

Definitive Interconnection
System Impact Study for
Generator Interconnection
Requests

(DISIS-2012-002-4)
[Group 1 / Group 3 Only]

June 2014

Generator Interconnection

Revision History

Date	Author	Change Description
01/31/2013	SPP	Report Issued (DISIS-2012-002)
02/08/2013	SPP	Report Re-Issued for corrections
05/16/2013	SPP	Account for Withdrawn Projects, Report Re-Posted (DISIS-2012-002-1)
08/05/2013	SPP	Account for Withdrawn Projects, Report Re-Posted (DISIS-2012-002-2)
01/23/2014	SPP	Account for Withdrawn Projects, Report Re-Posted (DISIS-2012-002-3)
06/12/2014	SPP	Study for Group 1 and Group 3 only to account for Withdrawn Projects, Report Re-Posted (DISIS-2012-002-4)

Executive Summary

Pursuant to the Generator Interconnection Procedures (GIP) of the Southwest Power Pool (SPP) Open Access Transmission Tariff (OATT), SPP has conducted this Definitive Interconnection System Impact Study (DISIS). The Interconnection Customers' requests have been clustered together for the following System Impact Cluster Study window which closed September 30, 2012. This DISIS Re-Study is being performed on the Group 1 and Group 3 Interconnection Customers exclusively to account for higher and equally queued withdrawn Interconnection Requests. The customers will be referred to in this study as the DISIS-2012-002 Interconnection Customers. This System Impact Study analyzes the interconnecting of multiple generation interconnection requests associated with new generation totaling approximately 380 MW of new generation which would be located within the transmission systems of Oklahoma Gas and Electric (OKGE) and Sunflower Electric Power Corporation/Mid-Kansas Electric Power LLC (SUNC)/(MKEC). The various generation interconnection requests have differing proposed in-service dates¹. The generation interconnection requests included in this System Impact Cluster Study are listed in Appendix A by their queue number, amount, requested interconnection service, area, requested interconnection point, proposed interconnection point, and the requested in-service date. This restudy was performed to account for withdrawals within the DISIS-2012-002 study and/or higher queued projects withdrawing.

Power flow analysis has indicated that for the power flow cases studied, 380 MW of nameplate generation may be interconnected with transmission system reinforcements within the SPP transmission system. Dynamic stability and power factor analysis has determined the need for reactive compensation in accordance with Order No. 661-A for wind farm interconnection requests and those requirements are listed for each interconnection request within the contents of this report. Dynamic stability analysis has determined that the transmission system will remain stable with the assigned Network Upgrades and necessary reactive compensation requirements.

It should be noted that although this study analyzed many of the most probable contingencies, it is not an all-inclusive list that can account for every operational situation. Additionally, the generator[s] may not be able to inject any power onto the Transmission System due to constraints that fall below the threshold of mitigation for a Generator Interconnection request. Because of this, it is likely that the Customer[s] may be required to reduce their generation output to 0 MW under certain system conditions to allow system operators to maintain the reliability of the transmission network.

The total estimated minimum cost for interconnecting the DISIS-2012-002 interconnection customers is \$40,040,000. These costs are shown in Appendix E and F. Interconnection Service to

¹ The generation interconnection requests in-service dates will need to be deferred based on the required lead time for the Network Upgrades necessary. The Interconnection Customer's that proceed to the Facility Study will be provided a new in-service date based on the Facility Study's time for completion of the Network Upgrades necessary.

DISIS-2012-002 interconnection customers is also contingent upon higher queued customers paying for certain required network upgrades. **The in service date for the DISIS customers will be deferred until the construction of these network upgrades can be completed.**

These costs do not include the Interconnection Customer Interconnection Facilities as defined by the SPP Open Access Transmission Tariff (OATT). This cost does not include additional network constraints in the SPP transmission system identified and shown in Appendix H.

Network Constraints listed in Appendix H are in the local area of the new generation when this generation is injected throughout the SPP footprint for the Energy Resource (ERIS) Interconnection Request. Certain Interconnection Requests were also studied for Network Resource Interconnection Service (NRIS). Those constraints are also listed in Appendix H. Additional Network constraints will have to be verified with a Transmission Service Request (TSR) and associated studies. With a defined source and sink in a TSR, this list of Network Constraints will be refined and expanded to account for all Network Upgrade requirements.

The required interconnection costs listed in Appendix E and F do not include all costs associated with the deliverability of the energy to final customers. These costs are determined by separate studies if the Customer submits a Transmission Service Request through SPP's Open Access Same Time Information System (OASIS) as required by Attachment Z1 of the SPP OATT.

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Introduction

Pursuant to the Generator Interconnection Procedures (GIP) of the Southwest Power Pool (SPP) Open Access Transmission Tariff (OATT), SPP has conducted this Definitive Interconnection System Impact Study (DISIS). The Interconnection Customers' requests have been clustered together for the following System Impact Cluster Study window which closed September 30, 2012. This DISIS Re-Study is being performed on the Group 1 and Group 3 Interconnection Customers exclusively to account for higher and equally queued withdrawn Interconnection Requests. The customers will be referred to in this study as the DISIS-2012-002 Interconnection Customers. This System Impact Study analyzes the interconnecting of multiple generation interconnection requests associated with new generation totaling approximately 380 MW of new generation which would be located within the transmission systems of Oklahoma Gas and Electric (OKGE) and Sunflower Electric Power Corporation/Mid-Kansas Electric Power LLC (SUNC)/(MKEC). The various generation interconnection requests have differing proposed in-service dates². The generation interconnection requests included in this System Impact Cluster Study are listed in Appendix A by their queue number, amount, requested interconnection service, area, requested interconnection point, proposed interconnection point, and the requested in-service date. This restudy was performed to account for withdrawals within the DISIS-2012-002 study and/or higher queued projects withdrawing.

The primary objective of this Definitive Interconnection System Impact Study is to identify the system constraints associated with connecting the generation to the area transmission system. The Impact and other subsequent Interconnection Studies are designed to identify attachment facilities, Network Upgrades and other Direct Assignment Facilities needed to accept power into the grid at each specific interconnection receipt point.

² The generation interconnection requests in-service dates will need to be deferred based on the required lead time for the Network Upgrades necessary. The Interconnection Customer's that proceed to the Facility Study will be provided a new in-service date based on the Facility Study's time for completion of the Network Upgrades necessary.

Model Development

Interconnection Requests Included in the Cluster

SPP has included all interconnection requests that submitted a Definitive Interconnection System Impact Study Agreement no later than September 30, 2012 and were subsequently accepted by Southwest Power Pool under the terms of the Generator Interconnection Procedures (GIP) that became effective March 30, 2010. The interconnection requests that are included in this study are listed in Appendix A.

Affected System Interconnection Requests

Also included in this Definitive Interconnection System Impact Study is a single Affected System Study, located on the Farmers Electric Cooperative, Inc. (FEC) system, which shares connections to the SPS system. The Affected System Study Requests has been given the designations: ASGI-2012-002 (18MW, Point of Interconnection is FEC-Clovis Interchange 115kV). This Affected System Request is located in Group 6 and was not re-evaluated for this study.

Previously Queued Interconnection Requests

The previous queued requests included in this study are listed in Appendix B. In addition to the Base Case Upgrades, the previous queued requests and associated upgrades were assumed to be in-service and added to the Base Case models. These projects were dispatched as Energy Resources with equal distribution across the SPP footprint. Prior queued projects that requested Network Resource Interconnection Service (NRIS) were dispatched in an additional analysis into the balancing authority of the interconnecting transmission owner.

Development of Base Cases

Power Flow

The 2013 series Transmission Service Request (TSR) Models 2014 spring, 2014 summer and winter peak, 2019 summer and winter peak, and the 2024 summer peak scenario 0 cases were used for this study. After the cases were developed, each of the control areas' resources were then re-dispatched to account for the new generation requests using current dispatch orders.

Dynamic Stability

The 2013 series SPP Model Development Working Group (MDWG) Models 2014 winter, 2015 summer, and 2024 summer were used as starting points for this study.

Base Case Upgrades

The following facilities are part of the SPP Transmission Expansion Plan or the Balanced Portfolio or recently approved Priority Projects. These facilities, have an approved Notice to Construct (NTC), or are in construction stages and were assumed to be in-service at the time of dispatch and added to the base case models. The DISIS-2012-002 Customers have not been assigned acceleration costs for the below listed projects. The DISIS-2012-002 Customers Generation Facilities in service dates may need to be delayed until the completion of the following upgrades. If for some reason, construction on these projects is discontinued, additional restudies will be needed to determine the interconnection needs of the DISIS Interconnection Customers.

- Hitchland 230/115kV area projects³:
 - Hitchland – Ochiltree 230kV Project, (placed in-service 2013)
- Balanced Portfolio Projects⁴:
 - Woodward – Border – TUCO 345kV project, scheduled for 5/19/2014 in-service
 - Woodward 345/138kV circuit #2 autotransformer
 - TUCO 345/138kV circuit #2 autotransformer
 - Reactors at Woodward and Border
 - Iatan – Nashua 345kV, scheduled for 6/1/2015 in-service
 - Nashua 345/161kV autotransformer
 - Muskogee– Seminole 345kV, scheduled for 12/31/2013 in-service
 - Tap Stillwell – Swissvale 345kV line at West Gardner, (placed in-service 2013)
- Priority Projects⁵:
 - Hitchland – Woodward double circuit 345kV, (placed in-service 2014)
 - Hitchland 345/230kV circuit #2 autotransformer
 - Woodward – Thistle double circuit 345kV, scheduled for 12/31/2014 in-service
 - Spearville – Clark double circuit 345kV, scheduled for 12/31/2014 in-service
 - Clark – Thistle double circuit 345kV, scheduled for 12/31/2014 in-service
 - Thistle – Wichita double circuit 345kV, scheduled for 12/31/2014 in-service
 - Thistle 345/138kV autotransformer, scheduled for 12/31/2014 in-service
 - Thistle – Flat Ridge 138kV, scheduled for 12/31/2014 in-service
- Various MKEC Transmission System Upgrades⁶
 - Harper – Flat Ridge 138kV rebuild, (placed in-service in 2013)
 - Flat Ridge – Medicine Lodge 138kV rebuild, scheduled for 12/31/2013 in-service
 - Pratt – Medicine Lodge 115kV rebuild, scheduled for 6/15/2014 in-service
 - Medicine Lodge 138/115kV autotransformer replacement, (placed in-service in 2013)
- Northwest 345/138/13.8kV circuit #3 autotransformer, scheduled for 6/1/2017 in-service⁷
- Woodward (OKGE) – Woodward (WFEC) 69kV rebuild, scheduled for 6/1/2015 in-service⁸
- Sheldon – SW7th and Pleasant Hill 115kV circuit #2 rebuild, (placed in-service in 2013)⁹
- Moundridge 138/115/13.8kV autotransformer circuit #2, scheduled for 12/1/2014 in-service¹⁰
- Fremont – S6801 161/69kV circuit #1 Project¹¹
 - Fremont 161/69/13.8kV transformer circuit #1, scheduled for 6/1/2019 in-service.
 - Fremont – S6801 69kV circuit #1, scheduled for 6/1/2019 in-service.

