021 RANDALL6 230 to 51020 RANDALL3 115 CKT 1	258.75	103.8	104.9	50915 NICHOL6 230 to 51041 AMARLS6 230 CKT 1	0	Open Amarillo South 230/115KV Transformer to Relieve Facility	\$ -
09WP	WERE	WERE	57343 WJCCTYE3 115 to 57342 WJCCTY 3 115 CKT 1	141	115.4	116.1	56766 JEC N 7 345 to 56773 SUMMIT 7 345 CKT 1	0	WERE Transmission Operating Directive 402 - Outage of the JEFFERY ENERGY CENTER - SUMMIT 345KV Line	\$ -
09WP	WERE	WERE	57342 WJCCTY 3 115 to 57344 WJCCTYW3 115 CKT 1	141	99.3	100.3	56766 JEC N 7 345 to 56773 SUMMIT 7 345 CKT 1	109	WERE Transmission Operating Directive 402 - Outage of the JEFFERY ENERGY CENTER - SUMMIT 345KV Line	\$ -
										\$ 14,624,000