Definitive Interconnection System Impact Study for Generation Interconnection Requests

(DISIS-2015-002-3)

Group 1 Restudy

July 2017

Generator Interconnection

SPP Southwest Power Pool

Revision History

Date	Author	Change Description
2/5/2016	SPP	Draft issued to Transmission Owners for review
2/12/2016	SPP	Report Issued (DISIS-2015-002). Some stability analysis still pending. Group 2, 6, 7, 15 and 16 Interconnection Request Results not included in this issue.
2/22/2016	SPP	Draft issued to Transmission Owners for Group 2, 6, and 7 review
2/29/2016	SPP	Report Issued (DISIS-2015-002) to include Group 2, 6, and 7 Results. Some stability analysis still pending. 15 and 16 Interconnection Request Results not included in this issue.
3/17/2016	SPP	Draft issued to Transmission Owners for Group 15, and 16 review
3/29/2016	SPP	Report Issued (DISIS-2015-002) to include Group 15 and 16 Results. Group 16 stability analysis still pending.
4/28/2016	SPP	Report Issued to include Group 16 stability analysis
8/01/2016	SPP	ReStudy to account for withdrawn projects.
8/04/2016	SPP	DISIS-2015-002-1 reposted for AECI Affected System Cost Allocation correction and update to Introduction Section Stand-Alone Language
11/29/2016	SPP	Restudy Power Flow Analysis for Group 1 only. Cost Allocation for all projects. To account for withdrawn Projects, Report Reposted (DISIS-2015-002-2)
7/10/2017	SPP	Restudy Power Flow Analysis for Group 1 only to account for withdrawn projects GEN-2011-051, GEN-2015-060, and GEN-2015-081. Report Reposted (DISIS-2015-002-3)

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 DISIS window which closed September 30, 2015. The Interconnection Customers will be referred to in this study as the DISIS-2015-002 Interconnection Customers. This DISIS analyzes the interconnecting of multiple generation interconnection requests associated with new generation totaling approximately 6,176.9 MW of new generation which would be located within the transmission systems of American Electric Power – Western (AEPW), Basin Electric Power Cooperative (BEPC), Nebraska Public Power District (NPPD), Oklahoma Gas and Electric (OKGE), Southwestern Public Service (SPS), Southwestern Power Administration (SWPA), Sunflower Electric Power Corporation\Mid-Kansas Electric Company, LLC (SUNC\MKEC), Western Area Power Administration (WAPA), Westar Energy, Inc. (WERE), and Western Farmers Electric Cooperative (WFEC). The various generation interconnection requests have differing proposed in-service dates[1]. The generation interconnection requests included in this DISIS 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-2015-002 analysis.

Power flow analysis has indicated that for the power flow cases studied, 6,176.9 MW of nameplate generation may be interconnected with transmission system reinforcements within the SPP transmission system. For the analyses that has been completed, 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 #661-A 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

[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 Interconnection Facilities 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.

for outage based constraints and 3% or greater distribution factor impact for system intact 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-T (Thermal) and Appendix G-V (Voltage). 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 minimum cost for interconnecting the DISIS-2015-002 Interconnection Customers is estimated at $5,174,890 for Group 1 Interconnection Customers only and $701,503,724 for all DISIS-2015-002 Interconnection Customers. The following costs are not included in this total –

- **Costs Not Included** – Costs on Affected Systems for particularly Associated Electric Cooperative Inc. (AECI), Mid-Continent Independent System Operator (MISO), and Minnkota Power Cooperative, Inc (MPC).

These costs determined at this time are shown in Appendix E and F. For Interconnection Requests that result in an interconnection to, or modification to, the transmission facilities of the Western-UGP (WAPA), a National Environmental Policy Act (NEPA) Environmental Review will be required. The Interconnection Customer will be required to execute and Environmental Review Agreement per Section 8.6.1 of the GIP.

Interconnection Service to DISIS-2015-002 Interconnection Customers is also contingent upon higher queued customers paying for certain required network upgrades. **The in-service date for the DISIS customers will be deferred until the construction of these network upgrades can be completed.** These costs 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 ERIS or when this study's generation is dispatched into the interconnecting Transmission Owner's (T.O.) area for 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.

When applicable, affected system thermal and voltage constraints are listed in Appendix H-T-AS and Appendix H-V-AS. Affected System constraints could require an affects system impact study review by the affected party or affected system parties. The affected system impact study could result in identifying additional affected transmission system reinforcement network upgrades required for interconnection.

NERC FAC-002-2 Compliance Statement

SPP, as Planning Coordinator has studied the reliability impact of interconnecting new or materially modified generation requesting interconnection to the Transmission System of SPP and any affected systems as requested by those entities. Affected systems include both the systems of SPP Transmission Owners and systems not included in the SPP Tariff footprint. The impact of the generation interconnection on affected systems will be further coordinated with the following systems as part of the coordinated planning procedures as described in Section 6 of this report and summarized below.

