Preliminary Interconnection System Impact Study for Generation Interconnection Requests

(PISIS-2013-002)

February 2014

Generator Interconnection

SPP Southwest Power Pool

Revision History

Date	Author	Change Description
02/28/2014	SPP	Report Issued (PISIS-2013-002)

Executive Summary

Generator Interconnection customers have requested a Preliminary Interconnection System Impact Study (PISIS) under the Generator Interconnection Procedures (GIP) in the Southwest Power Pool Open Access Transmission Tariff (OATT). The Interconnection Customers' requests have been clustered together for the following System Impact Cluster Study window which closed September 30, 2013. The customers will be referred to in this study as the PISIS-2013-002 Interconnection Customers. This System Impact Study analyzes the interconnecting new generation totaling approximately 326.4 MW of new generation which would be located within the transmission system of Southwestern Public Service (SPS). The generator interconnection request has a requested in service date of 3/31/2016[1]. The generator 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.

Power flow analysis has indicated that for the power flow cases studied, 326.4 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 FERC Order #661A 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.

In no way does this study guarantee operation for all periods of time. This interconnection study identifies and assigns transmission reinforcements for Energy Resource (ER) interconnection injection constraints (defined as a 20% distribution factor impact) and Network Resource (NR) constraints, if requested by the Customer. This interconnection study does not assign transmission reinforcements for all potential transmission constraints. 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, also known as curtailment, under certain system conditions to allow system operators to maintain the reliability of the transmission network.

The total estimated minimum cost for interconnecting the PISIS-2013-002 Interconnection Customers is estimated at $207,400,000. These costs are shown in Appendix E and F. Interconnection Service to PISIS-2013-002 Interconnection Customers is also contingent upon higher queued customers paying for certain required network upgrades. **The in-service date for the**

[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 Customers 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.

PISIS 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 Energy Resource Interconnection Service (ERIS) requests. 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 Southwest Power Pool (SPP) Open Access Transmission Tariff (OATT), SPP has conducted this Preliminary Interconnection System Impact Study (PISIS) for certain generator interconnection requests in the SPP Generator Interconnection Queue. These interconnection requests have been clustered together for the following System Impact Study window which closed September 30, 2013. The customers will be referred to in this study as the PISIS-2013-002 Interconnection Customers. This PISIS analyzes interconnecting a generation interconnection request associated with new generation totaling 326.4 MW which would be located within the transmission system of Southwestern Public Service (SPS). The interconnection request has an in service date of 3/31/2016[2]. The generator interconnection requests included in this System Impact 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.

The primary objective of this PISIS is to identify the system constraints associated with connecting the generation to the area transmission system. The Impact Study and other subsequent Interconnection Studies are designed to identify required interconnection 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 Customers that proceed to the Facility Study will be provided a new in-service date based on the completion of the Facility Study.

Model Development

Interconnection Requests Included in the Cluster

SPP included all interconnection requests that submitted a Preliminary Interconnection System Impact Study Agreement no later than September 30, 2013 and were subsequently accepted by Southwest Power Pool under the terms of the Generator Interconnection Procedures (GIP). The interconnection requests that are included in this study are listed in Appendix A.

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 including the 2014 (spring, summer and winter peak seasons), the 2019 (summer and winter peak seasons), and the 2024 (summer peak season) 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 peak cases were used as starting points for this study.

Base Case Upgrades

The following facilities are part of the SPP Transmission Expansion Plan, the Balanced Portfolio or recently approved Priority Projects. These facilities have an approved Notification 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 PISIS-2013-002 Interconnection Customers have not been assigned acceleration costs for the below listed projects. The PISIS-2013-002 Interconnection 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.

- Balanced Portfolio Projects[3]:

[3] Notification to Construct (NTC) issued June 2009

    - 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
- Priority Projects[4]:
    - Hitchland – Woodward double circuit 345kV, scheduled for 6/30/2014 in-service
        - Hitchland 345/230kV circuit #2 autotransformer
    - Woodward – Thistle double circuit 345kV, scheduled for 12/31/2014 in-service
    - Spearville – Clark County double circuit 345kV, scheduled for 12/31/2014 in-service
    - Clark County – 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
- St. John – Barber 115kV rebuild, scheduled for 6/20/2014 in service
- Hays – South Hays 115kV line rebuild, scheduled for 6/1/2015 in-service[5]
- Northwest 345/138/13.8kV circuit #3 autotransformer, scheduled for 6/1/2017 in-service[6]
- Ogallala 230/115/13kV Transformer circuit #1 replacement[7]
- Hoskins – Neligh East Projects[8]
    - Neligh East 345/115kV substation and transformer
    - Neligh East Area 115kV upgrades to support new station
    - Hoskins – Neligh East 345kV circuit #1
- Maxwell – North Platte 115kV terminal equipment upgrade[9]

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 PISIS-2013-002 study and are assumed to be in service. This list may not be all inclusive. The PISIS-2013-002 Interconnection 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 Generation Interconnection Agreement or withdraw from the interconnection queue. The PISIS-2013-002 Interconnection 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

[4] Notification to Construct (NTC) issued June 2010
[5] SPP Regional Reliability 2013 ITPNT Project Per SPP-NTC-200210
[6] SPP Transmission Service Project identified in SPP 2009-AG2-AFS6. Per SPP NTC 20137
[7] Notification to Construct (NTC) SPP-2009-AGP1-AFS-5 Per SPP-NTC-20117
[8] SPP Regional Reliability 2012 ITP 10 Project Per SPP-NTC-200220
[9] SPP Regional Reliability 2014 ITPNT Per SPP-NTC-200253

        - 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 Fort Dodge terminal of Shooting Star 115kV at North Ft Dodge
    - 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:
    - Twin Church – Dixon County 230kV circuit #1 rerate (320MVA)
    - Buckner – Spearville 345kV terminal equipment
- Upgrades assigned to DISIS-2011-001 Interconnection Customers:
    - Beaver County – Buckner 345kV circuit #1 build
    - Tatonga – Mathewson - Cimarron 345kV circuit #2 build and Tatonga terminal equipment upgrade (1792 MVA)
    - Hoskins – Dixon County – Twin Church 230kV circuit #1 conductor clearance increase
    - (NRIS only) Hitchland 230/115/13.2kV transformer circuit #2
    - (NRIS only) New Deal – TUCO 345kV/115kV Project
    - (NRIS only) Spearville – Mullergren 230kV circuit #1 rebuild
    - (NRIS only) Woodward – FPL Switch – Mooreland 138kV 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)
    - Mullergen 345kV Expansion Project
        - Mullergren 345/230kV substation and transformer
        - GEN-2011-017 Tap – Mullergren 345kV circuit #1
        - Extend Mullergren 230kV circuit to new 345/230kV Mullergren substation
    - Jones – Lubbock South 230kV circuit #2 replace line traps
    - West Brock – SUB 967 – SUB 968 – SUB 969 – SUB 974 69kV circuit #1 replace terminal equipment
    - (NRIS only) Hydro Carbon Tap - Sub974 69kV circuit #1 rewire CT
    - (NRIS only) Lubbock South 230/115kV Autotransformer circuit #2 addition
    - (NRIS only) Mullergren – Reno 345kV circuit #1
    - (NRIS only) Nebraska City U Syracuse – SUB 970 circuit #1 replace terminal equipment
    - (NRIS only) Yoakum 230/115kV transformer circuit #1 and #2 replacements
- Upgrades assigned to DISIS-2012-001 interconnection Customers:
    - Dobson – Gano 115kV replace terminal equipment
    - Garden City – Kansas Ave Water Treatment Plant 115kV replace terminal equipment
    - Mustang – Yoakum 230kV circuit #1 replace line traps
- Upgrades assigned to DISIS-2012-002 interconnection Customers:
    - Amoco Wasson – Oxy Tap – Yoakum 230kV circuit #1 replace line traps
    - Fairfax 138/69kV transformer replacement
    - Lake Creek – Lone Wolf 69kV circuit #1 reset CT
    - Remington – Fairfax 138kV circuit #1 conductor clearance increase

  - (NRIS only) Arkansas City – Paris – Creswell – Oak – Rainbow – City of Winfield 69kV rebuild
  - (NRIS only) Creswell 138/69/13.2kV Transformers circuit #1 and #2 replacements
- Upgrades assigned to DISIS-2013-001 interconnection Customers:
  - Deaf Smith – Plant X 230kV circuit #1 line trap replacements
  - 60 Mvar Capacitor Bank(s) at Oklaunion
  - Meadow Grove & S Norfolk Projects
    - Meadow Grove 115kV substation bay and transformer
    - Meadow Grove – N Petersburg 115kV
    - Meadow Grove – S Norfolk 230kV
    - S Norfolk 345/230kV substation and transformer
  - Tolk – Plant X 230kV circuit #3 addition
  - Vinita – Vinita Junction 69kV rebuild
  - Vinita Junction 138/69/13.2kV transformer circuit #1 replacement
  - (NRIS only) Catoosa – Terra Nitrogen Tap – Verdigras 138kV rebuild
  - (NRIS only) Knoll – N Hays – Vine – Hays Plant 115kV rebuild
  - (NRIS only) Plant X 230/115/13kV transformer circuit #2 addition
  - (NRIS only) Vinita – Eastern State Hospital Tap – Vinita Neo Tap – J6 – Explorer Tap – Afton 69kV rebuild
- Upgrades assigned to DISIS 2013-002 Customers
  - Bushland – Bushland South 230kV circuit #1
  - Gerald Gentleman Station Flowgate Stability Limit Mitigation
  - Viola – Wichita 345kV circuit #1 line trap replacements
  - (NRIS only) Cleo Corner – Glass Mountain 138kV circuit #1 rebuild
  - (NRIS only) Gavins Point – Yankton Junction 115kV circuit #1
  - (NRIS only) Glass Mountain – Mooreland 138kV circuit #1 rebuild
  - (NRIS only) Sub 184 – Neosho 161/69kV transformer circuit #1 replacement

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 into twelve active 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 Energy Resource Interconnection Service (ERIS), the wind generating plants were modeled at 100% nameplate of maximum generation. The other wind generating plants in the area were modeled at 80% nameplate while the wind generating plants in the remote areas were modeled at

20% nameplate of maximum generation. These projects were dispatched as Energy Resources with a load factor by area distribution across the SPP footprint. All wind generators that requested Network Resource Interconnection Service (NRIS) were dispatched in an additional analysis into the balancing authority of the interconnecting transmission owner at 100% nameplate. 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 all interconnection requests in each group being dispatched at 100% nameplate.

Peaking units were not dispatched in the 2014 spring model. To study peaking units' impacts, the 2014 summer and winter and 2019 summer and winter, and 2024 summer 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 studied 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 PSS®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 which 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 transmission reinforcement. In addition, stability issues are also considered for transmission reinforcement. 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 also 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 PSS®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:

  Request X Impact Factor on Upgrade Project 1 = PTDF(%)(X) * MW(X) = X1

  Request Y Impact Factor on Upgrade Project 1 = PTDF(%)(Y) * MW(Y) = Y1

  Request Z Impact Factor on Upgrade Project 1 = PTDF(%)(Z) * 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 326.4 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 an estimated $207,400,000. 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. Additional constraints identified by NERC category "C" contingencies are listed in Appendix I.

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, 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 Interconnection Service request (ERIS). Certain requests that are pursuing 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 SPS transmission system under system intact and contingency conditions in the peak seasons.

Cluster Group 1 (Woodward Area)

In addition to the 5,318.7 MW of previously queued generation in the area, 0.0 MW of new interconnection service was studied. No new constraints were found in this area.

Cluster Group 2 (Hitchland Area)

In addition to the 3,261.2 MW of previously queued generation in the area, 0.0 MW of new interconnection service was studied. No new constraints were found in this area.

Cluster Group 3 (Spearville Area)

In addition to the 4,309.4 MW of previously queued generation in the area, 0.0 MW of new interconnection service was studied. No new constraints were found in this area.

Cluster Group 4/11 (NW Kansas Group)

In addition to the 2,045.7MW of previously queued generation in the area, 0.0 MW of new interconnection service was studied. No new constraints were found in this area.

Cluster Group 5 (Amarillo Area)

In addition to the 1,314.1 MW of previously queued generation in the area, 0.0 MW of new interconnection service was studied. No new constraints were found in this area.

Cluster Group 6 (South Texas Panhandle/New Mexico)

In addition to the 4,035.5 MW of previously queued generation in the area, 326.4 MW of new interconnection service was studied. Constraints in the area where on the Bushland – Potter 345kV and Bushland South – Potter 345kV lines. Additional constraints were identified in the stability analysis.

ERIS/NRIS Constraints			
MONITORED ELEMENT	RATE B (MVA)	TC%LOADING (% MVA)	CONTINGENCY
BUSHLAND_S 230.00 - POTTER COUNTY INTERCHANGE 230KV CKT 1	351	101.6101	BUSHLAND INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1
BUSHLAND INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1	351	113.5079	BUSHLAND_S 230.00 - POTTER COUNTY INTERCHANGE 230KV CKT 1

Cluster Group 7 (Southwestern Oklahoma)

In addition to the 1,900.0 MW of previously queued generation in the area, 0.0 MW of new interconnection service was studied. No new constraints were found in this area.

Cluster Group 8 (South Central Kansas/North Oklahoma)

In addition to the 3,864.1.6 MW of previously queued generation in the area, 0.0 MW of new interconnection service was studied. No new constraints were found in this area.

Cluster Group 9/10 (Nebraska)

In addition to the 2,514.0 MW of previously queued generation in the area, 0.0 MW of new interconnection service was studied. No new constraints were found in this area.

Cluster Group 12 (Northwest Arkansas)

In addition to the 30.0 MW of previously queued generation in the area, 0.0 MW of new interconnection service was studied. No new constraints were found in this area.

Cluster Group 13 (Northwest Missouri)

In addition to the 375.8 MW of previously queued generation in the area, 0.0 MW of new interconnection service was studied. No new constraints were found in this area.

Cluster Group 14 (South Central Oklahoma)

In addition to the 362.5 MW of previously queued generation in the area, 0.0 MW of new interconnection service was studied. No new constraints were found in this area.

Curtailment 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, also known as curtailment, 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 using modified versions of the 2013 series SPP Model Development Working Group (MDWG) Models 2014 winter, 2015 summer, and 2024 summer peak dynamic cases. 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 other 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. The entire stability study for each group can be found in the Appendices section.

Cluster Group 1 (Woodward Area)

There were no customers requesting interconnection service in the Woodward area.

Cluster Group 2 (Hitchland Area)

There were no customers requesting interconnection service in the Hitchland area.

Cluster Group 3 (Spearville Area)

There were no customers requesting interconnection service in the Spearville area.

Cluster Group 4/11 (Northwest Kansas)

There were no customers requesting interconnection service in the Northwest Kansas area.

Cluster Group 5 (Amarillo Area)

There were no customers requesting interconnection service in the Amarillo Area.

Cluster Group 6 (South Texas Panhandle/New Mexico)

Stability analysis has determined that with all previously assigned Network Upgrades placed in service, potential stability issues are observed for the loss of the TUCO – Border 345kV and Border – Woodward 345kV. It was determined that a second 345kV circuit from TUCO to Border, a new substation (Chisholm) on the Border – Woodward line, a second circuit from Border – Chisholm, and a new 345kV line from Chisholm – Gracemont are required for system stability. With the proposed Network Upgrades, the system will remain stable and low voltage ride through requirements are satisfied for the contingencies studied. Power Factor requirements are listed in the table below.

Power Factor Requirements:

Request	Size (MW)	Generator Model	Point of Interconnection	Power Factor Requirement at POI*	
				Lagging (supplying)	Leading (absorbing)
GEN 2013-027	326.4 MW	GE 1.7	Tolk – Yoakum 230kV	0.95	0.95

*As reactive power is required for all projects, the final requirement in the GIA will be the pro-forma 95% lagging to 95% leading at the point of interconnection.

Cluster Group 7 (Southwest Oklahoma)

There were no customers requesting interconnection service in the Southwest Oklahoma area.

Cluster Group 8 (South Central Kansas/North Oklahoma)

There were no customers requesting interconnection service in the South Central Kansas/North Oklahoma area.

Cluster Group 9/10 (Nebraska)

There were no customers requesting interconnection service in the Nebraska area.

Cluster Group 12 (Northwest Arkansas Area)

There were no customers requesting interconnection service in the Northwest Arkansas area.

Cluster Group 13 (Northwest Missouri Area)

There were no customers requesting interconnection service in the Northwest Missouri area.

Cluster Group 14 (South Central Oklahoma)

There were no customers requesting interconnection service in the Northwest Missouri area.

Conclusion

The minimum cost of interconnecting 326.4 MW of new interconnection requests included in this Preliminary Interconnection System Impact Study is estimated at $207,400,000 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).

Appendices

A: Generation Interconnection Requests Considered for Impact Study

See next page.

A: Generation Interconnection Requests Considered for 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*
GEN-2013-027	326.40	ER/NR	SPS	Tap Tolk - Yoakum 230kV CKT 1	Tap Tolk West - Yoakum 230kV CKT 1	3/31/2016	3/1/2018
Total:	**326.40**						

*Requests that are dependent upon Priority Projects or Balanced Portfolio may be delayed until 12/31/2014. Other requests in-service date to be determined after Facility Study.

B: Prior Queued Interconnection Requests

See next page.

B: Prior Queued Interconnection Requests

Request	Amount	Area	Requested/Proposed Point of Interconnection	Status or In-Service Date
ASGI-2010-006	150.00	AECI	Tap Fairfax (AECI) - Shilder (AEPW) 138kV	AECI queue Affected Study
ASGI-2010-010	42.20	SPS	Lovington 115kV	Lea County Affected Study
ASGI-2010-020	30.00	SPS	Tap LE-Tatum - LE-Crossroads 69kV	Lea County Affected Study
ASGI-2010-021	15.00	SPS	Tap LE-Saunders Tap - LE-Anderson 69kV	Lea County Affected Study
ASGI-2011-001	28.80	SPS	Lovington 115kV	On-Line
ASGI-2011-002	20.00	SPS	Herring 115kV	On-Line
ASGI-2011-003	10.00	SPS	Hendricks 115kV	On-Line
ASGI-2011-004	20.00	SPS	Pleasant Hill 69kV	Under Study (DISIS-2011-002)
ASGI-2012-002	18.15	SPS	FE-Clovis Interchange 115kV	Under Study (DISIS-2012-002)
ASGI-2012-006	22.50	SUNCMKEC	Tap Hugoton - Rolla 69kV	Under Study (DISIS-2012-001)
ASGI-2013-001	11.50	SPS	PanTex South 115kV	Under Study (DISIS-2013-001)
ASGI-2013-002	18.40	SPS	FE Tucumcari 115kV	Under Study (DISIS-2013-001)
ASGI-2013-003	18.40	SPS	FE Clovis 115kV	Under Study (DISIS-2013-001)
ASGI-2013-004	29.60	SUNCMKEC	Morris 115kV	Facility Study
ASGI-2013-005	1.80	SPS	FE Clovis 115kV	Facility Study
ASGI-2013-006	2.00	SPS	SP-Erskine 115kV	
ASGI-2013-007	90.00	AECI	Tap Hickory Creek - Locust Creek 161kV	
GEN-2001-014	96.00	WFEC	Ft Supply 138kV	On-Line
GEN-2001-026	74.00	WFEC	Washita 138kV	On-Line
GEN-2001-033	180.00	SPS	San Juan Tap 230kV	On-Line at 120MW
GEN-2001-036	80.00	SPS	Norton 115kV	On-Line
GEN-2001-037	100.00	OKGE	FPL Moreland Tap 138kV	On-Line
GEN-2001-039A	105.00	SUNCMKEC	Tap Greensburg - Ft Dodge (Shooting Star Tap) 115kV	On-Line
GEN-2001-039M	100.00	SUNCMKEC	Central Plains Tap 115kV	On-Line
GEN-2002-004	200.00	WERE	Latham 345kV	On-Line at 150MW
GEN-2002-005	120.00	WFEC	Red Hills Tap 138kV	On-Line
GEN-2002-008	240.00	SPS	Hitchland 345kV	On-Line at 120MW
GEN-2002-009	80.00	SPS	Hansford 115kV	On-Line
GEN-2002-022	240.00	SPS	Bushland 230kV	On-Line
GEN-2002-023N	0.80	NPPD	Harmony 115kV	On-Line
GEN-2002-025A	150.00	SUNCMKEC	Spearville 230kV	On-Line
GEN-2003-004	100.00	WFEC	Washita 138kV	On-Line
GEN-2003-005	100.00	WFEC	Anadarko - Paradise (Blue Canyon) 138kV	On-Line
GEN-2003-006A	200.00	SUNCMKEC	Elm Creek 230kV	On-Line
GEN-2003-019	250.00	MIDW	Smoky Hills Tap 230kV	On-Line
GEN-2003-020	160.00	SPS	Martin 115kV	On-Line
GEN-2003-021N	75.00	NPPD	Ainsworth Wind Tap 115kV	On-Line
GEN-2003-022	120.00	AEPW	Washita 138kV	On-Line
GEN-2004-005N	30.00	NPPD	St Francis 115kV	On Suspension
GEN-2004-014	154.50	SUNCMKEC	Spearville 230kV	On-Line at 100MW
GEN-2004-020	27.00	AEPW	Washita 34.5kV	On-Line
GEN-2004-023	20.60	WFEC	Washita 138kV	On-Line
GEN-2004-023N	75.00	NPPD	Columbus Co 115kV	On-Line
GEN-2005-003	30.60	WFEC	Washita 138kV	On-Line
GEN-2005-008	120.00	OKGE	Woodward 138kV	On-Line
GEN-2005-012	250.00	SUNCMKEC	Ironwood 345kV	On-Line at 160MW
GEN-2005-013	201.00	WERE	Tap Latham - Neosho (Caney River) 345kV	On-Line

Request	Amount	Area	Requested/Proposed Point of Interconnection	Status or In-Service Date
GEN-2006-002	101.00	AEPW	Sweetwater 230kV	On-Line
GEN-2006-006	205.50	SUNCMKEC	Spearville 345kV	On Schedule for 2015
GEN-2006-018	170.00	SPS	TUCO Interchange 230kV	On-Line
GEN-2006-020N	42.00	NPPD	Bloomfield 115kV	On-Line
GEN-2006-020S	18.90	SPS	DWS Frisco 115kV	On-Line
GEN-2006-021	101.00	SUNCMKEC	Flat Ridge Tap 138kV	On-Line
GEN-2006-024S	19.80	WFEC	Buffalo Bear Tap 69kV	On-Line
GEN-2006-026	604.00	SPS	Hobbs 230kV & Hobbs 115kV	On-Line
GEN-2006-031	75.00	MIDW	Knoll 115kV	On-Line
GEN-2006-035	225.00	AEPW	Sweetwater 230kV	On-Line at 132MW
GEN-2006-037N1	75.00	NPPD	Broken Bow 115kV	On Schedule for 2014
GEN-2006-038N005	80.00	NPPD	Broken Bow 115kV	On-Line
GEN-2006-038N019	80.00	NPPD	Petersburg North 115kV	On-Line
GEN-2006-040	108.00	SUNCMKEC	Mingo 115kV	On Suspension
GEN-2006-043	99.00	AEPW	Sweetwater 230kV	On-Line
GEN-2006-044	370.00	SPS	Hitchland 345kV	On-Line at 120MW
GEN-2006-044N	40.50	NPPD	North Petersburg 115kV	On-Line
GEN-2006-046	131.00	OKGE	Dewey 138kV	On-Line
GEN-2006-047	240.00	SPS	Tap Bushland - Deaf Smith (Buffalo) 230kV	On Suspension
GEN-2007-011	135.00	SUNCMKEC	Syracuse 115kV	On Suspension
GEN-2007-011N08	81.00	NPPD	Bloomfield 115kV	On-Line
GEN-2007-021	201.00	OKGE	Tatonga 345kV	On Schedule for 2014
GEN-2007-025	300.00	WERE	Viola 345kV	On-Line
GEN-2007-032	150.00	WFEC	Tap Clinton Junction - Clinton 138kV	On Suspension
GEN-2007-038	200.00	SUNCMKEC	Spearville 345kV	On Schedule for 2015
GEN-2007-040	200.00	SUNCMKEC	Buckner 345kV	On-Line at 132MW
GEN-2007-043	200.00	OKGE	Minco 345kV	On-Line
GEN-2007-044	300.00	OKGE	Tatonga 345kV	On Schedule for 2014
GEN-2007-046	199.50	SPS	Hitchland 115kV	On Schedule for 2015
GEN-2007-050	170.00	OKGE	Woodward EHV 138kV	On-Line at 150MW
GEN-2007-052	150.00	WFEC	Anadarko 138kV	On-Line
GEN-2007-062	765.00	OKGE	Woodward EHV 345kV	On Schedule for 2014
GEN-2008-003	101.00	OKGE	Woodward EHV 138kV	On-Line
GEN-2008-008	60.00	SPS	Graham 69kV	On Suspension
GEN-2008-013	300.00	OKGE	Tap Wichita - Woodring (Hunter) 345kV	On-Line at 235MW
GEN-2008-017	300.00	SUNCMKEC	Setab 345kV	On Schedule for 2015
GEN-2008-018	250.00	SPS	Finney 345kV	On-Line
GEN-2008-019	300.00	OKGE	Tatonga 345kV	On Schedule for 2015
GEN-2008-021	42.00	WERE	Wolf Creek 345kV	On-Line
GEN-2008-022	300.00	SPS	Tap Eddy Co - Tolk (Chaves County) 345kV	On Schedule for 2015
GEN-2008-023	150.00	AEPW	Hobart Junction 138kV	On-Line
GEN-2008-029	250.50	OKGE	Woodward EHV 138kV	On Schedule for 2014
GEN-2008-037	101.00	WFEC	Tap Washita - Blue Canyon Wind 138kV	On-Line
GEN-2008-044	197.80	OKGE	Tatonga 345kV	On-Line
GEN-2008-047	300.00	OKGE	Tap Hitchland - Woodward Dbl Ckt (Beaver County) 345kV	On Schedule for 2014
GEN-2008-051	322.00	SPS	Potter County 345kV	On-Line at 161MW
GEN-2008-079	99.20	SUNCMKEC	Tap Cudahy - Ft Dodge 115kV	On-Line
GEN-2008-086N02	200.00	NPPD	Tap Ft Randle - Columbus (Meadow Grove) 230kV	On Schedule for 2014
GEN-2008-088	50.60	SPS	Vega 69kV	On Suspension

