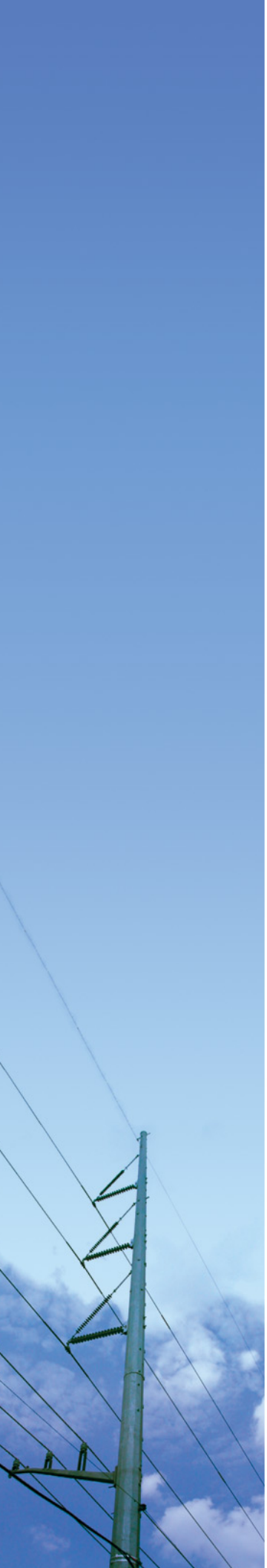

Screening Study
SPP-LTSR-2010-001

For OASIS Request #74838409

MAINTAINED BY
SPP Engineering, SPP Transmission Service Studies
January 20, 2011

Southwest Power Pool

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Executive Summary

Cargill has requested a screening study to determine the impacts on SPP facilities due to a Long Term Service Request of 85 MW. The service type requested for this screening study is Long Term Service Request (LTSR). The period of the service requested is from 1/1/2012 to 1/1/2032.

The principal objective of this study is to identify system problems and potential system modifications necessary to facilitate the LTSR request while maintaining system reliability. The LTSR request was studied using two system scenarios. The service was modeled by a transfer from WFEC to EES. The two scenarios were studied to capture system limitations caused or impacted by the requested service. An analysis was conducted on the planning horizon from 1/1/2012 to 1/1/2032.

The service was modeled from WFEC to EES. Facilities on the SPP system were identified for the requested service due to the SPP Study Methodology criteria. Tables 1 and 2 summarize the results of the screening study analysis for the transfer for the scenarios listed in the table. Table 1 lists SPP thermal transfer limitations identified. Table 2 lists SPP voltage transfer limitations identified. Table 3 lists the network upgrades required to mitigate the limitations impacted by this request.

Introduction

Cargill has requested a screening study to determine the impacts on SPP facilities for a Long Term Service Request of 85 MW.

The purpose of the LTSR Option Screening Study is to provide the Eligible Customer with an approximation of the transmission remediation costs of each potential LTSR and a reasonable cost differential between alternatives for the purpose of an Eligible Customer's ranking of its potential LTSRs. The results of the Screening Study are not binding and the Eligible Customer retains the rights to enter the Aggregate Transmission Service Study. The Screening Study results will not assess the third party impacts and upgrades required. Service will not be granted based on the Screening Study for potential LTSRs on the Transmission System. To obtain a Service Agreement, Eligible Customers must apply for service and follow the application process set forth in Parts II and III of the Tariff.

This study includes steady-state contingency analysis (PSS/E function ACCC). The steady-state analysis considers the impact of the request on transmission line and transformer loadings for outages of single transmission lines, transformers, and generating units, and selected multiple transmission lines and transformers on the SPP and first-tier third party systems.

The LTSR request was studied using two system scenarios. The service was modeled by a transfer from WFEC to EES. The two scenarios were studied to capture the system limitations caused or impacted by the requested service. Scenario 0 includes projected usage of transmission service included in the SPP 2010 Series Cases. Scenario 5 includes transmission service not already included in the SPP 2010 Series Cases.

Study Methodology

Description

The facility study analysis was conducted to determine the steady-state impact of the requested service on the SPP system. The steady-state analysis was performed to ensure current SPP Criteria and NERC Reliability Standards requirements are fulfilled. SPP conforms to NERC Reliability Standards, which provide strict requirements related to voltage violations and thermal overloads during normal conditions and during a contingency. NERC Standards require all facilities to be within normal operating ratings for normal system conditions and within emergency ratings after a contingency.