³ SPP Regional Reliability Projects identified in 2007 STEP. As of the writing of this report, SPP Project Tracking TAGIT shows some of these project's in-service dates have been delayed from the original 2010/2011 in-service dates.

⁴ Notice to Construct (NTC) issued June 2009.

⁵ Notice to Construct (NTC) issued June 2010.

⁶ SPP Transmission Service Projects identified in SPP-2007-AG3-AFS-9.

⁷ SPP Transmission Service Project identified in SPP-2009-AG2-AFS6. Per SPP-NTC-20137.

⁸ SPP Regional Reliability Project. Per SPP-NTC-20003.

⁹ SPP Regional Reliability 2012 ITPNT Project. Per SPP-NTC-200171.

¹⁰ SPP Regional Reliability 2012 ITP10 Project. Per SPP-NTC-200181.

¹¹ SPP Regional Reliability 2014 ITPNT Project. Per SPP-NTC-200259.

- S1226 – S1301 161kV circuit #1, scheduled for 6/1/2019 in-service.
- Mustang – Yoakum 230kV circuit #1 replace line traps (placed In-Service in 2014)
- Yoakum 230/115kV transformer #1 and #2 replacements, scheduled for 6/1/2019 in-service
- Dobson – Gano 115kV circuit #1 replace terminal equipment (placed In-Service in 2014)
- Garden City – Kansas Avenue 115kV circuit #1 replace terminal equipment (placed In-Service in 2014)
- Amoco – Wasson 230kV line traps (placed in service 2014)

Contingent Upgrades

The following facilities do not yet have approval. These facilities have been assigned to higher queued interconnection customers. These facilities have been included in the models for the DISIS-2012-002 study and are assumed to be in service. This list may not be all inclusive. The DISIS-2012-002 Customers at this time do not have responsibility for these facilities but may later be assigned the cost of these facilities if higher queued customers terminate their GIA or withdraw from the interconnection queue. The DISIS-2012-002 Customer Generation Facilities in service dates may need to be delayed until the completion of the following upgrades.

- Upgrades assigned to DISIS-2009-001 Interconnection Customers:
 - Lancer Project
 - Spearville – Lancer 345kV, addition
 - Lancer 345/115kV transformer circuit #1, addition
 - Lancer – North Ft. Dodge 115kV, addition
 - Ft. Dodge – North Ft. Dodge circuit #2, addition
 - Move Ft. Dodge terminal of Shooting Star 115kV
 - Fort Randall – Meadow Grove – Kelly 230kV circuit #1, rerate (320MVA)
- Upgrades assigned to DISIS-2010-001 Interconnection Customers:
 - Switch 2749 – Wildorado 69kV circuit # 1, rebuild
- Upgrades assigned to DISIS-2010-002 Interconnection Customers:
 - Buckner –Spearville 345kV circuit #1, replace terminal equipment
 - Twin Church – Dixon County 230kV circuit #1, rerate (320MVA)
- Upgrades assigned to DISIS-2011-001 Interconnection Customers:
 - Beaver County – Buckner 345kV circuit #1, build
 - Rice County – Circle 230kV conversion, (placed In-Service in 2012)
 - Rice County – Lyons 115kV, rebuild (placed In-Service in 2013)
 - Rice County 230/115kV autotransformer, (placed In-Service in 2012)
 - Wheatland – Lyons 115kV, rerate (199 MVA) (placed In-Service in 2012)
 - Hoskins – Dixon County – Twin Church 230kV circuit #1, rerate
 - (NRIS only) Mooreland – FPL Switch – Woodward 138kV circuit #1 rebuild
 - (NRIS only) Glass Mountain – Mooreland 138kV circuit #1, rebuild
 - (NRIS only) TUCO – New Deal – Stanton 345/115kV Project, build
 - (NRIS only) Wolfforth 230/115kV transformer circuit #1, rebuild
- Upgrades assigned to DISIS-2011-002 Interconnection Customers:
 - Power System Stabilizers - Install Power System Stabilizers @ Tolk(Units: 1,2) and Jones (Units: 1,2,3,4)
 - SUB 967 - SUB 968 69kV circuit #1, replace terminal equipment

- (NRIS only) Allen – Lubbock South 115kV circuit #1, rebuild
- (NRIS only) Hydro Carbon Tap - Sub974 69kV circuit #1, rewire CT
- (NRIS only) Nebraska City U Syracuse – SUB 970 circuit #1, replace terminal equipment
- Upgrades assigned to DISIS-2012-001 Interconnection Customers:
 - None

Potential Upgrades Not in the Base Case

Any potential upgrades that do not have a Notification to Construct (NTC) and not explicitly listed within this report have not been included in the base case. These upgrades include any identified in the SPP Extra-High Voltage (EHV) overlay plan, or any other SPP planning study other than the upgrades listed above in the previous section.

Regional Groupings

The interconnection requests listed in Appendix A were grouped together in fifteen different regional groups based on geographical and electrical impacts. These groupings are shown in Appendix C.

To determine interconnection impacts, fifteen different generation dispatch scenarios of the spring base case models were developed to accommodate the regional groupings.

Power Flow

For each group, the various wind generating plants were modeled at 100% nameplate of maximum generation. The other wind generating plants in each area were modeled at 80% nameplate while the wind generating plants in the other areas were modeled at 20% nameplate of maximum generation. These projects were dispatched as Energy Resources with equal distribution across the SPP footprint. Certain projects that requested Network Resource Interconnection Service were dispatched in an additional analysis into the balancing authority of the interconnecting transmission owner. This method allowed for the identification of network constraints that were common to the regional groupings that could then in turn have the mitigating upgrade cost allocated throughout the entire cluster. Other sensitivity analyses are also performed with each interconnection request modeled at 100% nameplate.

Peaking units were not dispatched in the 2014 spring model. To study peaking units' impacts, the 2014 summer and winter, 2019 summer and winter, and 2024 summer peak seasonal models were chosen and peaking units were modeled at 100% of the nameplate rating and wind generating facilities were modeled at 10% of the nameplate rating. Each interconnection request was also modeled separately at 100% nameplate for certain analyses.

Dynamic Stability

For each group, all interconnection requests were dispatched at 100% nameplate output while the other groups were dispatched at 20% output for wind requests and 100% output for thermal requests.

Identification of Network Constraints

The initial set of network constraints were found by using PTI MUST First Contingency Incremental Transfer Capability (FCITC) analysis on the entire cluster grouping dispatched at the various levels mentioned above. These constraints were then screened to determine if any of the generation interconnection requests had at least a 20% Distribution Factor (DF) upon the constraint. Constraints that measured at least a 20% DF from at least one interconnection request were considered for mitigation. Interconnection Requests that have requested Network Resource Interconnection Service (NRIS) were also studied in the NRIS analysis to determine if any constraint had at least a 3% DF. If so, these constraints were considered for mitigation.

Determination of Cost Allocated Network Upgrades

Cost Allocated Network Upgrades of wind generation interconnection requests were determined using the 2014 spring model. Cost Allocated Network Upgrades of peaking units was determined using the 2019 summer peak model. A MUST sensitivity analysis was performed to determine the Distribution Factors (DF), a distribution factor with no contingency that each generation interconnection request had on each new upgrade. The impact each generation interconnection request had on each upgrade project was weighted by the size of each request. Finally the costs due by each request for a particular project were then determined by allocating the portion of each request's impact over the impact of all affecting requests.

For example, assume that there are three Generation Interconnection requests, X, Y, and Z that are responsible for the costs of Upgrade Project '1'. Given that their respective PTDF for the project have been determined, the cost allocation for Generation Interconnection request 'X' for Upgrade Project 1 is found by the following set of steps and formulas:

- Determine an Impact Factor on a given project for all responsible GI requests:

$$\text{Request X Impact Factor on Upgrade Project 1} = \text{PTDF}(\%)(X) * \text{MW}(X) = X1$$

$$\text{Request Y Impact Factor on Upgrade Project 1} = \text{PTDF}(\%)(Y) * \text{MW}(Y) = Y1$$

$$\text{Request Z Impact Factor on Upgrade Project 1} = \text{PTDF}(\%)(Z) * \text{MW}(Z) = Z1$$

- Determine each request's Allocation of Cost for that particular project:

$$\text{Request X's Project 1 Cost Allocation (\$)} = \frac{\text{Network Upgrade Project 1 Cost(\$)} * X1}{X1 + Y1 + Z1}$$

- Repeat previous for each responsible GI request for each Project

The cost allocation of each needed Network Upgrade is determined by the size of each request and its impact on the given project. This allows for the most efficient and reasonable mechanism for sharing the costs of upgrades.

Credits for Amounts Advanced for Network Upgrades

Interconnection Customer shall be entitled to credits in accordance with Attachment Z2 of the SPP Tariff for any Network Upgrades including any tax gross-up or any other tax-related payments associated with the Network Upgrades, and not refunded to the Interconnection Customer.

Required Interconnection Facilities

The requirement to interconnect the 380 MW of generation into the existing and proposed transmission systems in the affected areas of the SPP transmission footprint consist of the necessary cost allocated shared facilities listed in Appendix F by upgrade. The interconnection requirements for the cluster total \$40,040,000. Interconnection Facilities specific to each generation interconnection request are listed in Appendix E. A preliminary one-line drawing for each generation interconnection request are listed in Appendix D.

A list of constraints that were identified and used for mitigation are listed in Appendix G. Listed within Appendix G are the ERIS constraints with greater than or equal to a 20% DF, as well as, the NRIS constraints that have a DF of 3% or greater. Other Network Constraints which are not requiring mitigation are shown in Appendix H. With a defined source and sink in a TSR, this list of Network Constraints will be refined and expanded to account for all Network Upgrade requirements.