Request	Amount	Area	Requested/Proposed Point of Interconnection	Status or In-Service Date
GEN-2008-092	201.00	MIDW	Post Rock 230kV	On Schedule for 2014
GEN-2008-098	100.80	WERE	Tap Lacygne - Wolf Creek (Anderson County) 345kV	On Schedule for 2015
GEN-2008-119O	60.00	OPPD	S1399 161kV	On-Line
GEN-2008-123N	89.70	NPPD	Tap Guide Rock - Pauline (Rosemont) 115kV	On Schedule for 2014
GEN-2008-124	200.10	SUNCMKEC	Ironwood 345kV	On Schedule for 2016
GEN-2008-129	80.00	MIPU	Pleasant Hill 161kV	On-Line
GEN-2009-008	199.50	MIDW	South Hays 230kV	On Suspension
GEN-2009-020	48.60	MIDW	Tap Nekoma - Bazine (Walnut Creek) 69kV	On Suspension
GEN-2009-025	60.00	OKGE	Nardins 69kV	On-Line
GEN-2009-040	108.00	WERE	Marshall 115kV	On Schedule for 2015
GEN-2010-001	300.00	OKGE	Tap Hitchland - Woodward Dbl Ckt (Beaver County) 345kV	On Schedule for 2014 (204 MW) and 2015 (96 MW)
GEN-2010-003	100.80	WERE	Tap Lacygne - Wolf Creek (Anderson County) 345kV	On Schedule for 2015
GEN-2010-005	300.00	WERE	Viola 345kV	On-Line at 170MW
GEN-2010-006	205.00	SPS	Jones 230kV	On-Line
GEN-2010-009	165.60	SUNCMKEC	Buckner 345kV	On-Line
GEN-2010-011	29.70	OKGE	Tatonga 345kV	On Line
GEN-2010-014	358.80	SPS	Hitchland 345kV	On Schedule for 2016
GEN-2010-015	200.10	SUNCMKEC	Spearville 345kV	On Schedule for 2015
GEN-2010-020	20.00	SPS	Roswell 69kV	On Suspension
GEN-2010-036	4.60	WERE	6th Street 115kV	On-Line
GEN-2010-040	300.00	OKGE	Cimarron 345kV	On-Line
GEN-2010-041	10.50	OPPD	S 1399 161kV	IA Pending
GEN-2010-045	197.80	SUNCMKEC	Buckner 345kV	IA Pending
GEN-2010-046	56.00	SPS	TUCO Interchange 230kV	On Schedule for 2016
GEN-2010-048	70.00	MIDW	Tap Beach Station - Redline 115kV	IA Pending
GEN-2010-051	200.00	NPPD	Tap Twin Church - Hoskins 230kV	On Schedule for 2014
GEN-2010-055	4.50	AEPW	Wekiwa 138kV	On-Line
GEN-2010-056	151.20	MIPU	Tap Saint Joseph - Cooper 345kV	On Schedule for 2015
GEN-2010-057	201.00	MIDW	Rice County 230kV	On-Line
GEN-2010-058	20.00	SPS	Chaves County 115kV	On Suspension
GEN-2011-007	250.10	OKGE	Tap Cimarron - Woodring (Mathewson) 345kV	On Schedule for 2014
GEN-2011-008	600.00	SUNCMKEC	Clark County 345kV	IA Pending
GEN-2011-010	100.80	OKGE	Minco 345kV	On-Line
GEN-2011-011	50.00	KACP	Iatan 345kV	On-Line
GEN-2011-014	201.00	OKGE	Tap Hitchland - Woodward Dbl Ckt (Beaver County) 345kV	IA Pending
GEN-2011-016	200.10	SUNCMKEC	Spearville 345kV	IA Pending
GEN-2011-017	299.00	SUNCMKEC	Tap Spearville - PostRock (GEN-2011-017T) 345kV	On Schedule 2018
GEN-2011-018	73.60	NPPD	Steele City 115kV	On-Line
GEN-2011-019	299.00	OKGE	Woodward 345kV	On Schedule for 2017
GEN-2011-020	299.00	OKGE	Woodward 345kV	On Schedule for 2017
GEN-2011-021	299.00	OKGE	Tap Hitchland - Woodward Dbl Ckt (Beaver County) 345kV	IA Pending
GEN-2011-022	299.00	SPS	Hitchland 345kV	On Schedule for 2017
GEN-2011-025	82.30	SPS	Tap Floyd County - Crosby County 115kV	On Suspension
GEN-2011-027	120.00	NPPD	Tap Twin Church - Hoskins 230kV (GEN-2010-51 Tap)	IA Pending
GEN-2011-037	7.00	WFEC	Blue Canyon 5 138kV	On-Line
GEN-2011-040	111.00	OKGE	Tap Ratliff - Pooleville 138kV	On Schedule for 2014
GEN-2011-045	205.00	SPS	Jones 230kV	On-Line
GEN-2011-046	27.00	SPS	Lopez 115kV	On-Line

Request	Amount	Area	Requested/Proposed Point of Interconnection	Status or In-Service Date
GEN-2011-048	175.00	SPS	Mustang 230kV	On-Line
GEN-2011-049	250.00	OKGE	Border 345kV	IA Pending
GEN-2011-050	109.80	AEPW	Rush Springs Natural Gas Tap 138kV	On Suspension
GEN-2011-051	104.40	OKGE	Tap Woodward - Tatonga 345kV	IA Pending
GEN-2011-054	300.00	OKGE	Cimarron 345kV	On Schedule for 2013 (200 MW) and 2014 (99 MW)
GEN-2011-055	52.80	OPPD	South Sterling 69kV	Facility Study
GEN-2011-056	3.60	NPPD	Jeffrey 115kV	On-Line
GEN-2011-056A	3.60	NPPD	John 1 115kV	On-Line
GEN-2011-056B	4.50	NPPD	John 2 115kV	On-Line
GEN-2011-057	150.40	WERE	Creswell 138kV	On Schedule for 2014
GEN-2012-001	61.20	SPS	Tap Grassland - Borden County 230kV	On-Line
GEN-2012-004	41.40	OKGE	Tap Ratliff - Pooleville (Carter County) 138kV	On Schedule for 2014
GEN-2012-005	81.00	NPPD	Tap Fort Randall - Columbus (North of Meadow Grove) 230kV	Facility Study
GEN-2012-007	120.00	SUNCMKEC	Rubart 115kV	On Schedule for 2014
GEN-2012-009	15.00	SPS	Mustang 230kV	Facility Study
GEN-2012-010	15.00	SPS	Mustang 230kV	Facility Study
GEN-2012-011	200.00	SUNCMKEC	Tap Spearville - Post Rock 345kV (North of GEN-2011-017 Tap)	Facility Study
GEN-2012-016	312.00	OKGE	Tap Woodward - Thistle 345kV Ckt 1	IA Pending
GEN-2012-020	478.00	SPS	TUCO 230kV	IA Pending
GEN-2012-021	4.80	LES	Terry Bundy Generating Station 115kV	On-Line
GEN-2012-023	115.00	WERE	Viola 345kV	IA Pending
GEN-2012-024	180.00	SUNCMKEC	Clark County 345kV	Facility Study
GEN-2012-026	100.00	MIDW	Colby 115kV	IA Pending
GEN-2012-027	136.00	AEPW	Shidler 138kV	On Schedule for 2015
GEN-2012-028	74.80	WFEC	Gotebo 69kV	On Schedule for 2015
GEN-2012-031	200.00	OKGE	Cimarron 345kV (GEN-2010-040 Sub)	IA Pending
GEN-2012-032	300.00	OKGE	Tap Rose Hill - Sooner (Ranch) 345kV	IA Pending
GEN-2012-033	98.80	OKGE	Tap and Tie South 4th - Bunch Creek & Enid Tap - Fairmont (GEN-2012-033T) 138kV	On Schedule for 2015
GEN-2012-034	7.00	SPS	Mustang 230kV	IA Pending
GEN-2012-035	7.00	SPS	Mustang 230kV	IA Pending
GEN-2012-036	7.00	SPS	Mustang 230kV	IA Pending
GEN-2012-037	203.00	SPS	TUCO 345kV	Facility Study
GEN-2012-040	76.50	WFEC	Chilocco 138kV	On Schedule for 2015
GEN-2012-041	121.50	OKGE	Tap Rose Hill - Sooner 345kV	On Schedule for 2015
GEN-2013-002	50.60	LES	Tap Sheldon - Folsom & Pleasant Hill 115kV CKT 2	Facility Study
GEN-2013-003	48.00	OKGE	Tap Woodwad - Thistle 345kV Dbl CKT (GEN-2012-016 Tap)	Facility Study
GEN-2013-004	6.00	NPPD	Tap Fort Randall - Columbus (Meadow Grove) 230kV	Facility Study
GEN-2013-005	73.50	NPPD	Meadow Grove (GEN-2008-086N2 Sub) 230kV	Facility Study
GEN-2013-006	50.60	NPPD	Tap Fort Randall - Columbus (Meadow Grove) 230kV	Facility Study
GEN-2013-007	100.30	OKGE	Tap Prices Falls - Carter 138kV	Facility Study
GEN-2013-008	1.20	NPPD	Steele City 115kV	IA Pending
GEN-2013-009	100.30	AEPW	Tap Alluwe Tap - Vinita Junction 138kV	Facility Study
GEN-2013-010	99.00	SUNCMKEC	Tap Spearville - Post Rock 345kV (GEN-2012-011 Tap)	Facility Study
GEN-2013-011	30.00	AEPW	Turk 138kV	Facility Study
GEN-2013-012	147.00	OKGE	Redbud 345kV	Facility Study
GEN-2013-013	248.40	SPS	Tap Eddy County - Tolk 345kV	Facility Study

Request	Amount	Area	Requested/Proposed Point of Interconnection	Status or In-Service Date
GEN-2013-014	25.50	NPPD	Tap Guide Rock - Pauline (GEN-2008-123N Tap) 115kV	Facility Study
GEN-2013-015	125.80	NPPD	Tap Pauline - Hildreth 115kV	Facility Study
GEN-2013-016	203.00	SPS	TUCO 345kV	Facility Study
GEN-2013-019	73.60	LES	Tap Sheldon - Folsom & Pleasant Hill (GEN-2013-002 Tap) 115kV CKT 2	Facility Study
GEN-2013-021	229.50	NPPD	Ogallala 230kV	Facility Study
GEN-2013-022	25.00	SPS	Norton 115kV	Facility Study
GEN-2013-025	50.00	OKGE	Tap Cimarron - Woodring (Mathewson) 345kV	Facility Study
GEN-2013-028	559.50	GRDA	Tap N Tulsa - GRDA 1 345kV	Facility Study
GEN-2013-029	300.00	OKGE	Renfrow 345kV	Facility Study
GEN-2013-030	300.00	OKGE	Tap Hitchland - Woodward Dbl Ckt (Beaver County) 345kV	Facility Study
GEN-2013-031	370.00	SPS	Bushland 230kV	Facility Study
GEN-2013-032	204.00	NPPD	Neligh 115kV	Facility Study
GEN-2013-033	28.00	MIDW	Goodman Energy Center 115kV	Facility Study
GEN-2013-034	73.60	OKGE	Tap Hitchland - Woodward Dbl Ckt (GEN-2013-034 Tap) 345kV	Facility Study
Gray County Wind (Montezuma)	110.00	SUNCMKEC	Gray County Tap 115kV	On-Line
Llano Estacado (White Deer)	80.00	SPS	Llano Wind 115kV	On-Line
NPPD Distributed (Broken Bow)	8.30	NPPD	Broken Bow 115kV	On-Line
NPPD Distributed (Burt County Wind)	12.00	NPPD	Tekamah & Oakland 115kV	On-Line
NPPD Distributed (Burwell)	3.00	NPPD	Ord 115kV	On-Line
NPPD Distributed (Columbus Hydro)	45.00	NPPD	Columbus 115kV	On-Line
NPPD Distributed (Ord)	11.90	NPPD	Ord 115kV	On-Line
NPPD Distributed (Stuart)	2.10	NPPD	Ainsworth 115kV	On-Line
SPS Distributed (Dumas 19th St)	20.00	SPS	Dumas 19th Street 115kV	On-Line
SPS Distributed (Etter)	20.00	SPS	Etter 115kV	On-Line
SPS Distributed (Hopi)	10.00	SPS	Hopi 115kV	On-Line
SPS Distributed (Jal)	10.00	SPS	S Jal 115kV	On-Line
SPS Distributed (Lea Road)	10.00	SPS	Lea Road 115kV	On-Line
SPS Distributed (Monument)	10.00	SPS	Monument 115kV	On-Line
SPS Distributed (Moore E)	25.00	SPS	Moore East 115kV	On-Line
SPS Distributed (Ocotillo)	10.00	SPS	S_Jal 115kV	On-Line
SPS Distributed (Sherman)	20.00	SPS	Sherman 115kV	On-Line
SPS Distributed (Spearman)	10.00	SPS	Spearman 69kV	On-Line
SPS Distributed (TC-Texas County)	20.00	SPS	Texas County 115kV	On-Line
Total:	**29,004.2**			

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-2008-019	300.00	OKGE	Tatonga 345kV
GEN-2008-029	250.50	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
GEN-2012-016	312.00	OKGE	Tap Woodward - Thistle 345kV Ckt 1
GEN-2012-031	200.00	OKGE	Cimarron 345kV (GEN-2010-040 Sub)
GEN-2013-003	48.00	OKGE	Tap Woodwad - Thistle 345kV Dbl CKT (GEN-2012-016 Tap)
GEN-2013-025	50.00	OKGE	Tap Cimarron - Woodring (Mathewson) 345kV
GEN-2013-034	73.60	OKGE	Tap Hitchland - Woodward Dbl Ckt (GEN-2013-034 Tap) 345kV
PRIOR QUEUED SUBTOTAL	**5,318.70**		
AREA TOTAL	**5,318.70**		

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-2011-021	299.00	OKGE	Tap Hitchland - Woodward Dbl Ckt (Beaver County) 345kV
GEN-2011-022	299.00	SPS	Hitchland 345kV
GEN-2013-030	300.00	OKGE	Tap Hitchland - Woodward Dbl Ckt (Beaver County) 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	**3,261.20**		
AREA TOTAL	**3,261.20**		

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)
GEN-2012-024	180.00	SUNCMKEC	Clark County 345kV
GEN-2013-010	99.00	SUNCMKEC	Tap Spearville - Post Rock 345kV (GEN-2012-011 Tap)
Gray County Wind (Montezuma)	110.00	SUNCMKEC	Gray County Tap 115kV
PRIOR QUEUED SUBTOTAL	**4,309.40**		
AREA TOTAL	**4,309.40**		

GROUP 4/11: NW KANSAS AREA

Request	Capacity	Area	Proposed Point of Interconnection
ASGI-2013-004	29.60	SUNCMKEC	Morris 115kV
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
GEN-2012-026	100.00	MIDW	Colby 115kV
GEN-2013-033	28.00	MIDW	Goodman Energy Center 115kV
PRIOR QUEUED SUBTOTAL	**2,045.70**		
AREA TOTAL	**2,045.70**		

GROUP 5: AMARILLO AREA

Request	Capacity	Area	Proposed Point of Interconnection
ASGI-2013-001	11.50	SPS	PanTex South 115kV
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
GEN-2013-031	370.00	SPS	Bushland 230kV
Llano Estacado (White Deer)	80.00	SPS	Llano Wind 115kV
PRIOR QUEUED SUBTOTAL	**1,314.10**		
AREA TOTAL	**1,314.10**		

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
ASGI-2012-002	18.15	SPS	FE-Clovis Interchange 115kV
ASGI-2013-002	18.40	SPS	FE Tucumcari 115kV
ASGI-2013-003	18.40	SPS	FE Clovis 115kV
ASGI-2013-005	1.80	SPS	FE Clovis 115kV
ASGI-2013-006	2.00	SPS	SP-Erskine 115kV
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-2008-008	60.00	SPS	Graham 69kV
GEN-2008-022	300.00	SPS	Tap Eddy Co - Tolk (Chaves County) 345kV
GEN-2010-006	205.00	SPS	Jones 230kV
GEN-2010-020	20.00	SPS	Roswell 69kV
GEN-2010-046	56.00	SPS	TUCO Interchange 230kV
GEN-2010-058	20.00	SPS	Chaves County 115kV
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
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
GEN-2013-013	248.40	SPS	Tap Eddy County - Tolk 345kV
GEN-2013-016	203.00	SPS	TUCO 345kV
GEN-2013-022	25.00	SPS	Norton 115kV
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	**3,708.65**		
GEN-2013-027	326.40	SPS	Tap Tolk West - Yoakum 230kV CKT 1
CURRENT CLUSTER SUBTOTAL	**326.40**		
AREA TOTAL	**4,035.05**		

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
GEN-2012-028	74.80	WFEC	Gotebo 69kV
PRIOR QUEUED SUBTOTAL	**1,900.00**		
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
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
GEN-2013-009	100.30	AEPW	Tap Alluwe Tap - Vinita Junction 138kV
GEN-2013-012	147.00	OKGE	Redbud 345kV
GEN-2013-028	559.50	GRDA	Tap N Tulsa - GRDA 1 345kV
GEN-2013-029	300.00	OKGE	Renfrow 345kV
PRIOR QUEUED SUBTOTAL	**3,864.10**		
AREA TOTAL	**3,864.10**		

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-2004-005N	30.00	NPPD	St Francis 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 (Meadow Grove) 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
GEN-2012-005	81.00	NPPD	Tap Fort Randall - Columbus (North of Meadow Grove) 230kV
GEN-2012-021	4.80	LES	Terry Bundy Generating Station 115kV
GEN-2013-002	50.60	LES	Tap Sheldon - Folsom & Pleasant Hill 115kV CKT 2
GEN-2013-004	6.00	NPPD	Tap Fort Randall - Columbus (Meadow Grove) 230kV
GEN-2013-005	73.50	NPPD	Meadow Grove (GEN-2008-086N2 Sub) 230kV
GEN-2013-006	50.60	NPPD	Tap Fort Randall - Columbus (Meadow Grove) 230kV
GEN-2013-008	1.20	NPPD	Steele City 115kV
GEN-2013-014	25.50	NPPD	Tap Guide Rock - Pauline (GEN-2008-123N Tap) 115kV
GEN-2013-015	125.80	NPPD	Tap Pauline - Hildreth 115kV
GEN-2013-019	73.60	LES	Tap Sheldon - Folsom & Pleasant Hill (GEN-2013-002 Tap) 115kV CKT 2
GEN-2013-021	229.50	NPPD	Ogallala 230kV
GEN-2013-032	204.00	NPPD	Neligh 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	**2,514.00**		
AREA TOTAL	**2,514.00**		

GROUP 12: NW-AR AREA

Request	Capacity	Area	Proposed Point of Interconnection
GEN-2013-011	30.00	AEPW	Turk 138kV
PRIOR QUEUED SUBTOTAL	**30.00**		
AREA TOTAL	**30.00**		

GROUP 13: NW MISSOURI AREA

Request	Capacity	Area	Proposed Point of Interconnection
ASGI-2013-007	90.00	AECI	Tap Hickory Creek - Locust Creek 161kV
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	**375.80**		
AREA TOTAL	**375.80**		

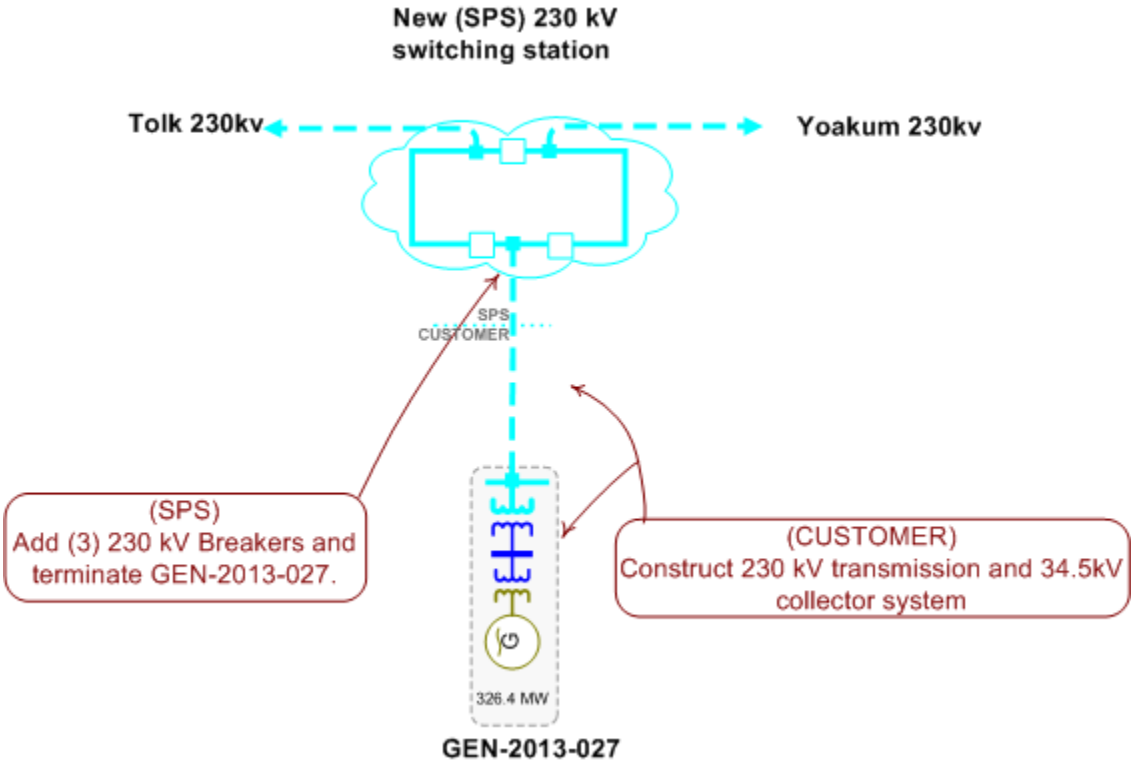
GROUP 14: S-OKLAHOMA AREA

Request	Capacity	Area	Proposed Point of Interconnection
GEN-2011-040	111.00	OKGE	Tap Ratliff - Pooleville 138kV
GEN-2011-050	109.80	AEPW	Rush Springs Natural Gas Tap 138kV
GEN-2012-004	41.40	OKGE	Tap Ratliff - Pooleville (Carter County) 138kV
GEN-2013-007	100.30	OKGE	Tap Prices Falls - Carter 138kV
PRIOR QUEUED SUBTOTAL	**362.50**		
AREA TOTAL	**362.50**		

CLUSTER TOTAL (CURRENT STUDY)	**326.4**	**MW**
PQ TOTAL (PRIOR QUEUED)	**29,004.2**	**MW**
CLUSTER TOTAL (INCLUDING PRIOR QUEUED)	**29,330.6**	**MW**

D: Proposed Point of Interconnection One Line Diagrams

GEN-2013-027



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.

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

Appendix E. Cost Allocation Per Request

(Including Previously Allocated Network Upgrades*)

Interconnection Request and Upgrades	Upgrade Type	Allocated Cost	Upgrade Cost
GEN-2013-027			
Border - Chisholm 345KV CKT 2 Build approximately 0.5 miles of 345kV line from Border to Chisolm	Current Study	$1,000,000.00	$1,000,000.00
Border - Tuco Interchange 345KV CKT 2 Build approximately 178 miles of 345kV line from Border to TUCO Interchange	Current Study	$200,000,000.00	$200,000,000.00
Bushland - Potter County 230kV CKT 1 Replace Line Traps	Current Study	$200,000.00	$200,000.00
Bushland South - Potter County 230kV CKT 1 Replace Line Traps	Current Study	$200,000.00	$200,000.00
GEN-2013-027 Interconnection Costs See One-Line Diagram	Current Study	$6,000,000.00	$6,000,000.00
Amoco Wasson - Oxy Tap 230kV CKT 1 Replace line traps at both terminals	Previously Allocated		$200,000.00
Border - Chisholm 345KV CKT 1 Balanced Portfolio: Tuco - Woodward 345kV CKT 1 (Total Project E&C Cost Shown)	Previously Allocated		$249,247,072.00
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
Bushland - Bushland South 230kV CKT 1 Build 15 miles of 345kV operating at 230kV from Bushland to New Bushland South Substation. Also includes terminal equipment at each end. Includes substation work.	Previously Allocated		$30,000,000.00
Chisholm - Gracemont 345kV Build approximately 100 miles of 345kV line from Chisolm to Elk City to Gracemont (Total Project E&C Cost Shown).	Previously Allocated		$162,952,357.00
Chisholm - Woodward 345kV CKT 1 Balanced Portfolio: Tuco - Woodward 345kV CKT 1 (Total Project E&C Cost Shown)	Previously Allocated		$249,247,072.00
Chisholm 345kV substation New substation on the Border to Woodward 345kV line (Total Project E&C Cost Shown).	Previously Allocated		$162,952,357.00
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
Deaf Smith - Plant X 230kV CKT 1 Replace line traps at both ends	Previously Allocated		$1,000,000.00

* 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
Hitchland - Beaver County 345kV Dbl CKT Priority Project: Hitchland - Woodward Dbl 345kV CKT (Total Project E&C Cost Shown)	Previously Allocated		$226,040,727.00
Hitchland 345/230kV Autotransformer CKT 2 Priority Project: Hitchland 345/230kV Autotransformer CKT 2 (Total Project E&C Cost Shown).	Previously Allocated		$8,883,760.00
Plant X 230/115/13.2kV Transformer NRIS only upgrade: Build second Plant X 230/115/13.2kV Transformer	Previously Allocated		$9,000,000.00
Power System Stabilizers (PSS) Install Power System Stabilizers @ Tolk(Units: 1,2) and Jones (Units: 1,2,3,4)	Previously Allocated		$300,000.00
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
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
Tolk - Plant X 230kV CKT 3 Build a 3rd circuit betweek Tolk - Plant X 230kV	Previously Allocated		$20,000,000.00
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	$207,400,000.00	
	TOTAL CURRENT STUDY COSTS:	**$207,400,000.00**	

* 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

Border - Chisholm 345KV CKT 2		**$1,000,000.00**
Build approximately 0.5 miles of 345kV line from Border to Chisolm		
GEN-2013-027	$1,000,000.00	
Total Allocated Costs	**$1,000,000.00**	
Border - Tuco Interchange 345KV CKT 2		**$200,000,000.00**
Build approximately 178 miles of 345kV line from Border to TUCO Interchange		
GEN-2013-027	$200,000,000.00	
Total Allocated Costs	**$200,000,000.00**	
Bushland - Potter County 230kV CKT 1		**$200,000.00**
Replace Line Traps		
GEN-2013-027	$200,000.00	
Total Allocated Costs	**$200,000.00**	
Bushland South - Potter County 230kV CKT 1		**$200,000.00**
Replace Line Traps		
GEN-2013-027	$200,000.00	
Total Allocated Costs	**$200,000.00**	
GEN-2013-027 Interconnection Costs		**$6,000,000.00**
See One-Line Diagram		
GEN-2013-027	$6,000,000.00	
Total Allocated Costs	**$6,000,000.00**	

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

G: Power Flow Analysis (Constraints Used For Mitigation)

See next page.