- Impacts on Associated Electric Cooperative Inc. (AECI) – AECI has completed their review and analysis for requests impacting the AECI system
- Impacts on Mid Continent Independent System Operation (MISO) – MISO has been contacted and provided a list of interconnection requests that proceed to move forward into the Interconnection Facilities Study Queue. MISO is evaluating the Interconnection Requests for impacts.
- Impacts on Minnkota Power Cooperative, Inc (MPC) – MPC has completed their review and did not identify an impact to the MPC

This analysis adheres to NERC standards, regional, and Transmission Owner planning criteria, as related to generator interconnections. Facility interconnection requirements will be fully evaluated by the Transmission Owners during the Interconnection Facilities Study.

This analysis evaluates steady-state (Section 8), short-circuit (Section 9), and dynamic studies (Section 9) to evaluate system performance under both normal and contingency conditions. Study assumptions (Section 2) and system performance (Section 3) are documented in this report. Alternatives considered and coordinated recommendations are documented in Section 8 and Section 9.

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1 Introduction

Pursuant to the Southwest Power Pool (SPP) Open Access Transmission Tariff (OATT), SPP has conducted this DISIS for certain generation interconnection requests in the SPP Generation Interconnection Queue. These interconnection requests have been clustered together for the following DISIS window which closed September 30, 2015. The customers will be referred to in this study as the DISIS-2015-002 Interconnection Customers. This DISIS analyzes the interconnecting of multiple generation interconnection requests associated with new generation totaling 6,176.9 MW of new generation which would be located within the transmission systems of American Electric Power – Western (AEPW), Basin Electric Power Cooperative (BEPC), Nebraska Public Power District (NPPD), Oklahoma Gas and Electric (OKGE), Southwestern Public Service (SPS), Southwestern Power Administration (SWPA), Sunflower Electric Power Corporation\Mid-Kansas Electric Company, LLC (SUNC\MKEC), Western Area Power Administration (WAPA), Westar Energy, Inc. (WERE), and Western Farmers Electric Cooperative (WFEC). The various generation interconnection requests have differing proposed in-service dates[2]. The generation interconnection requests included in this DISIS 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-2015-002 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.

2 Model Development (Study Assumptions)

2.1.1 Interconnection Requests Included in the Cluster

SPP included all interconnection requests that submitted a DISIS Agreement no later than September 30, 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 October 1, 2015. The interconnection requests that are included in this study are listed in Appendix A.

2.1.2 Affected System Interconnection Request

Also included in this DISIS is one (1) Affected System Study. 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.

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

2.2 Development of Base Cases

2.2.1 Power Flow

The 2015 series Integrated Transmission Planning models (used in the 2016 ITPNT) including the 2016 winter peak (16WP) season, the 2017 spring (17G) and 2017 summer peak (17SP) seasons, the 2020 light load (20L), summer (20SP) and winter peak (20WP) seasons, and the 2025 summer peak (25SP) season were the starting seasonal models for this study.

2.2.2 Dynamic Stability

The 2015 series SPP Model Development Working Group (MDWG) Models for 2016 winter peak (16WP) season, 2017 summer peak (17SP) season, and the 2025 summer peak (25SP) season cases were used as starting points for this study.

2.2.3 Short Circuit

The 2017 and 2025 summer peak stability cases are used for this analysis.

2.2.4 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-2015-002 Interconnection Customers have not been assigned advancement costs for the below listed projects. The DISIS-2015-002 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 circuit #2, scheduled for 2018 in-service[3]
  - Chisholm – Gracemont 345kV transmission line, and Chisholm 345/230kV transformer circuit #1, scheduled for 3/1/2018 in-service[4]
- 2015 Integrated Transmission Plan Near Term (2015 ITPNT) Projects
  - Potash Junction – Intrepid – IMC #1 – Livingston Ridge 115kV rebuild
  - National Enrichment Plant – Targa – Cardinal 115kV circuit #1 rebuild
- Gentleman – Thedford (Cherry County) – Holt County 345kV circuit #1 scheduled for 2019 in-service[5]
- Hoskins – Neligh East 345/115 kV Project[6]
  - 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) Projects[7]:
  - 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
  - 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
  - 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

[3] SPP Notification to Construct (NTC) 200223
[4] SPP Notification to Construct (NTC) 200240 and 200255
[5] SPP Notification to Construct (NTC) 200220
[6] SPP Regional Reliability 2012 ITP 10 Project Per SPP-NTC-200220
[7] Per Network Upgrades assigned in High Priority Incremental Loads (HPILs) study, Including Direct Assigned Upgrades, Projects in SPP-NTC-200256 and SPP-NTC-200283.