Power Flow Analysis

Power Flow Analysis Methodology

The ACCC function of PSS/E was used to simulate single element and special (i.e., breaker-to-breaker, multi-element, etc.) contingencies in portions or all of the modeled control areas of SPP, as well as, other control areas external to SPP and the resulting scenarios analyzed. NERC Category “B” and “C” contingencies were evaluated.

Power Flow Analysis

A power flow analysis was conducted for each Interconnection Customer’s facility using modified versions of the 2014 spring peak, 2014 summer and winter peak, and the 2019 summer and winter peak, and 2024 summer peak models. The output of the Interconnection Customer’s facility was offset in each model by a reduction in output of existing online SPP generation. This method allows the request to be studied as an Energy Resource (ER) Interconnection Request. Certain requests that requested Network Resource Interconnection Service (NRIS) had an additional analysis

conducted for displacing resources in the interconnecting Transmission Owner’s balancing authority.

This analysis was conducted assuming that previous queued requests in the immediate area of these interconnect requests were in-service. The analysis of each Customer’s project indicates that criteria violations will occur on the AEI, SPS, SUNC, WERE and WFEC transmission systems under system intact and contingency conditions in the peak seasons.

Cluster Group 1 (Woodward Area)

In addition to the 4,084.6 MW of previously queued generation in the area, 200.0 MW of new interconnection service was studied to determine impacts for the withdrawal of higher and equally queued Interconnection Requests. No new constraints were found in this area.

Cluster Group 3 (Spearville Area)

In addition to the 4,030.4 MW of previously queued generation in the area, 180.0 MW of new interconnection service was studied. Due to the withdrawal of GEN-2010-061, GEN-2011-043, and GEN-2011-044 and their associated Network Upgrades, power flow analysis indicates a need for a 125Mvar SVC and 100Mvar Cap bank at Thistle due to potential voltage collapse for multiple outages.

Group 3: ERIE Constraints			
MONITORED ELEMENT	RATE B (MVA)	TC%LOADI NG (% MVA)	CONTINGENCY
Non-converged Contingency	1793	-	G11-17T 345.00 - G12-011T 345.00 345KV CKT 1
Non-converged Contingency	1793	-	G12-011T 345.00 - POST ROCK 345KV CKT 1
Non-converged Contingency	1517	-	BUCKNER7 345.00 - SPEARVILLE 345KV CKT 1
Non-converged Contingency	1793	-	CLARKCOUNTY7345.00 - THISTLE7 345.00 345KV CKT 1
Non-converged Contingency	1793	-	CLARKCOUNTY7345.00 - THISTLE7 345.00 345KV CKT 2
Non-converged Contingency	1792	-	AXTELL - POST ROCK 345KV CKT 1
Non-converged Contingency	1792	-	BEAVER CO 345.00 - BUCKNER7 345.00 345KV CKT 1

Curtailement and System Reliability

In no way does this study guarantee operation for all periods of time. It should be noted that although this study analyzed many of the most probable contingencies, it is not an all-inclusive list and cannot account for every operational situation. Because of this, it is likely that the Customer[s] may be required to reduce their generation output to 0 MW under certain system conditions to allow system operators to maintain the reliability of the transmission network.

Stability Analysis

A stability analysis was conducted for each Interconnection Customer's facility using modified versions of the 2013 series SPP Model Development Working Group (MDWG) Models 2014 winter, 2015 summer, and 2024 summer peak dynamic models. The stability analysis was conducted with all upgrades in service that were identified in the power flow analysis. For each group, the interconnection requests were studied at 100% nameplate output while the other groups were dispatched at 20% output for wind requests and 100% output for fossil requests. The output of the Interconnection Customer's facility was offset in each model by a reduction in output of existing online SPP generation. The following synopsis is included for each group.

Cluster Group 1 (Woodward Area)

The Group 1 stability analysis for this restudy was performed by SPP Staff. . Stability analysis has determined that when all previously assigned and currently assigned network upgrades are placed in-service the transmission system will remain stable and low voltage ride through requirements are satisfied for the contingencies studied.

Power Factor analysis was not performed again for this restudy. With the power factor requirements and all network upgrades in service, all interconnection requests in Group 1 will meet FERC Order #661A low voltage ride through (LVRT) requirements.

Cluster Group 3 (Spearville Area)

The Group 3 stability analysis for this restudy was performed by SPP Staff. Stability analysis has determined that when all previously assigned and currently assigned network upgrades are placed in-service the transmission system will remain stable and low voltage ride through requirements are satisfied for the contingencies studied.

Power Factor analysis was not performed again for this restudy. With the power factor requirements and all network upgrades in service, all interconnection request in Group 3 will meet FERC Order #661A low voltage ride through (LVRT) requirements.

Conclusion

The minimum cost of interconnecting 380 MW of new interconnection requests included in this Definitive Interconnection System Impact Study is estimated at \$40,040,000 for the Allocated Network Upgrades and Transmission Owner Interconnection Facilities are listed in Appendix E and F. These costs do not include the cost of upgrades of other transmission facilities listed in Appendix H which are Network Constraints.

These interconnection costs do not include any cost of Network Upgrades determined to be required by short circuit analysis. These studies will be performed if the Interconnection Customer executes the appropriate Interconnection Facilities Study Agreement and provides the required data along with demonstration of Site Control and the appropriate deposit. At the time of the Interconnection Facilities Study, a better determination of the interconnection facilities may be available.

The required interconnection costs listed in Appendices E, and F, and other upgrades associated with Network Constraints do not include all costs associated with the deliverability of the energy to final customers. These costs are determined by separate studies if the Customer submits a Transmission Service Request (TSR) through SPP's Open Access Same Time Information System (OASIS) as required by Attachment Z1 of the SPP Open Access Transmission Tariff (OATT).

Appendix

A: Generation Interconnection Requests Considered for Impact Study

See next page.

A: Generation Interconnection Requests Considered for Impact Restudy

Request	Amount	Service	Area	Requested Point of Interconnection	Proposed Point of Interconnection	Requested In-Service Date	In Service Date Delayed Until no earlier than*
GEN-2012-024	180.00	ER	SUNCMKEC	Clark County 345kV	Clark County 345kV	12/31/2015	12/31/2014
GEN-2012-031	200.00	ER	OKGE	Cimarron 345kV (GEN-2010-040 Sub)	Cimarron 345kV (GEN-2010-040 Sub)	11/30/2014	TBD
Total:		380.00					

Requests included in Appendix A are those found to be affected and considered for this system impact restudy.

B: All Interconnection Request in Impact Study Cluster

See next page.

B: Generation Interconnection Requests in Impact Study

Request	Amount	Service	Area	Requested Point of Interconnection	Proposed Point of Interconnection	Requested In-Service Date	In Service Date Delayed Until no earlier than*
ASGI-2012-002	18.15	ER	SPS	FE-Clovis Interchange 115kV	FE-Clovis Interchange 115kV		
GEN-2012-020	478.00	ER	SPS	TUCO 230kV	TUCO 230kV	9/30/2015	12/31/2014
GEN-2012-021	4.80	ER	LES	Terry Bundy Generating Station 115kV	Terry Bundy Generating Station 115kV	8/1/2013	TBD
GEN-2012-023	115.00	ER	WERE	Viola 345kV	Viola 345kV	12/31/2014	TBD
GEN-2012-024	180.00	ER	SUNCMKEC	Clark County 345kV	Clark County 345kV	12/31/2015	12/31/2014
GEN-2012-026	100.00	ER/NR	MIDW	Colby 115kV	Colby 115kV	12/31/2014	TBD
GEN-2012-027	136.00	ER	AEPW	Shidler 138kV	Shidler 138kV	12/1/2014	TBD
GEN-2012-028	74.80	ER	WFEC	Gotebo 69kV	Gotebo 69kV	12/1/2014	TBD
GEN-2012-031	200.00	ER	OKGE	Cimarron 345kV (GEN-2010-040 Sub)	Cimarron 345kV (GEN-2010-040 Sub)	11/30/2014	TBD
GEN-2012-032	300.00	ER	OKGE	Tap Rose Hill - Sooner 345kV	Tap Rose Hill - Sooner (Ranch) 345kV	11/30/2014	TBD
GEN-2012-033	98.80	ER	OKGE	Tap and Tie South 4th - Bunch Creek & Enid Tap - Fairmont (GEN-2012-033T) 138kV	Tap and Tie South 4th - Bunch Creek & Enid Tap - Fairmont (GEN-2012-033T) 138kV	12/1/2014	TBD
GEN-2012-034	7.00	ER	SPS	Mustang 230kV	Mustang 230kV	6/1/2013	TBD
GEN-2012-035	7.00	ER	SPS	Mustang 230kV	Mustang 230kV	6/1/2013	TBD
GEN-2012-036	7.00	ER	SPS	Mustang 230kV	Mustang 230kV	6/1/2013	TBD
GEN-2012-037	203.00	ER	SPS	TUCO 345kV	TUCO 345kV	3/1/2015	12/31/2014
GEN-2012-040	76.50	ER/NR	WFEC	Chilocco 138kV	Chilocco 138kV	12/1/2013	TBD
GEN-2012-041	121.50	ER	OKGE	Tap Rose Hill - Sooner 345kV	Tap Rose Hill - Sooner 345kV	4/15/2015	TBD
Total: 2,127.55							

Appendix B is a complete list of Generation Interconnection Requests in the original system impact study.

