



**Definitive Interconnection
System Impact Study for
Generation Interconnection
Requests
(DISIS-2015-001-2)**

March 2016

Generator Interconnection



Revision History

Date	Author	Change Description
07/30/2015	SPP	Report Issued (DISIS-2015-001). Group 2, 5, 6, and 7 Interconnection Request Results not included in this issue.
08/28/2015	SPP	Report Reissued (DISIS-2015-001) to include Group 2, 5, 6, and 7 Interconnection Requests Results
12/23/2015	SPP	Re-Study to account for withdrawn projects
01/6/2016	SPP	Re-posted 12/23/15 issue with cost allocation correction for GEN-2014-074
03/9/2016	SPP	Re-Study to account for withdrawn projects

Executive Summary

Pursuant to the Generator Interconnection Procedures (GIP) of the Southwest Power Pool (SPP) Open Access Transmission Tariff (OATT), SPP has conducted this Definitive Interconnection System Impact Study (DISIS). The Interconnection Customers' requests have been clustered together for the following System Impact Cluster Study window which closed March 31, 2015. The Interconnection Customers will be referred to in this study as the DISIS-2015-001 Interconnection Customers. This System Impact Study analyzes the interconnecting of multiple generation interconnection requests associated with new generation totaling approximately 2,765.79 MW of new generation which would be located within the transmission systems of Grand River Dam Authority (GRDA), Kansas City Power and Light Company – Greater Missouri Operations Company (KCPL-GMO), Midwest Energy, Inc. (MIDW), Nebraska Public Power District (NPPD), Oklahoma Gas and Electric (OKGE), Southwestern Public Service (SPS), Sunflower Electric Power Corporation\Mid-Kansas Electric Company, LLC (SUNC\MKEC), Westar Energy, Inc. (WERE), and Western Farmers Electric Cooperative (WFEC). The various generation interconnection requests have differing proposed in-service dates¹. The generation interconnection requests included in this System Impact Cluster Study are listed in Appendix A by their queue number, amount, requested interconnection service, area, requested interconnection point, proposed interconnection point, and the requested in-service date. This study represents the “Stand-Alone” analysis for remaining Interconnection Requests in the DISIS-2015-001 analysis.

Power flow analysis has indicated that for the power flow cases studied, 2,765.79 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 SPP stability and voltage recovery requirements including FERC Order #661A for wind farm interconnection requests. Those reactive requirements are listed for each interconnection request within this report. Dynamic stability analysis has determined that the transmission system will remain stable with the assigned Network Upgrades and necessary reactive compensation requirements. A short circuit analysis has been performed with available short circuit values given in the stability study for each group in the appendices of this report. A short circuit analysis has been performed with available short circuit values given in the stability study for each group in the appendices of this report.

In no way does this study guarantee operation for all periods of time. This interconnection study identifies and assigns transmission reinforcements for Energy Resource Interconnection Service (ERIS) interconnection injection constraints (defined as a 20% or greater distribution factor impact for outage based constraints and 3% or greater distribution factor impact for system intact

¹ The generation interconnection requests in-service dates may 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 or as otherwise provided for in the GIP.

constraints) and Network Resource Interconnection Service (NRIS) constraints (defined as 3% or greater distribution factor impact), if requested by the Customer. These constraints are listed in Appendix G. 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 Interconnection 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 DISIS-2015-001 Interconnection Customers is estimated at \$255,880,179. These costs determined at this time are shown in Appendix E and F. Interconnection Service to DISIS-2015-001 Interconnection Customers is also contingent upon higher queued customers paying for certain required network upgrades. **The in-service date for the DISIS customers will be deferred until the construction of these network upgrades can be completed.** These costs also do not include the Interconnection Customer Interconnection Facilities as defined by the SPP Open Access Transmission Tariff (OATT) or the additional SPP transmission network constraints identified through this study and shown in Appendix H.

Constraints listed in Appendix H do not require transmission reinforcement for Interconnection Service, but could require Interconnection Customer to reduce generation in operational conditions. These transmission constraints occur when this study's generation is dispatched into the SPP footprint for Energy Resource Interconnection Service (ERIS) or when this study's generation is dispatched into the interconnecting Transmission Owner's (T.O.) area for Network Resource Interconnection Service (NRIS).

It should be noted that the additional network constraints identified in Appendix H may also be identified by a Transmission Service Request (TSR) and may need to be verified by associated studies. With a defined source and sink in a TSR, the 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 costs associated with the deliverability of the energy to load or other customers. These costs are determined by separate studies should the Customer decide to submit a Transmission Service Request through SPP's Open Access Same Time Information System (OASIS) as required by Attachment Z1 of the SPP OATT. Furthermore, this DISIS neither guarantees transmission service or deliverability of the requested resource.

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Introduction

Pursuant to the Southwest Power Pool (SPP) Open Access Transmission Tariff (OATT), SPP has conducted this Definitive Interconnection System Impact Study (DISIS) for certain generation interconnection requests in the SPP Generation Interconnection Queue. These interconnection requests have been clustered together for the following System Impact Study window which closed March 31, 2015. The customers will be referred to in this study as the DISIS-2015-001 Interconnection Customers. This DISIS analyzes the interconnecting of multiple generation interconnection requests associated with new generation totaling 2,765.79 MW of new generation which would be located within the transmission systems of Grand River Dam Authority (GRDA), Kansas City Power and Light Company – Greater Missouri Operations Company (KCPL-GMO), Midwest Energy, Inc. (MIDW), Nebraska Public Power District (NPPD), Oklahoma Gas and Electric (OKGE), Southwestern Public Service (SPS), Sunflower Electric Power Corporation\Mid-Kansas Electric Company, LLC (SUNC\MKEC), Westar Energy, Inc. (WERE), and Western Farmers Electric Cooperative (WFEC). The various generation interconnection requests have differing proposed in-service dates². The generation 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. A separate analysis for each Interconnection Request for “Stand-Alone” operation has also been performed. This study represents the “Stand-Alone” analysis for remaining Interconnection Requests in the DISIS-2015-001 analysis

The primary objective of this DISIS is to identify the system constraints, transient instabilities, and over-dutied equipment associated with connecting the generation to the area transmission system. The Impact Study and other subsequent Interconnection Studies are designed to identify required Transmission Owner Interconnection Facilities, Network Upgrades and other Direct Assignment Facilities needed to inject power into the grid at each specific point of interconnection.

² The generation interconnection requests in-service dates may 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 or as otherwise provided for in the GIP.

Model Development

Interconnection Requests Included in the Cluster

SPP included all interconnection requests that submitted a Definitive Interconnection System Impact Study Agreement no later than March 31, 2015 and were subsequently accepted by Southwest Power Pool under the terms of the Generator Interconnection Procedures (GIP) that were in effect at the time this study commenced on April 1, 2015. The interconnection requests that are included in this study are listed in Appendix A.

Affected System Interconnection Request

Also included in this Definitive Interconnection System Impact Study are three (3) Affected System Studies. The Affected System Interconnection Requests have been given the designations with the “ASGI” prefix. These requests are listed in Appendix A. Affected System Interconnection Requests were only studied in “cluster” scenarios.

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 Interconnection Service (ERIS) with equal distribution across the SPP footprint. Prior queued projects that requested Network Resource Interconnection Service (NRIS) were also dispatched in separate NRIS scenarios into the balancing authority of the interconnecting transmission owner.

Development of Base Cases

Power Flow

The 2015 series Integrated Transmission Planning models (used in the 2016 ITPNT) including the 2016 winter peak season, the 2017 spring and summer peak seasons, the 2020 light load, summer and winter peak seasons, and the 2025 summer peak season.

Dynamic Stability

The 2014 series SPP Model Development Working Group (MDWG) Models for the 2016 (winter peak season), 2017 (summer peak season) and 2025 (summer peak season) cases were used as starting points for this study.

Short Circuit

The 2025 summer peak stability case is used for this analysis.

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 DISIS-2015-001 Interconnection Customers have not been assigned advancement costs for the below listed projects. The DISIS-2015-001 Interconnection Customers Generation Facilities in service dates may need to be delayed until the completion of

the following upgrades. In some cases, the in-service date is beyond the allowable time a customer can delay. In this case, the Interconnection Customer may move forward with Limited Operation or remain in the DISIS Queue for additional study cycles. 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.

- 2012 Integrated Transmission Plan (2012 ITP10) Projects
 - Woodward-Tatonga-Mathewson-Cimarron 345kV transmission line, scheduled for 2021 in-service³
 - Chisholm – Gracemont 345kV transmission line, and Chisholm 345/230kV transformer circuit #1, scheduled for 3/1/2018 in-service⁴
- 2015 Integrated Transmission Plan Near Term (2015 ITPNT) Projects
 - China Draw 115kV Reactive Power Support
 - 200Mvar Capacitive and 50Mvar Inductive Static Var Compensator (SVC)
 - Road Runner 115kV Reactive Power Support
 - 200Mvar Capacitive and 50Mvar Inductive Static Var Compensator (SVC)
 - Potash Junction – Intrepid – IMC #1 – Livingston Ridge 115kV rebuild
 - National Enrichment Plant – Targa – Cardinal 115kV circuit #1 rebuild
- Nebraska City – Mullin Creek – Sibley 345kV circuit #1 build, scheduled for 12/31/2016 in-service⁵
- Northwest 345/138/13.8 kV circuit #3 autotransformer, placed in-service in 2015⁶
- Hoskins – Neligh East 345/115 kV Project⁷
 - Neligh East 345/115 kV substation and transformer
 - Neligh East Area 115 kV upgrades to support new station
 - Hoskins – Neligh East 345 kV circuit #1
- High Priority Incremental Loads (HPILs) Projects⁸:
 - TUCO Interchange – Yoakum – Hobbs Interchange 345/230 kV Project
 - TUCO Interchange – Yoakum – Hobbs Interchange 345 kV circuit #1 and associated terminal equipment upgrades
 - Hobbs 345/230/13 kV transformer circuit #1
 - Yoakum 345/230/13 kV transformer circuit #1
 - Battle Axe – Road Runner 115 kV circuit #1
 - Chaves County – Price – CV Pines – Capitan 115 kV circuit #1
 - China Draw – Yeso Hills 115 kV circuit #1
 - Dollarhide – Toboso Flats 115 kV circuit #1
 - Hobbs Interchange – Kiowa 345 kV circuit #1

³ SPP Notification to Construct (NTC) 200223

⁴ SPP Notification to Construct (NTC) 200240 and 200255

⁵ SPP Notification to Construct (NTC) 20097 and 20098

⁶ SPP Transmission Service Project identified in SPP 2009-AG2-AFS6. Per SPP NTC 20137 & 200194

⁷ SPP Regional Reliability 2012 ITP 10 Project Per SPP-NTC-200220

⁸ Per Network Upgrades assigned in High Priority Incremental Loads (HPILs) study, Including Direct Assigned Upgrades, Projects in SPP-NTC-200256 and SPP-NTC-200283.

- Kiowa – North Loving – China Draw 345/115 kV Projects
 - Kiowa – North Loving – China Draw circuit #1 and associated terminal equipment upgrades
 - China Draw 345/115/13 kV transformer circuit #1
 - North Loving 345/115/13 kV transformer circuit #1
- Kiowa – Road Runner 345/230/115 kV Projects
 - Kiowa 345/230 kV transformer circuit #1
 - Road Runner 345/115/13 kV transformer circuit #1
- Livingston Ridge – Sage Brush – Lagarto – Cardinal 115 kV circuit #1
- North Loving – South Loving 115 kV circuit #1
- Ponderosa – Ponderosa Tap 115 kV circuit #1
- Potash 230/115/13kV Transformer circuit #1 replacement

Contingent Upgrades

The following facilities do not yet have approval. These facilities have been assigned to higher queued interconnection customers. These facilities have been included in the models for the DISIS-2015-001 study and are assumed to be in service. This list may not be all inclusive. The DISIS-2015-001 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 DISIS-2015-001 Interconnection Customer Generation Facilities in-service dates may need to be delayed until the completion of the following upgrades.

- Upgrades assigned to DISIS-2010-002 Interconnection Customers:
 - Twin Church – Dixon County 230 kV circuit #1 rerate (320 MVA)
 - Buckner – Spearville 345 kV terminal equipment
- Upgrades assigned to DISIS-2011-001 Interconnection Customers:
 - Hoskins – Dixon County – Twin Church 230 kV circuit #1 conductor clearance increase
 - (NRIS only) Woodward District EHV Phase Shifting Transformer
- Upgrades assigned to DISIS-2012-002 Interconnection Customers:
 - Amoco Wasson – Oxy Tap 230 kV circuit #1 replace line traps
 - Associated Electric Cooperatives Inc. (AECI) Fairfax 138/69 kV transformer replacement
 - Lake Creek – Lone Wolf 69 kV circuit #1 reset CT
 - Remington – Fairfax 138 kV circuit #1 conductor clearance increase
 - (NRIS only) Arkansas City – Paris –Creswell – Oak – Rainbow – City of Winfield 69kV circuit #1 rebuild
 - (NRIS only) Creswell 138/69/13kV Transformer circuit #1 and #2, replacements
- Upgrades assigned to DISIS-2013-002 Interconnection Customers:
 - Battle Creek – County Line – Neligh East 115kV circuit #1 rebuild
- Upgrades assigned to DISIS-2014-002 Interconnection Customers:
 - Arnold – Ransom 115kV circuit #1, terminal equipment replacement
 - Tolk – Plant X 230kV circuit #1 and circuit #2 re-conductor
 - Tuco 345/230kV transformer replacement

Potential Upgrades Not in the Base Case

Any potential upgrades that do not have a Notification to Construct (NTC) and are 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 are grouped together into eight (8) active regional groups based on geographical and electrical impacts. These groupings are shown in Appendix C.

To determine interconnection impacts, eight (8) different generation dispatch scenarios of the spring, summer, and winter base case models are developed to accommodate the regional groupings.

Power Flow

For Variable Energy Resources (VER) (solar/wind) in each power flow case, Energy Resource Interconnection Service (ERIS), is evaluated for the generating plants within a geographical area of the interconnection request(s) for the VERs dispatched at 100% nameplate of maximum generation. The VERs in the remote areas are dispatched at 20% nameplate of maximum generation. These projects are dispatched across the SPP footprint using load factor ratios.

Peaking units are not dispatched in the 2017 spring, or in the “High VER” summer and winter peaks. To study peaking units’ impacts, the 2016 winter peak, 2017 summer peak, 2020 summer and winter peaks, and 2025 summer peak models are developed with peaking units dispatched at 100% of the nameplate rating and VERs dispatched at 20% of the nameplate rating. Each interconnection request is also modeled separately at 100% nameplate for certain analyses.

All generators (VER and peaking) that requested Network Resource Interconnection Service (NRIS) are dispatched in an additional analysis into the interconnecting Transmission Owner’s (T.O.) area at 100% nameplate with Energy Resource Interconnection Service (ERIS) only requests at 80% nameplate. This method allows for identification of network constraints that are common between regional groupings to have affecting requests share the mitigating upgrade costs throughout the cluster.

Dynamic Stability

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

Short Circuit

The dynamic stability models (2025 SP) are used for this analysis.

Identification of Network Constraints

Network constraints are found by using PSS/E AC Contingency Calculation (ACCC) analysis with PSS/E MUST First Contingency Incremental Transfer Capability (FCITC) analysis on the entire cluster grouping dispatched at the various levels previously mentioned. The ERIS constraints are then screened to determine which of the generation interconnection requests have at least a 20% Distribution Factor (DF) upon outage based constraints (n-1) and 3% DF upon system intact constraints (n-0) or on non-convergences case solutions during outage based constraints (n-1). In addition, stability issues are also considered for transmission reinforcement under ERIS. Interconnection Requests that requested Network Resource Interconnection Service (NRIS) are also studied in the NRIS analysis to determine if any constraint measured greater than or equal to a 3% DF. If so, these constraints are also considered for mitigation under NRIS.

Constraints that are identified and require transmission reinforcement are listed in Appendix G. These constraints met the criteria for analysis for Energy Resource Interconnection Service and Network Resource Interconnection Service (if requested).

Other network constraints not requiring transmission reinforcements are shown in Appendix H. With a defined source and sink in a Transmission Service Request, this list of network constraints can be refined and expanded to account for all Network Upgrade requirements for firm transmission service. Additional constraints identified by multi-element contingencies are listed in Appendix I.

In no way does the list of constraints in Appendix G identify all potential constraints that 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.

Determination of Cost Allocated Network Upgrades

Cost Allocated Network Upgrades of Variable Energy Resources (VER) (solar/wind) generation interconnection requests are determined using the 2017 spring model. Cost Allocated Network Upgrades of peaking units is determined using the 2020 summer peak model. A PSS/E and MUST sensitivity analysis is performed to determine the Distribution Factors (DF), a distribution factor with no contingency that each generation interconnection request has on each new upgrade. The impact each generation interconnection request has on each upgrade project is weighted by the size of each request. Finally the costs due by each request for a particular project are then determined by allocating the portion of each request's impact over the impact of all affecting requests.

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

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

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

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

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

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

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

- Repeat previous for each responsible GI request for each Project

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

Credits/Compensation for Amounts Advanced for Network Upgrades

Interconnection Customer shall be entitled to either credits or potentially Long Term Congestion Rights (LTCR), otherwise known as compensation, 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 2,765.79 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 \$255,880,179. 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.

For an explanation of how required Network Upgrades and Interconnection Facilities were determined, refer to the section on "Identification of Network Constraints."

Facilities Analysis

The interconnecting Transmission Owner for each Interconnection Request has provided its preliminary analysis of required Transmission Owner Interconnection Facilities and the associated Network Upgrades, shown in Appendix D. This analysis was limited only to the expected facilities

to be constructed by the Transmission Owner at the Point of Interconnection. These costs are included within one-line diagrams in Appendix D and also listed in Appendix E and F as combined “Interconnection Costs”. If the one-lines and costs in Appendix D have been updated by the Transmission Owner’s Interconnection Facilities Study, those costs will be noted in the appendix. These costs will be further refined by the Transmission Owner as part of the Interconnection Facilities Study. Any additional Network Upgrades identified by this DISIS beyond the Point of Interconnection are defined and estimated by either the Transmission Owner or by SPP. These additional Network Upgrade costs will also be refined further by the Transmission Owner within the Interconnection Facilities Study.

Power Flow Analysis

Power Flow Analysis Methodology

The ACCC function of PSS/E is 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. Single element and multi-element contingencies are evaluated.

Power Flow Analysis

A power flow analysis is conducted for each Interconnection Customer's facility using modified versions of the 2016 winter, 2017 spring and summer, 2020 light load, summer and winter, and 2025 summer peaks. The output of the Interconnection Customer's facility is 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 also pursuing Network Resource Interconnection Service (NRIS) have an additional analysis conducted for displacing resources in the interconnecting Transmission Owner's balancing area.

Power Flow Results

Cluster Group 1 (Woodward Area)

In addition to the 4,216.5 MW of previously queued generation in the area, 161.0 MW of new interconnection service was studied. This group was not analyzed for this restudy and previously identified results remain valid.