Normal operating ratings and emergency operating ratings monitored are Rate A and B in the SPP Model Development Working Group (MDWG) models, respectively. The upper bound and lower bound of the normal voltage range monitored is 105% and 95%. The upper bound and lower bound of the emergency voltage range monitored is 105% and 90%. Transmission Owner voltage monitoring criteria is used if more restrictive. The SPS Tuco 230 kV bus voltage is monitored at 92.5% due to pre-determined system stability limitations. The WERE Wolf Creek 345 kV bus voltage is monitored at 103.5% and 98.5% due to transmission operating procedure.

The contingency set includes all SPP control area branches and ties 69 kV and above; first tier non-SPP control area branches and ties 115 kV and above; any defined contingencies for these control areas; and generation unit outages for the control areas with SPP reserve share program redispatch. The monitor elements include all SPP control area branches, ties, and buses 69 kV. and above,. Voltage monitoring was performed for SPP control area buses 69 kV and above.

A 3 % transfer distribution factor (TDF) cutoff was applied to all SPP control area facilities. For voltage monitoring, a 0.02 per unit change in voltage must occur due to the transfer or modeling upgrades to be considered a valid limit to the transfer.

Model Updates

SPP used six seasonal models to study the WFEC to EES 85 MW request for the requested service period. The following SPP Transmission Expansion Plan 2010 Build 2

Cases were used to study the impact of the requested service on the transmission system:

2011/12 Winter Peak (11WP)
2012 Summer Peak (12SP)
2012/13 Winter Peak (12WP)
2016 Summer Peak (16SP)
2016/17 Winter Peak (16WP
2021 Summer Peak (21SP)

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 current modeling information. From the six seasonal models, two system scenarios were developed. Scenario 0 includes projected usage of transmission included in the SPP 2010 Series Cases. Scenario 5 includes transmission not already included in the SPP 2010 Series Cases.

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. Transfer distribution factor cutoffs and voltage threshold (0.02 change) were applied to determine the impacted facilities. The PSS/E options chosen to conduct the analysis can be found in Appendix A.

Study Results

Study Analysis Results

Tables 1 and 2 contain the initial steady-state analysis results of the LTSR. The tables are attached to the end of this report, if applicable. The tables identify the scenario and season in which the event occurred, the transfer amount studied, the facility control area location, applicable ratings of the thermal transfer limitations and voltage transfer limitations, and the loading percentage and voltage per unit (pu).

Table 1 lists the SPP thermal transfer limitations caused or impacted by the 85 MW requested transfer for applicable scenarios. Solutions are identified for the limitations in this table.

Table 2 lists the SPP voltage transfer limitations caused or impacted by the 85 MW requested transfer for applicable scenarios. Solutions are identified for the violations in this table.

Table 3 lists the network upgrades required to mitigate the limitations caused or impacted by this request. Engineering and construction costs are provided for assigned upgrades in this table.

Conclusion

The results of the screening study show that limiting constraints exist within the SPP regional transmission system for the requested transfer of 85 MW. The next steps are to WITHDRAW the request on OASIS and, if desired, enter a new OASIS request into the aggregate study queue.

The results contained in this study are for informational purposes only. Service will not be granted based on the Screening Study results. To obtain a Service Agreement, Eligible Customers must apply for service and follow the application processes set forth in Parts II and III of the Tariff and enter the Aggregate Study process. The results of the Aggregate Study may vary from the results of this screening study.

As a final step in this process, it is requested that the customer WITHDRAW the LTSR screening study request on OASIS.

Appendix A

PSS/E CHOICES IN RUNNING LOAD FLOW PROGRAM AND ACCC

BASE CASES:

- Solutions: Fixed slope decoupled Newton-Raphson solution (FDNS)
- Tap adjustment: Stepping
- Area interchange control: Tie lines and loads
- VAR limits: Apply immediately
- Solution options:

  X Phase shift adjustment
  _ Flat start
  _ Lock DC taps
  _ Lock switched shunts

ACCC CASES for system intact:

- Solutions: AC contingency checking (ACCC)
- MW mismatch tolerance: 0.5
- Contingency case rating: Rate A
- Percent of rating: 100
- Output code: Summary
- Min flow change in overload report: 3 MW
- Excld cases w/ no overloads form report: YES
- Exclude interfaces from report: NO
- Perform voltage limit check: YES
- Elements in available capacity table: 60000
- Cutoff threshold for available capacity table: 99999.0
- Min. contng. case Vltg chng for report: 0.02
- Sorted output: None
- Newton Solution:
- Tap adjustment: Stepping
- Area interchange control: Tie lines and loads
- VAR limits: Apply automatically
- Solution options:

  X Phase shift adjustment
  _ Flat start
  _ Lock DC taps
  _ Lock switched shunts