C: Study Groupings

See next page

C. Study Groups

GROUP 1: WOODWARD AREA			
Request	Capacity	Area	Proposed Point of Interconnection
GEN-2001-014	96.00	WFEC	Ft Supply 138kV
GEN-2001-037	100.00	OKGE	FPL Moreland Tap 138kV
GEN-2005-008	120.00	OKGE	Woodward 138kV
GEN-2006-024S	19.80	WFEC	Buffalo Bear Tap 69kV
GEN-2006-046	131.00	OKGE	Dewey 138kV
GEN-2007-021	201.00	OKGE	Tatonga 345kV
GEN-2007-043	200.00	OKGE	Minco 345kV
GEN-2007-044	300.00	OKGE	Tatonga 345kV
GEN-2007-050	170.00	OKGE	Woodward EHV 138kV
GEN-2007-062	765.00	OKGE	Woodward EHV 345kV
GEN-2008-003	101.00	OKGE	Woodward EHV 138kV
GEN-2008-044	197.80	OKGE	Tatonga 345kV
GEN-2010-011	29.70	OKGE	Tatonga 345kV
GEN-2010-040	300.00	OKGE	Cimarron 345kV
GEN-2011-007	250.10	OKGE	Tap Cimarron - Woodring (Mathewson) 345kV
GEN-2011-010	100.80	OKGE	Minco 345kV
GEN-2011-019	299.00	OKGE	Woodward 345kV
GEN-2011-020	299.00	OKGE	Woodward 345kV
GEN-2011-051	104.40	OKGE	Tap Woodward - Tatonga 345kV
GEN-2011-054	300.00	OKGE	Cimarron 345kV
PRIOR QUEUED SUBTOTAL	4,084.60		
GEN-2012-031	200.00	OKGE	Cimarron 345kV (GEN-2010-040 Sub)
CURRENT CLUSTER SUBTOTAL	200.00		
AREA TOTAL	4,284.60		

GROUP 2: HITCHLAND AREA			
Request	Capacity	Area	Proposed Point of Interconnection
ASGI-2011-002	20.00	SPS	Herring 115kV
GEN-2002-008	240.00	SPS	Hitchland 345kV
GEN-2002-009	80.00	SPS	Hansford 115kV
GEN-2003-020	160.00	SPS	Martin 115kV
GEN-2006-020S	18.90	SPS	DWS Frisco 115kV
GEN-2006-044	370.00	SPS	Hitchland 345kV
GEN-2007-046	199.50	SPS	Hitchland 115kV
GEN-2008-047	300.00	OKGE	Tap Hitchland - Woodward Dbl Ckt (Beaver County) 345kV
GEN-2010-001	300.00	OKGE	Tap Hitchland - Woodward Dbl Ckt (Beaver County) 345kV
GEN-2010-014	358.80	SPS	Hitchland 345kV
GEN-2011-014	201.00	OKGE	Tap Hitchland - Woodward Dbl Ckt (Beaver County) 345kV
GEN-2011-022	299.00	SPS	Hitchland 345kV
SPS Distributed (Dumas 19th St)	20.00	SPS	Dumas 19th Street 115kV
SPS Distributed (Etter)	20.00	SPS	Etter 115kV
SPS Distributed (Moore E)	25.00	SPS	Moore East 115kV
SPS Distributed (Sherman)	20.00	SPS	Sherman 115kV
SPS Distributed (Spearman)	10.00	SPS	Spearman 69kV
SPS Distributed (TC-Texas County)	20.00	SPS	Texas County 115kV
PRIOR QUEUED SUBTOTAL	2,662.20		
AREA TOTAL	2,662.20		

GROUP 3: SPEARVILLE AREA			
Request	Capacity	Area	Proposed Point of Interconnection
ASGI-2012-006	22.50	SUNCMKEC	Tap Hugoton - Rolla 69kV
GEN-2001-039A	105.00	SUNCMKEC	Tap Greensburg - Ft Dodge (Shooting Star Tap) 115kV
GEN-2002-025A	150.00	SUNCMKEC	Spearville 230kV
GEN-2004-014	154.50	SUNCMKEC	Spearville 230kV
GEN-2005-012	250.00	SUNCMKEC	Ironwood 345kV
GEN-2006-006	205.50	SUNCMKEC	Spearville 345kV
GEN-2006-021	101.00	SUNCMKEC	Flat Ridge Tap 138kV
GEN-2007-038	200.00	SUNCMKEC	Spearville 345kV
GEN-2007-040	200.00	SUNCMKEC	Buckner 345kV
GEN-2008-018	250.00	SPS	Finney 345kV
GEN-2008-079	99.20	SUNCMKEC	Tap Cudahy - Ft Dodge 115kV
GEN-2008-124	200.10	SUNCMKEC	Ironwood 345kV
GEN-2010-009	165.60	SUNCMKEC	Buckner 345kV
GEN-2010-015	200.10	SUNCMKEC	Spearville 345kV
GEN-2010-045	197.80	SUNCMKEC	Buckner 345kV
GEN-2011-008	600.00	SUNCMKEC	Clark County 345kV
GEN-2011-016	200.10	SUNCMKEC	Spearville 345kV
GEN-2011-017	299.00	SUNCMKEC	Tap Spearville - PostRock (GEN-2011-017T) 345kV
GEN-2012-007	120.00	SUNCMKEC	Rubart 115kV
GEN-2012-011	200.00	SUNCMKEC	Tap Spearville - Post Rock 345kV (North of GEN-2011-017 Tap)
Gray County Wind (Montezuma)	110.00	SUNCMKEC	Gray County Tap 115kV
PRIOR QUEUED SUBTOTAL	4,030.40		
GEN-2012-024	180.00	SUNCMKEC	Clark County 345kV
CURRENT CLUSTER SUBTOTAL	180.00		
AREA TOTAL	4,210.40		

GROUP 4/11: NW KANSAS AREA			
Request	Capacity	Area	Proposed Point of Interconnection
GEN-2001-039M	100.00	SUNCMKEC	Central Plains Tap 115kV
GEN-2003-006A	200.00	SUNCMKEC	Elm Creek 230kV
GEN-2003-019	250.00	MIDW	Smoky Hills Tap 230kV
GEN-2006-031	75.00	MIDW	Knoll 115kV
GEN-2006-040	108.00	SUNCMKEC	Mingo 115kV
GEN-2007-011	135.00	SUNCMKEC	Syracuse 115kV
GEN-2008-017	300.00	SUNCMKEC	Setab 345kV
GEN-2008-092	201.00	MIDW	Post Rock 230kV
GEN-2009-008	199.50	MIDW	South Hays 230kV
GEN-2009-020	48.60	MIDW	Tap Nekoma - Bazine (Walnut Creek) 69kV
GEN-2010-048	70.00	MIDW	Tap Beach Station - Redline 115kV
GEN-2010-057	201.00	MIDW	Rice County 230kV
PRIOR QUEUED SUBTOTAL	1,888.10		
GEN-2012-026	100.00	MIDW	Colby 115kV
CURRENT CLUSTER SUBTOTAL	100.00		
AREA TOTAL	1,988.10		

GROUP 5: AMARILLO AREA			
Request	Capacity	Area	Proposed Point of Interconnection
GEN-2002-022	240.00	SPS	Bushland 230kV
GEN-2006-047	240.00	SPS	Tap Bushland - Deaf Smith (Buffalo) 230kV
GEN-2008-051	322.00	SPS	Potter County 345kV
GEN-2008-088	50.60	SPS	Vega 69kV
Llano Estacado (White Deer)	80.00	SPS	Llano Wind 115kV
PRIOR QUEUED SUBTOTAL	932.60		
AREA TOTAL	932.60		

GROUP 6: S-TX PANHANDLE/W-TX AREA

Request	Capacity	Area	Proposed Point of Interconnection
ASGI-2010-010	42.20	SPS	Lovington 115kV
ASGI-2010-020	30.00	SPS	Tap LE-Tatum - LE-Crossroads 69kV
ASGI-2010-021	15.00	SPS	Tap LE-Saunders Tap - LE-Anderson 69kV
ASGI-2011-001	28.80	SPS	Lovington 115kV
ASGI-2011-003	10.00	SPS	Hendricks 115kV
ASGI-2011-004	20.00	SPS	Pleasant Hill 69kV
GEN-2001-033	180.00	SPS	San Juan Tap 230kV
GEN-2001-036	80.00	SPS	Norton 115kV
GEN-2006-018	170.00	SPS	TUCO Interchange 230kV
GEN-2006-026	604.00	SPS	Hobbs 230kV & Hobbs 115kV
GEN-2008-022	300.00	SPS	Tap Eddy Co - Tolk (Crossroads) 345kV
GEN-2010-006	205.00	SPS	Jones 230kV
GEN-2010-046	56.00	SPS	TUCO Interchange 230kV
GEN-2011-025	82.30	SPS	Tap Floyd County - Crosby County 115kV
GEN-2011-045	205.00	SPS	Jones 230kV
GEN-2011-046	27.00	SPS	Lopez 115kV
GEN-2011-048	175.00	SPS	Mustang 230kV
GEN-2012-001	61.20	SPS	Tap Grassland - Borden County 230kV
GEN-2012-009	15.00	SPS	Mustang 230kV
GEN-2012-010	15.00	SPS	Mustang 230kV
SPS Distributed (Hopi)	10.00	SPS	Hopi 115kV
SPS Distributed (Jal)	10.00	SPS	S_Jal 115kV
SPS Distributed (Lea Road)	10.00	SPS	Lea Road 115kV
SPS Distributed (Monument)	10.00	SPS	Monument 115kV
SPS Distributed (Ocotillo)	10.00	SPS	S_Jal 115kV
PRIOR QUEUED SUBTOTAL	2,371.50		
ASGI-2012-002	18.15	SPS	FE-Clovis Interchange 115kV
GEN-2012-020	478.00	SPS	TUCO 230kV
GEN-2012-034	7.00	SPS	Mustang 230kV
GEN-2012-035	7.00	SPS	Mustang 230kV
GEN-2012-036	7.00	SPS	Mustang 230kV
GEN-2012-037	203.00	SPS	TUCO 345kV
CURRENT CLUSTER SUBTOTAL	720.15		
AREA TOTAL	3,091.65		

GROUP 7: SW-OKLAHOMA AREA

Request	Capacity	Area	Proposed Point of Interconnection
GEN-2001-026	74.00	WFEC	Washita 138kV
GEN-2002-005	120.00	WFEC	Red Hills Tap 138kV
GEN-2003-004	100.00	WFEC	Washita 138kV
GEN-2003-005	100.00	WFEC	Anadarko - Paradise (Blue Canyon) 138kV
GEN-2003-022	120.00	AEPW	Washita 138kV
GEN-2004-020	27.00	AEPW	Washita 34.5kV
GEN-2004-023	20.60	WFEC	Washita 138kV
GEN-2005-003	30.60	WFEC	Washita 138kV
GEN-2006-002	101.00	AEPW	Sweetwater 230kV
GEN-2006-035	225.00	AEPW	Sweetwater 230kV
GEN-2006-043	99.00	AEPW	Sweetwater 230kV
GEN-2007-032	150.00	WFEC	Tap Clinton Junction - Clinton 138kV
GEN-2007-052	150.00	WFEC	Anadarko 138kV
GEN-2008-023	150.00	AEPW	Hobart Junction 138kV
GEN-2008-037	101.00	WFEC	Tap Washita - Blue Canyon Wind 138kV
GEN-2011-037	7.00	WFEC	Blue Canyon 5 138kV
GEN-2011-049	250.00	OKGE	Border 345kV
PRIOR QUEUED SUBTOTAL	1,825.20		
GEN-2012-028	74.80	WFEC	Gotebo 69kV
CURRENT CLUSTER SUBTOTAL	74.80		
AREA TOTAL	1,900.00		