GROUP	SCENARIO	SEASON	SOURCE	DIRECTION	MONITORED ELEMENT	RATE B	TDF	TC%LOADING	CONTIGNECY
00G13_027	0	14SP	G13_027	'FROM->TO'	'BUSHLAND_S 230.00 - POTTER COUNTY INTERCHANGE 230KV CKT 1'	351	0.25304	101.6101	'BUSHLAND INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1'
00G13_027	0	14SP	G13_027	'FROM->TO'	'BUSHLAND INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1'	351	0.27834	113.5079	'BUSHLAND_S 230.00 - POTTER COUNTY INTERCHANGE 230KV CKT 1'
00G13_027	0	14WP	G13_027	'FROM->TO'	'BUSHLAND INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1'	361	0.19334	101.8952	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
00G13_027	0	14WP	G13_027	'FROM->TO'	'BUSHLAND INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1'	361	0.19334	101.9273	'SPP-AEPW-32'
00G13_027	0	14WP	G13_027	'FROM->TO'	'BUSHLAND INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1'	361	0.19421	101.9454	'SPP-SWPS-01'
06ALL	0	14G	G13_027	'TO->FROM'	OKLAUNION - TUCO INTERCHANGE 345KV CKT 1 FLOWGATE LIMIT'	679	0.30398	100.4327	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'

H: Power Flow Analysis (Other Constraints Not Requiring Mitigation)

See next page.

GROUP	SCENARIO	SEASON	SOURCE	DIRECTION	MONTCOMMONNAME	RATE B	RATE C	TDF	TC%LOADI	CONTNAME
00G13_027	0	14SP	G13_027	'TO->FROM'	'BAILEY COUNTY REC-EARTH INTERCHANGE - PLANT X STATION 115KV CKT 1'	160	0	0.05392	109.0811	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
00G13_027	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.08577	103.5199	'LAMB COUNTY INTERCHANGE - TOLK STATION WEST 230KV CKT 1'
00G13_027	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.08577	105.0839	'LAMB COUNTY INTERCHANGE - TOLK STATION WEST 230KV CKT 1'
00G13_027	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.08577	103.5071	'LAMB COUNTY INTERCHANGE (WH ALM20172) 230/115/13.2KV TRANSFORMER CKT 1'
00G13_027	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.08577	105.0708	'LAMB COUNTY INTERCHANGE (WH ALM20172) 230/115/13.2KV TRANSFORMER CKT 1'
00G13_027	0	14SP	G13_027	'FROM->TO'	'YOAKUM COUNTY INTERCHANGE (PENN C010585) 230/115/13.2KV TRANSFORMER CKT 2'	150	0	0.03461	100.0732	'YOAKUM COUNTY INTERCHANGE (GE M100899) 230/115/13.2KV TRANSFORMER CKT 1'
00G13_027	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.08577	103.5071	'SPP-SWPS-K37'
00G13_027	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.08577	105.0708	'SPP-SWPS-K37'
00G13_027	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.0732	99.5	'GEN525493 1-PLANT X GEN #3'
00G13_027	0	14WP	G13_027	'TO->FROM'	'COULTER INTERCHANGE - HILLSIDE 115KV CKT 1'	191	0	0.09695	120.8622	'BUSHLAND INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1'
00G13_027	0	19SP	G13_027	'TO->FROM'	'BAILEY COUNTY REC-EARTH INTERCHANGE - PLANT X STATION 115KV CKT 1'	160	0	0.05697	101.1686	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
00G13_027	0	19SP	G13_027	'FROM->TO'	'YOAKUM COUNTY INTERCHANGE (PENN C010585) 230/115/13.2KV TRANSFORMER CKT 2'	150	0	0.03351	103.9216	'YOAKUM COUNTY INTERCHANGE (GE M100899) 230/115/13.2KV TRANSFORMER CKT 1'
00G13_027	0	19SP	G13_027	'FROM->TO'	'YOAKUM COUNTY INTERCHANGE (PENN C010585) 230/115/13.2KV TRANSFORMER CKT 2'	150	0	0.03351	107.1211	'YOAKUM COUNTY INTERCHANGE (GE M100899) 230/115/13.2KV TRANSFORMER CKT 1'
00G13_027	0	19SP	G13_027	'FROM->TO'	'YOAKUM COUNTY INTERCHANGE (GE M100899) 230/115/13.2KV TRANSFORMER CKT 1'	150	0	0.03233	100.7013	'YOAKUM COUNTY INTERCHANGE (PENN C010585) 230/115/13.2KV TRANSFORMER CKT 2'
00G13_027	0	19SP	G13_027	'FROM->TO'	'YOAKUM COUNTY INTERCHANGE (GE M100899) 230/115/13.2KV TRANSFORMER CKT 1'	150	0	0.03233	104.2904	'YOAKUM COUNTY INTERCHANGE (PENN C010585) 230/115/13.2KV TRANSFORMER CKT 2'
00G13_027	0	19WP	G13_027	'TO->FROM'	'COULTER INTERCHANGE - HILLSIDE 115KV CKT 1'	191	0	0.08836	117.9563	'BUSHLAND INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1'
00G13_027	0	24SP	G13_027	'FROM->TO'	'YOAKUM COUNTY INTERCHANGE (PENN C010585) 230/115/13.2KV TRANSFORMER CKT 2'	150	0	0.03355	108.1535	'YOAKUM COUNTY INTERCHANGE (GE M100899) 230/115/13.2KV TRANSFORMER CKT 1'
00G13_027	0	24SP	G13_027	'FROM->TO'	'YOAKUM COUNTY INTERCHANGE (PENN C010585) 230/115/13.2KV TRANSFORMER CKT 2'	150	0	0.03355	111.1752	'YOAKUM COUNTY INTERCHANGE (GE M100899) 230/115/13.2KV TRANSFORMER CKT 1'
00G13_027	0	24SP	G13_027	'FROM->TO'	'YOAKUM COUNTY INTERCHANGE (GE M100899) 230/115/13.2KV TRANSFORMER CKT 1'	150	0	0.03237	104.2077	'YOAKUM COUNTY INTERCHANGE (PENN C010585) 230/115/13.2KV TRANSFORMER CKT 2'
00G13_027	0	24SP	G13_027	'FROM->TO'	'YOAKUM COUNTY INTERCHANGE (GE M100899) 230/115/13.2KV TRANSFORMER CKT 1'	150	0	0.03237	107.2445	'YOAKUM COUNTY INTERCHANGE (PENN C010585) 230/115/13.2KV TRANSFORMER CKT 2'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.0429	101.6271	'BASE CASE'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.0429	103.2516	'BASE CASE'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.0429	103.9827	'GEN525492 1-PLANT X GEN #2'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.0429	106.3428	'GEN525492 1-PLANT X GEN #2'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.0429	103.9881	'GEN525493 1-PLANT X GEN #3'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.0429	106.356	'GEN525493 1-PLANT X GEN #3'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.0429	99.7	'GEN527161 1-MUSTANG GEN #1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.0429	101.336	'GEN527161 1-MUSTANG GEN #1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.0429	99.7	'GEN527162 1-MUSTANG GEN #2'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.0429	101.336	'GEN527162 1-MUSTANG GEN #2'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.0429	100.9066	'GEN527163 1-MUSTANG GEN #3 22 KV'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.0429	99.6	'GEN527164 1-MUSTANG GEN #4 22 KV'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.0429	101.1775	'GEN527164 1-MUSTANG GEN #4 22 KV'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.0429	99.6	'GEN527165 1-Mustang Gen #5'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.0429	101.2066	'GEN527165 1-Mustang Gen #5'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.0429	100.2523	'GEN527166 1-MUSTANG_6 118.000'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.0429	100.2006	'GEN527901 1-HOBBS PLANT #1 (CT)'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.0429	100.2218	'GEN527902 1-HOBBS PLANT #2 (CT)'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.05424	105.5857	'PLANT X STATION - POTTER COUNTY INTERCHANGE 230KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.05424	107.2155	'PLANT X STATION - POTTER COUNTY INTERCHANGE 230KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04125	103.3455	'PALO DURO SUB - RANDALL COUNTY INTERCHANGE 115KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04125	104.9956	'PALO DURO SUB - RANDALL COUNTY INTERCHANGE 115KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04125	103.1686	'HAPPY INTERCHANGE - PALO DURO SUB 115KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04125	104.8161	'HAPPY INTERCHANGE - PALO DURO SUB 115KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04495	100.3061	'DEAF SMITH REC-#6 - HEREFORD INTERCHANGE 115KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04495	101.9487	'DEAF SMITH REC-#6 - HEREFORD INTERCHANGE 115KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.06182	113.8644	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.06182	115.8573	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04495	103.9948	'CURRY COUNTY INTERCHANGE - DEAF SMITH REC-#20 115KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04495	105.6054	'CURRY COUNTY INTERCHANGE - DEAF SMITH REC-#20 115KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04159	109.8384	'KRESS INTERCHANGE - SWISHER COUNTY INTERCHANGE 115KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04159	111.5561	'KRESS INTERCHANGE - SWISHER COUNTY INTERCHANGE 115KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.03698	99.8	'HALE CO INTERCHANGE - KRESS INTERCHANGE 115KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.03698	101.4106	'HALE CO INTERCHANGE - KRESS INTERCHANGE 115KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04516	104.3682	'SWISHER COUNTY INTERCHANGE - TUCO INTERCHANGE 230KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04516	106.0088	'SWISHER COUNTY INTERCHANGE - TUCO INTERCHANGE 230KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04227	100.8819	'COX INTERCHANGE - HALE CO INTERCHANGE 115KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04095	106.8876	'HALE CO INTERCHANGE - TUCO INTERCHANGE 115KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04095	108.5762	'HALE CO INTERCHANGE - TUCO INTERCHANGE 115KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.05012	107.0244	'LAMB COUNTY INTERCHANGE - PLANT X STATION 115KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.05012	108.7115	'LAMB COUNTY INTERCHANGE - PLANT X STATION 115KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04055	99.5	'PLANT X STATION - TOLK STATION EAST 230KV CKT 2'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04055	100.821	'PLANT X STATION - TOLK STATION EAST 230KV CKT 2'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04029	100.6747	'PLANT X STATION - TOLK STATION WEST 230KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04029	100.6747	'PLANT X STATION - TOLK STATION WEST 230KV CKT 2'

00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04907	107.9886	'PLANT X STATION - SUNDOWN INTERCHANGE 230KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04907	109.8512	'PLANT X STATION - SUNDOWN INTERCHANGE 230KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.05952	112.3244	'TOLK STATION EAST - TUCO INTERCHANGE 230KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.05952	113.9762	'TOLK STATION EAST - TUCO INTERCHANGE 230KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.05281	129.0224	'LAMB COUNTY INTERCHANGE - TOLK STATION WEST 230KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.05281	130.8545	'LAMB COUNTY INTERCHANGE - TOLK STATION WEST 230KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04282	104.3758	'FLOYD COUNTY INTERCHANGE - TUCO INTERCHANGE 115KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04282	106.0315	'FLOYD COUNTY INTERCHANGE - TUCO INTERCHANGE 115KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04269	103.8586	'CROSBY COUNTY INTERCHANGE - LUBBOCK EAST INTERCHANGE 115KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04269	105.5106	'CROSBY COUNTY INTERCHANGE - LUBBOCK EAST INTERCHANGE 115KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04029	103.6966	'HOCKLEY COUNTY INTERCHANGE - Lamb County REC-Opdyke Sub 115KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04029	105.3639	'HOCKLEY COUNTY INTERCHANGE - Lamb County REC-Opdyke Sub 115KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04029	104.3086	'Lamb County REC-Opdyke Sub - SUNDOWN INTERCHANGE 115KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04029	105.9868	'Lamb County REC-Opdyke Sub - SUNDOWN INTERCHANGE 115KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04791	100.4083	'LUBBOCK SOUTH INTERCHANGE - WOLFFORTH INTERCHANGE 230KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04791	101.9694	'LUBBOCK SOUTH INTERCHANGE - WOLFFORTH INTERCHANGE 230KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04288	103.082	'JONES STATION - LUBBOCK EAST INTERCHANGE 230KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04288	104.719	'JONES STATION - LUBBOCK EAST INTERCHANGE 230KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04338	102.8808	'AMOCO SWITCHING STATION - YOAKUM COUNTY INTERCHANGE 230KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04342	103.0427	'WOLFFORTH INTERCHANGE - YUMA INTERCHANGE 115KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04342	104.698	'WOLFFORTH INTERCHANGE - YUMA INTERCHANGE 115KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04291	102.9537	'LEA COUNTY REC-PLAINS INTERCHANGE - YOAKUM COUNTY INTERCHANGE 115KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04291	104.549	'LEA COUNTY REC-PLAINS INTERCHANGE - YOAKUM COUNTY INTERCHANGE 115KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.05774	104.0475	'G13-027T 230.00 - YOAKUM COUNTY INTERCHANGE 230KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.05774	105.6633	'G13-027T 230.00 - YOAKUM COUNTY INTERCHANGE 230KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04463	105.0397	'CHAVESCO 345.00 - EDDY COUNTY INTERCHANGE 345KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04463	106.652	'CHAVESCO 345.00 - EDDY COUNTY INTERCHANGE 345KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04463	104.5549	'CHAVESCO 345.00 - G13_013T 345.00 345KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04463	106.1704	'CHAVESCO 345.00 - G13_013T 345.00 345KV CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04274	106.2648	'DEAF SMITH COUNTY INTERCHANGE (ELCO 13458-1) 230/115/13.8KV TRANSFORMER CKT 2'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04274	107.9785	'DEAF SMITH COUNTY INTERCHANGE (ELCO 13458-1) 230/115/13.8KV TRANSFORMER CKT 2'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04276	105.8307	'DEAF SMITH COUNTY INTERCHANGE (GE M101353) 230/115/13.2KV TRANSFORMER CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04276	107.5348	'DEAF SMITH COUNTY INTERCHANGE (GE M101353) 230/115/13.2KV TRANSFORMER CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04314	102.9306	'ROOSEVELT COUNTY INTERCHANGE (ABB LMM60042) 230/115/13.2KV TRANSFORMER CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04314	104.5544	'ROOSEVELT COUNTY INTERCHANGE (ABB LMM60042) 230/115/13.2KV TRANSFORMER CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04159	109.8222	'SWISHER COUNTY INTERCHANGE (GE M101686) 230/115/13.2KV TRANSFORMER CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04159	111.5397	'SWISHER COUNTY INTERCHANGE (GE M101686) 230/115/13.2KV TRANSFORMER CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.05281	129.0058	'LAMB COUNTY INTERCHANGE (WH ALM20172) 230/115/13.2KV TRANSFORMER CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.05281	130.8381	'LAMB COUNTY INTERCHANGE (WH ALM20172) 230/115/13.2KV TRANSFORMER CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04281	103.534	'TUCO INTERCHANGE (ENRCO 136401) 230/115/13.2KV TRANSFORMER CKT 2'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04281	105.1802	'TUCO INTERCHANGE (ENRCO 136401) 230/115/13.2KV TRANSFORMER CKT 2'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04281	103.5997	'TUCO INTERCHANGE (GE M102345) 230/115/13.2KV TRANSFORMER CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04281	105.2471	'TUCO INTERCHANGE (GE M102345) 230/115/13.2KV TRANSFORMER CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04284	105.1811	'SUNDOWN INTERCHANGE (WH XDS70381) 230/115/13.8KV TRANSFORMER CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04284	106.9091	'SUNDOWN INTERCHANGE (WH XDS70381) 230/115/13.8KV TRANSFORMER CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04463	105.0385	'EDDY COUNTY INTERCHANGE (ABB AEM30711) 345/230/13.2KV TRANSFORMER CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04463	106.6508	'EDDY COUNTY INTERCHANGE (ABB AEM30711) 345/230/13.2KV TRANSFORMER CKT 1'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.05281	129.0058	'SPP-SWPS-K37'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.05281	130.8381	'SPP-SWPS-K37'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04345	103.2588	'SPP-SWPS-K51'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04345	104.8874	'SPP-SWPS-K51'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.03487	113.2693	'SPP-SWPS-T04'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.03487	115.1524	'SPP-SWPS-T04'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04029	103.6502	'SPP-SWPS-T31'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04029	105.3203	'SPP-SWPS-T31'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04495	100.2817	'SPP-SWPS-T58'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04495	101.9243	'SPP-SWPS-T58'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04125	103.0676	'SPP-SWPS-T66'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04125	104.7151	'SPP-SWPS-T66'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04292	100.4101	'SPP-SWPS-T70'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04292	102.0353	'SPP-SWPS-T70'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.0429	100	'SPP-SWPS-V44'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.0429	101.5997	'SPP-SWPS-V44'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04283	100.3295	'SPP-SWPS-V49'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04283	101.9581	'SPP-SWPS-V49'
00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04262	100.1706	'SPP-SWPS-V55'

00NR	0	14SP	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04262	101.819	'SPP-SWPS-V55'
0	0	14SP	G13_027	'TO->FROM'	'COULTER INTERCHANGE - HILLSIDE 115KV CKT 1'	176	0	0.0959	115.3054	'BUSHLAND INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1'
0	0	19SP	G13_027	'TO->FROM'	'COULTER INTERCHANGE - HILLSIDE 115KV CKT 1'	176	0	0.08712	106.6231	'BUSHLAND INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1'
0	0	19SP	G13_027	'FROM->TO'	'YOAKUM COUNTY INTERCHANGE (PENN C010585) 230/115/13.2KV TRANSFORMER CKT 2'	150	0	0.03352	100.7953	'YOAKUM COUNTY INTERCHANGE (GE M100899) 230/115/13.2KV TRANSFORMER CKT 1'
0	0	24SP	G13_027	'FROM->TO'	'YOAKUM COUNTY INTERCHANGE (PENN C010585) 230/115/13.2KV TRANSFORMER CKT 2'	150	0	0.03356	102.044	'YOAKUM COUNTY INTERCHANGE (GE M100899) 230/115/13.2KV TRANSFORMER CKT 1'
0	0	24SP	G13_027	'FROM->TO'	'YOAKUM COUNTY INTERCHANGE (PENN C010585) 230/115/13.2KV TRANSFORMER CKT 2'	150	0	0.03356	104.9771	'YOAKUM COUNTY INTERCHANGE (GE M100899) 230/115/13.2KV TRANSFORMER CKT 1'
0	0	24SP	G13_027	'FROM->TO'	'YOAKUM COUNTY INTERCHANGE (GE M100899) 230/115/13.2KV TRANSFORMER CKT 1'	150	0	0.03237	101.2708	'YOAKUM COUNTY INTERCHANGE (PENN C010585) 230/115/13.2KV TRANSFORMER CKT 2'
0	0	14WP	G13_027	'TO->FROM'	'COULTER INTERCHANGE - HILLSIDE 115KV CKT 1'	191	0	0.09716	102.7358	'BUSHLAND INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1'
0	0	19WP	G13_027	'TO->FROM'	'COULTER INTERCHANGE - HILLSIDE 115KV CKT 1'	191	0	0.0885	102.4127	'BUSHLAND INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1'
06ALL	0	14G	G13_027	'FROM->TO'	'GRAPEVINE INTERCHANGE (PENN 0257751) 230/115/13.2KV TRANSFORMER CKT 1'	112	0	0.0345	100.5825	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'
06ALL	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.09142	106.3163	'PLANT X STATION - POTTER COUNTY INTERCHANGE 230KV CKT 1'
06ALL	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.09142	108.3209	'PLANT X STATION - POTTER COUNTY INTERCHANGE 230KV CKT 1'
06ALL	0	14G	G13_027	'TO->FROM'	'CANYON WEST SUB - DAWN SUB 115KV CKT 1'	96	0	0.08405	99.9	'BUFFALO 230.00 - BUSHLAND INTERCHANGE 230KV CKT 1'
06ALL	0	14G	G13_027	'TO->FROM'	'DAWN SUB - Panda Energy Substation Hereford 115KV CKT 1'	96	0	0.08405	102.9398	'BUFFALO 230.00 - BUSHLAND INTERCHANGE 230KV CKT 1'
06ALL	0	14G	G13_027	'TO->FROM'	'DEAF SMITH REC-#24 - PARMER COUNTY SUB 115KV CKT 1'	96	0	0.05491	104.9864	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
06ALL	0	14G	G13_027	'FROM->TO'	'DEAF SMITH REC-#20 - PARMER COUNTY SUB 115KV CKT 1'	96	0	0.05491	112.5077	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
06ALL	0	14G	G13_027	'FROM->TO'	'CURRY COUNTY INTERCHANGE - DEAF SMITH REC-#20 115KV CKT 1'	96	0	0.05491	121.4401	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
06ALL	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.105	117.5638	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
06ALL	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.105	120.3508	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
06ALL	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.08605	102.6615	'LAMB COUNTY INTERCHANGE - PLANT X STATION 115KV CKT 1'
06ALL	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.08605	104.5457	'LAMB COUNTY INTERCHANGE - PLANT X STATION 115KV CKT 1'
06ALL	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.07344	102.607	'PLANT X STATION - SUNDOWN INTERCHANGE 230KV CKT 1'
06ALL	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.07344	104.2336	'PLANT X STATION - SUNDOWN INTERCHANGE 230KV CKT 1'
06ALL	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.10456	117.3166	'TOLK STATION EAST - TUCO INTERCHANGE 230KV CKT 1'
06ALL	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.10456	119.3791	'TOLK STATION EAST - TUCO INTERCHANGE 230KV CKT 1'
06ALL	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.08171	116.6144	'LAMB COUNTY INTERCHANGE - TOLK STATION WEST 230KV CKT 1'
06ALL	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.08171	119.5181	'LAMB COUNTY INTERCHANGE - TOLK STATION WEST 230KV CKT 1'
06ALL	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.08289	99.6	'SUNDOWN INTERCHANGE - WOLFFORTH INTERCHANGE 230KV CKT 1'
06ALL	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.08289	101.2708	'SUNDOWN INTERCHANGE - WOLFFORTH INTERCHANGE 230KV CKT 1'
06ALL	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.08171	116.6234	'LAMB COUNTY INTERCHANGE (WH ALM20172) 230/115/13.2KV TRANSFORMER CKT 1'
06ALL	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.08171	119.5255	'LAMB COUNTY INTERCHANGE (WH ALM20172) 230/115/13.2KV TRANSFORMER CKT 1'
06ALL	0	14G	G13_027	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	153	0	0.05671	135.5499	'DBL-WWRD-G12'
06ALL	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.07098	100.4567	'SPP-SWPS-04'
06ALL	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.08171	116.6234	'SPP-SWPS-K37'
06ALL	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.08171	119.5256	'SPP-SWPS-K37'
06G13_027	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.10529	106.6601	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
06G13_027	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.10529	108.7491	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
06G13_027	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.07352	99.5	'PLANT X STATION - SUNDOWN INTERCHANGE 230KV CKT 1'
06G13_027	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.10478	109.3387	'TOLK STATION EAST - TUCO INTERCHANGE 230KV CKT 1'
06G13_027	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.10478	111.3039	'TOLK STATION EAST - TUCO INTERCHANGE 230KV CKT 1'
06G13_027	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.08184	110.7448	'LAMB COUNTY INTERCHANGE - TOLK STATION WEST 230KV CKT 1'
06G13_027	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.08184	113.6306	'LAMB COUNTY INTERCHANGE - TOLK STATION WEST 230KV CKT 1'
06G13_027	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.08184	110.7303	'LAMB COUNTY INTERCHANGE (WH ALM20172) 230/115/13.2KV TRANSFORMER CKT 1'
06G13_027	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.08184	113.5988	'LAMB COUNTY INTERCHANGE (WH ALM20172) 230/115/13.2KV TRANSFORMER CKT 1'
06G13_027	0	14G	G13_027	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	153	0	0.05721	116.9079	'DBL-WWRD-G12'
06G13_027	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.08184	110.7302	'SPP-SWPS-K37'
06G13_027	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.08184	113.5988	'SPP-SWPS-K37'
06NR	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04793	100	'PLANT X STATION - POTTER COUNTY INTERCHANGE 230KV CKT 1'
06NR	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.0551	108.8381	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
06NR	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.0551	111.1879	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
06NR	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.05304	106.223	'TOLK STATION EAST - TUCO INTERCHANGE 230KV CKT 1'
06NR	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.05304	108.1359	'TOLK STATION EAST - TUCO INTERCHANGE 230KV CKT 1'
06NR	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04599	108.9816	'LAMB COUNTY INTERCHANGE - TOLK STATION WEST 230KV CKT 1'
06NR	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04599	111.9816	'LAMB COUNTY INTERCHANGE - TOLK STATION WEST 230KV CKT 1'
06NR	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04599	108.9579	'LAMB COUNTY INTERCHANGE (WH ALM20172) 230/115/13.2KV TRANSFORMER CKT 1'
06NR	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04599	111.9536	'LAMB COUNTY INTERCHANGE (WH ALM20172) 230/115/13.2KV TRANSFORMER CKT 1'
06NR	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04599	108.9579	'SPP-SWPS-K37'
06NR	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.04599	111.9536	'SPP-SWPS-K37'
6	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.10537	103.2881	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
6	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.10537	105.2614	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
6	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.10487	106.0135	'TOLK STATION EAST - TUCO INTERCHANGE 230KV CKT 1'
6	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.10487	107.8715	'TOLK STATION EAST - TUCO INTERCHANGE 230KV CKT 1'
6	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.0819	108.3417	'LAMB COUNTY INTERCHANGE - TOLK STATION WEST 230KV CKT 1'
6	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.0819	111.1347	'LAMB COUNTY INTERCHANGE - TOLK STATION WEST 230KV CKT 1'
6	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.0819	108.3206	'LAMB COUNTY INTERCHANGE (WH ALM20172) 230/115/13.2KV TRANSFORMER CKT 1'
6	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.0819	111.1001	'LAMB COUNTY INTERCHANGE (WH ALM20172) 230/115/13.2KV TRANSFORMER CKT 1'