Cluster Group 2 (Hitchland Area)

In addition to the 3,616.2 MW of previously queued generation in the area, 0.0 MW of new interconnection service was studied. All Interconnection Requests in Group 2 have withdrawn from the study. No additional analysis was performed for Group 2.

Cluster Group 3 (Spearville Area)

In addition to the 3,204.8 MW of previously queued generation in the area, 31.03 MW of new interconnection service was studied. This group was not analyzed for this restudy and previously identified results remain valid.

Cluster Group 4 (Northwest Kansas Area)

In addition to the 1,462.2 MW of previously queued generation in the area, 70.0 MW of new interconnection service was studied. This group was not analyzed for this restudy and previously identified results remain valid.

Cluster Group 6 (South Texas Panhandle/New Mexico Area)

In addition to the 4,184.77 MW of previously queued generation in the area, 416.00 MW of new interconnection service was studied. There is a potential voltage collapse for the outage of Border to Woodward. To mitigate potential voltage collapse, capacitive reactive power at Oklaunion is needed to mitigate the voltage collapse. In addition to the potential voltage collapse, mitigations

for ERIS thermal constraints on the Kress Interchange – Swisher 115kV line will require terminal upgrade(s). NRIS constraints that require mitigation include the need for Bushland – Potter 230kV, Carlisle – LP-Doud 115kV, Carlisle 230/115kV Transformer, Cox Interchange – Hale County 115kV, Hale County – TUCO 2 115kV, TUCO Interchange – Jones 230kV, Potter County Interchange 345/230kV Transformer, Sundown Interchange 230/115kV Transformer, Wolfforth – Terry County 115kV, TUCO 345/230kV Transformer, TUCO 230/115kV Transformer and Wolfforth 230/115kV Transformer.

The Hobbs – Yoakum – TUCO 345/230kV Project has been previously cost allocated for this study per SPP-NTC-200223 and 200309 from the 2012 SPP Integrated Transmission Plan 10-Year (2012 ITP 10) High Priority Incremental Loads (HPILs) Study with a current anticipated in-service date of June, 2020. The in-service date for this project is well beyond the in-service date of the Interconnection Request(s) in Group 2 and Group 6. In accordance with the SPP Generator Interconnection Procedure (GIP), Interconnection Request(s) can delay their in-service dates no more than three (3) years, therefore Group 6 requests will not be able to move forward into the Interconnection Facilities Study Queued unless they execute a Limited Operation Interconnection Facilities Study Agreement (Appendix 4A to the SPP GIP).

It should be noted that higher queued assigned network upgrades are considered in this analysis based on higher queued Interconnection Request(s) assignment. If higher queued Interconnection Request(s) withdraw from the SPP GI queue or terminate their Generator Interconnection Agreement (GIA), a restudy will be needed for this group to determine network upgrade need changes.

For Group 6 Cluster analysis cost allocation, please refer to Appendix E and F.

Cluster ERIS Constraints			
MONITORED ELEMENT	Limiting Rate A/B (MVA)	TC%LOADING (% MVA)	CONTINGENCY
KRESS INTERCHANGE - SWISHER COUNTY INTERCHANGE 115KV CKT 1	159.35	113.5	System Intact

Cluster NRIS Constraints			
MONITORED ELEMENT	Limiting Rate A/B (MVA)	TC%LOADING (% MVA)	CONTINGENCY
BUSHLAND INTERCHANGE - POTTER COUNTY INTERCHANGE 230KV CKT 1	350.6	101.3	G14-074T 345.00 - TUCO INTERCHANGE 345KV CKT 1
CARLISLE INTERCHANGE - LP-DOUD_TP 3115.00 115KV CKT 1	160	115.1	WOLFFORTH INTERCHANGE (WH 7001668) 230/115/13.2KV TRANSFORMER CKT 1
CARLISLE INTERCHANGE (WH XHS70711) 230/115/13.2KV TRANSFORMER CKT 1	168	101.1	CARLISLE INTERCHANGE - WOLFFORTH INTERCHANGE 230KV CKT 1
COX INTERCHANGE - HALE CO INTERCHANGE 115KV CKT 1	95.81	100.6	KRESS INTERCHANGE - KRESS_RURAL3115.00 115KV CKT 1
HALE CO INTERCHANGE - TUCO2 115.00 115KV CKT 1	95.81	100	KRESS INTERCHANGE - SWISHER COUNTY INTERCHANGE 115KV CKT 1
Hansford County Switch Station - SPEARMAN INTERCHANGE 115KV CKT 1	159.95	115.9	POTTER COUNTY INTERCHANGE (WAUK 90343-A) 345/230/13.2KV TRANSFORMER CKT 1
HITCHLAND INTERCHANGE - Hansford County Switch Station 115KV CKT 1	159.95	106.3	POTTER COUNTY INTERCHANGE (WAUK 90343-A) 345/230/13.2KV TRANSFORMER CKT 1

JONES STATION - TUCO INTERCHANGE 230KV CKT 1	343.79	107.4	CARLISLE INTERCHANGE - TUCO INTERCHANGE 230KV CKT 1
POTTER COUNTY INTERCHANGE (WAUK 90343-A) 345/230/13.2KV TRANSFORMER CKT 1	560	108.6	G14-074T 345.00 - TUCO INTERCHANGE 345KV CKT 1
SUNDOWN INTERCHANGE (WH XDS70381) 230/115/13.8KV TRANSFORMER CKT 1	187	103.7	AMOCO SWITCHING STATION - SUNDOWN INTERCHANGE 230KV CKT 1
TERRY COUNTY INTERCHANGE - WOLFFORTH INTERCHANGE 115KV CKT 1	153.97	106.4	TUCO INTERCHANGE - YOAKUM_345 345.00 345KV CKT 1
TUCO INTERCHANGE (ENRCO 136401) 230/115/13.2KV TRANSFORMER CKT 1	288	115.5	TUCO INTERCHANGE (ENRCO 136401) 230/115/13.2KV TRANSFORMER CKT 2
TUCO INTERCHANGE (ENRCO 136401) 230/115/13.2KV TRANSFORMER CKT 2	288	115.5	TUCO INTERCHANGE (ENRCO 136401) 230/115/13.2KV TRANSFORMER CKT 1
TUCO INTERCHANGE (GE M1022338) 345/230/13.2KV TRANSFORMER CKT 1	644	107.1	TUCO INTERCHANGE (SIEM 8743066) 345/230/13.2KV TRANSFORMER CKT 2
TUCO INTERCHANGE (SIEM 8743066) 345/230/13.2KV TRANSFORMER CKT 2	644	107.1	TUCO INTERCHANGE (GE M1022338) 345/230/13.2KV TRANSFORMER CKT 1
WOLFFORTH INTERCHANGE (WH 7001668) 230/115/13.2KV TRANSFORMER CKT 1	154	104.3	CARLISLE INTERCHANGE - LP-DOUD_TP 3115.00 115KV CKT 1

After constraints for transmission reinforcement upgrades were mitigated, the following steady-state voltage violations require mitigation. An additional two blocks of 130Mvars at the Oklaunion 345kV capacitor bank(s) will be required to mitigate the steady state voltage observed after contingency.

Cluster ERS Voltage Constraints				
MONITORED ELEMENT	TC Voltage (PU)	VMIN (PU)	VMAX (PU)	CONTINGENCY
SHAMROCK 115KV	0.914952	0.92	1.05	G14-074T 345.00 - OKLAUNION 345KV CKT 1
		Mitigation		Add additional 260Mvars at Oklaunion 345kV
OKLAUNION 345KV	0.882016	0.92	1.05	BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1
		Mitigation		Add additional 260Mvars at Oklaunion 345kV

Group 6 (Limited Operation)

Limited Operation results are listed below. While these results are based on the criteria listed in GIP 8.4.3, the Interconnection Customer may request additional scenarios for Limited Operation based on higher queued Interconnection Requests not being placed in service.

Limited Operation Analysis		
Interconnection Request	MW	Constraint that most limits LOIS
ASGI-2015-002	2	Oklaunion voltage
GEN-2014-074	99 (ERIS)	Oklaunion voltage
	0 (NRIS)	CARLISLE INTERCHANGE - LP-DOUD_TP 3115.00 115KV CKT 1
GEN-2015-014	98	Oklaunion voltage
GEN-2015-022	73 (ERIS)	Oklaunion voltage
	0 (NRIS)	WOLFFORTH INTERCHANGE (WH 7001668) 230/115/13.2KV TRANSFORMER CKT 1

Cluster Group 7 (Southwestern Oklahoma Area)

In addition to the 1,751.00 MW of previously queued generation in the area, 172.90 MW of new interconnection service was studied. GEN-2015-004 was shown to have impacts on Group 6 Interconnection Request constraints for the outage of the Border-Woodward 345kV line. The

mitigation is to add a 345kV capacitor bank at Oklaunion. This upgrade is shared with Group 6 Interconnection Requests. GEN-2015-013 was not re-evaluated for impacts.

Cluster ERIS Voltage Constraints				
MONITORED ELEMENT	TC Voltage (PU)	VMIN (PU)	VMAX (PU)	CONTINGENCY
OKLAUNION 345KV	0.882016	0.92	1.05	BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1
Mitigation			Add additional 260Mvars at Oklaunion 345kV	

Group 7 (Limited Operation)

Limited Operation results are listed below. While these results are based on the criteria listed in GIP 8.4.3, the Interconnection Customer may request additional scenarios for Limited Operation based on higher queued Interconnection Requests not being placed in service.

Limited Operation Analysis		
Interconnection Request	MW	Constraint that most limits LOIS
GEN-2015-004	34	Oklaunion voltage
GEN-2015-013	0	multiple

Cluster Group 8 (North Oklahoma/South Central Kansas Area)

In addition to the 4,111.7 MW of previously queued generation in the area, 1,254.06 MW of new interconnection service was studied. This group was not analyzed for this restudy and previously identified results remain valid.

Cluster Group 9 (Nebraska Area)

In addition to the 2,092.5 MW of previously queued generation in the area, 860.70 MW of new interconnection service was studied. This group was not analyzed for this restudy and previously identified results remain valid.

Cluster Group 10 (Southeast Oklahoma/Northeast Texas Area)

In addition to the 0.0 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 Area)

In addition to the 30.0 MW of previously queued generation in the area, 0.0 MW of new interconnection service was studied. All Interconnection Requests in Group 12 have withdrawn from the study. No additional analysis was performed for Group 12.

Cluster Group 13 (Northeast Kansas/Northwest Missouri Area)

In addition to the 434.6 MW of previously queued generation in the area, 200.1 MW of new interconnection service was studied. This group was not analyzed for this restudy and previously identified results remain valid.

Cluster Group 14 (South Central Oklahoma Area)

In addition to the 612.50 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.

Curtailement and System Reliability

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

Stability & Short Circuit Analysis

For this restudy, a stability and short circuit analysis was conducted for Group 6 which had significant changes due to Interconnection Request withdrawals. For those groups, each Interconnection Request was studied using modified versions of the 2015 series SPP Model Development Working Group (MDWG) Models 2016 winter, 2017 summer, and 2025 summer peak dynamic cases⁹. The stability analysis is conducted with all upgrades in service that are identified in the power flow analysis unless otherwise noted in the individual group stability study. For each group, the interconnection requests are studied at 100% nameplate output while the other groups are dispatched at 20% output for Variable Energy Resource (VER) requests and 100% output for other requests. The output of the Interconnection Customer's facility is offset in each model by a reduction in output of existing online SPP generation. Each Interconnection Request is studied in a Stand Alone scenario in addition to the cluster scenario. A synopsis is included for each group. The entire stability study for each group can be found in the Appendices.

Short-circuit analysis is performed but verification of over-dutied equipment is performed by the Transmission Owner within the Interconnection Facilities Study. Results of that analysis may require additional costs to replace circuit breakers and associated equipment.

Cluster Group 1 (Woodward Area)

The Group 1 stability analysis was not performed again for this restudy. The original analysis in DISIS-2015-001 is still valid.

Cluster Group 2 (Hitchland Area)

No Interconnection Requests remained in Group 2.

Cluster Group 3 (Spearville Area)

The Group 3 stability analysis was not performed again for this restudy. The analysis in DISIS-2015-001-1 is still valid.

Cluster Group 4 (Northwest Kansas)

The Group 4 stability analysis was not performed again for this restudy. The original analysis in DISIS-2015-001 is still valid.

Cluster Group 6 (South Texas Panhandle/New Mexico)

The Group 6 stability analysis for this area was performed by SPP Staff to determine the sensitivity of the withdrawn Interconnection Requests to the potential need for reactive compensation of Oklaunion. The stability analysis has verified low voltages at Oklaunion for an outage of Border to Woodward. The mitigation for this outage is to add two 130Mvar capacitor banks at the existing capacitor bank at the Oklaunion 345kV bus identified in the powerflow analysis. With this

⁹ Short Circuit analysis performed only on the 2025 Summer Peak seasonal model. Group 6 Stability Analysis also includes 2020 Summer and Winter Peak seasons.

additional 260Mvar of capacitor banks and with all previously assigned and currently assigned Network Upgrades placed in service the transmission system will remain stable and low voltage ride through requirements are satisfied for the probable 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-2014-074**	152.0	Vestas V110 2.0MW	Tap Tuco – OKU 345kV	0.95	0.95
GEN-2015-014	150.0	Vestas V110 2.0MW	Tap on Cochran – LG Plains 115kV	0.95	0.95
GEN-2015-022	112.0	GE LV5 4.0MW Inverters	Swisher 115kV	0.95	0.95
ASGI-2015-002	2.0	GE 2.0MW	Yuma Interchange 115/69kV	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.

** Requirement for reactors for low wind conditions

Cluster Group 7 (Southwest Oklahoma)

The Group 7 stability analysis was not performed again for this restudy. The original analysis in DISIS-2015-001 is still valid.

Cluster Group 8 (South Central Kansas/North Oklahoma)

The Group 8 stability analysis was not performed again for this restudy. The original analysis in DISIS-2015-001-1 is still valid.

Cluster Group 9 (Nebraska)

The Group 9 stability analysis was not performed again for this restudy. The analysis in DISIS-2015-001-1 is still valid.

Cluster Group 10 (Southeast Oklahoma/Northeast Texas Area)

There were no customers requesting interconnection service in the southeast Oklahoma/northeast Texas area.

Cluster Group 12 (Northwest Arkansas Area)

No remaining Interconnection Requests in Group 12.

Cluster Group 13 (Northwest Missouri Area)

The Group 13 stability analysis was not performed again for this restudy. The original analysis in DISIS-2015-001 is still valid.

Cluster Group 14 (South Central Oklahoma)

There were no customers requesting Interconnection Service in the south central Oklahoma area.

Conclusion

The minimum cost of interconnecting 2,765.79 MW of new generation interconnection requests included in this Definitive Interconnection System Impact Study is estimated at \$255,880,179 for the Allocated Network Upgrades and Transmission Owner Interconnection Facilities 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 any Network Upgrades that are identified as required through the short circuit analysis. Potential over-duty circuit breakers capability will be identified by the Transmission Owner in the Interconnection Facilities Study.

Further refinement of total estimated interconnection costs will be provided, should the Interconnection Customer meet the requirements for acceptance and choose to move into the Interconnection Facilities Study following the posting of this DISIS. The Interconnection Facilities Study may include additional study analysis, additional facility upgrades not yet identified by this DISIS, such as circuit breaker replacements and affected system facilities, and further refinement of existing cost estimates.

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 Study

Request	Amount	Service	Area	Requested Point of Interconnection	Proposed Point of Interconnection	Requested In-Service Date	In Service Date Delayed Until no earlier than*
ASGI-2015-001	6.13	ER	SUNCMKEC	Ninnescah 115kV	Ninnescah 115kV		TBD
ASGI-2015-002	2.00	ER	SPS	SP-Yuma 69kV	SP-Yuma 69kV		TBD
ASGI-2015-004	56.36	ER	GRDA	Coffeyville City 69kV	Coffeyville City 69kV		TBD
GEN-2010-048	70.00	ER	MIDW	Tap Beach Station - Redline 115kV	Tap Beach Station - Redline 115kV	12/30/2017	TBD
GEN-2014-074	152.00	ER/NR	SPS	Tap TUCO Interchange - Oklaunion 345kV	Tap TUCO Interchange - Oklaunion (GEN-2014-074 Tap) 345kV	10/31/2017	TBD
GEN-2015-001	200.00	ER	OKGE	Ranch Road 345kV	Ranch Road 345kV	12/31/2016	TBD
GEN-2015-004	52.90	ER	OKGE	Border 345kV	Border 345kV	5/15/2017	TBD
GEN-2015-005	200.10	ER	KCPL	Tap Nebraska City - Sibley 345kV	Tap Nebraska City - Sibley 345kV	12/31/2017	TBD
GEN-2015-007	160.00	ER	NPPD	Hoskins 345kV	Hoskins 345kV	12/31/2016	TBD
GEN-2015-013	120.00	ER/NR	WFEC	Synder 138kV	Synder 138kV	12/1/2016	TBD
GEN-2015-014	150.00	ER	SPS	Lehman 115kV	Tap Cochran - Lehman 115kV	12/1/2016	TBD
GEN-2015-015	154.60	ER/NR	OKGE	Tap Medford Tap - Coyote 138kV	Tap Medford Tap - Coyote 138kV	7/31/2016	TBD
GEN-2015-016	200.00	ER/NR	KCPL	Tap Marmaton - Centerville 161kV	Tap Marmaton - Centerville 161kV	12/31/2017	TBD
GEN-2015-021	20.00	ER/NR	SUNCMKEC	Johnson Corner 115kV	Johnson Corner 115kV	12/31/2016	TBD
GEN-2015-022	112.00	ER/NR	SPS	Swisher 115kV	Swisher 115kV	12/1/2016	TBD
GEN-2015-023	300.70	ER/NR	NPPD	Holt County 345kV	Holt County 345kV	12/31/2019	TBD
GEN-2015-024	220.00	ER	WERE	Wichita 345kV	Tap Thistle - Wichita 345kV Dbl CKT	12/31/2016	TBD
GEN-2015-025	220.00	ER	WERE	Wichita 345kV	Tap Thistle - Wichita 345kV Dbl CKT	12/31/2016	TBD
GEN-2015-027	4.90	ER	SUNCMKEC	Crooked Creek 115kV	Crooked Creek 115kV	3/1/2016	TBD
GEN-2015-028	3.00	ER	OKGE	Nardins 69kV	Nardins 69kV	3/1/2016	TBD
GEN-2015-029	161.00	ER	OKGE	Tatonga 345kV	Tatonga 345kV	12/1/2016	TBD
GEN-2015-030	200.10	ER	OKGE	Sooner 345kV	Sooner 345kV	12/1/2017	TBD
Total: 2,765.79							

*In-Service Date for each request is to be determined after the Interconnection Facility Study is completed.