GROUP 8: N-OK/S-KS AREA

Request	Capacity	Area	Proposed Point of Interconnection
ASGI-2010-006	150.00	AECI	Tap Fairfax (AECI) - Shilder (AEPW) 138kV
GEN-2002-004	200.00	WERE	Latham 345kV
GEN-2005-013	201.00	WERE	Tap Latham - Neosho (Caney River) 345kV
GEN-2007-025	300.00	WERE	Viola 345kV
GEN-2008-013	300.00	OKGE	Tap Wichita - Woodring (Hunter) 345kV
GEN-2008-021	42.00	WERE	Wolf Creek 345kV
GEN-2008-098	100.80	WERE	Tap Lacygne - Wolf Creek (Anderson County) 345kV
GEN-2009-025	60.00	OKGE	Nardins 69kV
GEN-2010-003	100.80	WERE	Tap Lacygne - Wolf Creek (Anderson County) 345kV
GEN-2010-005	300.00	WERE	Viola 345kV
GEN-2010-055	4.50	AEPW	Wekiwa 138kV
GEN-2011-057	150.40	WERE	Creswell 138kV
PRIOR QUEUED SUBTOTAL	1,909.50		
GEN-2012-023	115.00	WERE	Viola 345kV
GEN-2012-027	136.00	AEPW	Shidler 138kV
GEN-2012-032	300.00	OKGE	Tap Rose Hill - Sooner (Ranch) 345kV
GEN-2012-033	98.80	OKGE	Tap and Tie South 4th - Bunch Creek & Enid Tap - Fairmont (GEN-2012-033T) 138kV
GEN-2012-040	76.50	WFEC	Chilocco 138kV
GEN-2012-041	121.50	OKGE	Tap Rose Hill - Sooner 345kV
CURRENT CLUSTER SUBTOTAL	847.80		
AREA TOTAL	2,757.30		

GROUP 9/10: NEBRASKA AREA			
Request	Capacity	Area	Proposed Point of Interconnection
GEN-2002-023N	0.80	NPPD	Harmony 115kV
GEN-2003-021N	75.00	NPPD	Ainsworth Wind Tap 115kV
GEN-2004-023N	75.00	NPPD	Columbus Co 115kV
GEN-2006-020N	42.00	NPPD	Bloomfield 115kV
GEN-2006-037N1	75.00	NPPD	Broken Bow 115kV
GEN-2006-038N005	80.00	NPPD	Broken Bow 115kV
GEN-2006-038N019	80.00	NPPD	Petersburg North 115kV
GEN-2006-044N	40.50	NPPD	North Petersburg 115kV
GEN-2007-011N08	81.00	NPPD	Bloomfield 115kV
GEN-2008-086N02	200.00	NPPD	Tap Ft Randle - Columbus (Madison County) 230kV
GEN-2008-119O	60.00	OPPD	S1399 161kV
GEN-2008-123N	89.70	NPPD	Tap Guide Rock - Pauline (Rosemont) 115kV
GEN-2009-040	108.00	WERE	Marshall 115kV
GEN-2010-041	10.50	OPPD	S 1399 161kV
GEN-2010-051	200.00	NPPD	Tap Twin Church - Hoskins 230kV
GEN-2011-018	73.60	NPPD	Steele City 115kV
GEN-2011-027	120.00	NPPD	Tap Twin Church - Hoskins 230kV (GEN-2010-51 Tap)
GEN-2011-055	52.80	OPPD	South Sterling 69kV
GEN-2011-056	3.60	NPPD	Jeffrey 115kV
GEN-2011-056A	3.60	NPPD	John 1 115kV
GEN-2011-056B	4.50	NPPD	John 2 115kV
NPPD Distributed (Broken Bow)	8.30	NPPD	Broken Bow 115kV
NPPD Distributed (Burt County Wind)	12.00	NPPD	Tekamah & Oakland 115kV
NPPD Distributed (Burwell)	3.00	NPPD	Ord 115kV
NPPD Distributed (Columbus Hydro)	45.00	NPPD	Columbus 115kV
NPPD Distributed (Ord)	11.90	NPPD	Ord 115kV
NPPD Distributed (Stuart)	2.10	NPPD	Ainsworth 115kV
PRIOR QUEUED SUBTOTAL	1,557.90		
GEN-2012-021	4.80	LES	Terry Bundy Generating Station 115kV
CURRENT CLUSTER SUBTOTAL	4.80		
AREA TOTAL	1,562.70		

GROUP 12: NW-AR AREA

Request	Capacity	Area	Proposed Point of Interconnection
AREA TOTAL	0.00		

GROUP 13: NW MISSOURI AREA

Request	Capacity	Area	Proposed Point of Interconnection
GEN-2008-129	80.00	MIPU	Pleasant Hill 161kV
GEN-2010-036	4.60	WERE	6th Street 115kV
GEN-2010-056	151.20	MIPU	Tap Saint Joseph - Cooper 345kV
GEN-2011-011	50.00	KACP	Iatan 345kV
PRIOR QUEUED SUBTOTAL	285.80		
AREA TOTAL	285.80		

GROUP 14: S-OKLAHOMA AREA

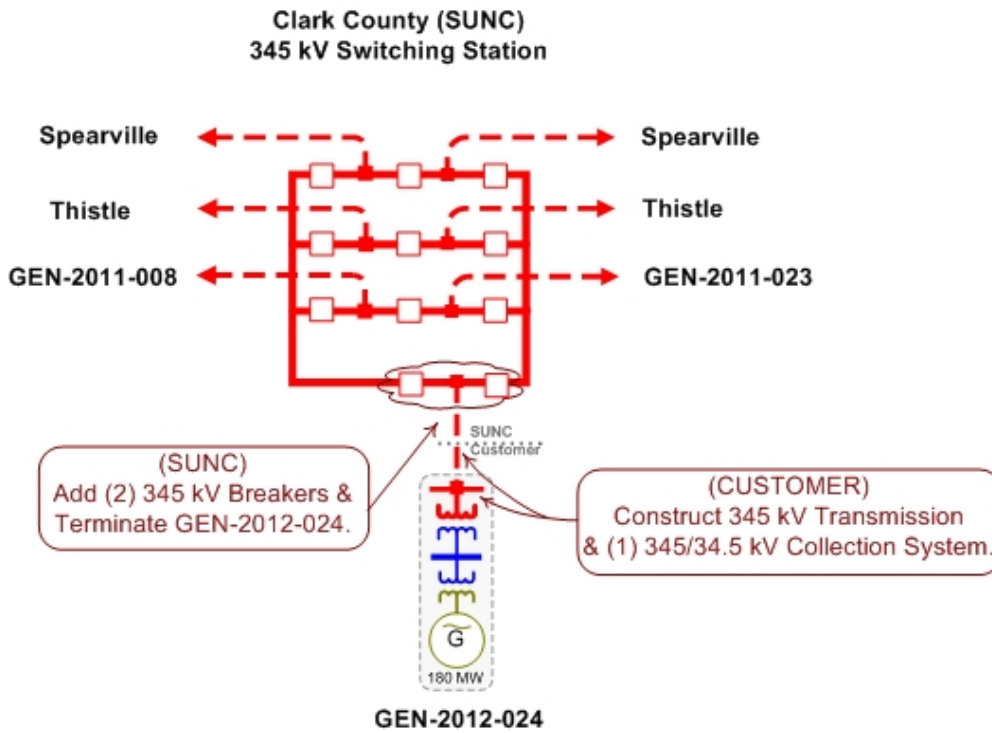
Request	Capacity	Area	Proposed Point of Interconnection
GEN-2011-040	111.00	OKGE	Tap Ratliff - Pooleville (Carter County) 138kV
GEN-2011-050	109.80	AEPW	Santa Fe Station 138kV
GEN-2012-004	41.40	OKGE	Tap Ratliff - Pooleville (Carter County) 138kV
PRIOR QUEUED SUBTOTAL	262.20		
AREA TOTAL	262.20		

CLUSTER TOTAL (CURRENT STUDY)	2,127.6	MW
PQ TOTAL (PRIOR QUEUED)	21,810.0	MW
CLUSTER TOTAL (INCLUDING PRIOR QUEUED)	23,937.6	MW

D: Proposed Point of Interconnection One line Diagrams

Refer to most recent Facility study for each request for an updated one-line.

GEN-2012-024



GEN-2012-031

****Refer to Facility Study for an updated one-line****

E: Cost Allocation per Interconnection Request (Including Prior Queued Upgrades)

Important Note:

****WITHDRAWAL OF HIGHER QUEUED PROJECTS WILL CAUSE A RESTUDY
AND MAY RESULT IN HIGHER INTERCONNECTION COSTS****

This section shows each Generation Interconnection Request Customer, their current study impacted Network Upgrades, and the previously allocated upgrades upon which they rely to accommodate their interconnection to the transmission system.

The costs associated with the current study Network Upgrades are allocated to the Customers shown in this report.

In addition should a higher queued request, defined as one this study includes as a prior queued request, withdraw, the Network Upgrades assigned to the withdrawn request may be reallocated to the remaining requests that have an impact on the Network Upgrade under a restudy. Also, should a Interconnection Request choose to go into service prior to the operation date of any necessary Network Upgrades, the costs associated with those upgrades may be reallocated to the impacted Interconnection Request. The actual costs allocated to each Generation Interconnection Request Customer will be determined at the time of a restudy.

The required interconnection costs listed do not include all costs associated with the deliverability of the energy to final customers. These costs are determined by separate studies if the Customer submits a Transmission Service Request through SPP's Open Access Same Time Information System (OASIS) as required by Attachment Z1 of the SPP OATT. In addition, costs associated with a short circuit analysis will be allocated should the Interconnection Request Customer choose to execute a Facility Study Agreement.