ACCC CASES for branch and transformer contingencies:

- Solutions: AC contingency checking (ACCC)
- MW mismatch tolerance: 0.5
- Contingency case rating: Rate B
- Percent of rating: 100
- Output code: Summary

- Min flow change in overload report: 3mw
- Excld cases w/ no overloads form report: YES
- Exclude interfaces from report: NO
- Perform voltage limit check: YES
- Elements in available capacity table: 60000
- Cutoff threshold for available capacity table: 99999.0
- Min. contng. case Vltg chng for report: 0.02
- Sorted output: None
- Newton Solution:
- Tap adjustment: Stepping
- Area interchange control: Tie lines and loads
- VAR limits: Apply automatically
- Solution options:

  X Phase shift adjustment
  _ Flat start
  _ Lock DC taps
  _ Lock switched shunts

ACCC CASES for generator contingencies (largest machine at a bus):

- Solutions: AC contingency checking (ACCC)
- MW mismatch tolerance: 0.5
- Contingency case rating: Rate B
- Percent of rating: 100
- Output code: Summary
- Min flow change in overload report: 3mw
- Excld cases w/ no overloads form report: YES
- Exclude interfaces from report: NO
- Perform voltage limit check: YES
- Elements in available capacity table: 60000
- Cutoff threshold for available capacity table: 99999.0
- Min. contng. case Vltg chng for report: 0.02
- Sorted output: None
- Newton Solution:
- Tap adjustment: Stepping
- Area interchange control: Disabled
- Var limits: Apply automatically
- Solution options:

  X Phase shift adjustment
  _ Flat start
  _ Lock DC taps
  _ Lock switched shunts