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	Remington 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	27.30	SPS	Lovington 115kV	On-Line
ASGI-2011-002	20.00	SPS	Herring 115kV	On-Line
ASGI-2011-003	10.00	SPS	Hendricks 69kV	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	36.60	SUNCMKEC	Morris 115kV	Under Study (DISIS-2013-002)
ASGI-2013-005	1.65	SPS	FE Clovis 115kV	Under Study (DISIS-2013-002)
ASGI-2013-006	2.00	SPS	SP-Erskine 115kV	
ASGI-2014-001	2.50	SPS	SP-Erskine 115kV	Under Study (DISIS-2014-001)
ASGI-2014-005	10.00	SPS	Strata 69kV	Under Study (DISIS-2014-002)
ASGI-2014-008	10.00	SPS	South Loving 69kV	Under Study (DISIS-2014-002)
ASGI-2014-009	10.00	SPS	Wood Draw 115kV	Under Study (DISIS-2014-002)
ASGI-2014-010	10.00	SPS	Ochoa 115kV	Under Study (DISIS-2014-002)
ASGI-2014-012	10.00	SPS	Cooper Ranch 115kV	Under Study (DISIS-2014-002)
ASGI-2014-014	56.40	GRDA	Ferguson 69kV	Under Study (DISIS-2014-002)
GEN-2001-014	96.00	WFEC	Ft Supply 138kV	On-Line
GEN-2001-026	74.30	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	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	Weatherford 138kV	On-Line
GEN-2004-014	154.50	SUNCMKEC	Spearville 230kV	On-Line at 100MW
GEN-2004-020	27.00	AEPW	Weatherford 138kV	On-Line

Request	Amount	Area	Requested/Proposed Point of Interconnection	Status or In-Service Date
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	Caney River 345kV	On-Line
GEN-2006-002	101.00	AEPW	Sweetwater 230kV	On-Line
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	502.00	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-Line
GEN-2006-038N005	80.00	NPPD	Broken Bow 115kV	On-Line
GEN-2006-038N019	80.00	NPPD	Petersburg North 115kV	On-Line
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-2007-011N08	81.00	NPPD	Bloomfield 115kV	On-Line
GEN-2007-021	201.00	OKGE	Tatonga 345kV	On-Line
GEN-2007-025	300.00	WERE	Viola 345kV	On-Line
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-Line at 199MW
GEN-2007-046	200.00	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 2016 and 2017
GEN-2008-003	101.00	OKGE	Woodward EHV 138kV	On-Line
GEN-2008-013	300.00	OKGE	Hunter 345kV	On-Line at 235MW
GEN-2008-018	250.00	SPS	Finney 345kV	On-Line
GEN-2008-021	42.00	WERE	Wolf Creek 345kV	On-Line
GEN-2008-022	300.00	SPS	Crossroads 345kV	On-Line
GEN-2008-023	150.00	AEPW	Hobart Junction 138kV	On-Line
GEN-2008-037	101.00	WFEC	Slick Hills 138kV	On-Line
GEN-2008-044	197.80	OKGE	Tatonga 345kV	On-Line
GEN-2008-047	300.00	OKGE	Beaver County 345kV	On-Line
GEN-2008-051	322.00	SPS	Potter County 345kV	On-Line at 161MW
GEN-2008-079	99.20	SUNCMKEC	Crooked Creek 115kV	On-Line
GEN-2008-086N02	201.00	NPPD	Meadow Grove 230kV	On-Line
GEN-2008-092	200.60	MIDW	Post Rock 230kV	On-Line
GEN-2008-098	100.80	WERE	Waverly 345kV	On-Line
GEN-2008-1190	60.00	OPPD	S1399 161kV	On-Line
GEN-2008-123N	89.70	NPPD	Tap Pauline - Hildreth (Rosemont) 115kV	On Schedule for 2016
GEN-2008-124	200.10	SUNCMKEC	Ironwood 345kV	On Schedule for 2016
GEN-2008-129	80.00	KCPL	Pleasant Hill 161kV	On-Line

Request	Amount	Area	Requested/Proposed Point of Interconnection	Status or In-Service Date
GEN-2009-008	199.50	MIDW	South Hays 230kV	On-Line
GEN-2009-020	48.30	MIDW	Walnut Creek 69kV	On-Line
GEN-2009-025	59.80	OKGE	Nardins 69kV	On-Line
GEN-2009-040	73.80	WERE	Marshall 115kV	On Schedule for 2016
GEN-2010-001	300.00	OKGE	Beaver County 345kV	On-Line
GEN-2010-003	100.80	WERE	Waverly 345kV	On-Line
GEN-2010-005	299.20	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 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	S1399 161kV	On Schedule for 2015
GEN-2010-045	197.80	SUNCMKEC	Buckner 345kV	On Schedule for 2017
GEN-2010-046	56.00	SPS	TUCO Interchange 230kV	On Schedule for 2016
GEN-2010-051	200.00	NPPD	Tap Hoskins - Twin Church (Dixon County) 230kV	On Suspension
GEN-2010-055	4.50	AEPW	Wekiwa 138kV	On-Line
GEN-2010-057	201.00	MIDW	Rice County 230kV	On-Line
GEN-2011-008	600.00	SUNCMKEC	Clark County 345kV	On Schedule for 2016
GEN-2011-010	100.80	OKGE	Minco 345kV	On-Line
GEN-2011-011	50.00	KCPL	Iatan 345kV	On-Line
GEN-2011-014	201.00	OKGE	Tap Hitchland - Woodward Dbl Ckt (GEN-2011-014 Tap) 345kV	On Schedule for 2016
GEN-2011-016	200.10	SUNCMKEC	Ironwood 345kV	On Schedule for 2017
GEN-2011-018	73.60	NPPD	Steele City 115kV	On-Line
GEN-2011-019	299.00	OKGE	Woodward 345kV	On Suspension
GEN-2011-020	299.00	OKGE	Woodward 345kV	On Suspension
GEN-2011-022	299.00	SPS	Hitchland 345kV	On Suspension
GEN-2011-025	80.00	SPS	Tap Floyd County - Crosby County 115kV	On Schedule for 2016
GEN-2011-027	120.00	NPPD	Tap Hoskins - Twin Church (Dixon County) 230kV	On Suspension
GEN-2011-037	7.00	WFEC	Blue Canyon 5 138kV	On-Line
GEN-2011-040	111.00	OKGE	Carter County 138kV	On-Line
GEN-2011-045	205.00	SPS	Jones 230kV	On-Line
GEN-2011-046	27.00	SPS	Lopez 115kV	On-Line
GEN-2011-048	175.00	SPS	Mustang 230kV	On-Line
GEN-2011-049	250.70	OKGE	Border 345kV	On Schedule for 2016
GEN-2011-050	109.80	AEPW	Santa Fe Tap 138kV	On Schedule for 2016
GEN-2011-051	104.40	OKGE	Tap Woodward - Tatonga 345kV (GEN-2011-051 Tap)	On Schedule for 2017
GEN-2011-054	300.00	OKGE	Cimarron 345kV	On-Line
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-Line
GEN-2012-001	61.20	SPS	Cirrus Tap 230kV	On-Line
GEN-2012-004	41.40	OKGE	Carter County 138kV	On-Line
GEN-2012-007	120.00	SUNCMKEC	Rubart 115kV	On-Line
GEN-2012-020	478.00	SPS	TUCO 230kV	On Schedule for 2016
GEN-2012-021	4.80	LES	Terry Bundy Generating Station 115kV	On-Line
GEN-2012-024	180.00	SUNCMKEC	Clark County 345kV	On Schedule for 2016

Request	Amount	Area	Requested/Proposed Point of Interconnection	Status or In-Service Date
GEN-2012-027	136.00	AEPW	Shidler 138kV	On Suspension
GEN-2012-028	74.80	WFEC	Gotebo 69kV	On-Line
GEN-2012-032	300.00	OKGE	Open Sky 345kV	On-Line
GEN-2012-033	98.80	OKGE	Tap and Tie South 4th - Bunch Creek & Enid Tap - Fairmont (GEN-2012-033T) 138kV	On-Line
GEN-2012-034	7.00	SPS	Mustang 230kV	On-Line
GEN-2012-035	7.00	SPS	Mustang 230kV	On-Line
GEN-2012-036	7.00	SPS	Mustang 230kV	On-Line
GEN-2012-037	203.00	SPS	TUCO 345kV	On-Line
GEN-2012-041	121.50	OKGE	Ranch Road 345kV	On-Line
GEN-2013-002	50.60	LES	Tap Sheldon - Folsom & Pleasant Hill (GEN-2013-002 Tap) 115kV CKT 2	On Schedule for 2016
GEN-2013-007	100.30	OKGE	Tap Prices Falls - Carter 138kV	On-Line
GEN-2013-008	1.20	NPPD	Steele City 115kV	On-Line
GEN-2013-010	99.00	SUNCMKEC	Tap Spearville - Post Rock (North of GEN-2011-017 Tap) 345kV	IA Pending
GEN-2013-011	30.00	AEPW	Turk 138kV	On-Line
GEN-2013-012	147.00	OKGE	Redbud 345kV	On-Line
GEN-2013-014	25.50	NPPD	Tap Pauline - Hildreth (Rosemont) 115kV	On Suspension
GEN-2013-016	203.00	SPS	TUCO 345kV	On Schedule for 2017
GEN-2013-019	73.60	LES	Tap Sheldon - Folsom & Pleasant Hill (GEN-2013-002 Tap) 115kV CKT 2	On Schedule for 2016
GEN-2013-022	25.00	SPS	Norton 115kV	On Schedule for 2016
GEN-2013-027	150.00	SPS	Tap Tolk - Yoakum 230kV	IA Pending
GEN-2013-028	559.50	GRDA	Tap N Tulsa - GRDA 1 345kV	On Schedule for 2017
GEN-2013-029	300.00	OKGE	Renfrow 345kV	On Schedule for 2016 (150MW) and 2016 (150MW)
GEN-2013-030	300.00	OKGE	Beaver County 345kV	On Schedule for 2016 (200MW) and 2017 (100MW)
GEN-2013-032	204.00	NPPD	Antelope 115kV	On Schedule for 2017
GEN-2013-033	28.00	MIDW	Knoll 115kV	On Schedule for 2016
GEN-2014-001	200.60	WERE	Tap Wichita - Emporia Energy Center (GEN-2014-001 Tap) 345kV	On Suspension
GEN-2014-002	10.50	OKGE	Tatonga 345kV (GEN-2007-021 POI)	On Schedule for 2015
GEN-2014-003	15.80	OKGE	Tatonga 345kV (GEN-2007-044 POI)	On Schedule for 2015
GEN-2014-004	4.00	NPPD	Steele City 115kV (GEN-2011-018 POI)	On-Line
GEN-2014-005	5.70	OKGE	Minco 345kV (GEN-2011-010 POI)	On-Line
GEN-2014-012	225.00	SPS	Tap Hobbs Interchange - Andrews 230kV	On Schedule for 2018
GEN-2014-013	73.50	NPPD	Meadow Grove (GEN-2008-086N2 Sub) 230kV	On-Line
GEN-2014-020	100.00	AEPW	Tuttle 138kV	On Schedule for 2017
GEN-2014-021	300.00	KCPL	Tap Nebraska City - Mullin Creek 345kV	On Schedule for 2016
GEN-2014-025	2.40	MIDW	Walnut Creek 69kV	On-Line
GEN-2014-028	35.00	EMDE	Riverton 161kV	On Schedule for 2016
GEN-2014-031	35.80	NPPD	Meadow Grove 230kV	On Schedule for 2016
GEN-2014-032	10.20	NPPD	Meadow Grove 230kV	IA Pending
GEN-2014-033	70.00	SPS	Chaves County 115kV	On Schedule for 2016
GEN-2014-034	70.00	SPS	Chaves County 115kV	IA Pending
GEN-2014-035	30.00	SPS	Chaves County 115kV	IA Pending
GEN-2014-039	73.40	NPPD	Friend 115kV	On Schedule for 2017
GEN-2014-040	320.40	SPS	Castro 115kV	On Schedule for 2016
GEN-2014-041	120.80	SUNCMKEC	Arnold 115kV	FACILITY STUDY STAGE
GEN-2014-047	40.00	SPS	Crossroads 345kV	IA Pending

Request	Amount	Area	Requested/Proposed Point of Interconnection	Status or In-Service Date
GEN-2014-056	250.00	OKGE	Minco 345kV	On Schedule for 2016
GEN-2014-057	250.00	AEPW	Tap Lawton - Sunnyside (Terry Road) 345kV	On Schedule for 2016
GEN-2014-064	248.40	OKGE	Otter 138kV	On Schedule for 2016
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 (Buffalo County Solar)	10.00	NPPD	Kearney Northeast	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 (North Platte - Lexington)	54.00	NPPD	Multiple: Jeffrey 115kV, John_1 115kV, John_2 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
SPS Distributed (Yuma)	2.57	SPS	SP-Yuma 69kV	On-Line
Total:	25,716.8			

C: Study Groupings

See next page

C. Study Groups

GROUP 1: WOODWARD AREA			
Request	Capacity	Area	Proposed Point of Interconnection
GEN-2001-014	96.00	WFEC	Ft Supply 138kV
GEN-2001-037	100.00	OKGE	FPL Moreland Tap 138kV
GEN-2005-008	120.00	OKGE	Woodward 138kV
GEN-2006-024S	19.80	WFEC	Buffalo Bear Tap 69kV
GEN-2006-046	131.00	OKGE	Dewey 138kV
GEN-2007-021	201.00	OKGE	Tatonga 345kV
GEN-2007-043	200.00	OKGE	Minco 345kV
GEN-2007-044	300.00	OKGE	Tatonga 345kV
GEN-2007-050	170.00	OKGE	Woodward EHV 138kV
GEN-2007-062	765.00	OKGE	Woodward EHV 345kV
GEN-2008-003	101.00	OKGE	Woodward EHV 138kV
GEN-2008-044	197.80	OKGE	Tatonga 345kV
GEN-2010-011	29.70	OKGE	Tatonga 345kV
GEN-2010-040	300.00	OKGE	Cimarron 345kV
GEN-2011-010	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-2011-051 Tap)
GEN-2011-054	300.00	OKGE	Cimarron 345kV
GEN-2014-002	10.50	OKGE	Tatonga 345kV (GEN-2007-021 POI)
GEN-2014-003	15.80	OKGE	Tatonga 345kV (GEN-2007-044 POI)
GEN-2014-005	5.70	OKGE	Minco 345kV (GEN-2011-010 POI)
GEN-2014-020	100.00	AEPW	Tuttle 138kV
GEN-2014-056	250.00	OKGE	Minco 345kV
PRIOR QUEUED SUBTOTAL	4,216.50		
GEN-2015-029	161.00	OKGE	Tatonga 345kV
CURRENT CLUSTER SUBTOTAL	161.00		
AREA TOTAL	4,377.50		

GROUP 2: HITCHLAND AREA			
Request	Capacity	Area	Proposed Point of Interconnection
ASGI-2011-002	20.00	SPS	Herring 115kV
ASGI-2013-001	11.50	SPS	PanTex South 115kV
GEN-2002-008	240.00	SPS	Hitchland 345kV
GEN-2002-009	80.00	SPS	Hansford 115kV
GEN-2002-022	240.00	SPS	Bushland 230kV
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	200.00	SPS	Hitchland 115kV
GEN-2008-047	300.00	OKGE	Beaver County 345kV
GEN-2008-051	322.00	SPS	Potter County 345kV
GEN-2010-001	300.00	OKGE	Beaver County 345kV
GEN-2010-014	358.80	SPS	Hitchland 345kV
GEN-2011-014	201.00	OKGE	Tap Hitchland - Woodward Dbl Ckt (GEN-2011-014 Tap) 345kV
GEN-2011-022	299.00	SPS	Hitchland 345kV
GEN-2013-030	300.00	OKGE	Beaver County 345kV
Llano Estacado (White Deer)	80.00	SPS	Llano Wind 115kV
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	3,616.20		
AREA TOTAL	3,616.20		

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	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-2006-021	101.00	SUNCMKEC	Flat Ridge Tap 138kV
GEN-2007-040	200.00	SUNCMKEC	Buckner 345kV
GEN-2008-018	250.00	SPS	Finney 345kV
GEN-2008-079	99.20	SUNCMKEC	Crooked Creek 115kV
GEN-2008-124	200.10	SUNCMKEC	Ironwood 345kV
GEN-2010-009	165.60	SUNCMKEC	Buckner 345kV
GEN-2010-045	197.80	SUNCMKEC	Buckner 345kV
GEN-2011-008	600.00	SUNCMKEC	Clark County 345kV
GEN-2011-016	200.10	SUNCMKEC	Ironwood 345kV
GEN-2012-007	120.00	SUNCMKEC	Rubart 115kV
GEN-2012-024	180.00	SUNCMKEC	Clark County 345kV
GEN-2013-010	99.00	SUNCMKEC	Tap Spearville - Post Rock (North of GEN-2011-017 Tap) 345kV
Gray County Wind (Montezuma)	110.00	SUNCMKEC	Gray County Tap 115kV
PRIOR QUEUED SUBTOTAL	3,204.80		
ASGI-2015-001	6.13	SUNCMKEC	Ninnescah 115kV
GEN-2015-021	20.00	SUNCMKEC	Johnson Corner 115kV
GEN-2015-027	4.90	SUNCMKEC	Crooked Creek 115kV
CURRENT CLUSTER SUBTOTAL	31.03		
AREA TOTAL	3,235.83		

GROUP 4: NORTHWEST KANSAS AREA			
Request	Capacity	Area	Proposed Point of Interconnection
ASGI-2013-004	36.60	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-2008-092	200.60	MIDW	Post Rock 230kV
GEN-2009-008	199.50	MIDW	South Hays 230kV
GEN-2009-020	48.30	MIDW	Walnut Creek 69kV
GEN-2010-057	201.00	MIDW	Rice County 230kV
GEN-2013-033	28.00	MIDW	Knoll 115kV
GEN-2014-025	2.40	MIDW	Walnut Creek 69kV
GEN-2014-041	120.80	SUNCMKEC	Arnold 115kV
PRIOR QUEUED SUBTOTAL	1,462.20		
GEN-2010-048	70.00	MIDW	Tap Beach Station - Redline 115kV
CURRENT CLUSTER SUBTOTAL	70.00		
AREA TOTAL	1,532.20		