Appendix E. Cost Allocation Per Request

(Including Previously Allocated Network Upgrades*)

Interconnection Request and Upgrades	Upgrade Type	Allocated Cost	Upgrade Cost
GEN-2012-024			
GEN-2012-024 Interconnection Cost See One-Line Diagram.	Current Study	\$5,000,000.00	\$5,000,000.00
Thistle SVC and Cap Bank Build Thistle SVC (+125Mvar) and 100Mvar switchable cap bank.	Current Study	\$35,000,000.00	\$35,000,000.00
Beaver County - Woodward 345kV Dbl CKT Priority Project: Hitchland - Woodward Dbl 345kV CKT (Total Project E&C Cost Shown)	In-Service		\$226,040,727.00
Hitchland - Beaver County 345kV Dbl CKT Priority Project: Hitchland - Woodward Dbl 345kV CKT (Total Project E&C Cost Shown)	In-Service		\$226,040,727.00
Hitchland 345/230kV Autotransformer CKT 2 Priority Project: Hitchland 345/230kV Autotransformer CKT 2 (Total Project E&C Cost Shown).	In-Service		\$8,883,760.00
Beaver County - Buckner 345kV Build approximately 90 miles of 345kV from Beaver County - Gray County @ 3000 amps	Previously Allocated		\$170,209,050.00
Beaver County 345kV Expansion Beaver County Expansion: Tap & Tie in Hitchland - Woodward 345kV CKT 2	Previously Allocated		\$3,500,000.00
Border - Tuco Interchange 345KV CKT 1 Balanced Portfolio: Tuco - Woodward 345kV CKT 1 (Total Project E&C Cost Shown)	Previously Allocated		\$249,247,072.00
Border - Woodward 345KV CKT 1 Balanced Portfolio: Tuco - Woodward 345kV CKT 1 (Total Project E&C Cost Shown)	Previously Allocated		\$249,247,072.00
Buckner - Spearville 345kV CKT 1 Replace wave trap and relays at Spearville to get the line rating up.	Previously Allocated		\$771,000.00
Clark - Thistle 345KV Dbl CKT Priority Project: Spearville - Clark - Thistle Dbl 345kV CKT (Total Project E&C Cost Shown.)	Previously Allocated		\$426,504,292.00
Spearville - Clark 345KV Dbl CKT Priority Project: Spearville - Clark - Thistle Dbl 345kV CKT (Total Project E&C Cost Shown.)	Previously Allocated		\$426,504,292.00
Thistle - Flat Ridge 138kV CKT 1 Priority Project: Thistle - Flat Ridge 138kV CKT 1 (Total Project E&C Cost Shown.)	Previously Allocated		\$5,776,280.00
Thistle - Wichita 345KV Dbl CKT Priority Project: Thistle - Wichita Dbl 345kV CKT (Total Project E&C Cost Shown.)	Previously Allocated		\$426,504,292.00

* Withdrawal of higher queued projects will cause a restudy and may result in higher costs

Interconnection Request and Upgrades	Upgrade Type	Allocated Cost	Upgrade Cost
Thistle - Woodward 345KV Dbl CKT Priority Project: Thistle - Woodward Dbl 345kV CKT (Total Project E&C Cost Shown)	Previously Allocated		\$207,782,000.00
Thistle 345/138KV Transformer CKT 1 Priority Project: Thistle 345/138kV Transformer CKT 1 (Total Project E&C Cost Shown.)	Previously Allocated		\$6,585,986.00
TUCO Interchange 345/230/13.2KV Autotransformer CKT 2 Balanced Portfolio: TUCO 345/230 kV Transformer CKT 2 (Total Project E&C Cost Shown)	Previously Allocated		\$14,900,907.00
Woodward XFMR 345/138/13.8kV CKT 2 Balanced Portfolio: Woodward 345/138kV Transformer CKT 2 & 50 MVAR Reactor (Total Project E&C Cost Shown).	Previously Allocated		\$249,247,072.00
	Current Study Total	\$40,000,000.00	
GEN-2012-031			
GEN-2012-031 Interconnection Cost See One-Line Diagram.	Current Study	\$40,000.00	\$40,000.00
Border - Tuco Interchange 345KV CKT 1 Balanced Portfolio: Tuco - Woodward 345kV CKT 1 (Total Project E&C Cost Shown)	Previously Allocated		\$249,247,072.00
Border - Woodward 345KV CKT 1 Balanced Portfolio: Tuco - Woodward 345kV CKT 1 (Total Project E&C Cost Shown)	Previously Allocated		\$249,247,072.00
Thistle - Woodward 345KV Dbl CKT Priority Project: Thistle - Woodward Dbl 345kV CKT (Total Project E&C Cost Shown)	Previously Allocated		\$207,782,000.00
Thistle 345/138KV Transformer CKT 1 Priority Project: Thistle 345/138kV Transformer CKT 1 (Total Project E&C Cost Shown.)	Previously Allocated		\$6,585,986.00
TUCO Interchange 345/230/13.2KV Autotransformer CKT 2 Balanced Portfolio: TUCO 345/230 kV Transformer CKT 2 (Total Project E&C Cost Shown)	Previously Allocated		\$14,900,907.00
	Current Study Total	\$40,000.00	
TOTAL CURRENT STUDY COSTS:		\$40,040,000.00	

* Withdrawal of higher queued projects will cause a restudy and may result in higher costs

F: Cost Allocation per Proposed Study Network Upgrade

Important Note:

****WITHDRAWAL OF HIGHER QUEUED PROJECTS WILL CAUSE A RESTUDY
AND MAY RESULT IN HIGHER INTERCONNECTION COSTS****

This section shows each Direct Assigned Facility and Network Upgrade and the Generation Interconnection Request Customer(s) which have an impact in this study assuming all higher queued projects remain in the queue and achieve commercial operation.

The required interconnection costs listed do not include all costs associated with the deliverability of the energy to final customers. These costs are determined by separate studies if the Customer submits a Transmission Service Request through SPP's Open Access Same Time Information System (OASIS) as required by Attachment Z1 of the SPP OATT. In addition, costs associated with a short circuit analysis will be allocated should the Interconnection Request Customer choose to execute a Facility Study Agreement.

There may be additional costs allocated to each Customer. See Appendix E for more details.

Appendix F. Cost Allocation by Upgrade

GEN-2012-024 Interconnection Cost **\$5,000,000.00**

See One-Line Diagram.

GEN-2012-024 \$5,000,000.00

Total Allocated Costs **\$5,000,000.00**

GEN-2012-031 Interconnection Cost **\$40,000.00**

See One-Line Diagram.

GEN-2012-031 \$40,000.00

Total Allocated Costs **\$40,000.00**

Thistle SVC and Cap Bank **\$35,000,000.00**

Build Thistle SVC (+125Mvar) and 100Mvar switchable cap bank.

GEN-2012-024 \$35,000,000.00

Total Allocated Costs **\$35,000,000.00**

* Withdrawal of higher queued projects will cause a restudy and may result in higher costs

G: Power Flow Analysis (Constraints For Transmission Reinforcement)

See next page.

SOLUTION	GROUP	SCENARIO	SEASON	SOURCE	DIRECTION	MONITORED ELEMENT	RATEB		TC%LOADING		CONTINGENCY
							(MVA)	TDF	(% MVA)		
FNSL-Blown up	03ALL	0	14G	G12_024	-	Non-converged Contingency	1793	0.2575	-		CLARKCOUNTY7345.00 - THISTLE7 345.00 345KV CKT 1
FNSL-Blown up	03ALL	0	14G	G12_024	-	Non-converged Contingency	1793	0.2575	-		CLARKCOUNTY7345.00 - THISTLE7 345.00 345KV CKT 2
FNSL-Blown up	03ALL	0	14G	G12_024	-	Non-converged Contingency	1517	0.24751	-		BUCKNER7 345.00 - SPEARVILLE 345KV CKT 1
FNSL-Blown up	03ALL	0	14G	G12_024	-	Non-converged Contingency	1793	0.14764	-		G11-17T 345.00 - G12-011T 345.00 345KV CKT 1
FNSL-Blown up	03ALL	0	14G	G12_024	-	Non-converged Contingency	1793	0.14764	-		G12-011T 345.00 - POST ROCK 345KV CKT 1
FNSL-Blown up	03ALL	0	14G	G12_024	-	Non-converged Contingency	1792	0.12025	-		BEAVER CO 345.00 - BUCKNER7 345.00 345KV CKT 1
FNSL-Blown up	03ALL	0	14G	G12_024	-	Non-converged Contingency	1792	0.09782	-		AXTELL - POST ROCK 345KV CKT 1

H: Power Flow Analysis (Other Constraints Not Requiring Transmission Reinforcement)