6	0	14G	G13_027	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	153	0	0.05729	113.8182	'DBL-WWRD-G12'
6	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.0819	108.3206	'SPP-SWPS-K37'
6	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.0819	111.1001	'SPP-SWPS-K37'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07539	112.3359	'BASE CASE'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07475	103.0101	'CARNEGIE - SOUTHWESTERN STATION 138KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.10977	126.1815	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07369	99.7	'CLINTON JUNCTION - ELK CITY 138KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07502	103.0564	'ELK CITY - RED HILLS WIND 138KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07364	100.3046	'LAWTON EASTSIDE - SUNNYSIDE 345KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07826	103.1983	'GRACEMONT - LAWTON EASTSIDE 345KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07486	100.8789	'CLINTON JUNCTION - CLINTON NATURAL GAS TAP 138KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07486	101.1283	'JERICHO - KIRBY SWITCHING STATION 115KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07486	101.1276	'HWRDWCK2 69.000 - JERICHO 69KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07486	101.2107	'CLARENDON - HWRDWCK2 69.000 69KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07374	101.0821	'CHILDRESS - HOLLIS TAP 138KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07238	100.8663	'CHILDRESS - LAKE PAULINE 138KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07374	100.9062	'HOLLIS TAP - WELLINGTON 138KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07374	100.25	'SHAMROCK - WELLINGTON 138KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07374	99.6	'MCLEAN RURAL SUB - SHAMROCK 115KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.08849	112.1662	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.08144	109.7432	'G11_051T 345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07643	103.717	'MATHWSN7 345.00 - TATONGA7 345.00 345KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07643	103.717	'MATHWSN7 345.00 - TATONGA7 345.00 345KV CKT 2'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.08144	110.0593	'G11_051T 345.00 - TATONGA7 345.00 345KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.08849	111.2377	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07509	103.1925	'BINGER NIJECT - ONEY 138KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07509	103.0533	'BINGER NIJECT - SICKLES 138KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07464	104.5524	'MOORELAND - NINE MILE 138KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07464	104.5396	'MOREWOOD SW - NINE MILE 138KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07509	103.2728	'ONEY - WASHITA 138KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07539	103.148	'GEN501801 1-DOLET HILLS UNIT1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07539	103.2823	'GEN509403 1-PIRKEY GENERATION'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07539	103.2649	'GEN509404 1-WELSH #1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07539	103.2651	'GEN509406 1-WELSH #3'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07539	103.5635	'GEN509416 1-TURK GENERATION'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07539	104.8497	'GEN511848 1-SOUTHWESTERN STATION #3'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07539	103.0393	'GEN511851 1-COMANCHE #1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07539	102.9588	'GEN511961 1-DEMPSEY1 34.500'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07539	103.0547	'GEN514939 1-HORSESHOE LAKE 8G'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07539	103.0192	'GEN515040 1-SEMINOLE 1G'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07539	103.4805	'GEN515042 1-SEMINOLE 3G'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07539	103.0452	'GEN515223 1-MUSKOGEE 4G'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07539	103.0556	'GEN515225 1-MUSKOGEE 5G'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07539	103.0512	'GEN515226 1-MUSKOGEE 6G'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07539	103.5023	'GEN520947 1-HUGO1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07539	101.1594	'GEN522814 1-LUBBOCK POWER & LIGHT-MACKENZIE GEN'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07539	101.0978	'GEN522866 2-LUBBOCK POWER & LIGHT-HOLLY GEN'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07539	100.9783	'GEN525491 1-PLANT X GEN #1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07539	99.7	'GEN525492 1-PLANT X GEN #2'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07539	99.6	'GEN525493 1-PLANT X GEN #3'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07539	100.4152	'GEN527881 1-CUNNINGHAM GEN #1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07539	99.5	'GEN527883 1-CUNNINGHAM GEN #3 22 KV'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07539	100.586	'GEN528362 1-MADDOX GEN #2'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07539	100.6344	'GEN532651 1-JEFFREY ENERGY CENTER UNIT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07539	100.6399	'GEN532652 1-JEFFREY ENERGY CENTER UNIT 2'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07539	100.6402	'GEN532653 1-JEFFREY ENERGY CENTER UNIT 3'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07539	100.5302	'GEN532751 1-WOLF CREEK GENERATING STATION UNIT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07539	101.229	'GEN539670 4-JUDSON LARGE GENERATOR'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07539	100.9659	'GEN542957 1-IATAN UNIT #1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07539	100.7508	'GEN542962 2-IATAN UNIT #2'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07539	100.8739	'GEN560331 1-G10-46 13.800'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07539	101.2333	'GEN562289 1-G12-016-2 18.000'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07539	101.1896	'GEN599950 1-PSCO LAMAR DC TIE'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07539	100.4487	'GEN640009 1-COOPER NUCLEAR STATION'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07539	99.5	'GEN640010 1-GERALD GENTLEMAN STATION UNIT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07539	100.9979	'GEN645001 1-FORT CALHOUN 1'

00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07539	100.8493	'GEN645011 1-NEBRASKA CITY 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07539	100.7774	'GEN645012 2-NEBRASKA CITY 2'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07539	101.2223	'GEN659103 1-ANTELOPE VALLEY UNIT1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07539	101.2223	'GEN659107 2-ANTELOPE VALLEY UNIT2'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07571	103.212	'CHAN/TASCOS6230.00 - POTTER COUNTY INTERCHANGE 230KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.08074	105.1281	'HITCHLAND INTERCHANGE - MOORE COUNTY INTERCHANGE 230KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07901	103.8599	'FINNEY SWITCHING STATION - Hitchland Interchange 345KV CKT 1'
00G13_027sens	0	19SP	G13_027	'FROM->TO'	'PRINGLE INTERCHANGE - SPEARMAN INTERCHANGE 115KV CKT 1'	160	0	0.04292	111.3367	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'MOORE COUNTY INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1'	351	0	0.11305	116.6839	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.09803	125.1013	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.0773	103.435	'BEAVER CO 345.00 - Hitchland Interchange 345KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.0773	103.435	'BEAVER CO 345.00 - Hitchland Interchange 345KV CKT 2'
00G13_027sens	0	19SP	G13_027	'FROM->TO'	'PRINGLE INTERCHANGE - SPEARMAN INTERCHANGE 115KV CKT 2'	160	0	0.0349	103.7496	'PRINGLE INTERCHANGE - SPEARMAN INTERCHANGE 115KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07601	103.1856	'PRINGLE INTERCHANGE - SPEARMAN INTERCHANGE 115KV CKT 1'
00G13_027sens	0	19SP	G13_027	'FROM->TO'	'PRINGLE INTERCHANGE - SPEARMAN INTERCHANGE 115KV CKT 1'	160	0	0.03868	114.9586	'PRINGLE INTERCHANGE - SPEARMAN INTERCHANGE 115KV CKT 2'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07671	104.1537	'Harrington Station East Bus - PRINGLE INTERCHANGE 230KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07906	106.7562	'MOORE COUNTY INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07627	107.6494	'GRAY COUNTY INTERCHANGE - HUTCHINSON COUNTY INTERCHANGE S. 115KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07685	104.7007	'HUTCHINSON COUNTY INTERCHANGE - NICHOLS STATION 230KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07627	102.9701	'GRAY COUNTY INTERCHANGE - KINGSMILL INTERCHANGE 69KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.08117	110.4104	'KINGSMILL INTERCHANGE - MCCULLOUGH SUB 69KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.08117	107.1903	'BOWERS INTERCHANGE - MCCULLOUGH SUB 69KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07766	108.4703	'KINGSMILL INTERCHANGE - LLANO ESTACADO WIND GEN 115KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07787	101.2301	'GRAPEVINE INTERCHANGE - KIRBY SWITCHING STATION 115KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'BOWERS INTERCHANGE - GRAPEVINE INTERCHANGE 115KV CKT 1'	160	0	0.03409	121.9111	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'CONWAY SUB - NICHOLS STATION 115KV CKT 1'	175	0	0.03786	114.4275	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'
00G13_027sens	0	19SP	G13_027	'FROM->TO'	'CONWAY SUB - KIRBY SWITCHING STATION 115KV CKT 1'	160	0	0.03786	113.4429	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07547	101.9684	'Graves Sub - STATELINE INTERCHANGE 115KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07766	107.6934	'LLANO ESTACADO WIND GEN - MIDSTREAM ENERGY TAP 115KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07766	107.9823	'MIDSTREAM ENERGY TAP - NICHOLS STATION 115KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07901	104.9981	'FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1'
00G13_027sens	0	19SP	G13_027	'FROM->TO'	'BUSHLAND INTERCHANGE - HILLSIDE 115KV CKT 1'	160	0	0.08689	236.6596	'BUSHLAND INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'COULTER INTERCHANGE - HILLSIDE 115KV CKT 1'	176	0	0.08689	201.9998	'BUSHLAND INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'CANYON WEST SUB - DAWN SUB 115KV CKT 1'	96	0	0.05172	103.3314	'BUSHLAND INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'DAWN SUB - Panda Energy Substation Hereford 115KV CKT 1'	96	0	0.05172	108.0313	'BUSHLAND INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1'
00G13_027sens	0	19SP	G13_027	'FROM->TO'	'BUSHLAND INTERCHANGE (WH 7001795) 230/115/13.2KV TRANSFORMER CKT 1'	168	0	0.08689	223.162	'BUSHLAND INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1'
00G13_027sens	0	19SP	G13_027	'FROM->TO'	'BUSHLAND INTERCHANGE (WH 7001795) 230/115/13.2KV TRANSFORMER CKT 1'	168	0	0.08689	241.5291	'BUSHLAND INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07492	102.9966	'CHERRY1 - HARRINGTON STATION 230KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.08548	118.6463	'CONWAY SUB - NICHOLS STATION 115KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.08548	115.9718	'CONWAY SUB - KIRBY SWITCHING STATION 115KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.06861	101.113	'BUFFALO 230.00 - BUSHLAND INTERCHANGE 230KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.06999	101.0959	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.06861	103.7306	'BUFFALO 230.00 - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07206	100.9003	'NEWHART 230 - PLANT X STATION 230KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.0814	104.2121	'TOLK STATION EAST - TUCO INTERCHANGE 230KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07653	103.2865	'HOLCOMB - SETAB 345KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07553	103.0619	'BUCKNER7 345.00 - HOLCOMB 345KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07685	103.5314	'MINGO - SETAB 345KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07697	103.0799	'MINGO - RED WILLOW 345KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07946	108.171	'BUCKNER7 345.00 - SPEARVILLE 345KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07646	103.8296	'G11-17T 345.00 - SPEARVILLE 345KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07814	103.9426	'BEAVER CO 345.00 - BUCKNER7 345.00 345KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07605	103.031	'THISTLE7 345.00 - WICHITA 345KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07605	103.031	'THISTLE7 345.00 - WICHITA 345KV CKT 2'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.0772	103.9218	'BEAVER CO 345.00 - G13-034T 345.00 345KV CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.0772	103.9218	'BEAVER CO 345.00 - G13-034T 345.00 345KV CKT 2'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07486	101.1313	'JERICHO (JERIC2WT) 115/69/14.4KV TRANSFORMER CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07374	100.1532	'SHAMROCK (SHAMRCK2) 138/69/14.4KV TRANSFORMER CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07374	99.6	'SHAMROCK (SHAMRCK1) 115/69/14.4KV TRANSFORMER CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07671	104.1527	'PRINGLE INTERCHANGE (WH ALM12301) 230/115/13.2KV TRANSFORMER CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07627	107.6407	'GRAY COUNTY INTERCHANGE (WH RHP17221) 115/69/13.2KV TRANSFORMER CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07547	101.9617	'STATELINE INTERCHANGE (H TP80154301) 230/115/13.2KV TRANSFORMER CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.09803	110.1309	'POTTER COUNTY INTERCHANGE (WAUK 90343-A) 345/230/13.2KV TRANSFORMER CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.0756	103.3773	'NICHOLS STATION (ENRCO 136731) 230/115/13.2KV TRANSFORMER CKT 1'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.0756	103.3773	'NICHOLS STATION (ENRCO 136732) 230/115/13.2KV TRANSFORMER CKT 2'
00G13_027sens	0	19SP	G13_027	'FROM->TO'	'YOAKUM COUNTY INTERCHANGE (PENN C010585) 230/115/13.2KV TRANSFORMER CKT 2'	150	0	0.0335	105.6305	'YOAKUM COUNTY INTERCHANGE (GE M100899) 230/115/13.2KV TRANSFORMER CKT 1'

00G13_027sens	0	19SP	G13_027	'FROM->TO'	'YOAKUM COUNTY INTERCHANGE (PENN C010585) 230/115/13.2KV TRANSFORMER CKT 2'	150	0	0.0335	108.7292	'YOAKUM COUNTY INTERCHANGE (GE M100899) 230/115/13.2KV TRANSFORMER CKT 1'
00G13_027sens	0	19SP	G13_027	'FROM->TO'	'YOAKUM COUNTY INTERCHANGE (GE M100899) 230/115/13.2KV TRANSFORMER CKT 1'	150	0	0.03232	101.7683	'YOAKUM COUNTY INTERCHANGE (PENN C010585) 230/115/13.2KV TRANSFORMER CKT 2'
00G13_027sens	0	19SP	G13_027	'FROM->TO'	'YOAKUM COUNTY INTERCHANGE (GE M100899) 230/115/13.2KV TRANSFORMER CKT 1'	150	0	0.03232	104.8797	'YOAKUM COUNTY INTERCHANGE (PENN C010585) 230/115/13.2KV TRANSFORMER CKT 2'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07791	105.7787	'DBL-WICH-THI'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07843	103.9703	'DBL-WWRD-G12'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07667	103.6382	'DBL-G1216-TH'
00G13_027sens	0	19SP	G13_027	'FROM->TO'	'BUCKNER7 345.00 - SPEARVILLE 345KV CKT 1'	611.9	0	0.15817	115.5567	'DBL-G1216-TH'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07554	102.9913	'DBL-THIS-CLR'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.09793	119.4356	'DBL-HTCH-BVR'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.08144	111.9857	'DBL-TGA-MATT'
00G13_027sens	0	19SP	G13_027	'FROM->TO'	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'	351	0	0.11113	101.2148	'SPP-AEPW-32'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.10977	128.3015	'SPP-AEPW-32'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.11035	126.326	'SPP-SWPS-01'
00G13_027sens	0	19SP	G13_027	'FROM->TO'	'PRINGLE INTERCHANGE - SPEARMAN INTERCHANGE 115KV CKT 1'	160	0	0.04292	107.1083	'SPP-SWPS-04'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'MOORE COUNTY INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1'	351	0	0.11305	110.1721	'SPP-SWPS-04'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.09803	120.9422	'SPP-SWPS-04'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07901	103.1025	'SPP-SWPS-05'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07671	104.1517	'SPP-SWPS-K43'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.08548	116.197	'SPP-SWPS-T53'
00G13_027sens	0	19SP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.07766	108.4367	'SPP-SWPS-V29'
00G13_027sens	0	19WP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	361	0	0.07617	106.0583	'BASE CASE'
00G13_027sens	0	19WP	G13_027	'FROM->TO'	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'	361	0	0.11269	100	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
00G13_027sens	0	19WP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	361	0	0.1112	120.9041	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
00G13_027sens	0	19WP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	361	0	0.0895	105.5466	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
00G13_027sens	0	19WP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	361	0	0.08234	106.0473	'G11_051T 345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
00G13_027sens	0	19WP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	361	0	0.08234	106.1868	'G11_051T 345.00 - TATONGA7 345.00 345KV CKT 1'
00G13_027sens	0	19WP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	361	0	0.0895	104.6766	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
00G13_027sens	0	19WP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	361	0	0.08159	99.6	'HITCHLAND INTERCHANGE - MOORE COUNTY INTERCHANGE 230KV CKT 1'
00G13_027sens	0	19WP	G13_027	'TO->FROM'	'MOORE COUNTY INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1'	361	0	0.11437	100.5208	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
00G13_027sens	0	19WP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	361	0	0.09907	117.084	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
00G13_027sens	0	19WP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	361	0	0.07989	100.6537	'MOORE COUNTY INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1'
00G13_027sens	0	19WP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	361	0	0.07702	101.1194	'GRAY COUNTY INTERCHANGE - HUTCHINSON COUNTY INTERCHANGE S. 115KV CKT 1'
00G13_027sens	0	19WP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	361	0	0.08202	105.1006	'KINGSMILL INTERCHANGE - MCCULLOUGH SUB 69KV CKT 1'
00G13_027sens	0	19WP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	361	0	0.08202	103.0258	'BOWERS INTERCHANGE - MCCULLOUGH SUB 69KV CKT 1'
00G13_027sens	0	19WP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	361	0	0.07851	102.19	'KINGSMILL INTERCHANGE - LLANO ESTACADO WIND GEN 115KV CKT 1'
00G13_027sens	0	19WP	G13_027	'TO->FROM'	'BOWERS INTERCHANGE - GRAPEVINE INTERCHANGE 115KV CKT 1'	177	0	0.03453	101.7769	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
00G13_027sens	0	19WP	G13_027	'TO->FROM'	'CONWAY SUB - NICHOLS STATION 115KV CKT 1'	180	0	0.03844	103.5334	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'
00G13_027sens	0	19WP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	361	0	0.07851	100.1434	'LLANO ESTACADO WIND GEN - MIDSTREAM ENERGY TAP 115KV CKT 1'
00G13_027sens	0	19WP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	361	0	0.07851	100.4184	'MIDSTREAM ENERGY TAP - NICHOLS STATION 115KV CKT 1'
00G13_027sens	0	19WP	G13_027	'FROM->TO'	'BUSHLAND INTERCHANGE - HILLSIDE 115KV CKT 1'	177	0	0.08804	209.3298	'BUSHLAND INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1'
00G13_027sens	0	19WP	G13_027	'TO->FROM'	'COULTER INTERCHANGE - HILLSIDE 115KV CKT 1'	191	0	0.08804	184.8002	'BUSHLAND INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1'
00G13_027sens	0	19WP	G13_027	'TO->FROM'	'DAWN SUB - Panda Energy Substation Hereford 115KV CKT 1'	106	0	0.05244	99.7	'BUSHLAND INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1'
00G13_027sens	0	19WP	G13_027	'FROM->TO'	'BUSHLAND INTERCHANGE (WH 7001795) 230/115/13.2KV TRANSFORMER CKT 1'	168	0	0.08804	221.0361	'BUSHLAND INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1'
00G13_027sens	0	19WP	G13_027	'FROM->TO'	'BUSHLAND INTERCHANGE (WH 7001795) 230/115/13.2KV TRANSFORMER CKT 1'	168	0	0.08804	238.4069	'BUSHLAND INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1'
00G13_027sens	0	19WP	G13_027	'FROM->TO'	'Harrington Station Mid Bus - NICHOLS STATION 230KV CKT 2'	684	0	0.04587	102.3438	'HARRINGTON STATION - NICHOLS STATION 230KV CKT 1'
00G13_027sens	0	19WP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	361	0	0.08647	111.2153	'CONWAY SUB - NICHOLS STATION 115KV CKT 1'
00G13_027sens	0	19WP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	361	0	0.08647	109.1147	'CONWAY SUB - KIRBY SWITCHING STATION 115KV CKT 1'
00G13_027sens	0	19WP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	361	0	0.08026	101.9424	'BUCKNER7 345.00 - SPEARVILLE 345KV CKT 1'
00G13_027sens	0	19WP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	361	0	0.07702	101.1117	'GRAY COUNTY INTERCHANGE (WH RHP17221) 115/69/13.2KV TRANSFORMER CKT 1'
00G13_027sens	0	19WP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	361	0	0.09907	103.1943	'POTTER COUNTY INTERCHANGE (WAUK 90343-A) 345/230/13.2KV TRANSFORMER CKT 1'
00G13_027sens	0	19WP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	361	0	0.07868	100.603	'DBL-WICH-THI'
00G13_027sens	0	19WP	G13_027	'FROM->TO'	'BUCKNER7 345.00 - SPEARVILLE 345KV CKT 1'	611.9	0	0.15839	106.1095	'DBL-G1216-TH'
00G13_027sens	0	19WP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	361	0	0.09894	114.4806	'DBL-HTCH-BVR'
00G13_027sens	0	19WP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	361	0	0.08234	107.7577	'DBL-TGA-MATT'
00G13_027sens	0	19WP	G13_027	'FROM->TO'	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'	361	0	0.11269	102.1446	'SPP-AEPW-32'
00G13_027sens	0	19WP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	361	0	0.1112	123.0914	'SPP-AEPW-32'
00G13_027sens	0	19WP	G13_027	'FROM->TO'	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'	361	0	0.11328	100.1473	'SPP-SWPS-01'
00G13_027sens	0	19WP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	361	0	0.11179	121.0422	'SPP-SWPS-01'
00G13_027sens	0	19WP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	361	0	0.09907	113.1095	'SPP-SWPS-04'
00G13_027sens	0	19WP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	361	0	0.08647	109.2721	'SPP-SWPS-T53'
00G13_027sens	0	19WP	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	361	0	0.07851	102.0315	'SPP-SWPS-V29'
06G13_027sens	0	14G	G13_027	'FROM->TO'	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'	351	0	0.09504	105.0285	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
06G13_027sens	0	14G	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.08786	111.0232	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
06G13_027sens	0	14G	G13_027	'FROM->TO'	'ELK CITY 230KV (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1'	316	0	0.09504	103.4052	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
06G13_027sens	0	14G	G13_027	'FROM->TO'	'ELK CITY 230KV (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1'	316	0	0.09504	101.9012	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
06G13_027sens	0	14G	G13_027	'TO->FROM'	'MOORE COUNTY INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1'	351	0	0.11918	105.7424	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'

06G13_027sens	0	14G	G13_027	'FROM->TO'	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'	351	0	0.08803	102.9163	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
06G13_027sens	0	14G	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.08147	109.6572	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
06G13_027sens	0	14G	G13_027	'FROM->TO'	'ELK CITY 230KV (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1'	316	0	0.08803	103.8544	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
06G13_027sens	0	14G	G13_027	'FROM->TO'	'ELK CITY 230KV (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1'	316	0	0.08803	102.6845	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
06G13_027sens	0	14G	G13_027	'FROM->TO'	'CONWAY SUB - KIRBY SWITCHING STATION 115KV CKT 1'	160	0	0.03146	100.7125	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'
06G13_027sens	0	14G	G13_027	'FROM->TO'	'GRAPEVINE INTERCHANGE (PENN 0257751) 230/115/13.2KV TRANSFORMER CKT 1'	112	0	0.03441	104.1302	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'
06G13_027sens	0	14G	G13_027	'FROM->TO'	'GRAPEVINE INTERCHANGE (PENN 0257751) 230/115/13.2KV TRANSFORMER CKT 1'	112	0	0.03441	116.5593	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'
06G13_027sens	0	14G	G13_027	'FROM->TO'	'BUSHLAND INTERCHANGE - HILLSIDE 115KV CKT 1'	160	0	0.09505	163.9315	'BUSHLAND INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1'
06G13_027sens	0	14G	G13_027	'TO->FROM'	'COULTER INTERCHANGE - HILLSIDE 115KV CKT 1'	176	0	0.09505	141.0996	'BUSHLAND INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1'
06G13_027sens	0	14G	G13_027	'FROM->TO'	'BUSHLAND INTERCHANGE (WH 7001795) 230/115/13.2KV TRANSFORMER CKT 1'	168	0	0.09505	156.6099	'BUSHLAND INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1'
06G13_027sens	0	14G	G13_027	'FROM->TO'	'BUSHLAND INTERCHANGE (WH 7001795) 230/115/13.2KV TRANSFORMER CKT 1'	168	0	0.09505	161.5364	'BUSHLAND INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1'
06G13_027sens	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.09127	100	'PLANT X STATION - POTTER COUNTY INTERCHANGE 230KV CKT 1'
06G13_027sens	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.09127	101.8204	'PLANT X STATION - POTTER COUNTY INTERCHANGE 230KV CKT 1'
06G13_027sens	0	14G	G13_027	'FROM->TO'	'Harrington Station Mid Bus - NICHOLS STATION 230KV CKT 2'	617	0	0.04365	106.6797	'HARRINGTON STATION - NICHOLS STATION 230KV CKT 1'
06G13_027sens	0	14G	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.06897	102.2254	'CONWAY SUB - NICHOLS STATION 115KV CKT 1'
06G13_027sens	0	14G	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.06897	100.4865	'CONWAY SUB - KIRBY SWITCHING STATION 115KV CKT 1'
06G13_027sens	0	14G	G13_027	'TO->FROM'	'CANYON WEST SUB - DAWN SUB 115KV CKT 1'	96	0	0.08393	103.3363	'BUFFALO 230.00 - BUSHLAND INTERCHANGE 230KV CKT 1'
06G13_027sens	0	14G	G13_027	'TO->FROM'	'DAWN SUB - Panda Energy Substation Hereford 115KV CKT 1'	96	0	0.08393	106.4002	'BUFFALO 230.00 - BUSHLAND INTERCHANGE 230KV CKT 1'
06G13_027sens	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.10483	102.2162	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
06G13_027sens	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.10483	104.0593	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
06G13_027sens	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.07332	101.29	'PLANT X STATION - SUNDOWN INTERCHANGE 230KV CKT 1'
06G13_027sens	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.07332	103.0163	'PLANT X STATION - SUNDOWN INTERCHANGE 230KV CKT 1'
06G13_027sens	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.10438	116.1121	'TOLK STATION EAST - TUCO INTERCHANGE 230KV CKT 1'
06G13_027sens	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.10438	118.3521	'TOLK STATION EAST - TUCO INTERCHANGE 230KV CKT 1'
06G13_027sens	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.08158	113.4561	'LAMB COUNTY INTERCHANGE - TOLK STATION WEST 230KV CKT 1'
06G13_027sens	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.08158	116.4146	'LAMB COUNTY INTERCHANGE - TOLK STATION WEST 230KV CKT 1'
06G13_027sens	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.08158	113.4807	'LAMB COUNTY INTERCHANGE (WH ALM20172) 230/115/13.2KV TRANSFORMER CKT 1'
06G13_027sens	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.08158	116.4269	'LAMB COUNTY INTERCHANGE (WH ALM20172) 230/115/13.2KV TRANSFORMER CKT 1'
06G13_027sens	0	14G	G13_027	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	153	0	0.0566	146.632	'DBL-WWRD-G12'
06G13_027sens	0	14G	G13_027	'FROM->TO'	'BUCKNER7 345.00 - SPEARVILLE 345KV CKT 1'	611.9	0	0.16295	103.1376	'DBL-G1216-TH'
06G13_027sens	0	14G	G13_027	'FROM->TO'	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'	351	0	0.08967	106.1894	'DBL-HTCH-BVR'
06G13_027sens	0	14G	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.08172	111.6244	'DBL-HTCH-BVR'
06G13_027sens	0	14G	G13_027	'FROM->TO'	'ELK CITY 230KV (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1'	316	0	0.08967	106.7755	'DBL-HTCH-BVR'
06G13_027sens	0	14G	G13_027	'FROM->TO'	'ELK CITY 230KV (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1'	316	0	0.08967	105.334	'DBL-HTCH-BVR'
06G13_027sens	0	14G	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.06537	99.7	'DBL-TGA-MATT'
06G13_027sens	0	14G	G13_027	'FROM->TO'	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'	351	0	0.09504	106.3148	'SPP-AEPW-32'
06G13_027sens	0	14G	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.08786	112.3776	'SPP-AEPW-32'
06G13_027sens	0	14G	G13_027	'FROM->TO'	'ELK CITY 230KV (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1'	316	0	0.09504	104.618	'SPP-AEPW-32'
06G13_027sens	0	14G	G13_027	'FROM->TO'	'ELK CITY 230KV (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1'	316	0	0.09504	103.0087	'SPP-AEPW-32'
06G13_027sens	0	14G	G13_027	'FROM->TO'	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'	351	0	0.09558	105.5653	'SPP-SWPS-01'
06G13_027sens	0	14G	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.08835	111.5281	'SPP-SWPS-01'
06G13_027sens	0	14G	G13_027	'FROM->TO'	'ELK CITY 230KV (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1'	316	0	0.09558	103.7108	'SPP-SWPS-01'
06G13_027sens	0	14G	G13_027	'FROM->TO'	'ELK CITY 230KV (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1'	316	0	0.09558	102.1542	'SPP-SWPS-01'
06G13_027sens	0	14G	G13_027	'TO->FROM'	'MOORE COUNTY INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1'	351	0	0.11918	102.9062	'SPP-SWPS-04'
06G13_027sens	0	14G	G13_027	'FROM->TO'	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'	351	0	0.08803	102.7996	'SPP-SWPS-04'
06G13_027sens	0	14G	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.08147	108.9871	'SPP-SWPS-04'
06G13_027sens	0	14G	G13_027	'FROM->TO'	'ELK CITY 230KV (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1'	316	0	0.08803	101.3141	'SPP-SWPS-04'
06G13_027sens	0	14G	G13_027	'FROM->TO'	'ELK CITY 230KV (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1'	316	0	0.08803	100	'SPP-SWPS-04'
06G13_027sens	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.07086	107.1262	'SPP-SWPS-04'
06G13_027sens	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.07086	109.0383	'SPP-SWPS-04'
06G13_027sens	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.08158	113.4808	'SPP-SWPS-K37'
06G13_027sens	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.08158	116.4269	'SPP-SWPS-K37'
06G13_027sens	0	14G	G13_027	'FROM->TO'	'PLANT X STATION (WH ALM20171) 230/115/13.2KV TRANSFORMER CKT 1'	252	0	0.05368	100	'SPP-SWPS-T04'
06G13_027sens	0	14G	G13_027	'TO->FROM'	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'	351	0	0.06897	100.5896	'SPP-SWPS-T53'

I: Power Flow Analysis (Constraints from Category C Contingencies)

Available upon request. Contact SPP Generation Interconnection Studies for details.