GROUP 6: SOUTH TEXAS PANHANDLE/NEW MEXICO 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	27.30	SPS	Lovington 115kV
ASGI-2011-003	10.00	SPS	Hendricks 69kV
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	1.65	SPS	FE Clovis 115kV
ASGI-2013-006	2.00	SPS	SP-Erskine 115kV
ASGI-2014-001	2.50	SPS	SP-Erskine 115kV
ASGI-2014-005	10.00	SPS	Strata 69kV
ASGI-2014-008	10.00	SPS	South Loving 69kV
ASGI-2014-009	10.00	SPS	Wood Draw 115kV
ASGI-2014-010	10.00	SPS	Ochoa 115kV
ASGI-2014-012	10.00	SPS	Cooper Ranch 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	502.00	SPS	Hobbs 230kV & Hobbs 115kV
GEN-2008-022	300.00	SPS	Crossroads 345kV
GEN-2010-006	205.00	SPS	Jones 230kV
GEN-2010-046	56.00	SPS	TUCO Interchange 230kV
GEN-2011-025	80.00	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	Cirrus Tap 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-2013-016	203.00	SPS	TUCO 345kV
GEN-2013-022	25.00	SPS	Norton 115kV
GEN-2013-027	150.00	SPS	Tap Tolk - Yoakum 230kV
GEN-2014-012	225.00	SPS	Tap Hobbs Interchange - Andrews 230kV
GEN-2014-033	70.00	SPS	Chaves County 115kV
GEN-2014-034	70.00	SPS	Chaves County 115kV
GEN-2014-035	30.00	SPS	Chaves County 115kV
GEN-2014-040	320.40	SPS	Castro 115kV
GEN-2014-047	40.00	SPS	Crossroads 345kV
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
SPS Distributed (Yuma)	2.57	SPS	SP-Yuma 69kV

PRIOR QUEUED SUBTOTAL	4,184.77		
ASGI-2015-002	2.00	SPS	SP-Yuma 69kV
GEN-2014-074	152.00	SPS	Tap TUCO Interchange - Oklaunion (GEN-2014-074 Tap) 345kV
GEN-2015-014	150.00	SPS	Tap Cochran - Lehman 115kV
GEN-2015-022	112.00	SPS	Swisher 115kV
CURRENT CLUSTER SUBTOTAL	416.00		
AREA TOTAL	4,600.77		

GROUP 7: SOUTHWEST OKLAHOMA AREA			
Request	Capacity	Area	Proposed Point of Interconnection
GEN-2001-026	74.30	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	Weatherford 138kV
GEN-2004-020	27.00	AEPW	Weatherford 138kV
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-2007-052	150.00	WFEC	Anadarko 138kV
GEN-2008-023	150.00	AEPW	Hobart Junction 138kV
GEN-2008-037	101.00	WFEC	Slick Hills 138kV
GEN-2011-037	7.00	WFEC	Blue Canyon 5 138kV
GEN-2011-049	250.70	OKGE	Border 345kV
GEN-2012-028	74.80	WFEC	Gotebo 69kV
PRIOR QUEUED SUBTOTAL	1,751.00		
GEN-2015-004	52.90	OKGE	Border 345kV
GEN-2015-013	120.00	WFEC	Synder 138kV
CURRENT CLUSTER SUBTOTAL	172.90		
AREA TOTAL	1,923.90		

GROUP 8: NORTH OKLAHOMA/SOUTH CENTRAL KANSAS AREA			
Request	Capacity	Area	Proposed Point of Interconnection
ASGI-2010-006	150.00	AECI	Remington 138kV
ASGI-2014-014	56.40	GRDA	Ferguson 69kV
GEN-2002-004	200.00	WERE	Latham 345kV
GEN-2005-013	201.00	WERE	Caney River 345kV
GEN-2007-025	300.00	WERE	Viola 345kV
GEN-2008-013	300.00	OKGE	Hunter 345kV
GEN-2008-021	42.00	WERE	Wolf Creek 345kV
GEN-2008-098	100.80	WERE	Waverly 345kV
GEN-2009-025	59.80	OKGE	Nardins 69kV
GEN-2010-003	100.80	WERE	Waverly 345kV
GEN-2010-005	299.20	WERE	Viola 345kV
GEN-2010-055	4.50	AEPW	Wekiwa 138kV
GEN-2011-057	150.40	WERE	Creswell 138kV
GEN-2012-027	136.00	AEPW	Shidler 138kV
GEN-2012-032	300.00	OKGE	Open Sky 345kV
GEN-2012-033	98.80	OKGE	Tap and Tie South 4th - Bunch Creek & Enid Tap - Fairmont (GEN-2012-033T) 138kV
GEN-2012-041	121.50	OKGE	Ranch Road 345kV
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
GEN-2014-001	200.60	WERE	Tap Wichita - Emporia Energy Center (GEN-2014-001 Tap) 345kV
GEN-2014-028	35.00	EMDE	Riverton 161kV
GEN-2014-064	248.40	OKGE	Otter 138kV
PRIOR QUEUED SUBTOTAL	4,111.70		

ASGI-2015-004	56.36	GRDA	Coffeyville City 69kV
GEN-2015-001	200.00	OKGE	Ranch Road 345kV
GEN-2015-015	154.60	OKGE	Tap Medford Tap - Coyote 138kV
GEN-2015-016	200.00	KCPL	Tap Marmaton - Centerville 161kV
GEN-2015-024	220.00	WERE	Tap Thistle - Wichita 345kV Dbl CKT
GEN-2015-025	220.00	WERE	Tap Thistle - Wichita 345kV Dbl CKT
GEN-2015-028	3.00	OKGE	Nardins 69kV
GEN-2015-030	200.10	OKGE	Sooner 345kV
CURRENT CLUSTER SUBTOTAL	1,254.06		
AREA TOTAL	5,365.76		

GROUP 9: NEBRASKA AREA

Request	Capacity	Area	Proposed Point of Interconnection
GEN-2002-023N	0.80	NPPD	Harmony 115kV
GEN-2003-021N	75.00	NPPD	Ainsworth Wind Tap 115kV
GEN-2004-023N	75.00	NPPD	Columbus Co 115kV
GEN-2006-020N	42.00	NPPD	Bloomfield 115kV
GEN-2006-037N1	75.00	NPPD	Broken Bow 115kV
GEN-2006-038N005	80.00	NPPD	Broken Bow 115kV
GEN-2006-038N019	80.00	NPPD	Petersburg North 115kV
GEN-2006-044N	40.50	NPPD	North Petersburg 115kV
GEN-2007-011N08	81.00	NPPD	Bloomfield 115kV
GEN-2008-086N02	201.00	NPPD	Meadow Grove 230kV
GEN-2008-1190	60.00	OPPD	S1399 161kV
GEN-2008-123N	89.70	NPPD	Tap Pauline - Hildreth (Rosemont) 115kV
GEN-2009-040	73.80	WERE	Marshall 115kV
GEN-2010-041	10.50	OPPD	S1399 161kV
GEN-2010-051	200.00	NPPD	Tap Hoskins - Twin Church (Dixon County) 230kV
GEN-2011-018	73.60	NPPD	Steele City 115kV
GEN-2011-027	120.00	NPPD	Tap Hoskins - Twin Church (Dixon County) 230kV
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-2012-021	4.80	LES	Terry Bundy Generating Station 115kV
GEN-2013-002	50.60	LES	Tap Sheldon - Folsom & Pleasant Hill (GEN-2013-002 Tap) 115kV CKT 2
GEN-2013-008	1.20	NPPD	Steele City 115kV
GEN-2013-014	25.50	NPPD	Tap Pauline - Hildreth (Rosemont) 115kV
GEN-2013-019	73.60	LES	Tap Sheldon - Folsom & Pleasant Hill (GEN-2013-002 Tap) 115kV CKT 2
GEN-2013-032	204.00	NPPD	Antelope 115kV
GEN-2014-004	4.00	NPPD	Steele City 115kV (GEN-2011-018 POI)
GEN-2014-013	73.50	NPPD	Meadow Grove (GEN-2008-086N2 Sub) 230kV
GEN-2014-031	35.80	NPPD	Meadow Grove 230kV
GEN-2014-032	10.20	NPPD	Meadow Grove 230kV
GEN-2014-039	73.40	NPPD	Friend 115kV
NPPD Distributed (Broken Bow)	8.30	NPPD	Broken Bow 115kV
NPPD Distributed (Buffalo County Solar)	10.00	NPPD	Kearney Northeast
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 (North Platte - Lexington)	54.00	NPPD	Multiple: Jeffrey 115kV, John_1 115kV, John_2 115kV
NPPD Distributed (Ord)	11.90	NPPD	Ord 115kV

NPPD Distributed (Stuart)	2.10	NPPD	Ainsworth 115kV
PRIOR QUEUED SUBTOTAL	2,092.50		
GEN-2007-017IS	166.00	WAPA	Ft Thompson-Grand Island 345kV
GEN-2007-018IS	234.00	WAPA	Ft Thompson-Grand Island 345kV
GEN-2015-007	160.00	NPPD	Hoskins 345kV
GEN-2015-023	300.70	NPPD	Holt County 345kV
CURRENT CLUSTER SUBTOTAL	860.70		
AREA TOTAL	2,953.20		

GROUP 10: SOUTHEAST OKLAHOMA/NORTHEAST TEXAS AREA

Request	Capacity	Area	Proposed Point of Interconnection
AREA TOTAL	0.00		

GROUP 12: NORTHWEST ARKANSAS 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: NORTHWEST MISSOURI AREA

Request	Capacity	Area	Proposed Point of Interconnection
GEN-2008-129	80.00	KCPL	Pleasant Hill 161kV
GEN-2010-036	4.60	WERE	6th Street 115kV
GEN-2011-011	50.00	KCPL	Iatan 345kV
GEN-2014-021	300.00	KCPL	Tap Nebraska City - Mullin Creek 345kV
PRIOR QUEUED SUBTOTAL	434.60		
GEN-2015-005	200.10	KCPL	Tap Nebraska City - Sibley 345kV
CURRENT CLUSTER SUBTOTAL	200.10		
AREA TOTAL	634.70		

GROUP 14: SOUTH CENTRAL OKLAHOMA AREA

Request	Capacity	Area	Proposed Point of Interconnection
GEN-2011-040	111.00	OKGE	Carter County 138kV
GEN-2011-050	109.80	AEPW	Santa Fe Tap 138kV
GEN-2012-004	41.40	OKGE	Carter County 138kV
GEN-2013-007	100.30	OKGE	Tap Prices Falls - Carter 138kV
GEN-2014-057	250.00	AEPW	Tap Lawton - Sunnyside (Terry Road) 345kV
PRIOR QUEUED SUBTOTAL	612.50		
AREA TOTAL	612.50		

GROUP 15: E-SOUTH DAKOTA AREA			
Request	Capacity	Area	Proposed Point of Interconnection
AREA TOTAL	0.00		

GROUP 16: W-NORTH DAKOTA AREA			
Request	Capacity	Area	Proposed Point of Interconnection
AREA TOTAL	0.00		

GROUP 17: W-SOUTH DAKOTA AREA			
Request	Capacity	Area	Proposed Point of Interconnection
AREA TOTAL	0.00		

GROUP 18: E-NORTH DAKOTA AREA			
Request	Capacity	Area	Proposed Point of Interconnection
AREA TOTAL	0.00		

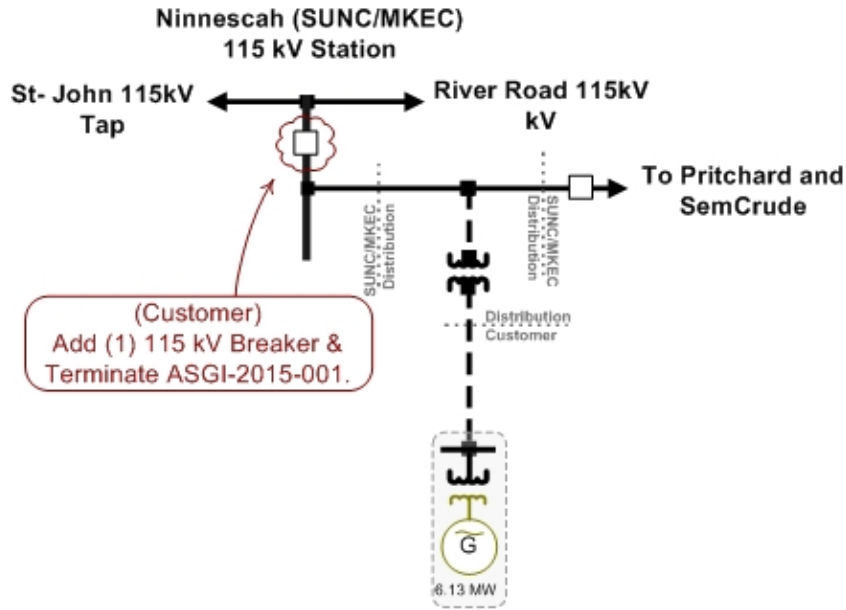
CLUSTER TOTAL (CURRENT STUDY)	3,165.8	MW
PQ TOTAL (PRIOR QUEUED)	25,716.8	MW
CLUSTER TOTAL (INCLUDING PRIOR QUEUED)	28,882.6	MW

D: Proposed Point of Interconnection One Line Diagrams

See next page

*Note: If not denoted otherwise for Affected System Generator Interconnection Requests (ASGI) interconnection cost estimate could include distribution system or third party system network upgrades and costs estimates.

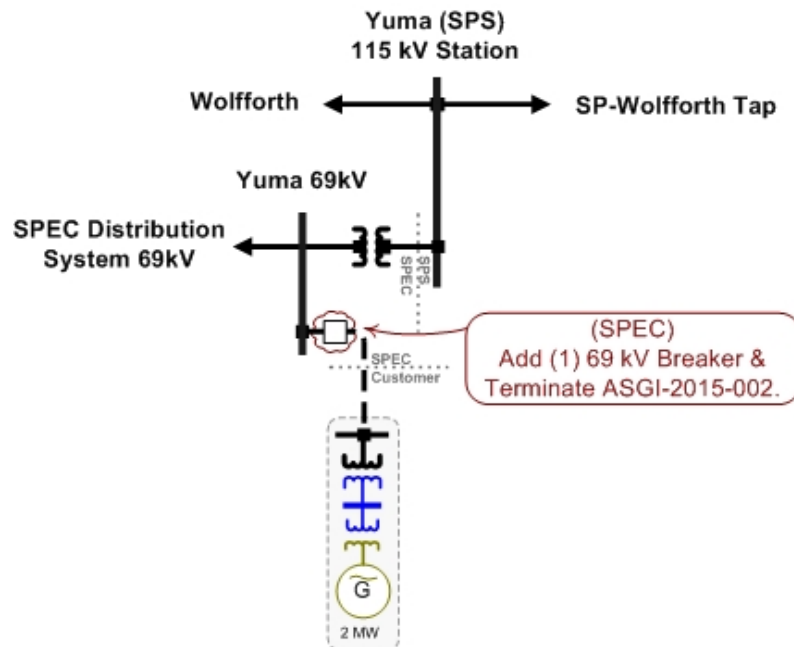
ASGI-2015-001
Estimated Cluster Analysis Interconnection Cost: \$3,188,259
Estimated Stand Alone Analysis Interconnection Cost: \$3,188,259



ASGI-2015-001

* Interconnection Cost Estimate(s) only include Affected System Interconnection costs

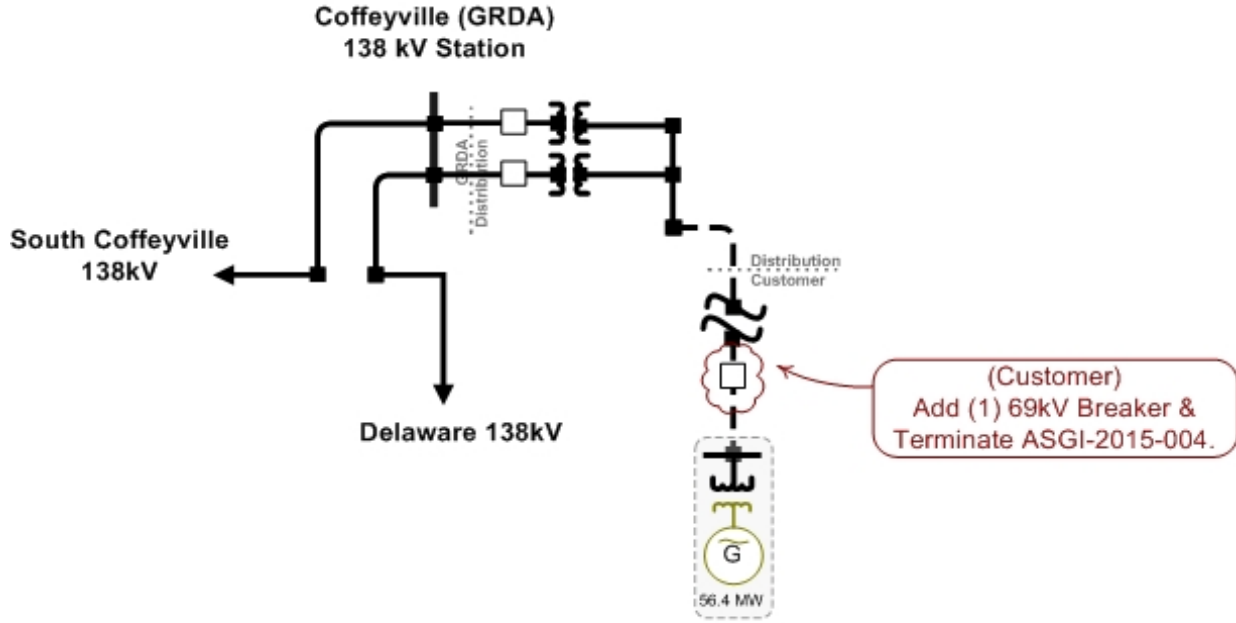
ASGI-2015-002
Estimated Cluster Analysis Interconnection Cost: \$0*
Estimated Stand Alone Analysis Interconnection Cost: \$0*



ASGI-2015-002

* Interconnection Cost Estimate(s) only include Affected System Interconnection costs

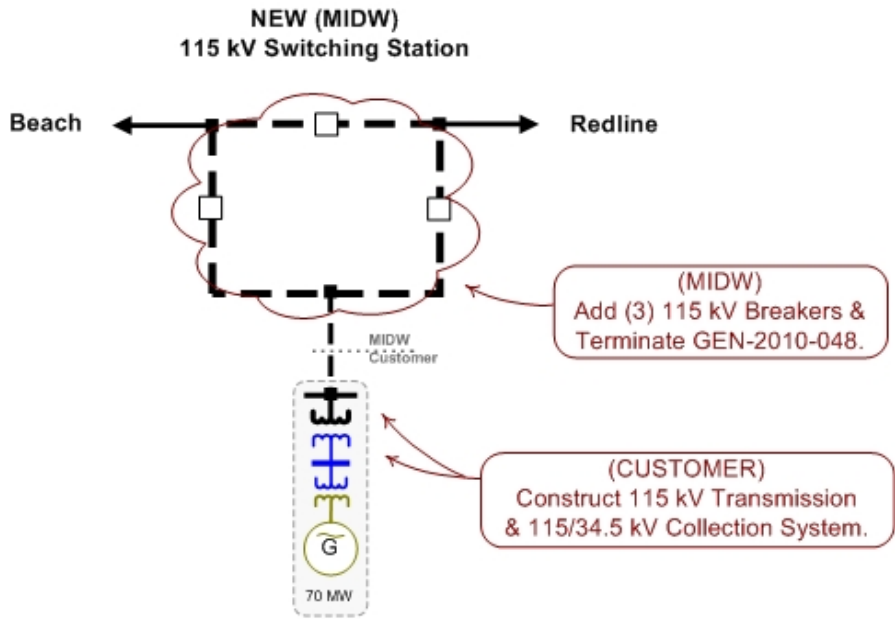
ASGI-2015-004
Estimated Cluster Analysis Interconnection Cost: \$ 0*
Estimated Stand Alone Analysis Interconnection Cost: \$ 0*