Scenario	Season	From Area	To Area	Monitored Branch Over 100% Rate B	Rating (MVA)	Transfer Case % Loading	TDF	Outaged Branch Causing Overload	Upgrade Name	Solution
5	12WP	SPRM	SPRM	BROOKLINE (BRKLTX1) 345/161/13.2KV TRANSFORMER CKT 1	400	103.5	3.1%	BROOKLINE (BRKLTX2) 345/161/13.2KV TRANSFORMER CKT 2	Multi - Flint Creek – Centerton 345 kV and Centerton- East Centerton 161 kV	Install 345/161 kV transformer at Centerton. Install 22 miles of new 345 kV, 2-954 ACSR line. Install 2 miles of 161 kV from new Centerton Substation to East Centerton Substation.
5	12WP	SPRM	SPRM	BROOKLINE (BRKLTX1) 345/161/13.2KV TRANSFORMER CKT 1	400	103.5	3.1%	BROOKLINE (BRKLTX2) 345/161/13.2KV TRANSFORMER CKT 2	Multi - Centerton - Osage Creek 345 kV	Install 9 miles of 345 kV line from Shipe Road to East Rogers, Install 32 miles of 345 kV line from East Rogers to Osage Creek, and Install new 345/161 kV transformer at Osage Creek
5	12WP	SPRM	SPRM	BROOKLINE (BRKLTX2) 345/161/13.2KV TRANSFORMER CKT 2	400	103.2	3.1%	BROOKLINE (BRKLTX1) 345/161/13.2KV TRANSFORMER CKT 1	Multi - Flint Creek – Centerton 345 kV and Centerton- East Centerton 161 kV	Install 345/161 kV transformer at Centerton. Install 22 miles of new 345 kV, 2-954 ACSR line. Install 2 miles of 161 kV from new Centerton Substation to East Centerton Substation.
5	12WP	SPRM	SPRM	BROOKLINE (BRKLTX2) 345/161/13.2KV TRANSFORMER CKT 2	400	103.2	3.1%	BROOKLINE (BRKLTX1) 345/161/13.2KV TRANSFORMER CKT 1	Multi - Centerton - Osage Creek 345 kV	Install 9 miles of 345 kV line from Shipe Road to East Rogers, Install 32 miles of 345 kV line from East Rogers to Osage Creek, and Install new 345/161 kV transformer at Osage Creek
5	16SP	SWPA	SWPA	BUFORD 5 161.00 - BULL SHOALS 161KV CKT 1	167	105.3	6.2%	BULL SHOALS - MIDWAY (YVEPA) 161KV CKT 1	BUFORD 5 161.00 - BULL SHOALS 161KV CKT 1	Three structures (#85, #94, and #95) would need to be replaced with taller structures. We would use steel structures and design them to handle a future conductor upgrade.
5	11WP	WFEC	WFEC	CANTON - OKEENE 69KV CKT 1	48	104.2	5.3%	CEDARDALE - MOORELAND 138KV CKT 1	Priority Projects	
5	11WP	WFEC	WFEC	CANTON - OKEENE 69KV CKT 1	48	102.9	5.3%	CEDARDALE - OKEENE 138KV CKT 1	Priority Projects	
5	11WP	WFEC	WFEC	CANTON - OKEENE 69KV CKT 1	48	100.7	5.7%	WWRDEHV7 345.00 (WWDEHV) 345/138/13.8KV TRANSFORMER CKT 1	Priority Projects	
5	12SP	WFEC	WFEC	CANTON - OKEENE 69KV CKT 1	48	107.7	5.5%	CEDARDALE - MOORELAND 138KV CKT 1	Priority Projects	
5	12SP	WFEC	WFEC	CANTON - OKEENE 69KV CKT 1	48	106.2	5.5%	CEDARDALE - OKEENE 138KV CKT 1	Priority Projects	
5	12SP	WFEC	WFEC	CANTON - OKEENE 69KV CKT 1	48	101.4	5.8%	WWRDEHV7 345.00 (WWDEHV) 345/138/13.8KV TRANSFORMER CKT 1	Priority Projects	
5	12WP	WFEC	WFEC	CANTON - OKEENE 69KV CKT 1	48	106.5	5.9%	WWRDEHV7 345.00 (WWDEHV) 345/138/13.8KV TRANSFORMER CKT 1	Priority Projects	
5	12WP	WFEC	WFEC	CANTON - OKEENE 69KV CKT 1	48	106.5	5.9%	TATONGA7 345.00 - WWRDEHV7 345.00 345KV CKT 1	Priority Projects	
5	12WP	WFEC	WFEC	CANTON - OKEENE 69KV CKT 1	48	105.2	5.5%	CEDARDALE - MOORELAND 138KV CKT 1	Priority Projects	
5	11WP	WFEC	WFEC	CANTON - TALOGA 69KV CKT 1	46	115.6	5.3%	CEDARDALE - MOORELAND 138KV CKT 1	CANTON - TALOGA 69KV CKT 1	UPGRADE CANTON TO TALOGA TO 336.4 ACSR
5	11WP	WFEC	WFEC	CANTON - TALOGA 69KV CKT 1	46	114.2	5.3%	CEDARDALE - OKEENE 138KV CKT 1	CANTON - TALOGA 69KV CKT 1	UPGRADE CANTON TO TALOGA TO 336.4 ACSR
5	11WP	WFEC	WFEC	CANTON - TALOGA 69KV CKT 1	46	111.9	5.7%	WWRDEHV7 345.00 (WWDEHV) 345/138/13.8KV TRANSFORMER CKT 1	CANTON - TALOGA 69KV CKT 1	UPGRADE CANTON TO TALOGA TO 336.4 ACSR
5	12SP	WFEC	WFEC	CANTON - TALOGA 69KV CKT 1	39	142.7	5.5%	CEDARDALE - MOORELAND 138KV CKT 1	CANTON - TALOGA 69KV CKT 1	UPGRADE CANTON TO TALOGA TO 336.4 ACSR