J: Group 6 Dynamic Stability Analysis Report

See report on next page.

Group 6 Impact Study

PISIS-2013-002

February 2014
Generator Interconnection

SPP Southwest Power Pool

Revision History

Date	Author	Change Description
2/28/2014	SPP	PISIS-2013-002 Group 6 Stability Report Issued

Executive Summary

PISIS-2013-002 Interconnection Customers have requested a Preliminary Interconnection System Impact Study detailing the impacts of interconnecting the generation projects shown below.

- GEN-2013-027 – 326.4MW wind farm using General Electric 1.7MW generators connected to a 230kV substation along the Tolk – Yoakum 230kV transmission line on the Southwestern Public Service (SPS) Transmission System.

There are twenty-nine (29) previously queued generation projects in the Group 6 area.

A stability analysis was performed for the addition of the generation projects in Group 6 to determine the stability impacts of interconnecting the generation. The analyses were performed on three seasonal models, the modified versions of the 2014 winter peak, the 2015 summer peak, and the 2024 summer peak cases. A total of one-hundred-fifty-eight (158) contingencies were evaluated for each season.

Transmission System Stability issues were observed with several studied contingencies as noted in Table III-2. Most notable of the issues was low voltage associated with transmission line faults causing the outage of the TUCO-Border-Woodward 345kV transmission line. The outage of these line segments caused system instability. 345kV transmission reinforcements are required to alleviate this potential voltage instability. The transmission reinforcements required are the following –

- Tuco – Border 345kV CKT 2
- New tap on the Border – Woodward 345kV line (Chisholm) and Border – Chisholm CKT 2
- 345kV line from Chisholm – Gracemont – This line currently has an NTC with an in-service date of 2018.

With all Base Case Network Upgrades in service, previously assigned Network Upgrades in service, and the above listed newly assigned Network Upgrades in service, the Group 6 projects were found to remain on line, and the transmission system was found to remain stable for all conditions studied.

All generators in the monitored areas remained stable for all of the modeled disturbances.

Nothing in this study should be construed as a guarantee of delivery or transmission service. If the customer wishes to sell power from the facility, a separate request for transmission service must be requested on Southwest Power Pool's OASIS by the Customer.

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I. Introduction

PISIS-2013-002 Interconnection Customers have requested a Preliminary Interconnection System Impact Study detailing the impacts of interconnecting the generation projects shown Table I-1 below.

Table I-1: Group 6 Interconnection Requests

Request	Capacity (MW)	Generator Model	Point of Interconnection
GEN-2013-027	326.4	GE 1.7MW	Tap Tolk – Yoakum 230kV (GEN 2013-027 POI, 562501)

The previously queued generation projects in the Group 6 area are listed in Table I-2 below.

Table I-2: Group 6 Prior Queued Interconnection Requests

Request	Capacity (MW)	Generator Model	Point of Interconnection
GEN-2001-033	180	Mitsubishi 1000	San Juan Mesa 230kV (524885)
GEN-2001-036	80	CIMTR	Norton 115kV (524502)
GEN-2006-018	170	GENSAL	TUCO 230kV (525830)
GEN-2008-008	60	G.E. 1.5MW	Graham 69kV (526693)
GEN-2008-022	300	G.E. 2.5MW	Tap on Eddy County – Tolk 345kV line (GEN-2008-022-POI, 560007)
GEN-2010-006	180 Summer 205 Winter	GENROU	Jones 230kV(526337)
ASGI-2010-010	42	GENSAL	Lovington 115kV (528334)
ASGI-2010-020	30	Nordex 2.5MW	Tap LE-Tatum – LE-Crosssroads 69kV (ASGI-2010-020-POI, 560360)
GEN-2010-020	20	Emerson 0.5MW	Roswell 69kV (527563)
ASGI-2010-021	15	Mitsubishi MPS-1000A 1.0MW	Tap LE-Saunder Tap – LE-Anderson 69kV (ASGI-2010-021 POI, 560364)
GEN-2010-046	56	GENSAL	TUCO 230kV (525830)
GEN-2010-058	20	Emerson 0.5MW	Chaves County 115kV (527482)
ASGI-2011-003	10	Sany 2.0MW	Hendricks 69kV (525943)
ASGI-2011-001	27.3	Suzlon 2.1MW	Lovington 115kV (528334)
GEN-2011-025	80	G.E. 1.6MW	Tap on Floyd County – Crosby County 115kV line (GEN-2011-025 POI, 562004)
GEN-2011-045	180 Summer 205 Winter	GENROU	Jones 230kV (526337)
GEN-2011-046	23 Summer 27 Winter	GENROU	Quay County 115kV (524472)
GEN-2011-048	165 Summer 175 Winter	GENROU	Mustang 230kV (527151)
ASGI-2011-004	19.2	G.E. 1.6MW	Crosby 69kV (525915)
GEN-2012-001	61.2	CCWE 3.6MW (WT4)	Tap Grassland – Borden 230kV (GEN-2012-001 POI, 526679)
GEN-2012-009	15 MW increase	GENROU	Mustang 230kV (527151)
GEN-2012-010	15 MW increase	GENROU	Mustang 230kV (527151)

Table I-2: Group 6 Prior Queued Interconnection Requests

Request	Capacity (MW)	Generator Model	Point of Interconnection
GEN-2012-020	478	G.E. 1.68MW	TUCO 230kV (525830)
GEN-2012-034	7 MW increase	GENROU	Mustang 230kV (527151)
GEN-2012-035	7 MW increase	GENROU	Mustang 230kV (527151)
GEN-2012-036	7 MW increase	GENROU	Mustang 230kV (527151)
GEN-2012-037	196 Summer 203 Winter	GENROU	TUCO 345kV (525832)
GEN-2013-013	248.4	Siemens 2.3MW	Tap Eddy County – Tolk 345kV (GEN-2013-013 POI, 560726)
GEN-2013-016	191 Summer 203 Winter	GENROU	TUCO 345kV (525832)
ASGI-2012-002	18	Vestas 1.65MW V82	Clovis 115kV (524808)
ASGI-2013-002	18.4	Siemens 2.3MW VS	Tucumcari 115kV (524509)
ASGI-2013-003	18.4	Siemens 2.3MW VS	Clovis 115kV (524808)

A stability analysis and a power factor analysis were performed for the addition of the generation projects in Group 6. The analyses were performed on three seasonal models, the modified versions of the 2014 winter peak, the 2015 summer peak, and the 2024 summer peak cases.

The stability analysis determines the impacts of the new interconnecting project on the stability and voltage recovery of the nearby systems and the ability of the interconnecting project to meet FERC Order 661A. If problems with stability or voltage recovery are identified, the need for reactive compensation or system upgrades is investigated. The three-phase faults and the single line-to-ground faults listed in Table III-1 were used in the stability analysis.

The power factor analysis determines the power factor at the point of interconnection for the wind interconnection project for pre-contingency and post-contingency conditions. The contingencies used in the power factor analysis (Table IV-2) are a subset of the stability analysis contingencies shown in Table III-1.

Nothing in this System Impact Study constitutes a request for transmission service or grants the Interconnection Customer any rights to transmission service.

II. Facilities

A one-line drawing for each of the generation interconnection request in this study is shown in Figure II-1.

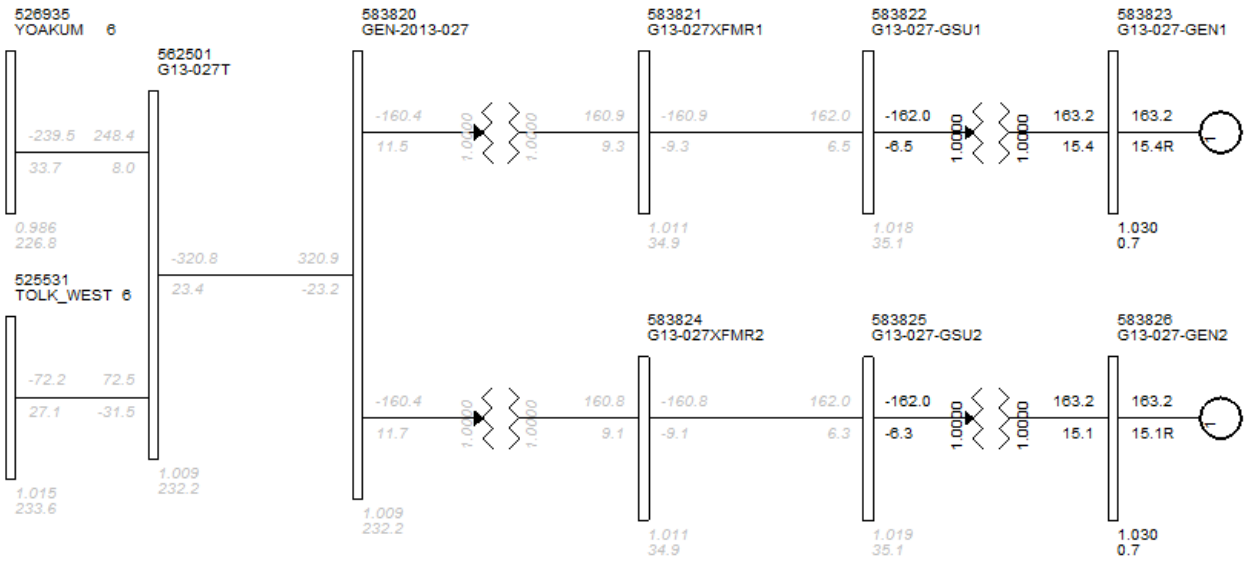

Figure II-1: GEN-2013-027 One-line Diagram

III. Stability Analysis

Transient stability analysis is used to determine if the transmission system can maintain angular stability and ensure bus voltages stay within planning criteria bandwidth during and after a disturbance while considering the addition of a generator interconnection request.

Model Preparation

Transient stability analysis was performed using modified versions of the 2013 series of Model Development Working Group (MDWG) dynamic study models including the 2014 winter peak, 2015 summer peak, and the 2024 summer peak seasonal models. For the 2024 summer peak season, SPS tie lines were adjusted to compare to the ITP model of the same year. The cases are then loaded with prior queued interconnection requests and network upgrades assigned to those interconnection requests. Finally the prior queued and study generation are dispatched into the SPP footprint. Initial simulations are then carried out for a no-disturbance run of twenty (20) seconds to verify the numerical stability of the model.

Disturbances

One hundred-fifty-eight (158) contingencies were identified for use in this study and are listed in Table III-1. These contingencies included three-phase faults and single-phase line faults at locations defined by SPP. Single-phase line faults were simulated by applying fault impedance to the positive sequence network at the fault location to represent the effect of the negative and zero sequence networks on the positive sequence network. The fault impedance was computed to give a positive sequence voltage at the specified fault location of approximately 60% of pre-fault voltage. This method is in agreement with SPP current practice.

Except for transformer faults, the typical sequence of events for a three-phase and a single-phase fault is as follows:

1. apply fault at particular location
2. continue fault for five (5) cycles, clear the fault by tripping the faulted facility
3. after an additional twenty (20) cycles, re-close the previous facility back into the fault
4. continue fault for five (5) additional cycles
5. trip the faulted facility and remove the fault

Transformer faults are typically modeled as three-phase faults, unless otherwise noted. The sequence of events for a transformer fault is as follows:

1. apply fault for five (5) cycles
2. clear the fault by tripping the affected transformer facility (unless otherwise noted there will be no re-closing into a transformer fault)

The control area monitored is 526.

Table III-1: Contingencies Evaluated

Cont. No.	Contingency Name	Description
1	FLT_01_GEN2013027_YOAKUM_230kV_3PH	3 phase fault on the GEN 2013-027 tap to Yoakum 230kV line, near GEN 2013-027 tap. a. Apply fault at the GEN 2013-027 tap 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
2	FLT_02_GEN2013027_YOAKUM_230kV_1PH	*Single phase fault and sequence like previous*
3	FLT_03_GEN2013027_TOLKWEST_230kV_3PH	3 phase fault on the GEN 2013-027 tap to Tolk West 230kV line, near GEN 2013-027 tap. a. Apply fault at the GEN 2013-027 tap 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
4	FLT_04_GEN2013027_TOLKWEST_230kV_1PH	*Single phase fault and sequence like previous*
5	FLT_05_YOAKUM_AMOCOSS_230kV_3PH	3 phase fault on the Yoakum to Amoco 230kV line, near GEN 2013-027 tap. a. Apply fault at the Yoakum 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
6	FLT_06_YOAKUM_AMOCOSS_230kV_1PH	*Single phase fault and sequence like previous*
7	FLT_07_YOAKUM_OXYBRUTP_230kV_3PH	3 phase fault on the Yoakum to Amoco 230kV line, near the Yoakum. a. Apply fault at the Yoakum 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
8	FLT_08_YOAKUM_OXYBRUTP_230kV_1PH	*Single phase fault and sequence like previous*
9	FLT_09_YOAKUM_MUSTANG_230kV_3PH	3 phase fault on the Yoakum to Mustang 230kV line, near GEN 2013-027 tap. a. Apply fault at the Yoakum 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
10	FLT_10_YOAKUM_MUSTANG_230kV_1PH	*Single phase fault and sequence like previous*
11	FLT_11_YOAKUM_HOBBSINT_230kV_3PH	3 phase fault on the Yoakum to Hobbs 230kV line, near Yoakum Interchange. a. Apply fault at the Yoakum 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
12	FLT_12_YOAKUM_HOBBSINT_230kV_1PH	*Single phase fault and sequence like previous*
13	FLT_13_YOAKUM_YOAKUM_230_115kV_3PH	3 phase fault on the Yoakum 230kV / 115kV / 13.2kV ransformer circuit #1, near Yoakum 230kV. a. Apply fault at the Yoakum 230kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.

Table III-1: Contingencies Evaluated

Cont. No.	Contingency Name	Description
14	FLT_14_YOAKUM_YOAKUM_230_115kV_3PH	3 phase fault on the Yoakum 230kV / 115kV / 13.2kV ransformer circuit #2, near Yoakum 230kV. a. Apply fault at the Yoakum 230kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.
15	FLT_15_YOAKUM_PRENTICE_115kV_3PH	3 phase fault on the Yoakum to Prentice 115kV line, near Yoakum. a. Apply fault at the Yoakum 115kVbus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
16	FLT_16_YOAKUM_PRENTICE_115kV_1PH	*Single phase fault and sequence like previous*
17	FLT_17_YOAKUM_LEPLNSINT_115kV_3PH	3 phase fault on the Yoakum to LEPLNSINT 115kV line, near Yoakum. a. Apply fault at the Yoakum 115kVbus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
18	FLT_18_YOAKUM_LEPLNSINT_115kV_1PH	*Single phase fault and sequence like previous*
19	FLT_19_YOAKUM_ARCOTP_115kV_3PH	3 phase fault on the Yoakum to Arco 115kV line, near Yoakum. a. Apply fault at the Yoakum 115kVbus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
20	FLT_20_YOAKUM_ARCOTP_115kV_1PH	*Single phase fault and sequence like previous*
21	FLT_21_YOAKUM_LGPLSHILL_115kV_3PH	3 phase fault on the Yoakum to LGPLSHILl 115kV line, near Yoakum. a. Apply fault at the Yoakum 115kVbus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
22	FLT_22_YOAKUM_LGPLSHILL_115kV_1PH	*Single phase fault and sequence like previous*
23	FLT_23_AMOCOSS_SUNDOWN_230kV_3PH	3 phase fault on the Amoco to Sundown 230kV line, near Amoco. a. Apply fault at the Amoco 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
24	FLT_24_AMOCOSS_SUNDOWN_230kV_1PH	*Single phase fault and sequence like previous*
25	FLT_25_SUNDOWN_PLANTX_230kV_3PH	3 phase fault on the Sundown to Plant X 230kV line, near Sundown. a. Apply fault at the Sundown 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
26	FLT_26_SUNDOWN_PLANTX_230kV_1PH	*Single phase fault and sequence like previous*
27	FLT_27_SUNDOWN_WOLFFORTH_230kV_3PH	3 phase fault on the Sundown to Wolfforth 230kV line, near Sundown. a. Apply fault at the Sundown 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.

Table III-1: Contingencies Evaluated

Cont. No.	Contingency Name	Description
28	FLT_28_SUNDOWN_WOLFFORTH_230kV_1PH	*Single phase fault and sequence like previous*
29	FLT_29_SUNDOWN_SUNDOWN_230_115kV_3PH	3 phase fault on the Sundown 230kV / 115kV / 13.2kV transformer circuit #1, near Sundown 230kV. a. Apply fault at the Sundown 230kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.
30	FLT_30_SUNDOWN_LCOPDYKE_115kV_3PH	3 phase fault on the Sundown to LCOPDYKE 115kV line, near Sundown. a. Apply fault at the Sundown 115kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
31	FLT_31_SUNDOWN_LCOPDYKE_115kV_1PH	*Single phase fault and sequence like previous*
32	FLT_32_SUNDOWN_PACIFIC_115kV_3PH	3 phase fault on the Sundown to Pacific 115kV line, near Sundown. a. Apply fault at the Sundown 115kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
33	FLT_33_SUNDOWN_PACIFIC_115kV_1PH	*Single phase fault and sequence like previous*
34	FLT_34_SUNDOWN_AMOCOTP_115kV_3PH	3 phase fault on the Sundown to Amoco 115kV line, near Sundown. a. Apply fault at the Sundown 115kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
35	FLT_35_SUNDOWN_AMOCOTP_115kV_1PH	*Single phase fault and sequence like previous*
36	FLT_36_PLANTX_POTTERCO_230kV_3PH	3 phase fault on the Plant X to Potter 230kV line, near Plant X. a. Apply fault at the Plant X 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
37	FLT_37_PLANTX_POTTERCO_230kV_1PH	*Single phase fault and sequence like previous*
38	FLT_38_PLANTX_DEAFSMITH_230kV_3PH	3 phase fault on the Plant X to Deaf Smith 230kV line, near Plant X. a. Apply fault at the Plant X 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
39	FLT_39_PLANTX_DEAFSMITH_230kV_1PH	*Single phase fault and sequence like previous*
40	FLT_40_PLANTX_TOLKEAST_230kV_3PH	3 phase fault on the Plant X to Tolk East 230kV line, near Plant X. a. Apply fault at the Plant X 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
41	FLT_41_PLANTX_TOLKEAST_230kV_1PH	*Single phase fault and sequence like previous*

Table III-1: Contingencies Evaluated

Cont. No.	Contingency Name	Description
42	FLT_42_PLANTX_TOLKWEST_230 kV_3PH	3 phase fault on the Plant X to Tolk West 230kV circuit 1 line, near Plant X. a. Apply fault at the Plant X 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
43	FLT_43_PLANTX_TOLKWEST_230 kV_1PH	*Single phase fault and sequence like previous*
44	FLT_44_PLANTX_TOLKWEST_230 kV_3PH	3 phase fault on the Plant X to Potter 230kV circuit 2 line, near Plant X. a. Apply fault at the Plant X 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
45	FLT_45_PLANTX_TOLKWEST_230 kV_1PH	*Single phase fault and sequence like previous*
46	FLT_46_PLANTX_PLANTX_230_11 5kV_3PH	3 phase fault on the Plant X 230kV / 115kV / 13.2kV transformer circuit #1, near Plant X 230kV. a. Apply fault at the Sundown 230kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.
47	FLT_47_WOLFFORTH_LUBBCKST H_230kV_3PH	3 phase fault on the Wolfforth to Lubbock South 230kV line, near Wolfforth. a. Apply fault at the Wolfforth 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
48	FLT_48_WOLFFORTH_LUBBCKST H_230kV_1PH	*Single phase fault and sequence like previous*
49	FLT_49_WOLFFORTH_WOLFFORT H_230_115kV_3PH	3 phase fault on the Wolfforth 230kV / 115kV / 13.2kV transformer circuit #1, near Wolfforth 230kV. a. Apply fault at the Sundown 230kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.
50	FLT_50_LUBBCKSTH_LPSOUTHES T_230kV_3PH	3 phase fault on the Lubbock South to LP South East 230kV line, near Lubbock South. a. Apply fault at the Lubbock South 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
51	FLT_51_LUBBCKSTH_LPSOUTHES T_230kV_1PH	*Single phase fault and sequence like previous*
52	FLT_52_LUBBCKSTH_JONES_230k V_3PH	3 phase fault on the Lubbock South to Jones 230kV circuit 1 line, near Lubbock South. a. Apply fault at the Lubbock South 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
53	FLT_53_LUBBCKSTH_JONES_230k V_1PH	*Single phase fault and sequence like previous*

Table III-1: Contingencies Evaluated

Cont. No.	Contingency Name	Description
54	FLT_54_LUBBCKSTH_JONES_230kV_3PH	3 phase fault on the Lubbock South to Jones 230kV circuit 2 line, near Lubbock South. a. Apply fault at the Lubbock South 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
55	FLT_55_LUBBCKSTH_JONES_230kV_1PH	*Single phase fault and sequence like previous*
56	FLT_56_LUBBCKSTH_LUBBCKSTH_230_115kV_3PH	3 phase fault on the Lubbock South 230kV / 115kV / 13.2kV transformer circuit #1, near Wolfforth 230kV. a. Apply fault at the Sundown 230kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.
57	FLT_57_OXYBRUTP_AMOCOWASSON_230kV_3PH	3 phase fault on the OXYBRUTP to Amoco-Wasson 230kV line, near OXYBRUTP. a. Apply fault at the OXYBRUTP 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
58	FLT_58_OXYBRUTP_AMOCOWASSON_230kV_1PH	*Single phase fault and sequence like previous*
59	FLT_59_AMOCOWASSON_MUSTANG6_230kV_3PH	3 phase fault on the Amoco-Wasson to Mustang 230kV line, near Amoco-Wasson. a. Apply fault at the Amoco-Wasson 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
60	FLT_60_AMOCOWASSON_MUSTANG6_230kV_1PH	*Single phase fault and sequence like previous*
61	FLT_61_AMOCOWASSON_OXYBRUTP_230kV_3PH	3 phase fault on the Amoco-Wasson to Oxybrutp 230kV line, near Amoco-Wasson. a. Apply fault at the Amoco-Wasson 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
62	FLT_62_AMOCOWASSON_OXYBRUTP_230kV_1PH	*Single phase fault and sequence like previous*
63	FLT_63_MUSTANG6_AMOCOWASSON_230kV_3PH	3 phase fault on the Mustang to Amoco Wasson 230kV line, near Mustang. a. Apply fault at the Mustang 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
64	FLT_64_MUSTANG6_AMOCOWASSON_230kV_1PH	*Single phase fault and sequence like previous*
65	FLT_65_MUSTANG6_SEMINOLE_230kV_3PH	3 phase fault on the Mustang to Seminole 230kV line, near Mustang. a. Apply fault at the Mustang 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
66	FLT_66_MUSTANG6_SEMINOLE_230kV_1PH	*Single phase fault and sequence like previous*

Table III-1: Contingencies Evaluated

Cont. No.	Contingency Name	Description
67	FLT_67_MUSTANG6_MUSTANG3_230_115kV_3PH	3 phase fault on the Mustang 230kV / 115kV / 13.2kV transformer circuit #1, near Mustang 230kV. a. Apply fault at the Mustang 230kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.
68	FLT_68_SEMINOLE_SEMINOLE_230_115kV_3PH	3 phase fault on the Seminole 230kV / 115kV / 13.2kV transformer circuit #1, near Seminole 230kV. a. Apply fault at the Seminole 230kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.
69	FLT_69_SEMINOLE_SEMINOLE_230_115kV_3PH	3 phase fault on the Seminole 230kV / 115kV / 13.2kV transformer circuit #2, near Seminole 230kV. a. Apply fault at the Seminole 230kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.
70	FLT_70_MUSTANG3_DENVERN_115kV_3PH	3 phase fault on the Mustang to Denver North 115kV line, near Mustang. a. Apply fault at the Mustang 115kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
71	FLT_71_MUSTANG3_DENVERN_115kV_1PH	*Single phase fault and sequence like previous*
72	FLT_72_MUSTANG3_DENVERS_115kV_3PH	3 phase fault on the Mustang to Denver South 115kV line, near Mustang. a. Apply fault at the Mustang 115kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
73	FLT_73_MUSTANG3_DENVERS_115kV_1PH	*Single phase fault and sequence like previous*
74	FLT_74_MUSTANG3_SEAGRAVES_115kV_3PH	3 phase fault on the Mustang to Seagraves 115kV line, near Mustang. a. Apply fault at the Mustang 115kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
75	FLT_75_MUSTANG3_SEAGRAVES_115kV_1PH	*Single phase fault and sequence like previous*
76	FLT_76_HOBBSINT_CUNNINGHAM_230kV_3PH	3 phase fault on the Hobbs to Cunningham 230kV line, near Hobbs. a. Apply fault at the Hobbs 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
77	FLT_77_HOBBSINT_CUNNINGHAM_230kV_1PH	*Single phase fault and sequence like previous*
78	FLT_78_HOBBSINT_HOBBSINT_230_115kV_3PH	3 phase fault on the Hobbs 230kV / 115kV / 13.2kV transformer circuit #1, near Hobbs 230kV. a. Apply fault at the Hobbs 230kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.
79	FLT_79_HOBBSINT_HOBBSINT_230_115kV_3PH	3 phase fault on the Hobbs 230kV / 115kV / 13.2kV transformer circuit #2, near Hobbs 230kV. a. Apply fault at the Hobbs 230kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.