ASGI-2015-004

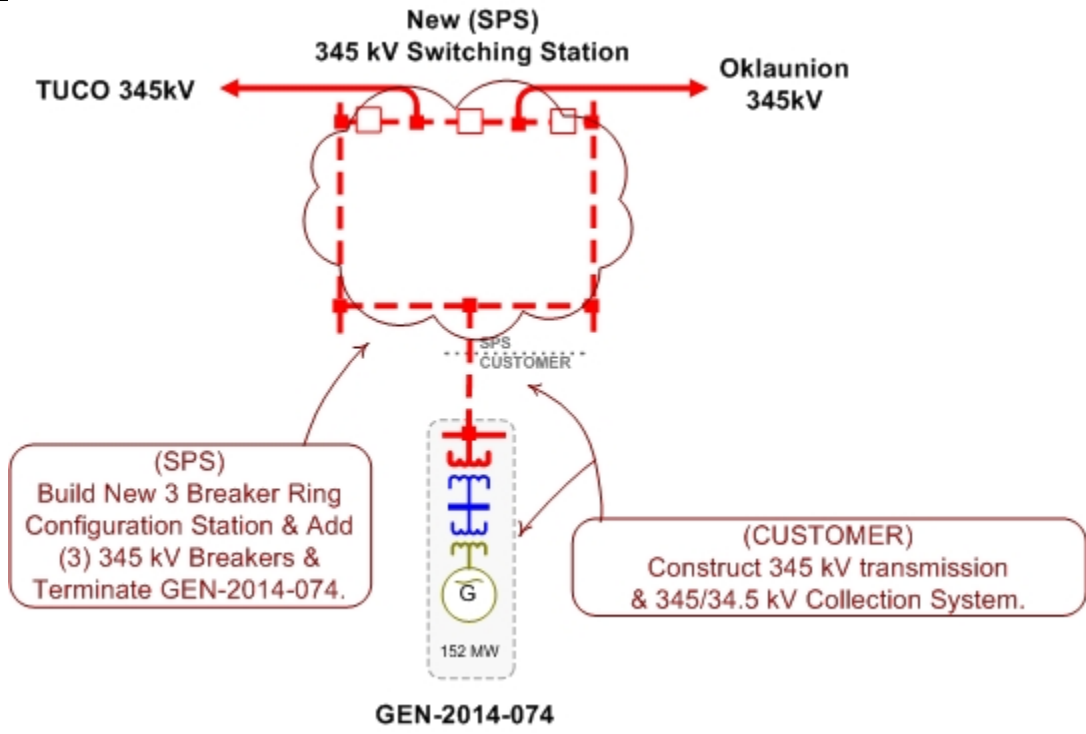
* Interconnection Cost Estimate(s) only include Affected System Interconnection costs

GEN-2010-048
Estimated Cluster Analysis Interconnection Cost: \$5,023,395
Estimated Stand Alone Analysis Interconnection Cost: \$5,023,395



GEN-2010-048

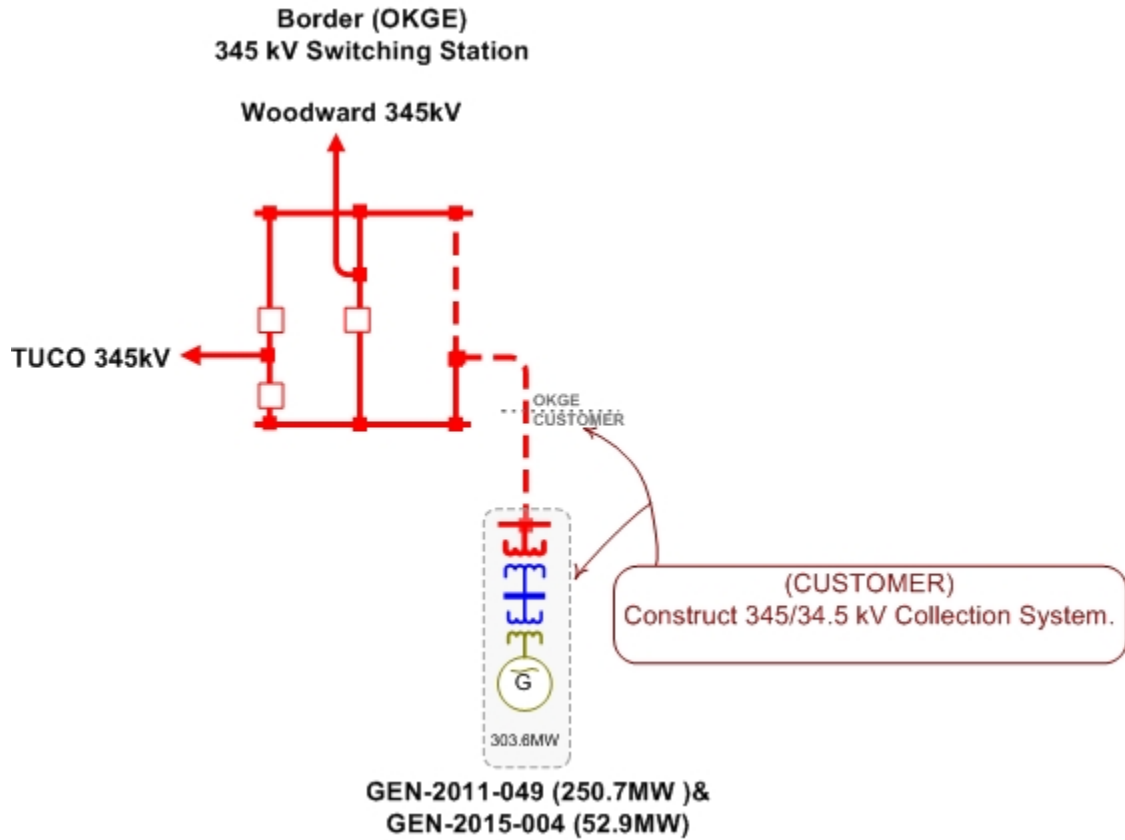
GEN-2014-074
Estimated Cluster Analysis Interconnection Cost: \$13,519,992
Estimated Stand Alone Analysis Interconnection Cost: \$13,519,992



GEN-2015-001

See Posted Interconnection Facilities Study for GEN-2015-001

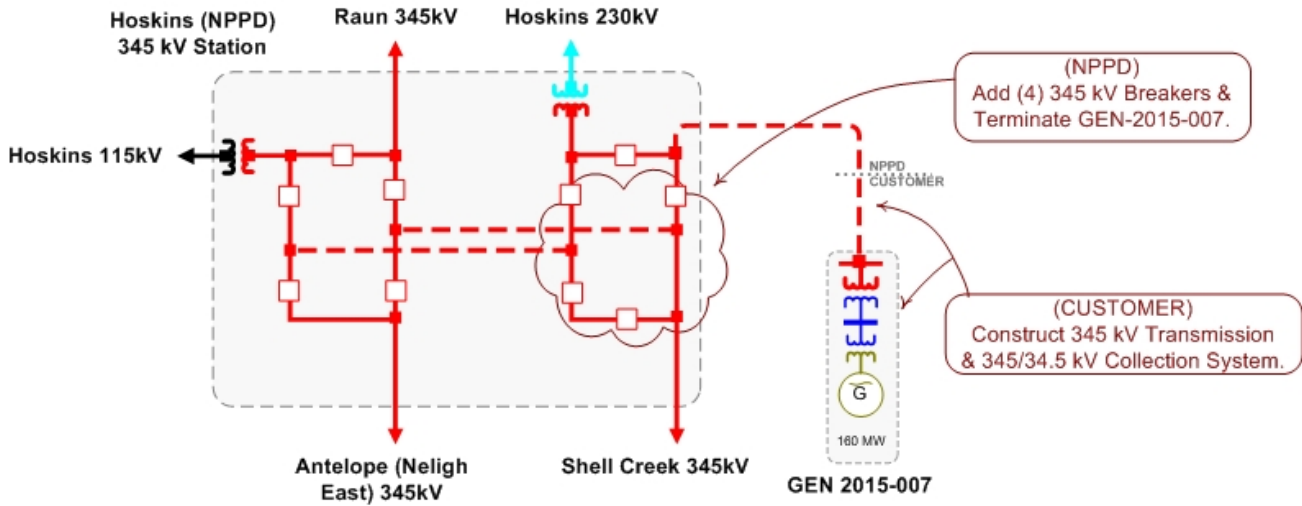
GEN-2015-004
Estimated Cluster Analysis Interconnection Cost: \$0
Estimated Stand Alone Analysis Interconnection Cost: \$0



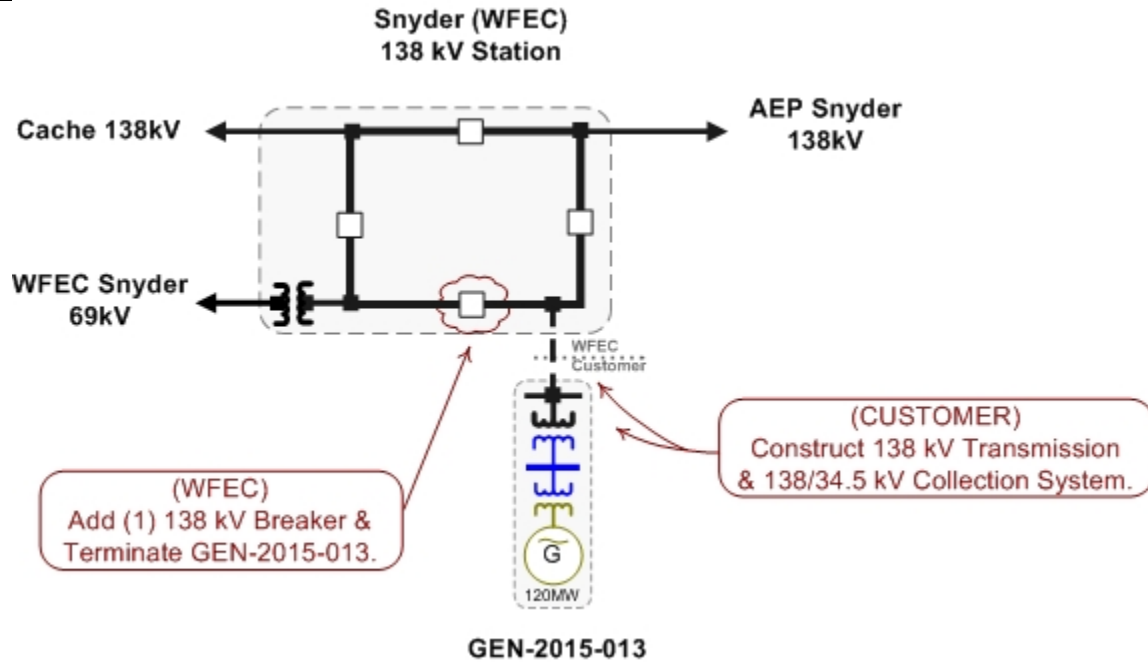
GEN-2015-005

See Posted Interconnection Facilities Study for GEN-2015-005

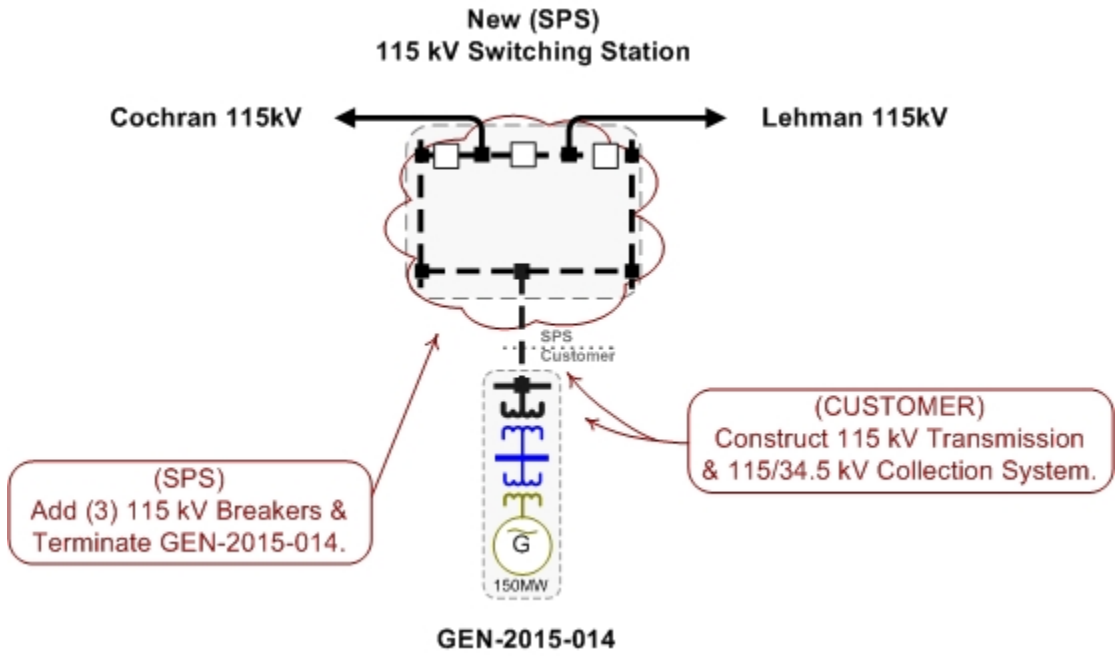
GEN-2015-007
Estimated Cluster Analysis Interconnection Cost: \$5,300,000
Estimated Stand Alone Analysis Interconnection Cost: \$5,300,000



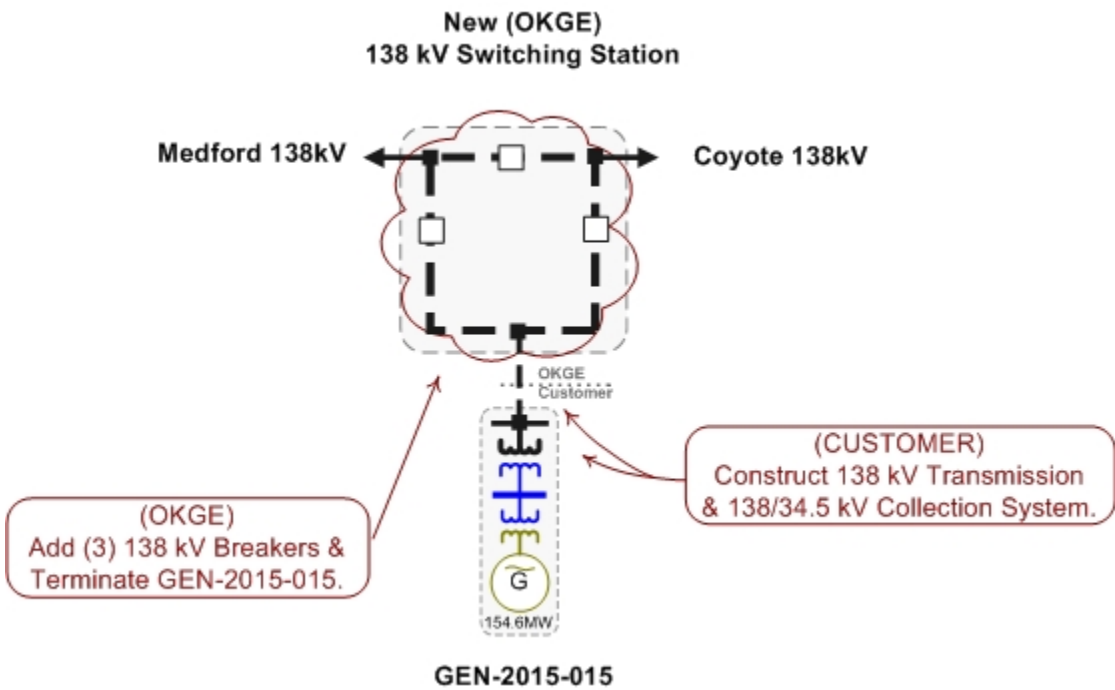
GEN-2015-013
Estimated Cluster Analysis Interconnection Cost: \$1,000,000
Estimated Stand Alone Analysis Interconnection Cost: \$1,000,000



GEN-2015-014
Estimated Cluster Analysis Interconnection Cost: \$4,773,333
Estimated Stand Alone Analysis Interconnection Cost: \$4,773,333



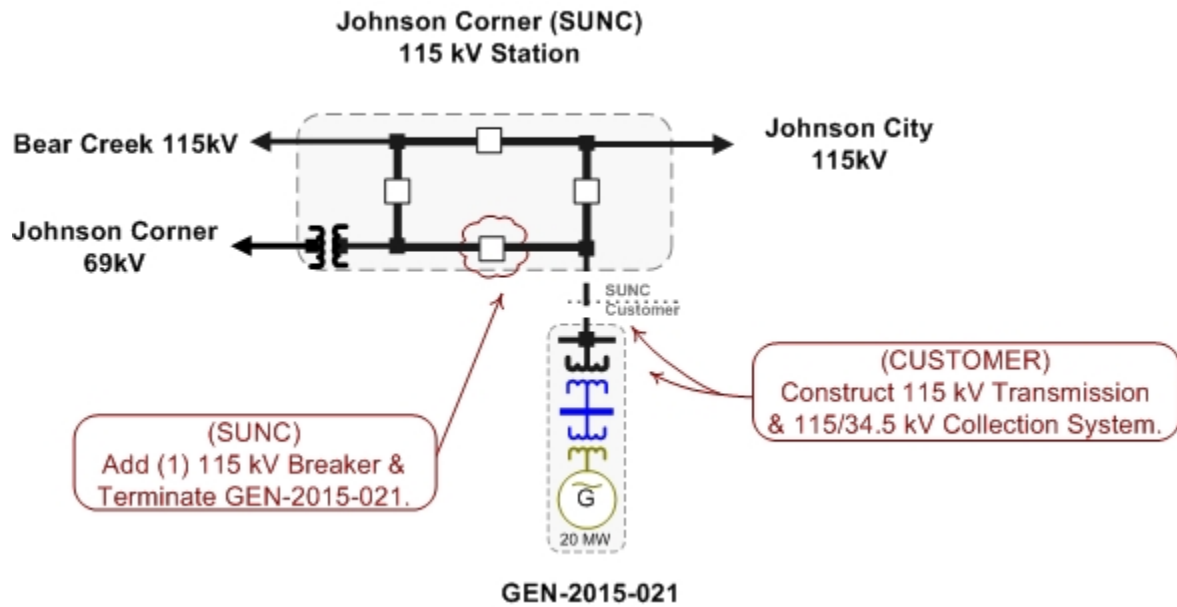
GEN-2015-015
Estimated Cluster Analysis Interconnection Cost: \$3,041,661
Estimated Stand Alone Analysis Interconnection Cost: \$3,041,661