Available upon request

SOLUTION	GROUP	SCENARIO	SEASON	SOURCE	DIRECTION	MONITORED ELEMENT	RATEB (MVA)	TDF	TC%LOADING (% MVA)	CONTINGENCY
FDNS	01ALL	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.04376	107.9634	IODINE - WOODWARD EHV 138KV CKT 1
FDNS	03G12_024	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03717	107.6728	MULLERGREN - SPEARVILLE 230KV CKT 1
FDNS	03G12_024	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03705	107.6701	CIRCLE - MULLERGREN 230KV CKT 1
FDNS	3	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03706	107.5432	SPP-AEPW-32
FDNS	03G12_024	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03677	107.5111	CIMARRON - NORTHWEST 345KV CKT 1
FDNS	03G12_024	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03622	107.5098	GEN520922 1-SLEEPING BEAR
FDNS	03G12_024	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03712	107.4856	HOLCOMB - SETAB 345KV CKT 1
FDNS	3	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03952	107.4064	G11-17T 345.00 - G12-011T 345.00 345KV CKT 1
FDNS	03G12_024	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03622	107.3725	GEN514806 1-SOONER UNIT 2
FDNS	03G12_024	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03696	107.1933	FLATR3G3 - HARPER 138KV CKT 1
FDNS	01ALL	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03832	107.1295	DEWEY - TALOGA 138KV CKT 1
FDNS	03G12_024	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03694	107.1254	SPP-MKEC-08
FDNS	03G12_024	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03749	106.8613	DEWEY - TALOGA 138KV CKT 1
FDNS	03G12_024	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03661	106.858	GRAND ISLAND - SWEETWATER 345KV CKT 1
FDNS	3	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03883	106.6276	POTTER COUNTY INTERCHANGE (WAUK 90343-A) 345/230/13.2KV TRANSFORMER CKT 1
FDNS	03G12_024	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.0371	106.6064	FARGO JCT - WOODWARD 69KV CKT 1
FDNS	03G12_024	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03696	106.5698	HARPER - MILAN TAP 138KV CKT 1
FDNS	01ALL	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03706	106.5572	BASE CASE
FDNS	03G12_024	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03696	106.4742	SPP-MKEC-05
FDNS	03G12_024	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03696	106.4688	SPP-MKEC-03A
FDNS	01ALL	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.0407	106.4304	BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1
FDNS	01ALL	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.04376	106.3713	DEWEY - IODINE 138KV CKT 1
FDNS	03G12_024	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03692	106.3055	KNOLL 230 - SMOKYHL6 230.00 230KV CKT 1
FDNS	03G12_024	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03696	106.2559	CLEARWATER - MILAN TAP 138KV CKT 1
FDNS	03G12_024	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03696	106.2504	SPP-MKEC-03B
FDNS	03G12_024	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03671	106.2364	AXTELL - PAULINE 345KV CKT 1
FDNS	03ALL	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03297	106.2218	CLEO CORNER - GLASS MOUNTAIN 138KV CKT 1
FDNS	03ALL	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03302	106.1665	CEDARDALE - OKEENE 138KV CKT 1
FDNS	03ALL	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03449	106.1009	KNOBHILL - MOORELAND 138KV CKT 1
FDNS	03G12_024	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03696	106.0904	CLEARWATER - GILL ENERGY CENTER WEST 138KV CKT 1
FDNS	03G12_024	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03687	106.0565	HITCHLAND INTERCHANGE - MOORE COUNTY INTERCHANGE 230KV CKT 1
FDNS	3	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03993	105.966	BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1
FDNS	3	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.04256	105.7571	VIOLA 7 345.00 - WICHITA 345KV CKT 1
FDNS	01ALL	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.04036	105.6547	DBL-HTCH-BVR
FDNS	03ALL	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03297	105.5065	GLASS MOUNTAIN - MOORELAND 138KV CKT 1
FDNS	03ALL	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03302	105.3846	CEDARDALE - MOORELAND 138KV CKT 1
FDNS	01ALL	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.05313	105.3632	G11_051T 345.00 - TATONGA7 345.00 345KV CKT 1
FDNS	3	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03817	105.219	AXTELL - POST ROCK 345KV CKT 1
FDNS	3	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03716	105.1489	SPP-SWPS-01
FDNS	01ALL	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.04351	105.1449	THISTLE7 345.00 - WICHITA 345KV CKT 1
FDNS	01ALL	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.04351	105.1449	THISTLE7 345.00 - WICHITA 345KV CKT 2
FDNS	06ALL	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.0349	105.0836	GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1
FDNS	3	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03883	105.0281	SPP-SWPS-04
FDNS	3	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.0358	105.0276	SAND RDG 138138.00 - WAKITA 138 138.00 138KV CKT 1
FDNS	3	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03706	104.9835	OKLAUNION - TUCO INTERCHANGE 345KV CKT 1
FDNS	3	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03883	104.9127	Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1
FDNS	3	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03752	104.5718	MINGO - SETAB 345KV CKT 1
FDNS	3	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03628	104.4526	GEN514805 1-SOONER UNIT 1
FDNS	01ALL	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03754	104.3049	FT SUPPLY - IODINE 138KV CKT 1
FDNS	01ALL	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.0407	104.2553	BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1
FDNS	3	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03716	104.206	STATELINE INTERCHANGE - STLN-DEMARC6 230KV CKT 1
FDNS	01ALL	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.04168	104.1989	WOODWARD - WOODWARD 69KV CKT 1
FDNS	3	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03716	104.196	SPP-SWPS-02
FDNS	3	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03716	104.1898	STLN-DEMARC6 - SWEETWATER 230KV CKT 1
FDNS	3	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03652	104.0938	WOODRIND (WOODRNG2) 345/138/13.8KV TRANSFORMER CKT 1
FDNS	3	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03786	104.0732	MINGO - RED WILLOW 345KV CKT 1
FDNS	03G12_024	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03622	103.9943	NC1_GEN-NEBRASKA CITY 1
FDNS	3	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03628	103.8041	GEN515787 1-OKLA WIND ENERGY CENTER
FDNS	3	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03831	103.5575	BENTON - WICHITA 345KV CKT 1
FDNS	01ALL	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03799	103.2807	LAWTON EASTSIDE - OKLAUNION 345KV CKT 1
FDNS	3	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03952	103.2661	G11-17T 345.00 - SPEARVILLE 345KV CKT 1
FDNS	6	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.0506	103.0156	G11_051T 345.00 - TATONGA7 345.00 345KV CKT 1
FDNS	3	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03697	102.9654	SMOKYHL6 230.00 - SUMMIT 230KV CKT 1
FDNS	06ALL	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03522	102.9063	STATELINE INTERCHANGE - STLN-DEMARC6 230KV CKT 1
FDNS	06ALL	0	14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03522	102.8985	SPP-SWPS-02

SOLUTION	GROUP	SCENARIO	SEASON	SOURCE	DIRECTION	MONITORED ELEMENT	RATEB (MVA)	TDF	TC%LOADING (% MVA)	CONTINGENCY
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03662	121.3983	CIMARRON - NORTHWEST 345KV CKT 1
FNSL	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03678	121.3705	SPP-MKEC-08
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	121.0578	GEN520922 1-SLEEPING BEAR
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	121.0154	GEN514806 1-SOONER UNIT 2
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03645	120.9344	GRAND ISLAND - SWEETWATER 345KV CKT 1
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03668	120.8783	HARPER - MILAN TAP 138KV CKT 1
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03733	120.8316	DEWEY - TALOGA 138KV CKT 1
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03668	120.8148	SPP-MKEC-05
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03668	120.8116	SPP-MKEC-03A
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03668	120.5905	CLEARWATER - MILAN TAP 138KV CKT 1
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03668	120.5828	SPP-MKEC-03B
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03676	120.5429	KNOLL 230 - SMOKYHLL6 230.00 230KV CKT 1
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03694	120.4289	FARGO JCT - WOODWARD 69KV CKT 1
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03655	120.3129	AXTELL - PAULINE 345KV CKT 1
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03668	120.2882	CLEARWATER - GILL ENERGY CENTER WEST 138KV CKT 1
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.0395	120.0129	DBL-HTCH-BVR
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.0365	119.9084	MOORE - PAULINE 345KV CKT 1
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03654	119.8873	POST ROCK (POSTROCK T1) 345/230/13.8KV TRANSFORMER CKT 1
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03723	119.8821	BENTON - ROSE HILL 345KV CKT 1
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03672	119.8332	HITCHLAND INTERCHANGE - MOORE COUNTY INTERCHANGE 230KV CKT 1
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	119.6423	GEN515225 1-MUSKOGEE 5G
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	119.6365	GEN520947 1-HUGO1
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	119.633	GEN515226 1-MUSKOGEE 6G
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.0362	119.6207	WRTOD400
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	119.616	GEN515223 1-MUSKOGEE 4G
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03672	119.6019	GERALD GENTLEMAN STATION - RED WILLOW 345KV CKT 1
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03694	119.5301	FARGO JCT - FT SUPPLY 69KV CKT 1
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03619	119.5106	HOYT - JEFFREY ENERGY CENTER 345KV CKT 1
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	119.4353	GEN509416 1-TURK GENERATION
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03782	119.3561	OPENSKY 345.00 - RANCH 345.00 345KV CKT 1
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	117.3997	NC1_GEN-NEBRASKA CITY 1
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	115.4211	GEN562074 1-G11_049_3 0.6900
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03091	115.3923	BUCKNER7 345.00 - SPEARVILLE 345KV CKT 1
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	115.3598	GEN560221 1-G07-62-1 0.6900
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	115.3598	GEN560222 1-G07-62-2 0.6900
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	115.3598	GEN560223 1-G07-62-3 0.6900
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	115.3598	GEN560224 1-G07-62-4 0.6900
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	115.2778	GEN562017 1-G11_022_3 0.6900
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	115.213	GEN560522 1-G05-12-2 0.6900
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	115.1479	GEN560121 1-G08-47 0.5750
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	115.0704	EASTDC - WELSH 345KV CKT 1
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	114.9774	GEN527161 1-MUSTANG GEN #1
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	114.9774	GEN527162 1-MUSTANG GEN #2
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03654	114.95	IODINE - MOORELAND 138KV CKT 1
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03579	114.9408	LYDIA - VALLIANT 345KV CKT 1
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03579	114.9352	SPP-AEPW-01
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	114.8731	GEN542957 1-IATAN UNIT #1
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	114.821	GEN531208 1-FLTRDG-WG1 0.6000
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	114.8066	GEN515365 1-CENT 21 34.500
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	114.7877	GEN539762 1-SSWIND 1 34.500
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	114.7775	GEN539785 1-ENSGW 1 0.5750
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	114.7618	GEN560267 1-G10-15-1 0.6900
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03581	114.7524	KNOBHILL (KNOBHILL4) 138/69/13.2KV TRANSFORMER CKT 1
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03536	114.732	DOVER - TWIN LAKES 138KV CKT 1
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	114.7153	GEN531459 2-S2 GENERATOR
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	114.7018	GEN560268 1-G10-15-2 0.6900
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03526	114.66	MATHWSN7 345.00 - WOODDRING 345KV CKT 1
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03536	114.6263	DOVER - DOVER SW 138KV CKT 1
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	114.6045	GEN527163 1-MUSTANG GEN #3 22 KV
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	114.5809	GEN539767 1-GRAY COUNTY WIND FARM
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	114.5567	GEN645001 1-FORT CALHOUN 1
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	114.5106	GEN515393 1-OGENDW2G
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	114.422	GEN560696 1-G11-008-4 0.6900
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03522	114.3672	WOODWARD - WOODWARD EHV 138KV CKT 2
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	114.3671	GEN527882 1-CUNNINGHAM GEN #2 20 KV
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	114.3216	GEN542962 2-IATAN UNIT #2