Table III-1: Contingencies Evaluated

Cont. No.	Contingency Name	Description
80	FLT_80_CUNNINGHAM_EDDYSOUTH_230kV_3PH	3 phase fault on the Cunningham to Eddy South 230kV line, near Cunningham. a. Apply fault at the Cunningham 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
81	FLT_81_CUNNINGHAM_EDDYSOUTH_230kV_1PH	*Single phase fault and sequence like previous*
82	FLT_82_CUNNINGHAM_POTASHJCT_230kV_3PH	3 phase fault on the Cunningham to Potash Junction 230kV line, near Cunningham. a. Apply fault at the Cunningham 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
83	FLT_83_CUNNINGHAM_POTASHJCT_230kV_1PH	*Single phase fault and sequence like previous*
84	FLT_84_CUNNINGHAM_CUNNINHAM_230_115kV_3PH	3 phase fault on the Cunningham 230kV / 115kV / 13.2kV transformer circuit #1, near Cunningham 230kV. a. Apply fault at the Cunningham 230kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.
85	FLT_85_TOLKWEST_ROSEVELTN_230kV_3PH	3 phase fault on the Tolk West to Rosevelt 230kV line, near Tolk West. a. Apply fault at the Tolk West 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
86	FLT_86_TOLKWEST_ROSEVELTN_230kV_1PH	*Single phase fault and sequence like previous*
87	FLT_87_TOLKWEST_PLANTX_230kV_3PH	3 phase fault on the Tolk West to Plant X 230kV circuit 1 line, near Tolk West. a. Apply fault at the Tolk West 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
88	FLT_88_TOLKWEST_PLANTX_230kV_1PH	*Single phase fault and sequence like previous*
89	FLT_89_TOLKWEST_PLANTX_230kV_3PH	3 phase fault on the Tolk West to Plant X 230kV circuit 2 line, near Tolk West. a. Apply fault at the Tolk West 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
90	FLT_90_TOLKWEST_PLANTX_230kV_1PH	*Single phase fault and sequence like previous*
91	FLT_91_TOLKWEST_TOLKTAP_230kV_3PH	3 phase fault on the Tolk West to Tolk Tap 230kV circuit 1 line, near Tolk West. a. Apply fault at the Tolk West 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
92	FLT_92_TOLKWEST_TOLKTAP_230kV_1PH	*Single phase fault and sequence like previous*

Table III-1: Contingencies Evaluated

Cont. No.	Contingency Name	Description
93	FLT_93_TOLKWEST_LAMBCNTY_230kV_3PH	3 phase fault on the Tolk West to Lamb County 230kV line, near Tolk West. a. Apply fault at the Tolk West 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
94	FLT_94_TOLKWEST_LAMBCNTY_230kV_1PH	*Single phase fault and sequence like previous*
95	FLT_95_ROSEVELTN_PLSNTHILL_230kV_3PH	3 phase fault on the Roosevelt to Pleasant Hill 230kV line, near Roosevelt. a. Apply fault at the Roosevelt 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
96	FLT_96_ROSEVELTN_PLSNTHILL_230kV_1PH	*Single phase fault and sequence like previous*
97	FLT_97_ROSEVELTN_SW4K33_230kV_3PH	3 phase fault on the Roosevelt to SW4k33 230kV line, near Roosevelt. a. Apply fault at the Roosevelt 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
98	FLT_98_ROSEVELTN_SW4K33_230kV_1PH	*Single phase fault and sequence like previous*
99	FLT_99_ROSEVELTN_ROOSEVELT_230_115kV_3PH	3 phase fault on the Roosevelt 230kV / 115kV / 13.2kV transformer circuit #1, near Roosevelt 230kV. a. Apply fault at the Roosevelt 230kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.
100	FLT_100_PLSNTHILL_OASIS_230kV_3PH	3 phase fault on the Pleasant Hill to Oasis 230kV line, near Pleasant Hill. a. Apply fault at the Pleasant Hill 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
101	FLT_101_PLSNTHILL_OASIS_230kV_1PH	*Single phase fault and sequence like previous*
102	FLT_102_PLSNTHILL_PLSNTHILL_230_115kV_3PH	3 phase fault on the Pleasant Hill 230kV / 115kV / 13.2kV transformer circuit #1, near Pleasant Hill 230kV. a. Apply fault at the Pleasant Hill 230kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.
103	FLT_103_OASIS_SW4K33_230kV_3PH	3 phase fault on the Oasis to SW4k33 230kV line, near Oasis. a. Apply fault at the Oasis 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
104	FLT_104_OASIS_SW4K33_230kV_1PH	*Single phase fault and sequence like previous*
105	FLT_105_OASIS_SANJANHVB1_230kV_3PH	3 phase fault on the Oasis to San Juan Mesa 230kV line, near Oasis. a. Apply fault at the Oasis 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
106	FLT_106_OASIS_SANJANHVB1_230kV_1PH	*Single phase fault and sequence like previous*

Table III-1: Contingencies Evaluated

Cont. No.	Contingency Name	Description
107	FLT_107_OASIS_OASIS_230_115kV_3PH	3 phase fault on the Oasis 230kV / 115kV / 13.2kV transformer circuit #1, near Oasis 230kV. a. Apply fault at the Oasis 230kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.
108	FLT_108_PLANTX_NEWHART6_230kV_3PH	3 phase fault on the Plant X to New Hart 230kV line, near Plant X. a. Apply fault at the Plant X 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
109	FLT_109_PLANTX_NEWHART6_230kV_1PH	*Single phase fault and sequence like previous*
110	FLT_110_PLANTX_DEAFSMITH_230kV_3PH	3 phase fault on the Plant X to Deaf Smith 230kV line, near Plant X. a. Apply fault at the Plant X 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
111	FLT_111_PLANTX_ DEAFSMITH _230kV_1PH	*Single phase fault and sequence like previous*
112	FLT_112_PLANTX_SUNDOWN_230kV_3PH	3 phase fault on the Plant X to Sundown 230kV line, near Plant X. a. Apply fault at the Plant X 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
113	FLT_113_PLANTX_SUNDOWN_230kV_1PH	*Single phase fault and sequence like previous*
114	FLT_114_PLANTX_PLANTX_230_115kV_3PH	3 phase fault on the Plant X 230kV / 115kV / 13.2kV transformer circuit #1, near Plant X 230kV. a. Apply fault at the Plant X 230kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.
115	FLT_115_POTTERCO_MOORECNTY_230kV_3PH	3 phase fault on the Potter County to Moore County 230kV line, near Potter County. a. Apply fault at the Potter County 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
116	FLT_116_POTTERCO_MOORECNTY_230kV_1PH	*Single phase fault and sequence like previous*
117	FLT_117_POTTERCO_HARRNGEST_230kV_3PH	3 phase fault on the Potter County to Harrington East 230kV line, near Potter County. a. Apply fault at the Potter County 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
118	FLT_118_POTTERCO_HARRNGEST_230kV_1PH	*Single phase fault and sequence like previous*
119	FLT_119_POTTERCO_ROLLHILLS_230kV_3PH	3 phase fault on the Potter County to RollHills 230kV line, near RollHills. a. Apply fault at the Potter County 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.

Table III-1: Contingencies Evaluated

Cont. No.	Contingency Name	Description
120	FLT_120_POTTERCO_ROLLHILLS_230kV_1PH	*Single phase fault and sequence like previous*
121	FLT_121_POTTERCO_BUSHLAND_230kV_3PH	3 phase fault on the Potter County to Bushland 230kV line, near Potter County. a. Apply fault at the Potter County 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
122	FLT_122_POTTERCO_BUSHLAND_230kV_1PH	*Single phase fault and sequence like previous*
123	FLT_123_POTTERCO_POTTERCO_230_115kV_3PH	3 phase fault on the Potter County 230kV / 115kV / 13.2kV transformer circuit #1, near Potter County 230kV. a. Apply fault at the Potter County 230kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.
124	FLT_124_POTTERCO_POTTERCO_230_345kV_3PH	3 phase fault on the Potter County 345kV / 230kV / 13.2kV transformer circuit #1, near Potter County 230kV. a. Apply fault at the Potter County 230kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.
125	FLT_125_DEAFSMITH_BUFFALO_230kV_3PH	3 phase fault on the Deaf Smith to Buffalo 230kV line, near Potter County. a. Apply fault at the Potter County 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
126	FLT_126_DEAFSMITH_BUFFALO_230kV_1PH	*Single phase fault and sequence like previous*
127	FLT_127_DEAFSMITH_DEAFSMITH_230_115kV_3PH	3 phase fault on the Deaf Smith 230kV / 115kV / 13.2kV transformer circuit #1, near Deaf Smith 230kV. a. Apply fault at the Potter County 230kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.
128	FLT_128_DEAFSMITH_DEAFSMITH_230_115kV_3PH	3 phase fault on the Deaf Smith 230kV / 115kV / 13.2kV transformer circuit #2, near Deaf Smith 230kV. a. Apply fault at the Potter County 230kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.
129	FLT_129_TOLKTAP_TOLKEAST_230kV_3PH	3 phase fault on the Tolk Tap to Tolk East 230kV line, near Tolk Tap. a. Apply fault at the Tolk Tap 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
130	FLT_130_TOLKTAP_TOLKEAST_230kV_1PH	*Single phase fault and sequence like previous*
131	FLT_131_TOLKTAP_TOLK_230_345kV_3PH	3 phase fault on the Tolk 345kV / 230kV / 13.2kV transformer circuit #1, near Tolk Tap 230kV. a. Apply fault at the Tolk Tap 230kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.
132	FLT_132_TOLKTAP_TOLK_230_345kV_3PH	3 phase fault on the Tolk 345kV / 230kV / 13.2kV transformer circuit #2, near Tolk Tap 230kV. a. Apply fault at the Tolk Tap 230kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.

Table III-1: Contingencies Evaluated

Cont. No.	Contingency Name	Description
133	FLT_133_TOLK_G08022TAP_345kV_3PH	3 phase fault on the Tolk to GEN 2008-022 tap 345kV line, near Tolk. a. Apply fault at the Tolk 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
134	FLT_134_TOLK_G08022TAP_345kV_1PH	*Single phase fault and sequence like previous*
135	FLT_135_TOLKEAST_ROSEVELTS_230kV_3PH	3 phase fault on the Tolk East to Roosevelt South 230kV line, near Tolk East. a. Apply fault at the Tolk East 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
136	FLT_136_TOLKEAST_ROSEVELTS_230kV_1PH	*Single phase fault and sequence like previous*
137	FLT_137_TOLKEAST_TUCOINT_230kV_3PH	3 phase fault on the Tolk East to Tuco 230kV line, near Tolk East. a. Apply fault at the Tolk East 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
138	FLT_138_TOLKEAST_TUCOINT_230kV_1PH	*Single phase fault and sequence like previous*
139	FLT_139_TUCOINT_TUCOINT_230_115kV_3PH	3 phase fault on the Tuco 230kV / 115kV / 13.2kV transformer circuit #1, near Tolk Tap 230kV. a. Apply fault at the Tuco 230kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.
140	FLT_140_TUCOINT_TUCOINT_230_115kV_3PH	3 phase fault on the Tuco 230kV / 115kV / 13.2kV transformer circuit #2, near Tuco 230kV. a. Apply fault at the Tuco 230kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.
141	FLT_141_TUCOINT7_BORDER_345kV_3PH	3 phase fault on the Tuco to Border 345kV line, near Tuco. a. Apply fault at the Tuco 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
142	FLT_142_TUCOINT7_BORDER_345kV_1PH	*Single phase fault and sequence like previous*
143	FLT_143_TUCOINT7_OKU_345kV_3PH	3 phase fault on the Tuco to Oklaunion 345kV line, near Tuco. a. Apply fault at the Tuco 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
144	FLT_144_TUCOINT7_OKU_345kV_1PH	*Single phase fault and sequence like previous*
145	FLT_145_BORDER_WWRDEHV7_345kV_3PH	3 phase fault on the Border to Woodward 345kV line, near Border. a. Apply fault at the Border 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
146	FLT_146_BORDER_WWRDEHV7_345kV_1PH	*Single phase fault and sequence like previous*

Table III-1: Contingencies Evaluated

Cont. No.	Contingency Name	Description
147	FLT_147_TUCOINT7_TUCOINT6_345_230kV_3PH	3 phase fault on the Tuco 345kV / 230kV / 13.2kV transformer circuit #1, near Tuco 230kV. a. Apply fault at the Tuco 230kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.
148	FLT_148_TUCOINT7_TUCOINT6_345_230kV_3PH	3 phase fault on the Tuco 345kV / 230kV / 13.2kV transformer circuit #2, near Tuco 230kV. a. Apply fault at the Tuco 230kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.
149	FLT_149_TUCOINT6_SWISHER_230kV_3PH	3 phase fault on the Tuco to Swisher 230kV line, near Tuco. a. Apply fault at the Tuco 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
150	FLT_150_TUCOINT6_SWISHER_230kV_1PH	*Single phase fault and sequence like previous*
151	FLT_151_TUCOINT6_TOLKEAST_230kV_3PH	3 phase fault on the Tuco to Tolk East 230kV line, near Tuco. a. Apply fault at the Tuco 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
152	FLT_152_TUCOINT6_TOLKEAST_230kV_1PH	*Single phase fault and sequence like previous*
153	FLT_153_TUCOINT6_CARLISLE_230kV_3PH	3 phase fault on the Tuco to CarIsle 230kV line, near Tuco. a. Apply fault at the Tuco 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
154	FLT_154_TUCOINT6_CARLISLE_230kV_1PH	*Single phase fault and sequence like previous*
155	FLT_155_TUCOINT6_JONES_230kV_3PH	3 phase fault on the Tuco to Jones 230kV line, near Tuco. a. Apply fault at the Tuco 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
156	FLT_156_TUCOINT6_JONES_230kV_1PH	*Single phase fault and sequence like previous*
157	FLT_157_CHISHOLM7_GRACEMONT_345kV_3PH	3 phase fault on the Chisholm to Gracemont 345kV line, near Chisholm. a. Apply fault at the Chisholm 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
158	FLT_158_CHISHOLM7_GRACEMONT_345kV_1PH	*Single phase fault and sequence like previous*

NOTE: For prior outage contingencies assume that the network is at steady state after the prior outage.

Results

The stability analysis was performed and the results are summarized in Table III-2. Transmission system stability issues were observed. Most notable of stability issues was voltage depression and

collapse that was associated with transmission line faults causing the outage of the TUCO-Border-Woodward 345kV transmission line. The outage of these line segments caused voltage instability at the Oklaunion 345kV bus.

345kV transmission reinforcement is required to alleviate this potential voltage instability. The transmission reinforcement required is the following:

- Tuco – Border 345kV circuit #2
- New tap on Border – Woodward 345kV line (Chisholm) and construct Border – Chisholm circuit #2
- New 345kV line from Chisholm to Gracemont. This line currently has an NTC with an in service date of 2018.

The transmission reinforcement listed above were added into the models and all simulations were performed again. These results are listed in Table III-3. The results indicate that the transmission system remained stable for all Category "B" fault contingencies studied.

Some prior outage conditions that were studied indicated potential instability in the power system. For these Category "C" contingencies studied, it will be required to back down (curtail) studied and prior queued generation for the prior outage.

The stability plots will be available upon request.

Table III-2: Stability Analysis Results

	Contingency Number and Name	2014WP	2015SP	2024SP
1	FLT_01_GEN2013027_YOAKUM_230kV_3PH	STABLE	STABLE	STABLE
2	FLT_02_GEN2013027_YOAKUM_230kV_1PH	STABLE	STABLE	STABLE
3	FLT_03_GEN2013027_TOLKWEST_230kV_3PH	STABLE	STABLE	STABLE
4	FLT_04_GEN2013027_TOLKWEST_230kV_1PH	STABLE	STABLE	STABLE
5	FLT_05_YOAKUM_AMOCOSS_230kV_3PH	STABLE	STABLE	STABLE
6	FLT_06_YOAKUM_AMOCOSS_230kV_1PH	STABLE	STABLE	STABLE
7	FLT_07_YOAKUM_OXYBRUTP_230kV_3PH	STABLE	STABLE	STABLE
8	FLT_08_YOAKUM_OXYBRUTP_230kV_1PH	STABLE	STABLE	STABLE
9	FLT_09_YOAKUM_MUSTANG_230kV_3PH	STABLE	STABLE	STABLE
10	FLT_10_YOAKUM_MUSTANG_230kV_1PH	STABLE	STABLE	STABLE
11	FLT_11_YOAKUM_HOBBSINT_230kV_3PH	STABLE	STABLE	STABLE
12	FLT_12_YOAKUM_HOBBSINT_230kV_1PH	STABLE	STABLE	STABLE
13	FLT_13_YOAKUM_YOAKUM_230_115kV_3PH	STABLE	STABLE	STABLE
14	FLT_14_YOAKUM_YOAKUM_230_115kV_3PH	STABLE	STABLE	STABLE
15	FLT_15_YOAKUM_PRENTICE_115kV_3PH	STABLE	STABLE	STABLE
16	FLT_16_YOAKUM_PRENTICE_115kV_1PH	STABLE	STABLE	STABLE
17	FLT_17_YOAKUM_LEPLNSINT_115kV_3PH	STABLE	STABLE	STABLE
18	FLT_18_YOAKUM_LEPLNSINT_115kV_1PH	STABLE	STABLE	STABLE
19	FLT_19_YOAKUM_ARCOTP_115kV_3PH	STABLE	STABLE	STABLE
20	FLT_20_YOAKUM_ARCOTP_115kV_1PH	STABLE	STABLE	STABLE
21	FLT_21_YOAKUM_LGPLSHILL_115kV_3PH	STABLE	STABLE	STABLE
22	FLT_22_YOAKUM_LGPLSHILL_115kV_1PH	STABLE	STABLE	STABLE
23	FLT_23_AMOCOSS_SUNDOWN_230kV_3PH	STABLE	STABLE	STABLE
24	FLT_24_AMOCOSS_SUNDOWN_230kV_1PH	STABLE	STABLE	STABLE

Table III-2: Stability Analysis Results

	Contingency Number and Name	2014WP	2015SP	2024SP
25	FLT_25_SUNDOWN_PLANTX_230kV_3PH	STABLE	STABLE	STABLE
26	FLT_26_SUNDOWN_PLANTX_230kV_1PH	STABLE	STABLE	STABLE
27	FLT_27_SUNDOWN_WOLFFORTH_230kV_3PH	STABLE	STABLE	STABLE
28	FLT_28_SUNDOWN_WOLFFORTH_230kV_1PH	STABLE	STABLE	STABLE
29	FLT_29_SUNDOWN_SUNDOWN_230_115kV_3PH	STABLE	STABLE	STABLE
30	FLT_30_SUNDOWN_LCOPDYKE_115kV_3PH	STABLE	STABLE	STABLE
31	FLT_31_SUNDOWN_LCOPDYKE_115kV_1PH	STABLE	STABLE	STABLE
32	FLT_32_SUNDOWN_PACIFIC_115kV_3PH	STABLE	STABLE	STABLE
33	FLT_33_SUNDOWN_PACIFIC_115kV_1PH	STABLE	STABLE	STABLE
34	FLT_34_SUNDOWN_AMOCOTP_115kV_3PH	STABLE	STABLE	STABLE
35	FLT_35_SUNDOWN_AMOCOTP_115kV_1PH	STABLE	STABLE	STABLE
36	FLT_36_PLANTX_POTTERCO_230kV_3PH	STABLE	STABLE	STABLE
37	FLT_37_PLANTX_POTTERCO_230kV_1PH	STABLE	STABLE	STABLE
38	FLT_38_PLANTX_DEAFSMITH_230kV_3PH	STABLE	STABLE	STABLE
39	FLT_39_PLANTX_DEAFSMITH_230kV_1PH	STABLE	STABLE	STABLE
40	FLT_40_PLANTX_TOLKEAST_230kV_3PH	STABLE	STABLE	STABLE
41	FLT_41_PLANTX_TOLKEAST_230kV_1PH	STABLE	STABLE	STABLE
42	FLT_42_PLANTX_TOLKWEST_230kV_3PH	STABLE	STABLE	STABLE
43	FLT_43_PLANTX_TOLKWEST_230kV_1PH	STABLE	STABLE	STABLE
44	FLT_44_PLANTX_TOLKWEST_230kV_3PH	STABLE	STABLE	STABLE
45	FLT_45_PLANTX_TOLKWEST_230kV_1PH	STABLE	STABLE	STABLE
46	FLT_46_PLANTX_PLANTX_230_115kV_3PH	STABLE	STABLE	STABLE
47	FLT_47_WOLFFORTH_LUBBCKSTH_230kV_3PH	STABLE	STABLE	STABLE
48	FLT_48_WOLFFORTH_LUBBCKSTH_230kV_1PH	STABLE	STABLE	STABLE
49	FLT_49_WOLFFORTH_WOLFFORTH_230_115kV_3PH	STABLE	STABLE	STABLE
50	FLT_50_LUBBCKSTH_LPSOUTHEST_230kV_3PH	STABLE	STABLE	STABLE
51	FLT_51_LUBBCKSTH_LPSOUTHEST_230kV_1PH	STABLE	STABLE	STABLE
52	FLT_52_LUBBCKSTH_JONES_230kV_3PH	STABLE	STABLE	STABLE
53	FLT_53_LUBBCKSTH_JONES_230kV_1PH	STABLE	STABLE	STABLE
54	FLT_54_LUBBCKSTH_JONES_230kV_3PH	STABLE	STABLE	STABLE
55	FLT_55_LUBBCKSTH_JONES_230kV_1PH	STABLE	STABLE	STABLE
56	FLT_56_LUBBCKSTH_LUBBCKSTH_230_115kV_3PH	STABLE	STABLE	STABLE
57	FLT_57_OXYBRUTP_AMOCOWASSON_230kV_3PH	STABLE	STABLE	STABLE
58	FLT_58_OXYBRUTP_AMOCOWASSON_230kV_1PH	STABLE	STABLE	STABLE
59	FLT_59_AMOCOWASSON_MUSTANG6_230kV_3PH	STABLE	STABLE	STABLE
60	FLT_60_AMOCOWASSON_MUSTANG6_230kV_1PH	STABLE	STABLE	STABLE
61	FLT_61_AMOCOWASSON_OXYBRUTP_230kV_3PH	STABLE	STABLE	STABLE
62	FLT_62_AMOCOWASSON_OXYBRUTP_230kV_1PH	STABLE	STABLE	STABLE
63	FLT_63_MUSTANG6_AMOCOWASSON_230kV_3PH	STABLE	STABLE	STABLE
64	FLT_64_MUSTANG6_AMOCOWASSON_230kV_1PH	STABLE	STABLE	STABLE
65	FLT_65_MUSTANG6_SEMINOLE_230kV_3PH	STABLE	STABLE	STABLE
66	FLT_66_MUSTANG6_SEMINOLE_230kV_1PH	STABLE	STABLE	STABLE
67	FLT_67_MUSTANG6_MUSTANG3_230_115kV_3PH	STABLE	STABLE	STABLE
68	FLT_68_SEMINOLE_SEMINOLE_230_115kV_3PH	STABLE	STABLE	STABLE
69	FLT_69_SEMINOLE_SEMINOLE_230_115kV_3PH	STABLE	STABLE	STABLE
70	FLT_70_MUSTANG3_DENVERN_115kV_3PH	STABLE	STABLE	STABLE
71	FLT_71_MUSTANG3_DENVERN_115kV_1PH	STABLE	STABLE	STABLE
72	FLT_72_MUSTANG3_DENVERS_115kV_3PH	STABLE	STABLE	STABLE
73	FLT_73_MUSTANG3_DENVERS_115kV_1PH	STABLE	STABLE	STABLE
74	FLT_74_MUSTANG3_SEAGRAVES_115kV_3PH	STABLE	STABLE	STABLE
75	FLT_75_MUSTANG3_SEAGRAVES_115kV_1PH	STABLE	STABLE	STABLE
76	FLT_76_HOBBSINT_CUNNINGHAM_230kV_3PH	STABLE	STABLE	STABLE
77	FLT_77_HOBBSINT_CUNNINGHAM_230kV_1PH	STABLE	STABLE	STABLE
78	FLT_78_HOBBSINT_HOBBSINT_230_115kV_3PH	STABLE	STABLE	STABLE
79	FLT_79_HOBBSINT_HOBBSINT_230_115kV_3PH	STABLE	STABLE	STABLE