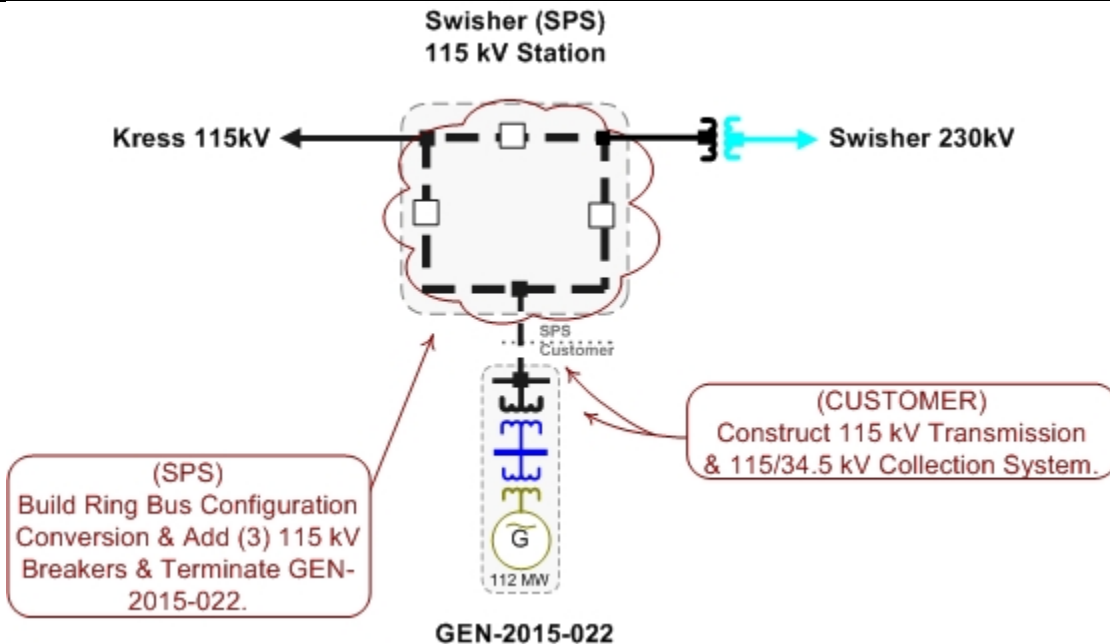
GEN-2015-016

See Posted Interconnection Facilities Study for GEN-2015-016

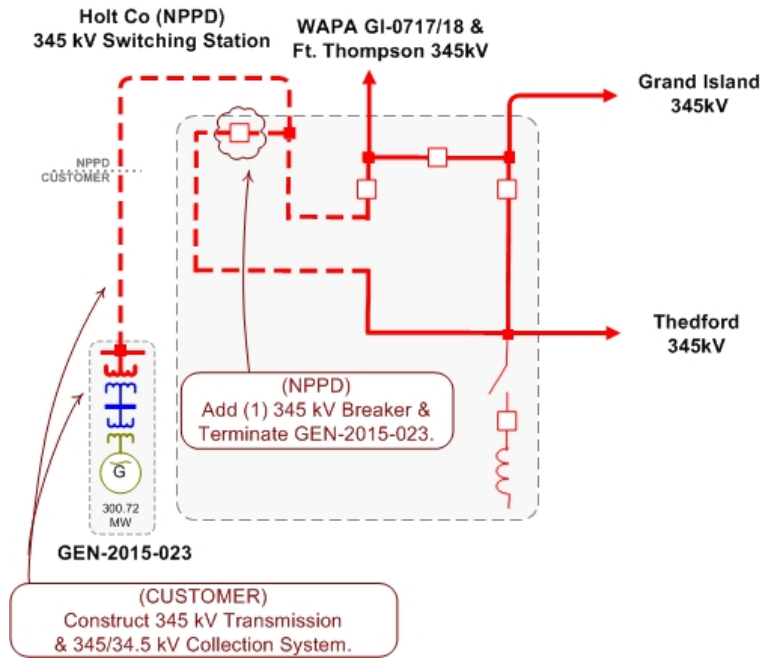
GEN-2015-021
Estimated Cluster Analysis Interconnection Cost: \$1,438,309
Estimated Stand Alone Analysis Interconnection Cost: \$1,438,309



GEN-2015-022
Estimated Cluster Analysis Interconnection Cost: \$3,565,234
Estimated Stand Alone Analysis Interconnection Cost: \$3,565,234



GEN-2015-023
Estimated Cluster Analysis Interconnection Cost: \$4,800,000
Estimated Stand Alone Analysis Interconnection Cost: \$4,800,000



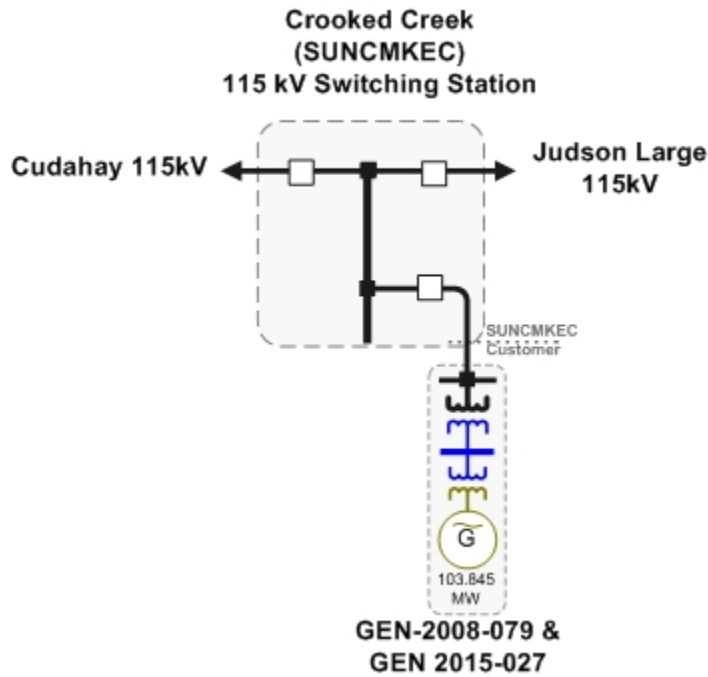
GEN-2015-024

See Posted Interconnection Facilities Study for GEN-2015-024

GEN-2015-025

See Posted Interconnection Facilities Study for GEN-2015-025

GEN-2015-027
Estimated Cluster Analysis Interconnection Cost: \$150,000
Estimated Stand Alone Analysis Interconnection Cost: \$150,000



GEN-2015-028

See Posted Interconnection Facilities Study for GEN-2015-028

GEN-2015-029

See Posted Interconnection Facilities Study for GEN-2015-029

GEN-2015-030

See Posted Interconnection Facilities Study for GEN-2015-030

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 an 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
ASGI-2015-001			
ASGI-2015-001 Interconnection Costs See One-Line Diagram.	Current Study	\$0	\$0
	Current Study Total	\$0	
ASGI-2015-002			
ASGI-2015-002 Interconnection Costs See One-Line Diagram.	Current Study	\$0	\$0
Oklauunion 345kV Reactive Power Install (2)-130Mvar Capacitor Bank(s) at Oklauunion.	Current Study	\$36,347	\$10,000,000
Amoco Wasson - Oxy Tap 230kV CKT 1 Replace line traps at both terminals	Previously Allocated		\$200,000
China Draw 115kV Reactive Power Support Build China Draw SVC (+200Mvar/-50Mvar) per 2015 ITPNT SPP-NTC-200324.	Previously Allocated		\$20,064,549
National Enrichment Plant-Targa 115kV CKT 1 Rebuild approximately 4 miles of 115kV from National Enrichment Plant to Targa per 2015 ITPNT.	Previously Allocated		\$2,909,669
Potash Junction 230kV Reactive Power Support Build Potash Junction 100Mvar Capacitor bank per 2015 ITPNT.	Previously Allocated		\$6,465,875
Targa-Cardinal 115kV CKT 1 Rebuild approximately 3 miles of 115kV from Targa to Cardinal per 2015 ITPNT.	Previously Allocated		\$2,049,062
Tolk - Plant X 230kV CKT 1 & 2 Rebuild circuit 1 and 2 between Tolk - Plant X 230kV to 1200 amps each.	Previously Allocated		\$9,921,693
	Current Study Total	\$36,347	
ASGI-2015-004			
ASGI-2015-004 Interconnection Costs See One-Line Diagram.	Current Study	\$0	\$0
	Current Study Total	\$0	
GEN-2010-048			
Beach - GEN-2010-048 Tap CKT 1 Replace terminal equipment	Current Study	\$250,000	\$250,000

* 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
GEN-2010-048 Interconnection Costs See One-Line Diagram.	Current Study	\$5,023,395	\$5,023,395
Arnold - Ransom 115kV CKT 1 Replace terminal equipment and relay panels at Ransom Substation	Previously Allocated		\$268,321
Bucker - Spearville 345V CKT 1 Replace Terminal equipment	Previously Allocated		\$1,480,238
Mingo 345/115kV Transformer CKT 2 Build second 345/115/13.8kV transformer at Mingo per 2015 NT SPP-NTC-200325 (Total Project E&C Cost Shown)..	Previously Allocated		\$10,696,692
	Current Study Total	\$5,273,395	

GEN-2014-074

Bushland - Potter County 230kV CKT 1 NRIS only required upgrade: Replace line traps at both terminals	Current Study	\$400,000	\$400,000
Carlisle - LP-Doud 115kV CKT 1 NRIS only required upgrade: Replace line traps	Current Study	\$400,000	\$400,000
Carlisle 230/115/13kV Transformer CKT 1 NRIS only required upgrade: Replace existing Carlisle 230/115/13kV Transformer circuit #1 with 250 MVA.	Current Study	\$4,192,913	\$4,192,913
Crawfish Draw (TUCO 2) 230/115/13kV Transformer CKT 1 NRIS only required upgrade: Build 115kV yard at TUCO 2, re-route Hale County - TUCO 115kV into TUCO 2 115kV, build TUCO 2 230/115/13kV Transformer 1	Current Study	\$12,000,000	\$12,000,000
GEN-2014-074 Interconnection Costs See One-Line Diagram.	Current Study	\$15,469,034	\$15,469,034
Kress Interchange - Swisher 115kV CKT 1 Replace terminal equipment	Current Study	\$2,102	\$500,000
Kress Interchange - Swisher 115kV CKT 2 NRIS only required upgrade: Build second 115kV circuit from Kress - Swisher.	Current Study	\$2,304,000	\$2,304,000
Oklaunion 345kV Reactive Power Install (2)-130Mvar Capacitor Bank(s) at Oklaunion.	Current Study	\$2,757,706	\$10,000,000
Potter County Interchange 345/230/13kV Transformer CKT 2 NRIS only required upgrade: Build second 345/230/13kV transformer at Potter County	Current Study	\$15,000,000	\$15,000,000
Sundown Interchange 230/115/13.8kV Transformer CKT 1 NRIS only required upgrade: Replace existing Sundown Interchange Transformer circuit #1 with 250 MVA.	Current Study	\$3,938,596	\$6,020,434
TUCO 2 (Crawfish Draw) Substation Upgrade 345/230kV NRIS only required upgrade: Tap Border-TUCO approximately 2 miles from TUCO and build TUCO 2 (Crawfish Draw) 345kV substation and add 345/230/13.2kV transformer and tie on TUCO-	Current Study	\$24,764,205	\$24,764,205

* 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
TUCO Interchange - Jones 230kV CKT 1 NRIS only required upgrade: Replace line traps at both terminals	Current Study	\$276,815	\$400,000
Wolfforth - Terry County 115kV CKT 1 NRIS only required upgrade: Replace terminal equipment to achieving conductor limit	Current Study	\$662,441	\$1,000,000
Wolfforth Interchange 230/115/13.2kV Transformer CKT 1 NRIS only required upgrade: Replace existing Wolfforth Interchange Transformer circuit #1 with 250 MVA.	Current Study	\$4,790,563	\$6,020,434
China Draw 115kV Reactive Power Support Build China Draw SVC (+200Mvar/-50Mvar) per 2015 ITPNT SPP-NTC-200324.	Previously Allocated		\$20,064,549
Potash Junction 230kV Reactive Power Support Build Potash Junction 100Mvar Capacitor bank per 2015 ITPNT.	Previously Allocated		\$6,465,875
Tolk - Plant X 230kV CKT 1 & 2 Rebuild circuit 1 and 2 between Tolk - Plant X 230kV to 1200 amps each.	Previously Allocated		\$9,921,693
TUCO 230/115kV CKT 1 Transformer NRIS only required upgrade: Replace TUCO 230/115kV transformer per SPP-2012-AG3-AFS9 SPP-NTC-200297	Previously Allocated		\$3,800,415
TUCO 345/230/13.2kV CKT 1 Replace existing TUCO 345/230/13.2kV Transformer circuit #1 with 700MVA.	Previously Allocated		\$3,347,036
	Current Study Total	\$86,958,376	
GEN-2015-001			
GEN-2015-001 Interconnection Costs See One-Line Diagram.	Current Study	\$2,250,100	\$2,250,100
	Current Study Total	\$2,250,100	
GEN-2015-004			
GEN-2015-004 Interconnection Costs See One-Line Diagram.	Current Study	\$0	\$0
Oklaunion 345kV Reactive Power Install (2)-130Mvar Capacitor Bank(s) at Oklaunion.	Current Study	\$3,193,214	\$10,000,000
Woodward EHV Phase Shifting Transformer CKT 1 Install one phase shifting transformer at Woodward	Previously Allocated		\$7,200,000
	Current Study Total	\$3,193,214	
GEN-2015-005			
GEN-2015-005 Interconnection Costs See One-Line Diagram.	Current Study	\$18,262,000	\$18,262,000

* 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
Nebraska City - Sibley 345kV CKT 1 Priority Project: Nebraska City - Mullin Creek - Sibley 345kV circuit 1 per SPP-NTC-20097 and SPP-NTC-20098 (Total Project E&C Cost Shown).	Previously Allocated		\$336,433,874
	Current Study Total	\$18,262,000	
GEN-2015-007			
GEN-2015-007 Interconnection Costs See One-Line Diagram.	Current Study	\$5,300,000	\$5,300,000
Gentleman - Thedford 345kV CKT 1 Build approximately 76 Miles of 345kV from Gentleman to Thedford per SPP-NTC-200220 (Total Project E&C Cost Shown).	Previously Allocated		\$311,717,040
Thedford - Holt County 345kV CKT 1 Build approximately 146 Miles of 345kV from Thedford to Holt County per SPP-NTC-200220 (Total Project E&C Cost Shown).	Previously Allocated		\$311,717,040
Thedford 345/115kV Transformer CKT 1 Install Thedford 345/115kV transformer per SPP-NTC-200277 (Total Project E&C Cost Shown).	Previously Allocated		\$311,717,040
Twin Church - Dixon County 230kV Increase conductor clearances to accommodate 320MVA facility rating	Previously Allocated		\$100,000
	Current Study Total	\$5,300,000	
GEN-2015-013			
Altus SW - Navajo 69kV CKT 1 Rebuild approximately 2.5 miles of 69kV from Altus SW to Navajo	Current Study	\$1,250,000	\$1,250,000
Anadarko - Sequoyah 138kV CKT 1 Rebuild approximately 1 mile of 138kV from Anadarko to Sequoyah	Current Study	\$700,000	\$700,000
Cornville Tap - Naples Tap 138kV CKT 1 Rebuild approximately 11 miles of 138kV from Cornville Tap to Naples Tap	Current Study	\$7,700,000	\$7,700,000
GEN-2015-013 Interconnection Costs See One-Line Diagram.	Current Study	\$1,000,000	\$1,000,000
Naples Tap - Payne 138kV CKT 1 Rebuild approximately 8 miles of 138kV from Naples Tap to Payne	Current Study	\$5,600,000	\$5,600,000
Navajo - Snyder 69kV CKT 1 Rebuild approximately 15 miles of 69kV from Navajo to Snyder	Current Study	\$7,500,000	\$7,500,000
Sequoyah - Cornville Tap 138kV CKT 1 Rebuild approximately 20 miles of 138kV from Sequoyah to Cornville Tap	Current Study	\$1,000,000	\$1,000,000
Stateline - Sweetwater 230kV CKT 1 Replace terminal equipment	Current Study	\$1,000,000	\$1,000,000

* 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
Woodward EHV Phase Shifting Transformer CKT 1 Install one phase shifting transformer at Woodward	Previously Allocated		\$7,200,000
	Current Study Total	\$25,750,000	
GEN-2015-014			
GEN-2015-014 Interconnection Costs See One-Line Diagram.	Current Study	\$4,773,333	\$4,773,333
Oklauunion 345kV Reactive Power Install (2)-130Mvar Capacitor Bank(s) at Oklauunion.	Current Study	\$2,450,056	\$10,000,000
Amoco Wasson - Oxy Tap 230kV CKT 1 Replace line traps at both terminals	Previously Allocated		\$200,000
National Enrichment Plant-Targa 115kV CKT 1 Rebuild approximately 4 miles of 115kV from National Enrichment Plant to Targa per 2015 ITPNT.	Previously Allocated		\$2,909,669
Potash Junction 230kV Reactive Power Support Build Potash Junction 100Mvar Capacitor bank per 2015 ITPNT.	Previously Allocated		\$6,465,875
Targa-Cardinal 115kV CKT 1 Rebuild approximately 3 miles of 115kV from Targa to Cardinal per 2015 ITPNT.	Previously Allocated		\$2,049,062
Tolk - Plant X 230kV CKT 1 & 2 Rebuild circuit 1 and 2 betweek Tolk - Plant X 230kV to 1200 amps each.	Previously Allocated		\$9,921,693
	Current Study Total	\$7,223,389	
GEN-2015-015			
GEN-2015-015 Interconnection Costs See One-Line Diagram.	Current Study	\$3,041,661	\$3,041,661
Renfrow - Renfrow 138kV CKT 1 NRIS only required upgrade: Rebuild approximately 2 miles of 138kV from Renfrow to Renfrow.	Current Study	\$1,400,000	\$1,400,000
Clearwater - Viola 138kV CKT 1 SPP 2013 ITP NT assigneg upgrade per SPP-NTC-200288 for 6/1/2019 in-service.	Previously Allocated		\$37,815,044
Viola 345/138 kV Transformer CKT 1 SPP 2013 ITP NT assigned upgrade per SPP-NTC-200288 for 6/1/2019 in-service.	Previously Allocated		\$19,339,327
	Current Study Total	\$4,441,661	
GEN-2015-016			
GEN-2015-016 Interconnection Costs See One-Line Diagram.	Current Study	\$8,190,000	\$8,190,000