SOLUTION	GROUP	SCENARIO	SEASON	SOURCE	DIRECTION	MONITORED ELEMENT	RATEB (MVA)	TDF	TC%LOADING (% MVA)	CONTINGENCY
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	114.2833	GEN645011 1-NEBRASKA CITY 1
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	114.2703	GEN527902 1-HOBBS PLANT #2 (CT)
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	114.2629	GEN562023 1-G11_020_3 0.6900
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	114.2629	GEN562026 1-G11_019_3 0.6900
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	114.2486	GEN527901 1-HOBBS PLANT #1 (CT)
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	114.2056	GEN659111 2-LELAND OLDS UNIT2
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03526	114.1937	CIMARRON - MATHWSN7 345.00 345KV CKT 1
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03546	114.1917	CLINTON AIR FORCE BASE TAP - HOBART JUNCTION 138KV CKT 1
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	114.0376	GEN526331 1-JONES GEN #1 22 KV
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	114.017	GEN659103 1-ANTELOPE VALLEY UNIT1
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	114.017	GEN659107 2-ANTELOPE VALLEY UNIT2
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03546	113.9785	CLINTON AIR FORCE BASE TAP - ELK CITY 138KV CKT 1
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	113.962	GEN532653 1-JEFFREY ENERGY CENTER UNIT 3
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	113.9617	GEN532652 1-JEFFREY ENERGY CENTER UNIT 2
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	113.9194	GEN532651 1-JEFFREY ENERGY CENTER UNIT 1
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	113.8929	GEN526334 1-JONES_4 116.500
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	113.807	GEN539670 4-JUDSON LARGE GENERATOR
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	113.6509	GEN526332 1-JONES GEN #2 21 KV
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	113.6176	GEN560695 1-G11-008-3 0.6900
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	113.598	GEN645012 2-NEBRASKA CITY 2
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03503	113.5896	SPP-SWPS-05
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	113.5521	GEN542902 1-GPW_G1 0.6900
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03503	113.4707	FINNEY SWITCHING STATION - Hitchland Interchange 345KV CKT 1
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.0355	113.4395	CLINTON JUNCTION - ELK CITY 138KV CKT 1
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	113.4061	GEN560694 1-G11-008-2 0.6900
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	113.3799	GEN532751 1-WOLF CREEK GENERATING STATION UNIT 1
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	113.3616	GEN560514 1-G04_014 0.6900
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	113.3072	GEN640009 1-COOPER NUCLEAR STATION
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	113.1357	GEN562123 1-G12_011_3 0.6900
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	113.0256	GEN640011 2-GERALD GENTLEMAN STATION UNIT 2
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	112.911	GEN640010 1-GERALD GENTLEMAN STATION UNIT 1
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	112.9031	GEN539807 1-G05-12 0.6900
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	112.7831	GEN527903 1-HOBBS PLANT #3 (ST)
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	112.6204	GEN562298 1-G12-024 0.6500
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	112.6043	GEN560238 1-G10-09 0.6900
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	112.4952	GEN523971 1-HARRINGTON GEN #1 24 KV
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	112.495	GEN523972 1-HARRINGTON GEN #2 24 KV
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	112.4813	GEN523973 1-HARRINGTON GEN #3 24 KV
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03553	112.2621	BYRON_138 138.00 - SANDY_CN_138138.00 138KV CKT 1
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	112.1717	GEN560659 1-G07-38 0.6900
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	112.1211	GEN562035 1-G11_016_3 0.6900
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	112.1051	GEN560432 1-G08-124 0.6900
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	112.0403	GEN560693 1-G11-008-1 0.6900
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	111.9717	GEN560549 1-G06-06 0.6900
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	111.6575	GEN560329 1-G10-45 0.6900
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	111.6396	GEN531503 1-CIMRRN 1 34.500
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.0347	111.3503	EL RENO - ROMAN NOSE 138KV CKT 1
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03553	111.0556	BYRON_138 138.00 - C_CITY_138 138.00 138KV CKT 1
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.0347	110.9602	ROMAN NOSE - SOUTHARD 138KV CKT 1
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03553	110.4497	C_CITY_138 138.00 - KNOBHILL 138KV CKT 1
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	110.3172	GEN523117 1-BUFF_DUNES210.6900
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.0347	110.0971	DEWEY - SOUTHARD 138KV CKT 1
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	109.741	GEN562032 1-G11_017_3 0.6900
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03512	109.7365	BEAVER CO 345.00 - WOODWARD DISTRICT EHV 345KV CKT 1
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03512	109.7365	BEAVER CO 345.00 - WOODWARD DISTRICT EHV 345KV CKT 2
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03593	109.4855	MOORELAND - TALOGA 138KV CKT 1
FNSL	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	109.426	GEN659118 1-LARAMIE RIVER UNIT1
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	109.1196	GEN525561 1-TOLK GEN #1 24 KV
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03404	109.0527	MOREWOOD SW - RED HILLS WIND 138KV CKT 1
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	109.0075	GEN525562 1-TOLK GEN #2 24 KV
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03299	108.8811	BEAVER CO 345.00 - BUCKNER7 345.00 345KV CKT 1
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03304	107.4644	WOODWARD DISTRICT EHV (WWDEHV) 345/138/13.8KV TRANSFORMER CKT 1
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03392	107.3966	DOVER SW - OKEENE 138KV CKT 1
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03607	107.1032	GEN531447 1-HOLCOMB GENERATOR
FDNS	03ALL		2 14G	G12_024	TO->FROM	FPL SWITCH - WOODWARD 138KV CKT 1	153	0.03264	106.0964	WOODWARD DISTRICT EHV (WWDEHV-T2) 345/138/13.8KV TRANSFORMER CKT 2

SOLUTION	GROUP	SCENARIO	SEASON	SOURCE	DIRECTION	MONITORED ELEMENT	RATEB (MVA)	TDF	TC%LOADING (% MVA)	CONTINGENCY
FDNS	03ALL	2	14G	G12_024	FROM->TO	SMOKYHL6 230.00 - SUMMIT 230KV CKT 1	330	0.04068	99.9	SEWARD - ST JOHN 115KV CKT 1
FDNS	03ALL	2	14G	G12_024	FROM->TO	SMOKYHL6 230.00 - SUMMIT 230KV CKT 1	330	0.04068	99.9	SPP-MKEC-06
FDNS	03ALL	2	14G	G12_024	FROM->TO	SMOKYHL6 230.00 - SUMMIT 230KV CKT 1	330	0.04061	99.9	GREENSBURG - SSTARTP3 115.00 115KV CKT 1
FDNS	03ALL	2	14G	G12_024	FROM->TO	SMOKYHL6 230.00 - SUMMIT 230KV CKT 1	330	0.04124	99.8	HUNTSVILLE - ST JOHN 115KV CKT 1
FDNS	03ALL	2	14G	G12_024	FROM->TO	SMOKYHL6 230.00 - SUMMIT 230KV CKT 1	330	0.04104	99.8	POTTER COUNTY INTERCHANGE (WAUK 90343-A) 345/230/13.2KV TRANSFORMER CKT 1
FDNS	03ALL	2	14G	G12_024	FROM->TO	SMOKYHL6 230.00 - SUMMIT 230KV CKT 1	330	0.04089	99.8	PHILLIPSBURG - PLAINVILLE 115KV CKT 1
FDNS	03ALL	2	14G	G12_024	FROM->TO	SMOKYHL6 230.00 - SUMMIT 230KV CKT 1	330	0.04048	99.8	G10-056T 345.00 - ST JOE 345KV CKT 1
FDNS	03ALL	2	14G	G12_024	FROM->TO	SMOKYHL6 230.00 - SUMMIT 230KV CKT 1	330	0.04025	99.8	GEN542951 5-HAWTHORN UNIT #5
FDNS	03ALL	2	14G	G12_024	FROM->TO	SMOKYHL6 230.00 - SUMMIT 230KV CKT 1	330	0.04061	99.75642	GREENSBURG - SUN CITY 115KV CKT 1
FDNS	03ALL	2	14G	G12_024	FROM->TO	SMOKYHL6 230.00 - SUMMIT 230KV CKT 1	330	0.04186	99.7	EMPORIA ENERGY CENTER - WICHITA 345KV CKT 1
FDNS	03ALL	2	14G	G12_024	FROM->TO	SMOKYHL6 230.00 - SUMMIT 230KV CKT 1	330	0.04124	99.7	MIDW-CATB05
FDNS	03ALL	2	14G	G12_024	FROM->TO	SMOKYHL6 230.00 - SUMMIT 230KV CKT 1	330	0.04061	99.67157	MEDICINE LODGE - SUN CITY 115KV CKT 1
FDNS	03ALL	2	14G	G12_024	FROM->TO	SMOKYHL6 230.00 - SUMMIT 230KV CKT 1	330	0.04092	99.66577	HARPER - MILAN TAP 138KV CKT 1
FDNS	03ALL	2	14G	G12_024	FROM->TO	SMOKYHL6 230.00 - SUMMIT 230KV CKT 1	330	0.04124	99.6	HUNTSVILLE - HUTCHINSON ENERGY CENTER 115KV CKT 1
FDNS	03ALL	2	14G	G12_024	FROM->TO	SMOKYHL6 230.00 - SUMMIT 230KV CKT 1	330	0.04092	99.6	SPP-MKEC-03A
FDNS	03ALL	2	14G	G12_024	FROM->TO	SMOKYHL6 230.00 - SUMMIT 230KV CKT 1	330	0.04092	99.6	SPP-MKEC-03B
FDNS	03ALL	2	14G	G12_024	FROM->TO	SMOKYHL6 230.00 - SUMMIT 230KV CKT 1	330	0.04092	99.6	SPP-MKEC-05
FDNS	03ALL	2	14G	G12_024	FROM->TO	SMOKYHL6 230.00 - SUMMIT 230KV CKT 1	330	0.04048	99.6	COOPER - G10-056T 345.00 345KV CKT 1
FDNS	03ALL	2	14G	G12_024	FROM->TO	SMOKYHL6 230.00 - SUMMIT 230KV CKT 1	330	0.04092	99.54389	CLEARWATER - MILAN TAP 138KV CKT 1
FDNS	03ALL	2	14G	G12_024	FROM->TO	SMOKYHL6 230.00 - SUMMIT 230KV CKT 1	330	0.04104	99.5	Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1
FDNS	03ALL	2	14G	G12_024	FROM->TO	SMOKYHL6 230.00 - SUMMIT 230KV CKT 1	330	0.04061	99.5	BARBER 3 115.00 - MEDICINE LODGE 115KV CKT 1
FDNS	03ALL	2	14G	G12_024	FROM->TO	SMOKYHL6 230.00 - SUMMIT 230KV CKT 1	330	0.04044	99.5	NUNDRWD - WAYSIDE 230KV CKT 1
FDNS	03ALL	2	14G	G12_024	FROM->TO	SMOKYHL6 230.00 - SUMMIT 230KV CKT 1	330	0.04025	99.5	GEN541151 3-SIBLEY GENERATING UNIT #3
FDNS	06ALL	0	14G	G12_031	FROM->TO	LAWEASOKLUNI	425	0.05969	144.5	BASE CASE
FDNS	6	0	14G	G12_031	FROM->TO	LAWEASOKLUNI	425	0.05833	107.8	BASE CASE

I: Power Flow Analysis (Category “C” Contingencies)

Available on Request

J: Dynamic Stability Analysis Report

Available upon request