Table III-2: Stability Analysis Results

	Contingency Number and Name	2014WP	2015SP	2024SP
80	FLT_80_CUNNINGHAM_EDDYSOUTH_230kV_3PH	STABLE	STABLE	STABLE
81	FLT_81_CUNNINGHAM_EDDYSOUTH_230kV_1PH	STABLE	STABLE	STABLE
82	FLT_82_CUNNINGHAM_POTASHJCT_230kV_3PH	STABLE	STABLE	STABLE
83	FLT_83_CUNNINGHAM_POTASHJCT_230kV_1PH	STABLE	STABLE	STABLE
84	FLT_84_CUNNINGHAM_CUNNINHAM_230_115kV_3PH	STABLE	STABLE	STABLE
85	FLT_85_TOLKWEST_ROSEVELTN_230kV_3PH	STABLE	STABLE	STABLE
86	FLT_86_TOLKWEST_ROSEVELTN_230kV_1PH	STABLE	STABLE	STABLE
87	FLT_87_TOLKWEST_PLANTX_230kV_3PH	STABLE	STABLE	STABLE
88	FLT_88_TOLKWEST_PLANTX_230kV_1PH	STABLE	STABLE	STABLE
89	FLT_89_TOLKWEST_PLANTX_230kV_3PH	STABLE	STABLE	STABLE
90	FLT_90_TOLKWEST_PLANTX_230kV_1PH	STABLE	STABLE	STABLE
91	FLT_91_TOLKWEST_TOLKTAP_230kV_3PH	STABLE	STABLE	STABLE
92	FLT_92_TOLKWEST_TOLKTAP_230kV_1PH	STABLE	STABLE	STABLE
93	FLT_93_TOLKWEST_LAMBCNTY_230kV_3PH	STABLE	STABLE	STABLE
94	FLT_94_TOLKWEST_LAMBCNTY_230kV_1PH	STABLE	STABLE	STABLE
95	FLT_95_ROSEVELTN_PLSNTHILL_230kV_3PH	STABLE	STABLE	STABLE
96	FLT_96_ROSEVELTN_PLSNTHILL_230kV_1PH	STABLE	STABLE	STABLE
97	FLT_97_ROSEVELTN_SW4K33_230kV_3PH	STABLE	STABLE	STABLE
98	FLT_98_ROSEVELTN_SW4K33_230kV_1PH	STABLE	STABLE	STABLE
99	FLT_99_ROSEVELTN_ROOSEVELT_230_115kV_3PH	STABLE	STABLE	STABLE
100	FLT_100_PLSNTHILL_OASIS_230kV_3PH	STABLE	STABLE	STABLE
101	FLT_101_PLSNTHILL_OASIS_230kV_1PH	STABLE	STABLE	STABLE
102	FLT_102_PLSNTHILL_PLSNTHILL_230_115kV_3PH	STABLE	STABLE	STABLE
103	FLT_103_OASIS_SW4K33_230kV_3PH	STABLE	STABLE	STABLE
104	FLT_104_OASIS_SW4K33_230kV_1PH	STABLE	STABLE	STABLE
105	FLT_105_OASIS_SANJANHVB1_230kV_3PH	STABLE	STABLE	STABLE
106	FLT_106_OASIS_SANJANHVB1_230kV_1PH	STABLE	STABLE	STABLE
107	FLT_107_OASIS_OASIS_230_115kV_3PH	STABLE	STABLE	STABLE
108	FLT_108_PLANTX_NEWHART6_230kV_3PH	STABLE	STABLE	STABLE
109	FLT_109_PLANTX_NEWHART6_230kV_1PH	STABLE	STABLE	STABLE
110	FLT_110_PLANTX_DEAFSMITH_230kV_3PH	STABLE	STABLE	STABLE
111	FLT_111_PLANTX_ DEAFSMITH _230kV_1PH	STABLE	STABLE	STABLE
112	FLT_112_PLANTX_SUNDOWN_230kV_3PH	STABLE	STABLE	STABLE
113	FLT_113_PLANTX_SUNDOWN_230kV_1PH	STABLE	STABLE	STABLE
114	FLT_114_PLANTX_PLANTX_230_115kV_3PH	STABLE	STABLE	STABLE
115	FLT_115_POTTERCO_MOORECNTY_230kV_3PH	STABLE	STABLE	STABLE
116	FLT_116_POTTERCO_MOORECNTY_230kV_1PH	STABLE	STABLE	STABLE
117	FLT_117_POTTERCO_HARRNGEST_230kV_3PH	STABLE	STABLE	STABLE
118	FLT_118_POTTERCO_HARRNGEST_230kV_1PH	STABLE	STABLE	STABLE
119	FLT_119_POTTERCO_ROLLHILLS_230kV_3PH	STABLE	STABLE	STABLE
120	FLT_120_POTTERCO_ROLLHILLS_230kV_1PH	STABLE	STABLE	STABLE
121	FLT_121_POTTERCO_BUSHLAND_230kV_3PH	STABLE	STABLE	STABLE
122	FLT_122_POTTERCO_BUSHLAND_230kV_1PH	STABLE	STABLE	STABLE
123	FLT_123_POTTERCO_POTTERCO_230_115kV_3PH	STABLE	STABLE	STABLE
124	FLT_124_POTTERCO_POTTERCO_230_345kV_3PH	STABLE	STABLE	STABLE
125	FLT_125_DEAFSMITH_BUFFALO_230kV_3PH	STABLE	STABLE	STABLE
126	FLT_126_DEAFSMITH_BUFFALO_230kV_1PH	STABLE	STABLE	STABLE
127	FLT_127_DEAFSMITH_DEAFSMITH_230_115kV_3PH	STABLE	STABLE	STABLE
128	FLT_128_DEAFSMITH_DEAFSMITH_230_115kV_3PH	STABLE	STABLE	STABLE
129	FLT_129_TOLKTAP_TOLKEAST_230kV_3PH	STABLE	STABLE	STABLE
130	FLT_130_TOLKTAP_TOLKEAST_230kV_1PH	STABLE	STABLE	STABLE
131	FLT_131_TOLKTAP_TOLK_230_345kV_3PH	STABLE	STABLE	STABLE
132	FLT_132_TOLKTAP_TOLK_230_345kV_3PH	STABLE	STABLE	STABLE
133	FLT_133_TOLK_G08022TAP_345kV_3PH	STABLE	STABLE	STABLE
134	FLT_134_TOLK_G08022TAP_345kV_1PH	STABLE	STABLE	STABLE

Table III-2: Stability Analysis Results

	Contingency Number and Name	2014WP	2015SP	2024SP
135	FLT_135_TOLKEAST_ROSEVELTS_230kV_3PH	STABLE	STABLE	STABLE
136	FLT_136_TOLKEAST_ROSEVELTS_230kV_1PH	STABLE	STABLE	STABLE
137	FLT_137_TOLKEAST_TUCOINT_230kV_3PH	STABLE	STABLE	STABLE
138	FLT_138_TOLKEAST_TUCOINT_230kV_1PH	STABLE	STABLE	STABLE
139	FLT_139_TUCOINT_TUCOINT_230_115kV_3PH	STABLE	STABLE	STABLE
140	FLT_140_TUCOINT_TUCOINT_230_115kV_3PH	STABLE	STABLE	STABLE
141	FLT_141_TUCOINT7_BORDER_345kV_3PH	UNSTABLE	UNSTABLE	UNSTABLE
142	FLT_142_TUCOINT7_BORDER_345kV_1PH	UNSTABLE	UNSTABLE	UNSTABLE
143	FLT_143_TUCOINT7_OKU_345kV_3PH	STABLE	STABLE	STABLE
144	FLT_144_TUCOINT7_OKU_345kV_1PH	STABLE	STABLE	STABLE
145	FLT_145_BORDER_WWRDEHV7_345kV_3PH	UNSTABLE	UNSTABLE	UNSTABLE
146	FLT_146_BORDER_WWRDEHV7_345kV_1PH	UNSTABLE	UNSTABLE	UNSTABLE
147	FLT_147_TUCOINT7_TUCOINT6_345_230kV_3PH	STABLE	STABLE	STABLE
148	FLT_148_TUCOINT7_TUCOINT6_345_230kV_3PH	STABLE	STABLE	STABLE
149	FLT_149_TUCOINT6_SWISHER_230kV_3PH	STABLE	STABLE	STABLE
150	FLT_150_TUCOINT6_SWISHER_230kV_1PH	STABLE	STABLE	STABLE
151	FLT_151_TUCOINT6_TOLKEAST_230kV_3PH	STABLE	STABLE	STABLE
152	FLT_152_TUCOINT6_TOLKEAST_230kV_1PH	STABLE	STABLE	STABLE
153	FLT_153_TUCOINT6_CARLISLE_230kV_3PH	STABLE	STABLE	STABLE
154	FLT_154_TUCOINT6_CARLISLE_230kV_1PH	STABLE	STABLE	STABLE
155	FLT_155_TUCOINT6_JONES_230kV_3PH	STABLE	STABLE	STABLE
156	FLT_156_TUCOINT6_JONES_230kV_1PH	STABLE	STABLE	STABLE

Table III-3: Stability Analysis Results (with Tuco – Border – Chisholm CKT 2)

	Contingency Number and Name	2014WP	2015SP	2024SP
1	FLT_141_TUCOINT7_BORDER_345kV_3PH	STABLE	STABLE	STABLE
2	FLT_142_TUCOINT7_BORDER_345kV_1PH	STABLE	STABLE	STABLE
3	FLT_145_ Chisholm _WWRDEHV7_345kV_3PH	UNSTABLE	UNSTABLE	UNSTABLE
4	FLT_146_ Chisholm _WWRDEHV7_345kV_1PH	UNSTABLE	UNSTABLE	UNSTABLE

Table III-4: Stability Analysis Results (with Tuco – Border – Chisholm CKT 2 and Chisholm - Gracemont)

	Contingency Number and Name	2014WP	2015SP	2024SP
5	FLT_01_GEN2013027_YOAKUM_230kV_3PH	STABLE	STABLE	STABLE
6	FLT_02_GEN2013027_YOAKUM_230kV_1PH	STABLE	STABLE	STABLE
7	FLT_03_GEN2013027_TOLKWEST_230kV_3PH	STABLE	STABLE	STABLE
8	FLT_04_GEN2013027_TOLKWEST_230kV_1PH	STABLE	STABLE	STABLE
9	FLT_05_YOAKUM_AMOCOSS_230kV_3PH	STABLE	STABLE	STABLE
10	FLT_06_YOAKUM_AMOCOSS_230kV_1PH	STABLE	STABLE	STABLE
11	FLT_07_YOAKUM_OXYBRUTP_230kV_3PH	STABLE	STABLE	STABLE
12	FLT_08_YOAKUM_OXYBRUTP_230kV_1PH	STABLE	STABLE	STABLE
13	FLT_09_YOAKUM_MUSTANG_230kV_3PH	STABLE	STABLE	STABLE
14	FLT_10_YOAKUM_MUSTANG_230kV_1PH	STABLE	STABLE	STABLE
15	FLT_11_YOAKUM_HOBBSINT_230kV_3PH	STABLE	STABLE	STABLE
16	FLT_12_YOAKUM_HOBBSINT_230kV_1PH	STABLE	STABLE	STABLE
17	FLT_13_YOAKUM_YOAKUM_230_115kV_3PH	STABLE	STABLE	STABLE

Table III-4: Stability Analysis Results (with Tuco – Border – Chisholm CKT 2 and Chisholm - Gracemont)

	Contingency Number and Name	2014WP	2015SP	2024SP
18	FLT_14_YOAKUM_YOAKUM_230_115kV_3PH	STABLE	STABLE	STABLE
19	FLT_15_YOAKUM_PRENTICE_115kV_3PH	STABLE	STABLE	STABLE
20	FLT_16_YOAKUM_PRENTICE_115kV_1PH	STABLE	STABLE	STABLE
21	FLT_17_YOAKUM_LEPLNSINT_115kV_3PH	STABLE	STABLE	STABLE
22	FLT_18_YOAKUM_LEPLNSINT_115kV_1PH	STABLE	STABLE	STABLE
23	FLT_19_YOAKUM_ARCOTP_115kV_3PH	STABLE	STABLE	STABLE
24	FLT_20_YOAKUM_ARCOTP_115kV_1PH	STABLE	STABLE	STABLE
25	FLT_21_YOAKUM_LGPLSHILL_115kV_3PH	STABLE	STABLE	STABLE
26	FLT_22_YOAKUM_LGPLSHILL_115kV_1PH	STABLE	STABLE	STABLE
27	FLT_23_AMOCOSS_SUNDOWN_230kV_3PH	STABLE	STABLE	STABLE
28	FLT_24_AMOCOSS_SUNDOWN_230kV_1PH	STABLE	STABLE	STABLE
29	FLT_25_SUNDOWN_PLANTX_230kV_3PH	STABLE	STABLE	STABLE
30	FLT_26_SUNDOWN_PLANTX_230kV_1PH	STABLE	STABLE	STABLE
31	FLT_27_SUNDOWN_WOLFFORTH_230kV_3PH	STABLE	STABLE	STABLE
32	FLT_28_SUNDOWN_WOLFFORTH_230kV_1PH	STABLE	STABLE	STABLE
33	FLT_29_SUNDOWN_SUNDOWN_230_115kV_3PH	STABLE	STABLE	STABLE
34	FLT_30_SUNDOWN_LCOPDYKE_115kV_3PH	STABLE	STABLE	STABLE
35	FLT_31_SUNDOWN_LCOPDYKE_115kV_1PH	STABLE	STABLE	STABLE
36	FLT_32_SUNDOWN_PACIFIC_115kV_3PH	STABLE	STABLE	STABLE
37	FLT_33_SUNDOWN_PACIFIC_115kV_1PH	STABLE	STABLE	STABLE
38	FLT_34_SUNDOWN_AMOCOTP_115kV_3PH	STABLE	STABLE	STABLE
39	FLT_35_SUNDOWN_AMOCOTP_115kV_1PH	STABLE	STABLE	STABLE
40	FLT_36_PLANTX_POTTERCO_230kV_3PH	STABLE	STABLE	STABLE
41	FLT_37_PLANTX_POTTERCO_230kV_1PH	STABLE	STABLE	STABLE
42	FLT_38_PLANTX_DEAFSMITH_230kV_3PH	STABLE	STABLE	STABLE
43	FLT_39_PLANTX_DEAFSMITH_230kV_1PH	STABLE	STABLE	STABLE
44	FLT_40_PLANTX_TOLKEAST_230kV_3PH	STABLE	STABLE	STABLE
45	FLT_41_PLANTX_TOLKEAST_230kV_1PH	STABLE	STABLE	STABLE
46	FLT_42_PLANTX_TOLKWEST_230kV_3PH	STABLE	STABLE	STABLE
47	FLT_43_PLANTX_TOLKWEST_230kV_1PH	STABLE	STABLE	STABLE
48	FLT_44_PLANTX_TOLKWEST_230kV_3PH	STABLE	STABLE	STABLE
49	FLT_45_PLANTX_TOLKWEST_230kV_1PH	STABLE	STABLE	STABLE
50	FLT_46_PLANTX_PLANTX_230_115kV_3PH	STABLE	STABLE	STABLE
51	FLT_47_WOLFFORTH_LUBBCKSTH_230kV_3PH	STABLE	STABLE	STABLE
52	FLT_48_WOLFFORTH_LUBBCKSTH_230kV_1PH	STABLE	STABLE	STABLE
53	FLT_49_WOLFFORTH_WOLFFORTH_230_115kV_3PH	STABLE	STABLE	STABLE
54	FLT_50_LUBBCKSTH_LPSOUTHEST_230kV_3PH	STABLE	STABLE	STABLE
55	FLT_51_LUBBCKSTH_LPSOUTHEST_230kV_1PH	STABLE	STABLE	STABLE
56	FLT_52_LUBBCKSTH_JONES_230kV_3PH	STABLE	STABLE	STABLE
57	FLT_53_LUBBCKSTH_JONES_230kV_1PH	STABLE	STABLE	STABLE
58	FLT_54_LUBBCKSTH_JONES_230kV_3PH	STABLE	STABLE	STABLE
59	FLT_55_LUBBCKSTH_JONES_230kV_1PH	STABLE	STABLE	STABLE
60	FLT_56_LUBBCKSTH_LUBBCKSTH_230_115kV_3PH	STABLE	STABLE	STABLE
61	FLT_57_OXYBRUTP_AMOCOWASSON_230kV_3PH	STABLE	STABLE	STABLE
62	FLT_58_OXYBRUTP_AMOCOWASSON_230kV_1PH	STABLE	STABLE	STABLE
63	FLT_59_AMOCOWASSON_MUSTANG6_230kV_3PH	STABLE	STABLE	STABLE
64	FLT_60_AMOCOWASSON_MUSTANG6_230kV_1PH	STABLE	STABLE	STABLE
65	FLT_61_AMOCOWASSON_OXYBRUTP_230kV_3PH	STABLE	STABLE	STABLE
66	FLT_62_AMOCOWASSON_OXYBRUTP_230kV_1PH	STABLE	STABLE	STABLE
67	FLT_63_MUSTANG6_AMOCOWASSON_230kV_3PH	STABLE	STABLE	STABLE
68	FLT_64_MUSTANG6_AMOCOWASSON_230kV_1PH	STABLE	STABLE	STABLE
69	FLT_65_MUSTANG6_SEMINOLE_230kV_3PH	STABLE	STABLE	STABLE
70	FLT_66_MUSTANG6_SEMINOLE_230kV_1PH	STABLE	STABLE	STABLE
71	FLT_67_MUSTANG6_MUSTANG3_230_115kV_3PH	STABLE	STABLE	STABLE

Table III-4: Stability Analysis Results (with Tuco – Border – Chisholm CKT 2 and Chisholm - Gracemont)

	Contingency Number and Name	2014WP	2015SP	2024SP
72	FLT_68_SEMINOLE_SEMINOLE_230_115kV_3PH	STABLE	STABLE	STABLE
73	FLT_69_SEMINOLE_SEMINOLE_230_115kV_3PH	STABLE	STABLE	STABLE
74	FLT_70_MUSTANG3_DENVERN_115kV_3PH	STABLE	STABLE	STABLE
75	FLT_71_MUSTANG3_DENVERN_115kV_1PH	STABLE	STABLE	STABLE
76	FLT_72_MUSTANG3_DENVERS_115kV_3PH	STABLE	STABLE	STABLE
77	FLT_73_MUSTANG3_DENVERS_115kV_1PH	STABLE	STABLE	STABLE
78	FLT_74_MUSTANG3_SEAGRAVES_115kV_3PH	STABLE	STABLE	STABLE
79	FLT_75_MUSTANG3_SEAGRAVES_115kV_1PH	STABLE	STABLE	STABLE
80	FLT_76_HOBBSINT_CUNNINGHAM_230kV_3PH	STABLE	STABLE	STABLE
81	FLT_77_HOBBSINT_CUNNINGHAM_230kV_1PH	STABLE	STABLE	STABLE
82	FLT_78_HOBBSINT_HOBBSINT_230_115kV_3PH	STABLE	STABLE	STABLE
83	FLT_79_HOBBSINT_HOBBSINT_230_115kV_3PH	STABLE	STABLE	STABLE
84	FLT_80_CUNNINGHAM_EDDYSOUTH_230kV_3PH	STABLE	STABLE	STABLE
85	FLT_81_CUNNINGHAM_EDDYSOUTH_230kV_1PH	STABLE	STABLE	STABLE
86	FLT_82_CUNNINGHAM_POTASHJCT_230kV_3PH	STABLE	STABLE	STABLE
87	FLT_83_CUNNINGHAM_POTASHJCT_230kV_1PH	STABLE	STABLE	STABLE
88	FLT_84_CUNNINGHAM_CUNNINHAM_230_115kV_3PH	STABLE	STABLE	STABLE
89	FLT_85_TOLKWEST_ROSEVELTN_230kV_3PH	STABLE	STABLE	STABLE
90	FLT_86_TOLKWEST_ROSEVELTN_230kV_1PH	STABLE	STABLE	STABLE
91	FLT_87_TOLKWEST_PLANTX_230kV_3PH	STABLE	STABLE	STABLE
92	FLT_88_TOLKWEST_PLANTX_230kV_1PH	STABLE	STABLE	STABLE
93	FLT_89_TOLKWEST_PLANTX_230kV_3PH	STABLE	STABLE	STABLE
94	FLT_90_TOLKWEST_PLANTX_230kV_1PH	STABLE	STABLE	STABLE
95	FLT_91_TOLKWEST_TOLKTAP_230kV_3PH	STABLE	STABLE	STABLE
96	FLT_92_TOLKWEST_TOLKTAP_230kV_1PH	STABLE	STABLE	STABLE
97	FLT_93_TOLKWEST_LAMBCNTY_230kV_3PH	STABLE	STABLE	STABLE
98	FLT_94_TOLKWEST_LAMBCNTY_230kV_1PH	STABLE	STABLE	STABLE
99	FLT_95_ROSEVELTN_PLSNTHILL_230kV_3PH	STABLE	STABLE	STABLE
100	FLT_96_ROSEVELTN_PLSNTHILL_230kV_1PH	STABLE	STABLE	STABLE
101	FLT_97_ROSEVELTN_SW4K33_230kV_3PH	STABLE	STABLE	STABLE
102	FLT_98_ROSEVELTN_SW4K33_230kV_1PH	STABLE	STABLE	STABLE
103	FLT_99_ROSEVELTN_ROOSEVELT_230_115kV_3PH	STABLE	STABLE	STABLE
104	FLT_100_PLSNTHILL_OASIS_230kV_3PH	STABLE	STABLE	STABLE
105	FLT_101_PLSNTHILL_OASIS_230kV_1PH	STABLE	STABLE	STABLE
106	FLT_102_PLSNTHILL_PLSNTHILL_230_115kV_3PH	STABLE	STABLE	STABLE
107	FLT_103_OASIS_SW4K33_230kV_3PH	STABLE	STABLE	STABLE
108	FLT_104_OASIS_SW4K33_230kV_1PH	STABLE	STABLE	STABLE
109	FLT_105_OASIS_SANJANHVB1_230kV_3PH	STABLE	STABLE	STABLE
110	FLT_106_OASIS_SANJANHVB1_230kV_1PH	STABLE	STABLE	STABLE
111	FLT_107_OASIS_OASIS_230_115kV_3PH	STABLE	STABLE	STABLE
112	FLT_108_PLANTX_NEWHART6_230kV_3PH	STABLE	STABLE	STABLE
113	FLT_109_PLANTX_NEWHART6_230kV_1PH	STABLE	STABLE	STABLE
114	FLT_110_PLANTX_DEAFSMITH_230kV_3PH	STABLE	STABLE	STABLE
115	FLT_111_PLANTX_ DEAFSMITH _230kV_1PH	STABLE	STABLE	STABLE
116	FLT_112_PLANTX_SUNDOWN_230kV_3PH	STABLE	STABLE	STABLE
117	FLT_113_PLANTX_SUNDOWN_230kV_1PH	STABLE	STABLE	STABLE
118	FLT_114_PLANTX_PLANTX_230_115kV_3PH	STABLE	STABLE	STABLE
119	FLT_115_POTTERCO_MOORECNTY_230kV_3PH	STABLE	STABLE	STABLE
120	FLT_116_POTTERCO_MOORECNTY_230kV_1PH	STABLE	STABLE	STABLE
121	FLT_117_POTTERCO_HARRNGEST_230kV_3PH	STABLE	STABLE	STABLE
122	FLT_118_POTTERCO_HARRNGEST_230kV_1PH	STABLE	STABLE	STABLE
123	FLT_119_POTTERCO_ROLLHILLS_230kV_3PH	STABLE	STABLE	STABLE
124	FLT_120_POTTERCO_ROLLHILLS_230kV_1PH	STABLE	STABLE	STABLE
125	FLT_121_POTTERCO_BUSHLAND_230kV_3PH	STABLE	STABLE	STABLE

Table III-4: Stability Analysis Results (with Tuco – Border – Chisholm CKT 2 and Chisholm - Gracemont)

	Contingency Number and Name	2014WP	2015SP	2024SP
126	FLT_122_POTTERCO_BUSHLAND_230kV_1PH	STABLE	STABLE	STABLE
127	FLT_123_POTTERCO_POTTERCO_230_115kV_3PH	STABLE	STABLE	STABLE
128	FLT_124_POTTERCO_POTTERCO_230_345kV_3PH	STABLE	STABLE	STABLE
129	FLT_125_DEAFSMITH_BUFFALO_230kV_3PH	STABLE	STABLE	STABLE
130	FLT_126_DEAFSMITH_BUFFALO_230kV_1PH	STABLE	STABLE	STABLE
131	FLT_127_DEAFSMITH_DEAFSMITH_230_115kV_3PH	STABLE	STABLE	STABLE
132	FLT_128_DEAFSMITH_DEAFSMITH_230_115kV_3PH	STABLE	STABLE	STABLE
133	FLT_129_TOLKTAP_TOLKEAST_230kV_3PH	STABLE	STABLE	STABLE
134	FLT_130_TOLKTAP_TOLKEAST_230kV_1PH	STABLE	STABLE	STABLE
135	FLT_131_TOLKTAP_TOLK_230_345kV_3PH	STABLE	STABLE	STABLE
136	FLT_132_TOLKTAP_TOLK_230_345kV_3PH	STABLE	STABLE	STABLE
137	FLT_133_TOLK_G08022TAP_345kV_3PH	STABLE	STABLE	STABLE
138	FLT_134_TOLK_G08022TAP_345kV_1PH	STABLE	STABLE	STABLE
139	FLT_135_TOLKEAST_ROSEVELTS_230kV_3PH	STABLE	STABLE	STABLE
140	FLT_136_TOLKEAST_ROSEVELTS_230kV_1PH	STABLE	STABLE	STABLE
141	FLT_137_TOLKEAST_TUCOINT_230kV_3PH	STABLE	STABLE	STABLE
142	FLT_138_TOLKEAST_TUCOINT_230kV_1PH	STABLE	STABLE	STABLE
143	FLT_139_TUCOINT_TUCOINT_230_115kV_3PH	STABLE	STABLE	STABLE
144	FLT_140_TUCOINT_TUCOINT_230_115kV_3PH	STABLE	STABLE	STABLE
145	FLT_141_TUCOINT7_BORDER_345kV_3PH	STABLE	STABLE	STABLE
146	FLT_142_TUCOINT7_BORDER_345kV_1PH	STABLE	STABLE	STABLE
147	FLT_143_TUCOINT7_OKU_345kV_3PH	STABLE	STABLE	STABLE
148	FLT_144_TUCOINT7_OKU_345kV_1PH	STABLE	STABLE	STABLE
149	FLT_145_ Chisholm _WWRDEHV7_345kV_3PH	STABLE	STABLE	STABLE
150	FLT_146_ Chisholm _WWRDEHV7_345kV_1PH	STABLE	STABLE	STABLE
151	FLT_147_TUCOINT7_TUCOINT6_345_230kV_3PH	STABLE	STABLE	STABLE
152	FLT_148_TUCOINT7_TUCOINT6_345_230kV_3PH	STABLE	STABLE	STABLE
153	FLT_149_TUCOINT6_SWISHER_230kV_3PH	STABLE	STABLE	STABLE
154	FLT_150_TUCOINT6_SWISHER_230kV_1PH	STABLE	STABLE	STABLE
155	FLT_151_TUCOINT6_TOLKEAST_230kV_3PH	STABLE	STABLE	STABLE
156	FLT_152_TUCOINT6_TOLKEAST_230kV_1PH	STABLE	STABLE	STABLE
157	FLT_153_TUCOINT6_CARLISLE_230kV_3PH	STABLE	STABLE	STABLE
158	FLT_154_TUCOINT6_CARLISLE_230kV_1PH	STABLE	STABLE	STABLE
159	FLT_155_TUCOINT6_JONES_230kV_3PH	STABLE	STABLE	STABLE
160	FLT_156_TUCOINT6_JONES_230kV_1PH	STABLE	STABLE	STABLE
161	FLT_157_CHISHOLM7_GRACEMONT_345kV_3PH	STABLE	STABLE	STABLE
162	FLT_158_CHISHOLM7_GRACEMONT_345kV_1PH	STABLE	STABLE	STABLE

FERC LVRT Compliance

FERC Order #661A places specific requirements on wind farms through its Low Voltage Ride Through (LVRT) provisions. For Interconnection Agreements signed after December 31, 2006, wind farms shall stay on line for faults at the POI that draw the voltage down at the POI to 0.0 pu.