* 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
	Current Study Total	\$8,190,000	
GEN-2015-021			
GEN-2015-021 Interconnection Costs See One-Line Diagram.	Current Study	\$1,438,309	\$1,438,309
Bucker - Spearville 345V CKT 1 Replace Terminal equipment	Previously Allocated		\$1,480,238
Walkemeyer Tap - Walkemeyer 345/115kV Project Per SPP-NTC-200343 and SPP-NTC-200344 (Total Project E&C Cost Shown).	Previously Allocated		\$17,838,846
Woodward EHV Phase Shifting Transformer CKT 1 Install one phase shifting transformer at Woodward	Previously Allocated		\$7,200,000
	Current Study Total	\$1,438,309	
GEN-2015-022			
Cox Interchange - Hale County 115kV CKT 1 NRIS only required upgrade: Rebuild approximately 20 miles of 115kV from Hale Co to Cox Co	Current Study	\$15,000,000	\$15,000,000
GEN-2015-022 Interconnection Costs See One-Line Diagram.	Current Study	\$3,565,234	\$3,565,234
Kress Interchange - Swisher 115kV CKT 1 Replace terminal equipment	Current Study	\$497,898	\$500,000
Oklaunion 345kV Reactive Power Install (2)-130Mvar Capacitor Bank(s) at Oklaunion.	Current Study	\$1,562,677	\$10,000,000
Sundown Interchange 230/115/13.8kV Transformer CKT 1 NRIS only required upgrade: Replace existing Sundown Interchange Transformer circuit #1 with 250 MVA.	Current Study	\$2,081,838	\$6,020,434
TUCO Interchange - Jones 230kV CKT 1 NRIS only required upgrade: Replace line traps at both terminals	Current Study	\$123,185	\$400,000
Wolfforth - Terry County 115kV CKT 1 NRIS only required upgrade: Replace terminal equipment to achieving conductor limit	Current Study	\$337,559	\$1,000,000
Wolfforth Interchange 230/115/13.2kV Transformer CKT 1 NRIS only required upgrade: Replace existing Wolfforth Interchange Transformer circuit #1 with 250 MVA.	Current Study	\$1,229,871	\$6,020,434
Potash Junction 230/115 kV Ckt 1 Per HPILs SPP-NTC-200282 (Total Project E&C Cost Shown)	Previously Allocated		\$3,508,346
TUCO 345/230/13.2kV CKT 1 Replace existing TUCO 345/230/13.2kV Transformer circuit #1 with 700MVA.	Previously Allocated		\$3,347,036

* 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
Current Study Total		\$24,398,261	
GEN-2015-023			
GEN-2015-023 Interconnection Costs See One-Line Diagram.	Current Study	\$4,800,000	\$4,800,000
Battle Creek - County Line 115kV CKT 1 Rebuild approximately 11 miles of 115kV from Battle Creek to County Line.	Previously Allocated		\$4,000,000
County Line - Neligh East 115kV CKT 1 Rebuild approximately 12 miles of 115kV from County Line to Neligh East.	Previously Allocated		\$8,050,000
Gentleman - Thedford 345kV CKT 1 Build approximately 76 Miles of 345kV from Gentleman to Thedford per SPP-NTC-200220 (Total Project E&C Cost Shown).	Previously Allocated		\$311,717,040
Hoskins - Neligh 345/115kV Projects Per SPP 2014 ITP NT and NTC 200253 for 6/1/2016 in-service.	Previously Allocated		\$98,697,720
Thedford - Holt County 345kV CKT 1 Build approximately 146 Miles of 345kV from Thedford to Holt County per SPP-NTC-200220 (Total Project E&C Cost Shown).	Previously Allocated		\$311,717,040
Thedford 345/115kV Transformer CKT 1 Install Thedford 345/115kV transformer per SPP-NTC-200277 (Total Project E&C Cost Shown).	Previously Allocated		\$311,717,040
Twin Church - Dixon County 230kV Increase conductor clearances to accommodate 320MVA facility rating	Previously Allocated		\$100,000
Current Study Total		\$4,800,000	
GEN-2015-024			
GEN-2015-024 Interconnection Costs See One-Line Diagram.	Current Study	\$33,199,661	\$33,199,661
Current Study Total		\$33,199,661	
GEN-2015-025			
GEN-2015-025 Interconnection Costs See One-Line Diagram.	Current Study	\$30,000	\$30,000
Current Study Total		\$30,000	
GEN-2015-027			
Cimarron River Tap - Kismet CKT 1 Rebuild approximately 3.4 miles of 115kV from Cudahy - Kismet.	Current Study	\$2,400,000	\$2,400,000
Crooked Creek - Cudahy 115kV CKT 1 Rebuild approximately 10 miles of 115kV from Crooked Creek - Cudahy.	Current Study	\$7,000,000	\$7,000,000

* 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
Cudahy - Kismet 115kV CKT 1 Rebuild approximately 32 miles of 115kV from Cudahy - Kismet.	Current Study	\$22,400,000	\$22,400,000
GEN-2015-027 Interconnection Costs See One-Line Diagram.	Current Study	\$150,000	\$150,000
Greenburg - Shooting Star 115kV CKT 1 Rebuild approximately 8 miles of 115kV from Greenburg - Shooting Star.	Current Study	\$5,250,000	\$5,250,000
Walkemeyer Tap - Walkemeyer 345/115kV Project Per SPP-NTC-200343 and SPP-NTC-200344 (Total Project E&C Cost Shown).	Previously Allocated		\$17,838,846
Woodward EHV Phase Shifting Transformer CKT 1 Install one phase shifting transformer at Woodward	Previously Allocated		\$7,200,000
	Current Study Total	\$37,200,000	
GEN-2015-028			
GEN-2015-028 Interconnection Costs See One-Line Diagram.	Current Study	\$0	\$0
Clearwater - Viola 138kV CKT 1 SPP 2013 ITP NT assigneg upgrade per SPP-NTC-200288 for 6/1/2019 in-service.	Previously Allocated		\$37,815,044
Viola 345/138 kV Transformer CKT 1 SPP 2013 ITP NT assigned upgrade per SPP-NTC-200288 for 6/1/2019 in-service.	Previously Allocated		\$19,339,327
	Current Study Total	\$0	
GEN-2015-029			
GEN-2015-029 Interconnection Costs See One-Line Diagram.	Current Study	\$2,270,100	\$2,270,100
	Current Study Total	\$2,270,100	
GEN-2015-030			
GEN-2015-030 Interconnection Costs See One-Line Diagram.	Current Study	\$3,369,366	\$3,369,366
Clearwater - Viola 138kV CKT 1 SPP 2013 ITP NT assigneg upgrade per SPP-NTC-200288 for 6/1/2019 in-service.	Previously Allocated		\$37,815,044
Viola 345/138 kV Transformer CKT 1 SPP 2013 ITP NT assigned upgrade per SPP-NTC-200288 for 6/1/2019 in-service.	Previously Allocated		\$19,339,327
	Current Study Total	\$3,369,366	
TOTAL CURRENT STUDY COSTS:		\$273,584,179	

* 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

Altus SW - Navajo 69kV CKT 1		\$1,250,000
Rebuild approximately 2.5 miles of 69kV from Altus SW to Navajo		
	GEN-2015-013	\$1,250,000
	Total Allocated Costs	\$1,250,000
Anadarko - Sequoyah 138KV CKT 1		\$700,000
Rebuild approximately 1 mile of 138kV from Anadarko to Sequoyah		
	GEN-2015-013	\$700,000
	Total Allocated Costs	\$700,000
ASGI-2015-001 Interconnection Costs		\$0
See One-Line Diagram.		
	ASGI-2015-001	\$0
	Total Allocated Costs	\$0
ASGI-2015-002 Interconnection Costs		\$0
See One-Line Diagram.		
	ASGI-2015-002	\$0
	Total Allocated Costs	\$0
ASGI-2015-004 Interconnection Costs		\$0
See One-Line Diagram.		
	ASGI-2015-004	\$0
	Total Allocated Costs	\$0
Beach - GEN-2010-048 Tap CKT 1		\$250,000
Replace terminal equipment		
	GEN-2010-048	\$250,000
	Total Allocated Costs	\$250,000
Bushland - Potter County 230kV CKT 1		\$400,000
NRIS only required upgrade: Replace line traps at both terminals		
	GEN-2014-074	\$400,000
	Total Allocated Costs	\$400,000

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

Carlisle - LP-Doud 115kV CKT 1	\$400,000
NRIS only required upgrade: Replace line traps	
GEN-2014-074	\$400,000
Total Allocated Costs	\$400,000
Carlisle 230/115/13kV Transformer CKT 1	\$4,192,913
NRIS only required upgrade: Replace existing Carlisle 230/115/13kV Transformer circuit #1 with 250 MVA.	
GEN-2014-074	\$4,192,913
Total Allocated Costs	\$4,192,913
Cimarron River Tap - Kismet CKT 1	\$2,400,000
Rebuild approximately 3.4 miles of 115kV from Cudahy - Kismet.	
GEN-2015-027	\$2,400,000
Total Allocated Costs	\$2,400,000
Cornville Tap - Naples Tap 138kV CKT 1	\$7,700,000
Rebuild approximately 11 miles of 138kV from Cornville Tap to Naples Tap	
GEN-2015-013	\$7,700,000
Total Allocated Costs	\$7,700,000
Cox Interchange - Hale County 115kV CKT 1	\$15,000,000
NRIS only required upgrade: Rebuild approximately 20 miles of 115kV from Hale Co to Cox Co	
GEN-2015-022	\$15,000,000
Total Allocated Costs	\$15,000,000
Crawfish Draw (TUCO 2) 230/115/13kV Transformer CKT 1	\$12,000,000
NRIS only required upgrade: Build 115kV yard at TUCO 2, re-route Hale County - TUCO 115kV into TUCO 2 115kV, build TUCO 2 230/115/13kV Transformer 1	
GEN-2014-074	\$12,000,000
Total Allocated Costs	\$12,000,000
Crooked Creek - Cudahy 115kV CKT 1	\$7,000,000
Rebuild approximately 10 miles of 115kV from Crooked Creek - Cudahy.	
GEN-2015-027	\$7,000,000
Total Allocated Costs	\$7,000,000
Cudahy - Kismet 115kV CKT 1	\$22,400,000
Rebuild approximately 32 miles of 115kV from Cudahy - Kismet.	
GEN-2015-027	\$22,400,000
Total Allocated Costs	\$22,400,000

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

GEN-2010-048 Interconnection Costs		\$5,023,395
See One-Line Diagram.		
	GEN-2010-048	\$5,023,395
	Total Allocated Costs	\$5,023,395
GEN-2014-074 Interconnection Costs		\$15,469,034
See One-Line Diagram.		
	GEN-2014-074	\$15,469,034
	Total Allocated Costs	\$15,469,034
GEN-2015-001 Interconnection Costs		\$2,250,100
See One-Line Diagram.		
	GEN-2015-001	\$2,250,100
	Total Allocated Costs	\$2,250,100
GEN-2015-004 Interconnection Costs		\$0
See One-Line Diagram.		
	GEN-2015-004	\$0
	Total Allocated Costs	\$0
GEN-2015-005 Interconnection Costs		\$18,262,000
See One-Line Diagram.		
	GEN-2015-005	\$18,262,000
	Total Allocated Costs	\$18,262,000
GEN-2015-007 Interconnection Costs		\$5,300,000
See One-Line Diagram.		
	GEN-2015-007	\$5,300,000
	Total Allocated Costs	\$5,300,000
GEN-2015-013 Interconnection Costs		\$1,000,000
See One-Line Diagram.		
	GEN-2015-013	\$1,000,000
	Total Allocated Costs	\$1,000,000
GEN-2015-014 Interconnection Costs		\$4,773,333
See One-Line Diagram.		
	GEN-2015-014	\$4,773,333
	Total Allocated Costs	\$4,773,333

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

GEN-2015-015 Interconnection Costs		\$3,041,661
See One-Line Diagram.		
	GEN-2015-015	\$3,041,661
	Total Allocated Costs	\$3,041,661
GEN-2015-016 Interconnection Costs		\$8,190,000
See One-Line Diagram.		
	GEN-2015-016	\$8,190,000
	Total Allocated Costs	\$8,190,000
GEN-2015-021 Interconnection Costs		\$1,438,309
See One-Line Diagram.		
	GEN-2015-021	\$1,438,309
	Total Allocated Costs	\$1,438,309
GEN-2015-022 Interconnection Costs		\$3,565,234
See One-Line Diagram.		
	GEN-2015-022	\$3,565,234
	Total Allocated Costs	\$3,565,234
GEN-2015-023 Interconnection Costs		\$4,800,000
See One-Line Diagram.		
	GEN-2015-023	\$4,800,000
	Total Allocated Costs	\$4,800,000
GEN-2015-024 Interconnection Costs		\$33,199,661
See One-Line Diagram.		
	GEN-2015-024	\$33,199,661
	Total Allocated Costs	\$33,199,661
GEN-2015-025 Interconnection Costs		\$30,000
See One-Line Diagram.		
	GEN-2015-025	\$30,000
	Total Allocated Costs	\$30,000
GEN-2015-027 Interconnection Costs		\$150,000
See One-Line Diagram.		
	GEN-2015-027	\$150,000
	Total Allocated Costs	\$150,000

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

GEN-2015-028 Interconnection Costs		\$0
See One-Line Diagram.		
	GEN-2015-028	\$0
	Total Allocated Costs	\$0
GEN-2015-029 Interconnection Costs		\$2,270,100
See One-Line Diagram.		
	GEN-2015-029	\$2,270,100
	Total Allocated Costs	\$2,270,100
GEN-2015-030 Interconnection Costs		\$3,369,366
See One-Line Diagram.		
	GEN-2015-030	\$3,369,366
	Total Allocated Costs	\$3,369,366
Greenburg - Shooting Star 115kV CKT 1		\$5,250,000
Rebuild approximately 8 miles of 115kV from Greenburg - Shooting Star.		
	GEN-2015-027	\$5,250,000
	Total Allocated Costs	\$5,250,000
Kress Interchange - Swisher 115kV CKT 1		\$500,000
Replace terminal equipment		
	GEN-2014-074	\$2,102
	GEN-2015-022	\$497,898
	Total Allocated Costs	\$500,000
Kress Interchange - Swisher 115kV CKT 2		\$2,304,000
NRIS only required upgrade: Build second 115kV circuit from Kress - Swisher.		
	GEN-2014-074	\$2,304,000
	Total Allocated Costs	\$2,304,000
Naples Tap - Payne 138kV CKT 1		\$5,600,000
Rebuild approximately 8 miles of 138kV from Naples Tap to Payne		
	GEN-2015-013	\$5,600,000
	Total Allocated Costs	\$5,600,000
Navajo - Snyder 69kV CKT 1		\$7,500,000
Rebuild approximately 15 miles of 69kV from Navajo to Snyder		
	GEN-2015-013	\$7,500,000
	Total Allocated Costs	\$7,500,000

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

Oklaunion 345kV Reactive Power **\$10,000,000**

Install (2)-130Mvar Capacitor Bank(s) at Oklaunion.

ASGI-2015-002	\$36,347
GEN-2014-074	\$2,757,706
GEN-2015-004	\$3,193,214
GEN-2015-014	\$2,450,056
GEN-2015-022	\$1,562,677

Total Allocated Costs **\$10,000,000**

Potter County Interchange 345/230/13kV Transformer CKT 2 **\$15,000,000**

NRIS only required upgrade: Build second 345/230/13kV transformer at Potter County

GEN-2014-074	\$15,000,000
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Total Allocated Costs **\$15,000,000**

Renfrow - Renfrow 138kV CKT 1 **\$1,400,000**

NRIS only required upgrade: Rebuild approximately 2 miles of 138kV from Renfrow to Renfrow.

GEN-2015-015	\$1,400,000
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Total Allocated Costs **\$1,400,000**

Sequoyah - Cornville Tap 138kV CKT 1 **\$1,000,000**

Rebuild approximately 20 miles of 138kV from Sequoyah to Cornville Tap

GEN-2015-013	\$1,000,000
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Total Allocated Costs **\$1,000,000**

Stateline - Sweetwater 230kV CKT 1 **\$1,000,000**

Replace terminal equipment

GEN-2015-013	\$1,000,000
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Total Allocated Costs **\$1,000,000**

Sundown Interchange 230/115/13.8kV Transformer CKT 1 **\$6,020,434**

NRIS only required upgrade: Replace existing Sundown Interchange Transformer circuit #1 with 250 MVA.

GEN-2014-074	\$3,938,596
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GEN-2015-022	\$2,081,838
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Total Allocated Costs **\$6,020,434**

TUCO 2 (Crawfish Draw) Substation Upgrade 345/230kV **\$24,764,205**

NRIS only required upgrade: Tap Border-TUCO approximately 2 miles from TUCO and build TUCO 2 (Crawfish Draw) 345kV substation and add 345/230/13.2kV transformer and tie on TUCO-Swisher 230kV.

GEN-2014-074	\$24,764,205
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Total Allocated Costs **\$24,764,205**

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

TUCO Interchange - Jones 230kV CKT 1 **\$400,000**

NRIS only required upgrade: Replace line traps at both terminals

GEN-2014-074 \$276,815

GEN-2015-022 \$123,185

Total Allocated Costs **\$400,000**

Wolfforth - Terry County 115kV CKT 1 **\$1,000,000**

NRIS only required upgrade: Replace terminal equipment to achieving conductor limit

GEN-2014-074 \$662,441

GEN-2015-022 \$337,559

Total Allocated Costs **\$1,000,000**

Wolfforth Interchange 230/115/13.2kV Transformer CKT 1 **\$6,020,434**

NRIS only required upgrade: Replace existing Wolfforth Interchange Transformer circuit #1 with 250 MVA.

GEN-2014-074 \$4,790,563

GEN-2015-022 \$1,229,871

Total Allocated Costs **\$6,020,434**

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

G: Power Flow Analysis (Constraints Requiring Transmission Reinforcement)

See next page.