5	12SP	WFEC	WFEC	CANTON - TALOGA 69KV CKT 1	39	140.9	5.5%	CEDARDALE - OKEENE 138KV CKT 1	CANTON - TALOGA 69KV CKT 1	UPGRADE CANTON TO TALOGA TO 336.4 ACSR
5	12SP	WFEC	WFEC	CANTON - TALOGA 69KV CKT 1	39	135.3	5.8%	WWRDEHV7 345.00 (WWDEHV) 345/138/13.8KV TRANSFORMER CKT 1	CANTON - TALOGA 69KV CKT 1	UPGRADE CANTON TO TALOGA TO 336.4 ACSR
5	12SP	WFEC	WFEC	CANTON - TALOGA 69KV CKT 1	39	112.2	5.2%	BASE CASE	CANTON - TALOGA 69KV CKT 1	UPGRADE CANTON TO TALOGA TO 336.4 ACSR
5	12WP	WFEC	WFEC	CANTON - TALOGA 69KV CKT 1	46	118.0	5.9%	TATONGA7 345.00 - WWRDEHV7 345.00 345KV CKT 1	CANTON - TALOGA 69KV CKT 1	UPGRADE CANTON TO TALOGA TO 336.4 ACSR
5	12WP	WFEC	WFEC	CANTON - TALOGA 69KV CKT 1	46	118.0	5.9%	WWRDEHV7 345.00 (WWDEHV) 345/138/13.8KV TRANSFORMER CKT 1	CANTON - TALOGA 69KV CKT 1	UPGRADE CANTON TO TALOGA TO 336.4 ACSR
5	12WP	WFEC	WFEC	CANTON - TALOGA 69KV CKT 1	46	116.6	5.5%	CEDARDALE - MOORELAND 138KV CKT 1	CANTON - TALOGA 69KV CKT 1	UPGRADE CANTON TO TALOGA TO 336.4 ACSR
5	16SP	WFEC	WFEC	CANTON - TALOGA 69KV CKT 1	39	116.9	5.0%	CEDARDALE - MOORELAND 138KV CKT 1	CANTON - OKEENE 69KV CKT 1 Accelerate	Replace CT
5	16SP	WFEC	WFEC	CANTON - TALOGA 69KV CKT 1	39	116.9	5.0%	CEDARDALE - MOORELAND 138KV CKT 1	CANTON - TALOGA 69KV CKT 1	UPGRADE CANTON TO TALOGA TO 336.4 ACSR
5	16SP	WFEC	WFEC	CANTON - TALOGA 69KV CKT 1	39	115.2	5.0%	CEDARDALE - OKEENE 138KV CKT 1	CANTON - OKEENE 69KV CKT 1 Accelerate	Replace CT
5	16SP	WFEC	WFEC	CANTON - TALOGA 69KV CKT 1	39	115.2	5.0%	CEDARDALE - OKEENE 138KV CKT 1	CANTON - TALOGA 69KV CKT 1	UPGRADE CANTON TO TALOGA TO 336.4 ACSR
5	16SP	WFEC	WFEC	CANTON - TALOGA 69KV CKT 1	39	102.7	3.6%	OKEENE (OKEENE) 138/69/13.8KV TRANSFORMER CKT 1	CANTON - OKEENE 69KV CKT 1 Accelerate	Replace CT
5	16SP	WFEC	WFEC	CANTON - TALOGA 69KV CKT 1	39	102.7	3.6%	OKEENE (OKEENE) 138/69/13.8KV TRANSFORMER CKT 1	CANTON - TALOGA 69KV CKT 1	UPGRADE CANTON TO TALOGA TO 336.4 ACSR
5	12SP	SWPA	SPRM	CLAY - SPRINGFIELD 161KV CKT 1	167	106.8	3.0%	HUBEN - MORGAN 345KV CKT 1	CLAY - SPRINGFIELD 161KV CKT 1 SWPA	One medium angle structure (#39) would need to be replaced. In addition, disconnect switches would need to be replaced at Springfield and a wave trap removed.
5	12WP	SWPA	SPRM	CLAY - SPRINGFIELD 161KV CKT 1	167	108.9	3.1%	HUBEN - MORGAN 345KV CKT 1	CLAY - SPRINGFIELD 161KV CKT 1 SWPA	One medium angle structure (#39) would need to be replaced. In addition, disconnect switches would need to be replaced at Springfield and a wave trap removed.
5	16SP	SWPA	SPRM	CLAY - SPRINGFIELD 161KV CKT 1	167	114.1	3.0%	AI03	CLAY - SPRINGFIELD 161KV CKT 1 SWPA	One medium angle structure (#39) would need to be replaced. In addition, disconnect switches would need to be replaced at Springfield and a wave trap removed.
5	16SP	SWPA	SPRM	CLAY - SPRINGFIELD 161KV CKT 1	167	107.6	3.2%	HUBEN - MORGAN 345KV CKT 1	CLAY - SPRINGFIELD 161KV CKT 1 SWPA	One medium angle structure (#39) would need to be replaced. In addition, disconnect switches would need to be replaced at Springfield and a wave trap removed.
5	16WP	SWPA	SPRM	CLAY - SPRINGFIELD 161KV CKT 1	167	115.8	3.0%	AI03	CLAY - SPRINGFIELD 161KV CKT 1 SWPA	One medium angle structure (#39) would need to be replaced. In addition, disconnect switches would need to be replaced at Springfield and a wave trap removed.
5	16WP	SWPA	SPRM	CLAY - SPRINGFIELD 161KV CKT 1	167	110.5	3.2%	HUBEN - MORGAN 345KV CKT 1	CLAY - SPRINGFIELD 161KV CKT 1 SWPA	One medium angle structure (#39) would need to be replaced. In addition, disconnect switches would need to be replaced at Springfield and a wave trap removed.
5	12SP	OKGE	OKGE	EL RENO - ROMAN NOSE 138KV CKT 1	153	104.7	6.5%	WWRDEHV7 345.00 (WWDEHV) 345/138/13.8KV TRANSFORMER CKT 1	Priority Projects	