Fault contingencies were developed to verify that wind farms remain on line when the POI voltage is drawn down to 0.0 pu. These contingencies are shown in Table 5.

Table 5 – LVRT Contingencies

	Contingency Number and Name	Description
1	FLT_01_GEN2013027_YOAKUM_230kV_3PH	3 phase fault on the GEN 2013-027 tap to Yoakum 230kV line, near GEN 2013-027 tap.
2	FLT_03_GEN2013027_TOLKWEST_230kV_3PH	3 phase fault on the GEN 2013-027 tap to Tolk West 230kV line, near GEN 2013-027 tap.

The required prior queued project wind farms remained online for the fault contingencies described in this section as well as the fault contingencies described in the Disturbances section of this report. GEN-2013-027 was found to be in compliance with FERC Order #661A.

Power Factor Analysis

The power factor analysis was performed for this study and is designed to demonstrate the reactive power requirements at the point of interconnection. In order to perform the analysis the request and equivalent transmission lines and collectors systems were modeled using specifications provided by the Customer. Table 2 shows a summary of the power factor analysis at the POI, and Table 3 shows the contingencies and the resultant power factors at the POI.

Table 4 – Summary of Power Factor Analysis at the POI

Request	Capacity	POI	Fuel	Generator	Power Factor at POI Leading (absorbing vars)	Power Factor at POI Lagging (providing vars)
GEN-2013-027	326.4MW	Tolk - Yoakum 230kV transmission line	Wind	G.E. 1.7MW	0.95	0.95

NOTE: As reactive power is required for all projects, the final requirement in the GIA will be the pro-forma 95% lagging to 95% leading at the point of interconnection.

Table 5 – Power Factor Analysis at the POI

PISIS-2013-002 Group 6 POI –Tolk – Yoakum 20kV		2014 Winter Voltage = 1.0066 pu				2015 Summer Voltage = 1.007 pu				2024 Summer Voltage = 1.004 pu			
Cont. No.	Contingency Name	Power @ POI	VARS @ POI	Power Factor		Power @ POI	VARS @ POI	Power Factor		Power @ POI	VARS @ POI	Power Factor	
0	FLT_00_NoFault	326.4	-32.7276	0.995011	LEAD	326.4	-34.02	0.995	LEAD	326.4	-34.02	0.995	LEAD
1	FLT_01_GEN2013027_YOAKUM_230kV	326.4	-60.4266	0.983292	LEAD	326.4	-31.24	0.995	LEAD	326.4	-31.24	0.995	LEAD
3	FLT_03_GEN2013027_TOLKWEST_230kV	326.4	22.05604	0.997725	LAG	326.4	12.356	0.999	LAG	326.4	12.356	1	LAG
5	FLT_05_YOAKUM_AMOCOSS_230kV	326.4	-35.6738	0.99408	LEAD	326.4	-35.616	0.994	LEAD	326.4	-35.616	0.993	LEAD
7	FLT_07_YOAKUM_OXYBRUTP_230kV	326.4	-31.7699	0.995296	LEAD	326.4	-29.728	0.996	LEAD	326.4	-29.728	0.996	LEAD
9	FLT_09_YOAKUM_MUSTANG_230kV	326.4	-31.3159	0.995429	LEAD	326.4	-29.331	0.996	LEAD	326.4	-29.331	0.996	LEAD
11	FLT_11_YOAKUM_HOBBSINT_230kV	326.4	-16.232	0.998766	LEAD	326.4	-31.916	0.995	LEAD	326.4	-31.916	0.996	LEAD
13	FLT_13_YOAKUM_YOAKUM_230_115kV	326.4	-33.7385	0.9947	LEAD	326.4	-34.55	0.994	LEAD	326.4	-34.55	0.995	LEAD
14	FLT_14_YOAKUM_YOAKUM_230_115kV	326.4	-33.8386	0.994669	LEAD	326.4	-34.289	0.995	LEAD	326.4	-34.289	0.994	LEAD
15	FLT_15_YOAKUM_PRENTICE_115kV	326.4	-33.4682	0.994784	LEAD	326.4	-34.517	0.994	LEAD	326.4	-34.517	0.995	LEAD
17	FLT_17_YOAKUM_LEPLNSINT_115kV	326.4	-33.6538	0.994727	LEAD	326.4	-34.182	0.995	LEAD	326.4	-34.182	0.994	LEAD
19	FLT_19_YOAKUM_ARCOTP_115kV	326.4	-34.3079	0.994521	LEAD	326.4	-35.916	0.994	LEAD	326.4	-35.916	0.994	LEAD
21	FLT_21_YOAKUM_LGPLSHILL_115kV	326.4	-32.7491	0.995004	LEAD	326.4	-34.435	0.994	LEAD	326.4	-34.435	0.995	LEAD
23	FLT_23_AMOCOSS_SUNDOWN_230kV	326.4	-17.3947	0.998583	LEAD	326.4	-34.237	0.995	LEAD	326.4	-34.237	0.995	LEAD
25	FLT_25_SUNDOWN_PLANTX_230kV	326.4	-6.12389	0.999824	LEAD	326.4	-30.85	0.996	LEAD	326.4	-30.85	0.997	LEAD
27	FLT_27_SUNDOWN_WOLFFORTH_230kV	326.4	-33.6536	0.994727	LEAD	326.4	-33.966	0.995	LEAD	326.4	-33.966	0.995	LEAD
29	FLT_29_SUNDOWN_SUNDOWN_230_115kV	326.4	-30.3033	0.995718	LEAD	326.4	-33.987	0.995	LEAD	326.4	-33.98	0.995	LEAD
30	FLT_30_SUNDOWN_LCOPDYKE_115kV	326.4	-31.9438	0.995245	LEAD	326.4	-34.708	0.994	LEAD	326.4	-34.708	0.995	LEAD

Table 5 – Power Factor Analysis at the POI

PISIS-2013-002 Group 6 POI –Tolk – Yoakum 20kV		2014 Winter Voltage = 1.0066 pu				2015 Summer Voltage = 1.007 pu				2024 Summer Voltage = 1.004 pu			
Cont. No.	Contingency Name	Power @ POI	VARS @ POI	Power Factor		Power @ POI	VARS @ POI	Power Factor		Power @ POI	VARS @ POI	Power Factor	
32	FLT_32_SUNDOWN_PACIFIC_115kV	326.4	-27.6189	0.996439	LEAD	326.4	-32.836	0.995	LEAD	326.4	-32.836	0.996	LEAD
34	FLT_34_SUNDOWN_AMOCOTP_115kV	326.4	-30.1828	0.995752	LEAD	326.4	-34.323	0.995	LEAD	326.4	-34.323	0.995	LEAD
36	FLT_36_PLANTX_POTTERCO_230kV	326.4	-30.6003	0.995634	LEAD	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
38	FLT_38_PLANTX_DEAFSMITH_230kV	326.4	-31.0582	0.995503	LEAD	326.4	-33.54	0.995	LEAD	326.4	-33.54	0.996	LEAD
40	FLT_40_PLANTX_TOLKEAST_230kV	326.4	-31.8657	0.995268	LEAD	326.4	-33.825	0.995	LEAD	326.4	-33.825	0.995	LEAD
42	FLT_42_PLANTX_TOLKWEST_230kV	326.4	-31.8121	0.995284	LEAD	326.4	-33.806	0.995	LEAD	326.4	-33.806	0.995	LEAD
44	FLT_44_PLANTX_TOLKWEST_230kV	326.4	-31.8121	0.995284	LEAD	326.4	-33.806	0.995	LEAD	326.4	-33.806	0.995	LEAD
46	FLT_46_PLANTX_PLANTX_230_115kV	326.4	-31.1978	0.995463	LEAD	326.4	-33.537	0.995	LEAD	326.4	-33.537	0.995	LEAD
47	FLT_47_WOLFFORTH_LUBBCKSTH_230kV	326.4	-29.5754	0.99592	LEAD	326.4	-32.368	0.995	LEAD	326.4	-32.368	0.995	LEAD
49	FLT_49_WOLFFORTH_WOLFFORTH_230_115kV	326.4	-32.0945	0.995201	LEAD	326.4	-34.15	0.995	LEAD	326.4	-34.15	0.995	LEAD
50	FLT_50_LUBBCKSTH_LPSOUTHEST_230kV	326.4	-32.9294	0.994949	LEAD	326.4	-34.055	0.995	LEAD	326.4	-34.055	0.995	LEAD
52	FLT_52_LUBBCKSTH_JONES_230kV	326.4	-32.6489	0.995035	LEAD	326.4	-33.97	0.995	LEAD	326.4	-33.97	0.995	LEAD
54	FLT_54_LUBBCKSTH_JONES_230kV	326.4	-32.6489	0.995035	LEAD	326.4	-33.97	0.995	LEAD	326.4	-33.97	0.995	LEAD
56	FLT_56_LUBBCKSTH_LUBBCKSTH_230_115kV	326.4	-32.9411	0.994946	LEAD	326.4	-34.046	0.995	LEAD	326.4	-34.046	0.995	LEAD
57	FLT_57_OXYBRUTP_AMOCOWASSON_230kV	326.4	-31.757	0.9953	LEAD	326.4	-29.498	0.996	LEAD	326.4	-29.498	0.996	LEAD
59	FLT_59_AMOCOWASSON_MUSTANG6_230kV	326.4	-31.7955	0.995289	LEAD	326.4	-28.14	0.996	LEAD	326.4	-28.14	0.997	LEAD
61	FLT_61_AMOCOWASSON_OXYBRUTP_230kV	326.4	-31.757	0.9953	LEAD	326.4	-29.498	0.996	LEAD	326.4	-29.498	0.996	LEAD
63	FLT_63_MUSTANG6_AMOCOWASSON_230kV	326.4	-31.7955	0.995289	LEAD	326.4	-28.14	0.996	LEAD	326.4	-28.14	0.997	LEAD
65	FLT_65_MUSTANG6_SEMINOLE_230kV	326.4	-37.1879	0.993572	LEAD	326.4	-33.494	0.995	LEAD	326.4	-33.494	0.995	LEAD

Table 5 – Power Factor Analysis at the POI

PISIS-2013-002 Group 6 POI –Tolk – Yoakum 20kV		2014 Winter Voltage = 1.0066 pu				2015 Summer Voltage = 1.007 pu				2024 Summer Voltage = 1.004 pu			
Cont. No.	Contingency Name	Power @ POI	VARS @ POI	Power Factor		Power @ POI	VARS @ POI	Power Factor		Power @ POI	VARS @ POI	Power Factor	
67	FLT_67_MUSTANG6_MUSTANG3_230_115kV	326.4	-34.2504	0.994539	LEAD	326.4	-33.395	0.995	LEAD	326.4	-33.395	0.995	LEAD
68	FLT_68_SEMINOLE_SEMINOLE_230_115kV	326.4	-33.5885	0.994747	LEAD	326.4	-33.949	0.995	LEAD	326.4	-33.949	0.995	LEAD
69	FLT_69_SEMINOLE_SEMINOLE_230_115kV	326.4	-33.5918	0.994746	LEAD	326.4	-33.945	0.995	LEAD	326.4	-33.945	0.995	LEAD
70	FLT_70_MUSTANG3_DENVERN_115kV	326.4	-32.8883	0.994962	LEAD	326.4	-33.749	0.995	LEAD	326.4	-33.749	0.995	LEAD
72	FLT_72_MUSTANG3_DENVERS_115kV	326.4	-32.8716	0.994967	LEAD	326.4	-33.771	0.995	LEAD	326.4	-33.771	0.995	LEAD
74	FLT_74_MUSTANG3_SEAGRAVES_115kV	326.4	-32.6845	0.995024	LEAD	326.4	-32.691	0.995	LEAD	326.4	-32.691	0.995	LEAD
76	FLT_76_HOBBSINT_CUNNINGHAM_230kV	326.4	-31.1852	0.995467	LEAD	326.4	-34.023	0.995	LEAD	326.4	-34.023	0.995	LEAD
78	FLT_78_HOBBSINT_HOBBSINT_230_115kV	326.4	-32.4529	0.995094	LEAD	326.4	-34.012	0.995	LEAD	326.4	-34.012	0.995	LEAD
79	FLT_79_HOBBSINT_HOBBSINT_230_115kV	326.4	-32.43	0.9951	LEAD	326.4	-34.011	0.995	LEAD	326.4	-34.011	0.995	LEAD
80	FLT_80_CUNNINGHAM_EDDYSOUTH_230kV	326.4	-31.478	0.995382	LEAD	326.4	-34.032	0.995	LEAD	326.4	-34.032	0.995	LEAD
82	FLT_82_CUNNINGHAM_POTASHJCT_230kV	326.4	-34.0775	0.994594	LEAD	326.4	-34.001	0.995	LEAD	326.4	-34.001	0.995	LEAD
84	FLT_84_CUNNINGHAM_CUNNINHAM_230_115kV	326.4	-32.2681	0.995149	LEAD	326.4	-34.009	0.995	LEAD	326.4	-34.009	0.995	LEAD
85	FLT_85_TOLKWEST_ROSEVELTN_230kV	326.4	-32.3036	0.995138	LEAD	326.4	-33.989	0.995	LEAD	326.4	-33.989	0.995	LEAD
87	FLT_87_TOLKWEST_PLANTX_230kV	326.4	-31.8121	0.995284	LEAD	326.4	-33.806	0.995	LEAD	326.4	-33.806	0.995	LEAD
89	FLT_89_TOLKWEST_PLANTX_230kV	326.4	-31.8121	0.995284	LEAD	326.4	-33.806	0.995	LEAD	326.4	-33.806	0.995	LEAD
91	FLT_91_TOLKWEST_TOLKTAP6_230kV	326.4	-33.9584	0.994631	LEAD	326.4	-34.128	0.995	LEAD	326.4	-34.128	0.994	LEAD
93	FLT_93_TOLKWEST_LAMBCNTY_230kV	326.4	-29.0278	0.996069	LEAD	326.4	-32.465	0.995	LEAD	326.4	-32.465	0.996	LEAD

Table 5 – Power Factor Analysis at the POI

PISIS-2013-002 Group 6 POI –Tolk – Yoakum 20kV		2014 Winter Voltage = 1.0066 pu				2015 Summer Voltage = 1.007 pu				2024 Summer Voltage = 1.004 pu			
Cont. No.	Contingency Name	Power @ POI	VARS @ POI	Power Factor		Power @ POI	VARS @ POI	Power Factor		Power @ POI	VARS @ POI	Power Factor	
95	FLT_95_ROSEVELTN_PLSNTHILL_230kV	326.4	-32.6764	0.995026	LEAD	326.4	-34.012	0.995	LEAD	326.4	-34.012	0.995	LEAD
97	FLT_97_ROSEVELTN_SW4K33_230kV	326.4	-32.7971	0.99499	LEAD	326.4	-34.024	0.995	LEAD	326.4	-34.024	0.995	LEAD
99	FLT_99_ROSEVELTN_ROOSEVELT_230_115kV	326.4	-32.5781	0.995056	LEAD	326.4	-33.986	0.995	LEAD	326.4	-33.986	0.995	LEAD
100	FLT_100_PLSNTHILL_OASIS_230kV	326.4	-32.7279	0.995011	LEAD	326.4	-34.018	0.995	LEAD	326.4	-34.018	0.995	LEAD
102	FLT_102_PLSNTHILL_PLSNTHILL_230_115kV	326.4	-32.6991	0.995019	LEAD	326.4	-34.005	0.995	LEAD	326.4	-34.005	0.995	LEAD
103	FLT_103_OASIS_SW4K33_230kV	326.4	-32.5136	0.995075	LEAD	326.4	-34	0.995	LEAD	326.4	-34	0.995	LEAD
105	FLT_105_OASIS_SANJANHVB1_230kV	326.4	-34.7623	0.994376	LEAD	326.4	-34.011	0.995	LEAD	326.4	-34.011	0.995	LEAD
107	FLT_107_OASIS_OASIS_230_115kV	326.4	-32.7734	0.994997	LEAD	326.4	-34.002	0.995	LEAD	326.4	-34.002	0.995	LEAD
108	FLT_108_PLANTX_NEWHART6_230kV	N/A	N/A	N/A	N/A	326.4	-33.061	0.995	LEAD	326.4	-33.061	0.996	LEAD
110	FLT_110_PLANTX_DEAFSMITH_230kV	326.4	-31.0582	0.995503	LEAD	326.4	-33.54	0.995	LEAD	326.4	-33.54	0.996	LEAD
112	FLT_112_PLANTX_SUNDOWN_230kV	326.4	-6.12389	0.999824	LEAD	326.4	-30.85	0.996	LEAD	326.4	-30.85	0.997	LEAD
114	FLT_114_PLANTX_PLANTX_230_115kV	326.4	-31.1978	0.995463	LEAD	326.4	-33.537	0.995	LEAD	326.4	-33.537	0.995	LEAD
115	FLT_115_POTTERCO_MOORECNTY_230kV	326.4	-32.2847	0.995144	LEAD	326.4	-33.958	0.995	LEAD	326.4	-33.958	0.995	LEAD
117	FLT_117_POTTERCO_HARRNGEST_230kV	326.4	-32.7458	0.995005	LEAD	326.4	-34.02	0.995	LEAD	326.4	-34.02	0.995	LEAD
119	FLT_119_POTTERCO_ROLLHILLS_230kV	326.4	-32.7279	0.995011	LEAD	326.4	-34.021	0.995	LEAD	326.4	-34.021	0.995	LEAD
121	FLT_121_POTTERCO_BUSHLAND_230kV	326.4	-30.2957	0.99572	LEAD	326.4	-33.65	0.995	LEAD	326.4	-33.65	0.996	LEAD
123	FLT_123_POTTERCO_POTTERCO_230_115kV	326.4	-32.6661	0.995029	LEAD	326.4	-34.009	0.995	LEAD	326.4	-34.009	0.995	LEAD
124	FLT_124_POTTERCO_POTTERCO_230_345kV	326.4	-31.1113	0.995488	LEAD	326.4	-33.835	0.995	LEAD	326.4	-33.835	0.995	LEAD
125	FLT_125_DEAFSMITH_BUFFALO_230kV	326.4	-32.3877	0.995113	LEAD	326.4	-33.907	0.995	LEAD	326.4	-	0.995	LEAD

Table 5 – Power Factor Analysis at the POI

PISIS-2013-002 Group 6 POI –Tolk – Yoakum 20kV		2014 Winter Voltage = 1.0066 pu				2015 Summer Voltage = 1.007 pu				2024 Summer Voltage = 1.004 pu			
Cont. No.	Contingency Name	Power @ POI	VARS @ POI	Power Factor		Power @ POI	VARS @ POI	Power Factor		Power @ POI	VARS @ POI	Power Factor	
											33.907		
127	FLT_127_DEAFSMITH_DEAFSMITH_230_115kV	326.4	-32.6919	0.995022	LEAD	326.4	-34.012	0.995	LEAD	326.4	-34.012	0.995	LEAD
128	FLT_128_DEAFSMITH_DEAFSMITH_230_115kV	326.4	-32.6886	0.995023	LEAD	326.4	-34.012	0.995	LEAD	326.4	-34.012	0.995	LEAD
129	FLT_129_TOLKTAP6_TOLKEAST6_230kV	326.4	-31.5626	0.995357	LEAD	326.4	-33.769	0.995	LEAD	326.4	-33.769	0.995	LEAD
131	FLT_131_TOLKTAP6_TOLK7_230_345kV	326.4	-33.3738	0.994813	LEAD	326.4	-34.039	0.995	LEAD	326.4	-34.039	0.995	LEAD
132	FLT_132_TOLKTAP6_TOLK7_230_345kV	326.4	-33.3729	0.994814	LEAD	326.4	-34.039	0.995	LEAD	326.4	-34.039	0.995	LEAD
133	FLT_133_TOLK7_G08022TAP_345kV	326.4	-42.915	0.991467	LEAD	326.4	-31.504	0.995	LEAD	326.4	-31.504	0.994	LEAD
135	FLT_135_TOLKEAST_ROSEVELTS_230kV	326.4	-32.2951	0.995141	LEAD	326.4	-33.989	0.995	LEAD	326.4	-33.989	0.995	LEAD
137	FLT_137_TOLKEAST_TUCOINT_230kV	326.4	-20.0766	0.998114	LEAD	326.4	-32	0.995	LEAD	326.4	-32	0.997	LEAD
139	FLT_139_TUCOINT_TUCOINT_230_115kV	326.4	-32.5981	0.99505	LEAD	326.4	-33.975	0.995	LEAD	326.4	-33.975	0.995	LEAD
140	FLT_140_TUCOINT_TUCOINT_230_115kV	326.4	-32.5889	0.995053	LEAD	326.4	-33.971	0.995	LEAD	326.4	-33.971	0.995	LEAD
141	FLT_141_TUCOINT7_BORDER_345kV	326.4	-34.0555	0.994601	LEAD	326.4	-34.198	0.995	LEAD	326.4	-34.198	0.995	LEAD
143	FLT_143_TUCOINT7_OKU_345kV	326.4	-35.3346	0.994191	LEAD	326.4	-34.334	0.995	LEAD	326.4	-34.334	0.995	LEAD
145	FLT_145_CHISHOLM7_WWRDEHV7_345kV	326.4	-33.2792	0.994842	LEAD	326.4	-34.137	0.995	LEAD	326.4	-34.137	0.995	LEAD
147	FLT_147_TUCOINT7_TUCOINT6_345_230kV	326.4	-33.3641	0.994816	LEAD	326.4	-34.107	0.995	LEAD	326.4	-34.107	0.995	LEAD
148	FLT_148_TUCOINT7_TUCOINT6_345_230kV	326.4	-33.223	0.99486	LEAD	326.4	-34.088	0.995	LEAD	326.4	-34.088	0.995	LEAD
149	FLT_149_TUCOINT6_SWISHER_230kV	326.4	-32.9816	0.994934	LEAD	326.4	-34.169	0.995	LEAD	326.4	-34.169	0.995	LEAD
151	FLT_151_TUCOINT6_TOLKEAST_230kV	326.4	-20.0766	0.998114	LEAD	326.4	-32	0.995	LEAD	326.4	-32	0.997	LEAD

Table 5 – Power Factor Analysis at the POI

PISIS-2013-002 Group 6 POI –Tolk – Yoakum 20kV		2014 Winter Voltage = 1.0066 pu				2015 Summer Voltage = 1.007 pu				2024 Summer Voltage = 1.004 pu			
Cont. No.	Contingency Name	Power @ POI	VARS @ POI	Power Factor		Power @ POI	VARS @ POI	Power Factor		Power @ POI	VARS @ POI	Power Factor	
153	FLT_153_TUCOINT6_CARLISLE_230kV	326.4	-30.6148	0.99563	LEAD	326.4	-33.599	0.995	LEAD	326.4	-33.599	0.995	LEAD
155	FLT_155_TUCOINT6_JONES_230kV	326.4	-31.9686	0.995238	LEAD	326.4	-34.453	0.994	LEAD	326.4	-34.453	0.995	LEAD
157	FLT_157_CHISHOLM7_ELKMONT7_345kV	326.4	-33.6197	0.994737	LEAD	326.4	-34.127	0.995	LEAD	326.4	-34.127	0.995	LEAD

IV. Conclusion

PISIS-2013-002 Interconnection Customers have requested an Impact Study to determine the impacts of interconnecting generation to the SPP Transmission System.

Transmission System Stability issues were observed with transmission line faults causing the outage of the TUCO-Border-Woodward 345kV transmission line. The outage of these line segments caused voltage instability at the Oklaunion 345kV bus. The following network upgrades are required.

- Tuco – Border 345kV circuit #2
- New tap on Border – Woodward 345kV line (Chisholm) Border – Chisholm circuit #2
- New 345kV line from Chisholm to Gracemont

With all Base Case Network Upgrades in service, previously assigned Network Upgrades in service, and the newly assigned Network Upgrades in service, the Group 6 projects were found to remain

All generators in the monitored areas remained stable for all of the modeled disturbances.

Any changes to the assumptions made in this study, for example, one or more of the previously queued requests withdraw, may require a re-study at the expense of the Customer.

Nothing in this System Impact Study constitutes a request for transmission service or confers upon the Interconnection Customer any right to receive transmission service.

Appendix A: 2014 Winter Peak Stability Plots

(Available on request)

Appendix B: 2015 Summer Peak Stability Plots

(Available on request)

Appendix C: 2024 Summer Peak Stability Plots

(Available on request)