SOLUTION	GROUP	SCENARIO	SEASON	SOURCE	DIRECTION	MONITORED ELEMENT	RATEA (MVA)	RATEB (MVA)	TDF	TC%LOADING (% MVA)	CONTINGENCY
FDNS	00NR		0 20SP	G15_022	TO->FROM	KRESS INTERCHANGE - SWISHER COUNTY INTERCHANGE 115KV CKT 1	159.35	175.28	0.50316	104.6079	TUCO INTERCHANGE - YOAKUM_345 345.00 345KV CKT 1
FDNS	00NR		0 20SP	G15_022	TO->FROM	KRESS INTERCHANGE - SWISHER COUNTY INTERCHANGE 115KV CKT 1	159.35	175.28	0.50198	104.4815	HART INDUSTRIAL - NEWHART 115KV CKT 1
FDNS	00NR		0 20SP	G15_022	TO->FROM	KRESS INTERCHANGE - SWISHER COUNTY INTERCHANGE 115KV CKT 1	159.35	175.28	0.50208	104.4551	CARLISLE INTERCHANGE - TUCO INTERCHANGE 230KV CKT 1
FDNS	00NR		0 20SP	G15_022	TO->FROM	KRESS INTERCHANGE - SWISHER COUNTY INTERCHANGE 115KV CKT 1	159.35	175.28	0.50208	104.4551	CARLISLE INTERCHANGE - TUCO INTERCHANGE 230KV CKT 1
FDNS	00NR		0 20SP	G15_022	TO->FROM	KRESS INTERCHANGE - SWISHER COUNTY INTERCHANGE 115KV CKT 1	159.35	175.28	0.50117	104.4526	BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1
FDNS	06ALL		0 20SP	G15_022	TO->FROM	KRESS INTERCHANGE - SWISHER COUNTY INTERCHANGE 115KV CKT 1	159.35	175.28	0.52775	104.4455	AMARILLO SOUTH INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1
FDNS	06ALL		0 20SP	G15_022	TO->FROM	KRESS INTERCHANGE - SWISHER COUNTY INTERCHANGE 115KV CKT 1	159.35	175.28	0.52775	104.4455	AMARILLO SOUTH INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1
FDNS	00NR		0 20SP	G15_022	TO->FROM	KRESS INTERCHANGE - SWISHER COUNTY INTERCHANGE 115KV CKT 1	159.35	175.28	0.50088	104.3983	JONES STATION - LUBBOCK EAST INTERCHANGE 230KV CKT 1
FDNS	00NR		0 20SP	G15_022	TO->FROM	KRESS INTERCHANGE - SWISHER COUNTY INTERCHANGE 115KV CKT 1	159.35	175.28	0.50088	104.3983	JONES STATION - LUBBOCK EAST INTERCHANGE 230KV CKT 1
FDNS	00NR		0 17SP	G15_022	TO->FROM	KRESS INTERCHANGE - SWISHER COUNTY INTERCHANGE 115KV CKT 1	159.35	175.28	0.49954	104.2128	CROSBY COUNTY INTERCHANGE - LUBBOCK EAST INTERCHANGE 115KV CKT 1
FDNS	00NR		0 17SP	G15_022	TO->FROM	KRESS INTERCHANGE - SWISHER COUNTY INTERCHANGE 115KV CKT 1	159.35	175.28	0.49954	104.2128	CROSBY COUNTY INTERCHANGE - LUBBOCK EAST INTERCHANGE 115KV CKT 1
FDNS	00NR		0 17SP	G15_022	TO->FROM	KRESS INTERCHANGE - SWISHER COUNTY INTERCHANGE 115KV CKT 1	159.35	175.28	0.50466	104.0917	CARLISLE INTERCHANGE - TUCO INTERCHANGE 230KV CKT 1
FDNS	00NR		0 17SP	G15_022	TO->FROM	KRESS INTERCHANGE - SWISHER COUNTY INTERCHANGE 115KV CKT 1	159.35	175.28	0.50466	104.0917	CARLISLE INTERCHANGE - TUCO INTERCHANGE 230KV CKT 1
FDNS	00NR		0 17SP	G15_022	TO->FROM	KRESS INTERCHANGE - SWISHER COUNTY INTERCHANGE 115KV CKT 1	159.35	175.28	0.50342	103.7552	BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1
FDNS	00NR		0 17SP	G15_022	TO->FROM	KRESS INTERCHANGE - SWISHER COUNTY INTERCHANGE 115KV CKT 1	159.35	175.28	0.50342	103.7552	BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1
FDNS	00NR		0 17SP	G15_022	TO->FROM	KRESS INTERCHANGE - SWISHER COUNTY INTERCHANGE 115KV CKT 1	159.35	175.28	0.49764	103.6877	PLANT X STATION - SPGLAKE_TP 115.00 115KV CKT 1
FDNS	00NR		0 17SP	G15_022	TO->FROM	KRESS INTERCHANGE - SWISHER COUNTY INTERCHANGE 115KV CKT 1	159.35	175.28	0.50533	103.4928	JONES STATION - TUCO INTERCHANGE 230KV CKT 1
FDNS	00NR		0 17SP	G15_022	TO->FROM	KRESS INTERCHANGE - SWISHER COUNTY INTERCHANGE 115KV CKT 1	159.35	175.28	0.50533	103.4928	JONES STATION - TUCO INTERCHANGE 230KV CKT 1
FDNS	00NR		0 17SP	G15_022	TO->FROM	KRESS INTERCHANGE - SWISHER COUNTY INTERCHANGE 115KV CKT 1	159.35	175.28	0.50301	103.3989	GEN525493 1-PLANT X GEN #3
FDNS	00NR		0 17SP	G15_022	TO->FROM	KRESS INTERCHANGE - SWISHER COUNTY INTERCHANGE 115KV CKT 1	159.35	175.28	0.50278	103.3828	JONES STATION - LUBBOCK EAST INTERCHANGE 230KV CKT 1
FDNS	00NR		0 17SP	G15_022	TO->FROM	KRESS INTERCHANGE - SWISHER COUNTY INTERCHANGE 115KV CKT 1	159.35	175.28	0.50278	103.3828	JONES STATION - LUBBOCK EAST INTERCHANGE 230KV CKT 1
FDNS	00NR		0 17SP	G15_022	TO->FROM	KRESS INTERCHANGE - SWISHER COUNTY INTERCHANGE 115KV CKT 1	159.35	175.28	0.50262	103.3666	LAMB COUNTY INTERCHANGE - TOLK STATION WEST 230KV CKT 1
FDNS	00NR		0 17SP	G15_022	TO->FROM	KRESS INTERCHANGE - SWISHER COUNTY INTERCHANGE 115KV CKT 1	159.35	175.28	0.50262	103.3593	LAMB COUNTY INTERCHANGE (WH_ALM20172) 230/115/13.2KV TRANSFORMER CKT 1
FDNS	00NR		0 17SP	G15_022	TO->FROM	KRESS INTERCHANGE - SWISHER COUNTY INTERCHANGE 115KV CKT 1	159.35	175.28	0.50262	103.3593	LAMB COUNTY INTERCHANGE (WH_ALM20172) 230/115/13.2KV TRANSFORMER CKT 1
FDNS	00NR		0 17SP	G15_022	TO->FROM	KRESS INTERCHANGE - SWISHER COUNTY INTERCHANGE 115KV CKT 1	159.35	175.28	0.50262	103.3593	LAMB COUNTY INTERCHANGE (WH_ALM20172) 230/115/13.2KV TRANSFORMER CKT 1
FDNS	00NR		0 17SP	G15_022	TO->FROM	KRESS INTERCHANGE - SWISHER COUNTY INTERCHANGE 115KV CKT 1	159.35	175.28	0.50262	103.3593	LAMB COUNTY INTERCHANGE (WH_ALM20172) 230/115/13.2KV TRANSFORMER CKT 1
FDNS	00NR		0 17SP	G15_022	TO->FROM	KRESS INTERCHANGE - SWISHER COUNTY INTERCHANGE 115KV CKT 1	159.35	175.28	0.50301	103.3474	GEN562550 1-G14_040_3 0.6900
FDNS	00NR		0 17SP	G15_022	TO->FROM	KRESS INTERCHANGE - SWISHER COUNTY INTERCHANGE 115KV CKT 1	159.35	175.28	0.50399	103.3185	HART INDUSTRIAL - NEWHART 115KV CKT 1
FDNS	06ALL		0 20SP	G15_022	TO->FROM	KRESS INTERCHANGE - SWISHER COUNTY INTERCHANGE 115KV CKT 1	159.35	175.28	0.49254	103.2231	BASE CASE
FDNS	06ALL		0 17SP	G15_022	TO->FROM	KRESS INTERCHANGE - SWISHER COUNTY INTERCHANGE 115KV CKT 1	159.35	175.28	0.50301	103.1762	GEN527903 1-HOBBS PLANT #3 (ST)
FDNS	06ALL		0 17SP	G15_022	TO->FROM	KRESS INTERCHANGE - SWISHER COUNTY INTERCHANGE 115KV CKT 1	159.35	175.28	0.52638	102.1782	AMARILLO SOUTH INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1
FDNS	06ALL		0 17SP	G15_022	TO->FROM	KRESS INTERCHANGE - SWISHER COUNTY INTERCHANGE 115KV CKT 1	159.35	175.28	0.52638	102.1782	AMARILLO SOUTH INTERCHANGE - SWISHER COUNTY INTERCHANGE 230KV CKT 1
FDNS	06ALL		0 25SP	G15_022	TO->FROM	KRESS INTERCHANGE - SWISHER COUNTY INTERCHANGE 115KV CKT 1	159.35	175.28	0.49749	101.8915	NEWHART 230 - PLANT X STATION 230KV CKT 1
FDNS	06ALL		0 20SP	G15_022	TO->FROM	KRESS INTERCHANGE - SWISHER COUNTY INTERCHANGE 115KV CKT 1	159.35	175.28	0.47628	100.6209	COX INTERCHANGE - FLOYD COUNTY INTERCHANGE 115KV CKT 1
FDNS	06ALL		0 20SP	G15_022	TO->FROM	KRESS INTERCHANGE - SWISHER COUNTY INTERCHANGE 115KV CKT 1	159.35	175.28	0.47628	100.6209	COX INTERCHANGE - FLOYD COUNTY INTERCHANGE 115KV CKT 1
FDNS	00NR		0 25SP	G15_022	TO->FROM	KRESS INTERCHANGE - SWISHER COUNTY INTERCHANGE 115KV CKT 1	159.35	175.28	0.47481	100.4844	KISER 3115.00 - N_PLAINVIEW 3115.00 115KV CKT 1
FDNS	00NR		0 20SP	G15_022	TO->FROM	KRESS INTERCHANGE - SWISHER COUNTY INTERCHANGE 115KV CKT 1	159.35	175.28	0.45707	100.3458	HAPPY INTERCHANGE - TULIA TAP 115KV CKT 1
FDNS	06ALL		0 17SP	G15_022	TO->FROM	KRESS INTERCHANGE - SWISHER COUNTY INTERCHANGE 115KV CKT 1	159.35	175.28	0.49183	100.0787	BASE CASE
FDNS	00NR		0 17SP	G15_022	FROM->TO	SUNDOWN INTERCHANGE (WH_XD570381) 230/115/13.8KV TRANSFORMER CKT 1	187	187	0.05445	103.7191	AMOCO SWITCHING STATION - SUNDOWN INTERCHANGE 230KV CKT 1
FDNS	00NR		0 17SP	G15_022	FROM->TO	SUNDOWN INTERCHANGE (WH_XD570381) 230/115/13.8KV TRANSFORMER CKT 1	187	187	0.05445	103.7191	AMOCO SWITCHING STATION - SUNDOWN INTERCHANGE 230KV CKT 1
FDNS	00NR		0 17SP	G15_022	FROM->TO	SUNDOWN INTERCHANGE (WH_XD570381) 230/115/13.8KV TRANSFORMER CKT 1	187	187	0.05445	101.1351	AMOCO SWITCHING STATION - SUNDOWN INTERCHANGE 230KV CKT 1
FDNS	00NR		0 17SP	G15_022	FROM->TO	SUNDOWN INTERCHANGE (WH_XD570381) 230/115/13.8KV TRANSFORMER CKT 1	187	187	0.05445	101.1351	AMOCO SWITCHING STATION - SUNDOWN INTERCHANGE 230KV CKT 1
FDNS	00NR		0 25SP	G15_022	TO->FROM	TERRY COUNTY INTERCHANGE - WOLFFORTH INTERCHANGE 115KV CKT 1	119.51	153.97	0.04569	106.3717	TUCO INTERCHANGE - YOAKUM_345 345.00 345KV CKT 1
FDNS	00NR		0 17SP	G15_022	FROM->TO	WOLFFORTH INTERCHANGE (WH_7001668) 230/115/13.2KV TRANSFORMER CKT 1	120	154	0.03802	105.4033	CARLISLE INTERCHANGE - LP-DOUD_TP 3115.00 115KV CKT 1
FDNS	00NR		0 17SP	G15_022	FROM->TO	WOLFFORTH INTERCHANGE (WH_7001668) 230/115/13.2KV TRANSFORMER CKT 1	120	154	0.03802	102.0838	CARLISLE INTERCHANGE - LP-DOUD_TP 3115.00 115KV CKT 1
FDNS	00NR		2 25SP	G15_022	TO->FROM	KRESS INTERCHANGE - KRESS_RURAL3115.00 115KV CKT 1	95.81	95.81	0.03537	100.596	KRESS INTERCHANGE - KRESS_RURAL3115.00 115KV CKT 1
FDNS	00NR		2 25SP	G15_022	TO->FROM	JONES STATION - TUCO INTERCHANGE 230KV CKT 1	343.79	343.79	0.10084	107.3759	CARLISLE INTERCHANGE - TUCO INTERCHANGE 230KV CKT 1
FDNS	00NR		2 25SP	G15_022	TO->FROM	JONES STATION - TUCO INTERCHANGE 230KV CKT 1	343.79	343.79	0.10084	107.3759	CARLISLE INTERCHANGE - TUCO INTERCHANGE 230KV CKT 1
FDNS	00NR		2 17SP	G15_022	FROM->TO	SUNDOWN INTERCHANGE (WH_XD570381) 230/115/13.8KV TRANSFORMER CKT 1	187	187	0.05445	103.7191	AMOCO SWITCHING STATION - SUNDOWN INTERCHANGE 230KV CKT 1
FDNS	00NR		2 17SP	G15_022	FROM->TO	SUNDOWN INTERCHANGE (WH_XD570381) 230/115/13.8KV TRANSFORMER CKT 1	187	187	0.05445	103.7191	AMOCO SWITCHING STATION - SUNDOWN INTERCHANGE 230KV CKT 1
FDNS	00NR		2 17SP	G15_022	FROM->TO	SUNDOWN INTERCHANGE (WH_XD570381) 230/115/13.8KV TRANSFORMER CKT 1	187	187	0.05445	101.1351	AMOCO SWITCHING STATION - SUNDOWN INTERCHANGE 230KV CKT 1
FDNS	00NR		2 17SP	G15_022	FROM->TO	SUNDOWN INTERCHANGE (WH_XD570381) 230/115/13.8KV TRANSFORMER CKT 1	187	187	0.05445	101.1351	AMOCO SWITCHING STATION - SUNDOWN INTERCHANGE 230KV CKT 1
FDNS	00NR		2 25SP	G15_022	TO->FROM	TERRY COUNTY INTERCHANGE - WOLFFORTH INTERCHANGE 115KV CKT 1	119.51	153.97	0.04569	106.3717	TUCO INTERCHANGE - YOAKUM_345 345.00 345KV CKT 1
FDNS	00NR		2 17SP	G15_022	FROM->TO	WOLFFORTH INTERCHANGE (WH_7001668) 230/115/13.2KV TRANSFORMER CKT 1	120	154	0.03802	105.4033	CARLISLE INTERCHANGE - LP-DOUD_TP 3115.00 115KV CKT 1
FDNS	00NR		2 17SP	G15_022	FROM->TO	WOLFFORTH INTERCHANGE (WH_7001668) 230/115/13.2KV TRANSFORMER CKT 1	120	154	0.03802	102.0838	CARLISLE INTERCHANGE - LP-DOUD_TP 3115.00 115KV CKT 1
FDNS	00NR		3 25SP	G15_022	TO->FROM	COX INTERCHANGE - HALE CO INTERCHANGE 115KV CKT 1	95.81	95.81	0.03543	100.3647	KRESS INTERCHANGE - KRESS_RURAL3115.00 115KV CKT 1
FDNS	00NR		3 25SP	G15_022	TO->FROM	JONES STATION - TUCO INTERCHANGE 230KV CKT 1	343.79	343.79	0.09953	108.6498	CARLISLE INTERCHANGE - TUCO INTERCHANGE 230KV CKT 1
FDNS	00NR		3 25SP	G15_022	TO->FROM	JONES STATION - TUCO INTERCHANGE 230KV CKT 1	343.79	343.79	0.09953	108.6498	CARLISLE INTERCHANGE - TUCO INTERCHANGE 230KV CKT 1
FDNS	00NR		3 17SP	G15_022	FROM->TO	SUNDOWN INTERCHANGE (WH_XD570381) 230/115/13.8KV TRANSFORMER CKT 1	187	187	0.05444	103.7475	AMOCO SWITCHING STATION - SUNDOWN INTERCHANGE 230KV CKT 1
FDNS	00NR		3 17SP	G15_022	FROM->TO	SUNDOWN INTERCHANGE (WH_XD570381) 230/115/13.8KV TRANSFORMER CKT 1	187	187	0.05444	103.7475	AMOCO SWITCHING STATION - SUNDOWN INTERCHANGE 230KV CKT 1
FDNS	00NR		3 17SP	G15_022	FROM->TO	SUNDOWN INTERCHANGE (WH_XD570381) 230/115/13.8KV TRANSFORMER CKT 1	187	187	0.05444	101.1632	AMOCO SWITCHING STATION - SUNDOWN INTERCHANGE 230KV CKT 1

SOLUTION	GROUP	SCENARIO	SEASON	SOURCE	DIRECTION	MONITORED ELEMENT	RATEA (MVA)	RATEB (MVA)	TDF	TC%LOADING (% MVA)	CONTINGENCY
FDNS	00NR		3 17SP	G15_022	FROM->TO	SUNDOWN INTERCHANGE (WH XDS70381) 230/115/13.8KV TRANSFORMER CKT 1	187	187	0.05444	101.1632	AMOCO SWITCHING STATION - SUNDOWN INTERCHANGE 230KV CKT 1
FDNS	00NR		3 25SP	G15_022	TO->FROM	TERRY COUNTY INTERCHANGE - WOLFFORTH INTERCHANGE 115KV CKT 1	119.51	153.97	0.04567	106.6053	TUCO INTERCHANGE - YOAKUM_345 345.00 345KV CKT 1
FDNS	00NR		3 17SP	G15_022	FROM->TO	WOLFFORTH INTERCHANGE (WH 7001668) 230/115/13.2KV TRANSFORMER CKT 1	120	154	0.03801	105.4483	CARLISLE INTERCHANGE - LP-DOUD_TP 3115.00 115KV CKT 1
FDNS	00NR		3 17SP	G15_022	FROM->TO	WOLFFORTH INTERCHANGE (WH 7001668) 230/115/13.2KV TRANSFORMER CKT 1	120	154	0.03801	102.1282	CARLISLE INTERCHANGE - LP-DOUD_TP 3115.00 115KV CKT 1
FDNS	00NR		4 25SP	G15_022	TO->FROM	COX INTERCHANGE - HALE CO INTERCHANGE 115KV CKT 1	95.81	95.81	0.03775	101.1803	KRESS INTERCHANGE - KRESS_RURAL3115.00 115KV CKT 1

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

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

I: Power Flow Analysis (Constraints from Multi-Contingencies)

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

J: Group 6 Dynamic Stability Analysis Report

Plots available upon request. Contact SPP Generation Interconnection Studies for details.