Scenario	Season	From Area	To Area	Monitored Branch Over 100% Rate B	Rating (MVA)	Transfer Case % Loading	TDF	Outaged Branch Causing Overload	Upgrade Name	Solution
5	12SP	OKGE	OKGE	EL RENO - ROMAN NOSE 138KV CKT 1	153	104.6	6.5%	TATONGA7 345.00 - WWRDEHV7 345.00 345KV CKT 1	Priority Projects	
5	12WP	OKGE	OKGE	EL RENO - ROMAN NOSE 138KV CKT 1	185	100.1	6.4%	WWRDEHV7 345.00 (WWDEHV) 345/138/13.8KV TRANSFORMER CKT 1	Priority Projects	
5	11WP	WFEC	OKGE	GLASS MOUNTAIN - MOORELAND 138KV CKT 1	124	130.8	5.3%	WWRDEHV7 345.00 (WWDEHV) 345/138/13.8KV TRANSFORMER CKT 1	Priority Projects	
5	11WP	WFEC	OKGE	GLASS MOUNTAIN - MOORELAND 138KV CKT 1	124	130.8	5.3%	TATONGA7 345.00 - WWRDEHV7 345.00 345KV CKT 1	Priority Projects	
5	12SP	WFEC	OKGE	GLASS MOUNTAIN - MOORELAND 138KV CKT 1	124	127.6	5.3%	WWRDEHV7 345.00 (WWDEHV) 345/138/13.8KV TRANSFORMER CKT 1	Priority Projects	
5	12SP	WFEC	OKGE	GLASS MOUNTAIN - MOORELAND 138KV CKT 1	124	127.6	5.3%	TATONGA7 345.00 - WWRDEHV7 345.00 345KV CKT 1	Priority Projects	
5	12SP	WFEC	OKGE	GLASS MOUNTAIN - MOORELAND 138KV CKT 1	124	100.4	3.5%	KNOBHILL - MOORELAND 138KV CKT 1	Priority Projects	
5	12WP	WFEC	OKGE	GLASS MOUNTAIN - MOORELAND 138KV CKT 1	124	131.8	5.3%	TATONGA7 345.00 - WWRDEHV7 345.00 345KV CKT 1	Priority Projects	
5	12WP	WFEC	OKGE	GLASS MOUNTAIN - MOORELAND 138KV CKT 1	124	131.8	5.3%	WWRDEHV7 345.00 (WWDEHV) 345/138/13.8KV TRANSFORMER CKT 1	Priority Projects	
5	11WP	WFEC	WFEC	LAKE CREEK - LONEWOLF 69KV CKT 1	48	125.5	62.7%	GOTEBO - MOUNTAIN VIEW 69KV CKT 1	LAKE CREEK - LONEWOLF 69KV CKT 1	Replace CT
5	11WP	WFEC	WFEC	LAKE CREEK - LONEWOLF 69KV CKT 1	48	120.6	62.7%	MOUNTAIN VIEW - PINE RIDGE 69KV CKT 1	LAKE CREEK - LONEWOLF 69KV CKT 1	Replace CT
5	11WP	WFEC	WFEC	LAKE CREEK - LONEWOLF 69KV CKT 1	48	115.1	62.7%	PINE RIDGE - WASHITA 69KV CKT 1	LAKE CREEK - LONEWOLF 69KV CKT 1	Replace CT
5	12SP	WFEC	WFEC	LAKE CREEK - LONEWOLF 69KV CKT 1	48	131.5	62.6%	GOTEBO - MOUNTAIN VIEW 69KV CKT 1	LAKE CREEK - LONEWOLF 69KV CKT 1	Replace CT
5	12SP	WFEC	WFEC	LAKE CREEK - LONEWOLF 69KV CKT 1	48	129.4	27.2%	ELK CITY (ELKCTY-4) 138/69/13.8KV TRANSFORMER CKT 1	LAKE CREEK - LONEWOLF 69KV CKT 1	Replace CT
5	12SP	WFEC	WFEC	LAKE CREEK - LONEWOLF 69KV CKT 1	48	123.9	62.6%	MOUNTAIN VIEW - PINE RIDGE 69KV CKT 1	LAKE CREEK - LONEWOLF 69KV CKT 1	Replace CT
5	12WP	WFEC	WFEC	LAKE CREEK - LONEWOLF 69KV CKT 1	48	129.7	62.6%	GOTEBO - MOUNTAIN VIEW 69KV CKT 1	LAKE CREEK - LONEWOLF 69KV CKT 1	Replace CT
5	12WP	WFEC	WFEC	LAKE CREEK - LONEWOLF 69KV CKT 1	48	124.7	62.6%	MOUNTAIN VIEW - PINE RIDGE 69KV CKT 1	LAKE CREEK - LONEWOLF 69KV CKT 1	Replace CT
5	12WP	WFEC	WFEC	LAKE CREEK - LONEWOLF 69KV CKT 1	48	119.7	27.2%	ELK CITY (ELKCTY-4) 138/69/13.8KV TRANSFORMER CKT 1	LAKE CREEK - LONEWOLF 69KV CKT 1	Replace CT
5	16SP	WFEC	WFEC	LAKE CREEK - LONEWOLF 69KV CKT 1	48	128.6	27.2%	ELK CITY (ELKCTY-4) 138/69/13.8KV TRANSFORMER CKT 1	LAKE CREEK - LONEWOLF 69KV CKT 1	Replace CT
5	16SP	WFEC	WFEC	LAKE CREEK - LONEWOLF 69KV CKT 1	48	123.0	62.4%	GOTEBO - MOUNTAIN VIEW 69KV CKT 1	LAKE CREEK - LONEWOLF 69KV CKT 1	Replace CT
5	16SP	WFEC	WFEC	LAKE CREEK - LONEWOLF 69KV CKT 1	48	115.2	62.4%	MOUNTAIN VIEW - PINE RIDGE 69KV CKT 1	LAKE CREEK - LONEWOLF 69KV CKT 1	Replace CT
5	16WP	WFEC	WFEC	LAKE CREEK - LONEWOLF 69KV CKT 1	48	121.8	62.4%	GOTEBO - MOUNTAIN VIEW 69KV CKT 1	LAKE CREEK - LONEWOLF 69KV CKT 1	Replace CT
5	16WP	WFEC	WFEC	LAKE CREEK - LONEWOLF 69KV CKT 1	48	117.7	27.2%	ELK CITY (ELKCTY-4) 138/69/13.8KV TRANSFORMER CKT 1	LAKE CREEK - LONEWOLF 69KV CKT 1	Replace CT
5	16WP	WFEC	WFEC	LAKE CREEK - LONEWOLF 69KV CKT 1	48	116.7	62.4%	MOUNTAIN VIEW - PINE RIDGE 69KV CKT 1	LAKE CREEK - LONEWOLF 69KV CKT 1	Replace CT
5	11WP	OKGE	OKGE	ROMAN NOSE - SOUTHARD 138KV CKT 1	185	101.0	6.7%	WWRDEHV7 345.00 (WWDEHV) 345/138/13.8KV TRANSFORMER CKT 1	Priority Projects	
5	11WP	OKGE	OKGE	ROMAN NOSE - SOUTHARD 138KV CKT 1	185	101.0	6.7%	TATONGA7 345.00 - WWRDEHV7 345.00 345KV CKT 1	Priority Projects	
5	12SP	OKGE	OKGE	ROMAN NOSE - SOUTHARD 138KV CKT 1	153	113.4	6.5%	WWRDEHV7 345.00 (WWDEHV) 345/138/13.8KV TRANSFORMER CKT 1	Priority Projects	
5	12SP	OKGE	OKGE	ROMAN NOSE - SOUTHARD 138KV CKT 1	153	113.4	6.5%	TATONGA7 345.00 - WWRDEHV7 345.00 345KV CKT 1	Priority Projects	
5	12WP	OKGE	OKGE	ROMAN NOSE - SOUTHARD 138KV CKT 1	185	104.8	6.4%	WWRDEHV7 345.00 (WWDEHV) 345/138/13.8KV TRANSFORMER CKT 1	Priority Projects	
5	12WP	OKGE	OKGE	ROMAN NOSE - SOUTHARD 138KV CKT 1	185	104.8	6.4%	TATONGA7 345.00 - WWRDEHV7 345.00 345KV CKT 1	Priority Projects	

Table 2- SPP Facility Voltage Transfer Limitations

Scenario	Season	Area	Monitored Bus with Violation	Transfer Case Voltage (PU)	Outaged Branch Causing Overload	Upgrade Name	Solution
			None				

Transmission Owner	Upgrade	Solution	Earliest Date Upgrade Required (DUN)	Estimated Date of Upgrade Completion (EOC)	* Estimated Engineering & Construction Cost	RTO Determined Need Date
WFEC	CANTON - OKEENE 69KV CKT 1 Accelerate	Replace CT	6/1/2016	6/1/2016	$225,000	6/1/2017
WFEC	LAKE CREEK - LONEWOLF 69KV CKT 1	Replace CT	1/1/2012	6/1/2013	$225,000	

Construction Pending Projects - The requested service is contingent upon completion of the following upgrades. Cost is not assignable to the transmission customer.

Transmission Owner	Upgrade	Solution	Earliest Date Upgrade Required (DUN)	Estimated Date of Upgrade Completion (EOC)	Estimated Engineering & Construction Cost
SWPA	BUFORD 5 161.00 - BULL SHOALS 161KV CKT 1	Three structures (#85, #94, and #95) would need to be replaced with taller structures. We would use steel structures and design them to handle a future conductor upgrade.	6/1/2013	6/1/2013	$100,000
SWPA	CLAY - SPRINGFIELD 161KV CKT 1 SWPA	One medium angle structure (#39) would need to be replaced. In addition, disconnect switches would need to be replaced at Springfield and a wave trap removed.	6/1/2012	6/1/2013	$150,000
WFEC	CANTON - TALOGA 69KV CKT 1	UPGRADE CANTON TO TALOGA TO 336.4 ACSR	1/1/2012	6/1/2013	$4,800,000

Reliability Projects - The requested service is contingent upon completion of the following upgrades. Cost is not assignable to the transmission customer.

Transmission Owner	Upgrade	Solution	Earliest Date Upgrade Required (DUN)	Estimated Date of Upgrade Completion (EOC)
AEPW	Multi - Flint Creek – Centerton 345 kV and Centerton- East Centerton 161 kV	Install 345/161 kV transformer at Centerton. Install 22 miles of new 345 kV, 2-954 ACSR line. Install 2 miles of 161 kV from new Centerton Substation to East Centerton Substation.	12/1/2012	6/1/2014
AEPW	Multi - Centerton - Osage Creek 345 kV	Install 9 miles of 345 kV line from Shipe Road to East Rogers, Install 32 miles of 345 kV line from East Rogers to Osage Creek, and Install new 345/161 kV transformer at Osage Creek	12/1/2012	6/1/2016

Priority Projects - The requested service is contingent upon completion of the following upgrades. Cost is not assignable to the transmission customer.

Transmission Owner	Upgrade	Solution	Earliest Date Upgrade Required (DUN)	Estimated Date of Upgrade Completion (EOC)
MKEC	Line - Comanche County - Medicine Lodge 345 kV dbl ckt	Build a new 55 mile double circuit 345 kV line	1/1/2012	1/1/2015
MKEC	Line - Medicine Lodge - Wichita 345 kV dbl ckt MKEC	Build a new 35 mile double circuit 345 kV line with at least 3000 A capacity from the new Medicine Lodge 345 kV substation to the WR interception from the Wichita substation.	1/1/2012	1/1/2015
MKEC	Line - Spearville - Comanche County 345 kV dbl ckt MKEC	Build a new 27.5 mile double circuit 345 kV line	1/1/2012	1/1/2015
MKEC	Line - Woodward - Comanche County 345 kV dbl ckt MKEC	Build a new 5 mile double circuit 345 kV line	1/1/2012	1/1/2015
MKEC	XFR - Medicine Lodge 345/138 kV	Install a 400 MVA 345/138 kV transformer at the new 345 kV Medicine Lodge substation.	1/1/2012	1/1/2015
OKGE	Line - Hitchland - Woodward 345 kV dbl ckt OKGE	Build a new 60.5 mile double circuit 345 kV line	1/1/2012	7/1/2014
OKGE	Line - Woodward - Comanche County 345 kV dbl ckt OKGE	Build a new 50 mile double circuit 345 kV	1/1/2012	1/1/2015
SPS	Line - Hitchland - Woodward 345 kV dbl ckt SPS	Build a new 60.5 mile double circuit 345 kV line	1/1/2012	7/1/2014
SUNC	Line - Spearville - Comanche County 345 kV dbl ckt SUNC	Build a new 27.5 mile double circuit 345 kV line with at least 3000 A capacity from the Spearville substation to the MKEC interception point from the new Comanche County substation.	1/1/2012	1/1/2015
WERE	Line - Medicine Lodge - Wichita 345 kV dbl ckt WERE	Build a new 35 mile double circuit 345 kV line	1/1/2012	1/1/2015

* The previously identified Network Upgrade may be accelerated. The accelerated cost would be based on the change in date from the respective "RTO Determined Need Date" to the Estimated Date of Upgrade Completion (EOC) in accordance with Financial Analysis of the Aggregate Transmission Service Study (See Financial Analysis section). An expected cost may be estimated by assuming 5-10% of the Estimated Engineering & Construction Cost per year.