  - 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
- Nebraska City – Mullin Creek – Sibley 345kV circuit #1 build, place in-service in 2016[8]

2.2.5 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-2015-002 study and are assumed to be in service. This list may not be all inclusive. The DISIS-2015-002 Interconnection Customers, at this time, do not have responsibility for these facilities but may later be assigned the cost of these facilities if higher queued customers terminate their Generation Interconnection Agreement or withdraw from the interconnection queue. The DISIS-2015-002 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 circuit #1 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:
  - Lake Creek – Lone Wolf 69 kV circuit #1 reset CT, placed in-service
- 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.
- Upgrades assigned to DISIS-2015-001 Interconnection Customers:
  - Cimarron River Tap – Kismet – Cudahy – Crooked Creek 115kV circuit #1 rebuild.
  - Oklaunion 345kV Reactive Power Support
    - Install two (2) 130Mvar Capacitor Bank(s).
  - (NRIS Only) Potter County Interchange 345/230/13kV Transformer circuit #2, build.
  - (NRIS Only) Renfrow – Renfrow 138kV circuit #1 rebuild.
  - (NRIS Only) Sundown Interchange 230/115/13.8kV transformer circuit #1 replacement.
  - (NRIS Only) Crawfish Draw Substation 345/230kV
    - Build new 345/230kV substation along TUCO – Border 345kV and TUCO – Swisher 230kV. Tie in and Terminate TUCO 345kV, Border 345kV, TUCO 230kV, and Swisher 230kV at Crawfish Draw (TUCO 2).

[8] SPP Notification to Construct (NTC) 20097 and 20098

- Build 345/230/13kV transformer
  - (NRIS Only) Wolfforth Interchange 230/225/13.2kV circuit #1 replacement.

2.2.6 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.

2.2.7 Regional Groupings

The interconnection requests listed in Appendix A are grouped together into ten (10) active regional groups based on geographical and electrical impacts. These groupings are shown in Appendix C.

To determine interconnection impacts, ten (10) different generation dispatch scenarios of the spring, summer, and winter base case models are developed to accommodate the regional groupings.

2.3 Development of Analysis Cases

2.3.1 Power Flow

For Variable Energy Resources (VER) (solar/wind) in each power flow case, 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, 2020 light, or in the "High VER" summer and winter peaks. To study peaking units' impacts, the 2016 winter peak and 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 NRIS are dispatched in an additional analysis into the interconnecting Transmission Owner's (T.O.) area at 100% nameplate with 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.

2.3.1.1 *Additional Sensitivities Considered* – The following sensitivities were run for situations prevalent to the local area for which they were considered

- North Dakota – Canadian border – The phase shifting transformer to Saskatchewan Power (also known as B-10T) and Miles City DC Tie were dispatched at the following levels
  - 2016 Winter Peak –
    - Miles City DC Tie– 200MW East to West transfer
    - B-10T – 65MW South to North transfer

- 2017 Summer Peak –
  - Miles City DC Tie – 200MW East to West transfer
  - B-10T – 200MW North to South transfer
- Other Seasons
  - Miles City DC Tie – 140MW East to West transfer (20WP)
  - Miles City DC Ties – 92MW East to West transfer (17G & 20L)
  - B-10T – 0MW

2.3.2 **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.

2.3.2.1 Additional Sensitivities Considered

- North Dakota – Canadian border – The phase shifting transformer to Saskatchewan Power (also known as B-10T) and Miles City DC Tie were dispatched at the following levels
  - 2016 Winter Peak –
    - Miles City DC Tie– 200MW East to West transfer
    - B-10T – 65MW South to North transfer
  - 2017 Summer Peak –
    - Miles City DC Tie – 200MW East to West transfer
    - B-10T – 200MW North to South transfer

2.3.3 Short Circuit

The dynamic stability models (2017 SP and 2025 SP) are used for this analysis.

3 Identification of Network Constraints (System Performance)

3.1.1 Thermal Overloads

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.

For ERIS, thermal overloads are determined for system intact (n-0) (greater than 100% of Rate A - normal) and for contingency (n-1) (greater than 100% of Rate B – emergency) conditions.

The overloads are then screened to determine which of generator interconnection requests have at least

- 3% Distribution Factor (DF) for system intact conditions (n-0),
- 20% DF upon outage based conditions (n-1),
- or 3% DF on contingent elements that resulted in a non-converged solution.

Appropriate transmission support is then determined to mitigate the constraints.

Interconnection Requests that requested NRIS are also studied in a separate NRIS analysis to determine if any constraint measured greater than or equal to a 3% DF. If so, these constraints are also considered for transmission reinforcement under NRIS.

3.1.2 Voltage

For non-converged power flow solutions that are determined to be caused by lack of voltage support, appropriate transmission support will be determined to mitigate the constraint.

After all thermal overload and voltage support mitigations are determined; a full ACCC analysis is then performed to determine voltage constraints. The following voltage performance guidelines are used in accordance with the Transmission Owner local planning criteria.

SPP Areas (69kV+):

Transmission Owner	Voltage Criteria (System Intact)	Voltage Criteria (Contingency)
AEPW	0.95 – 1.05 pu	0.92 – 1.05 pu
GRDA	0.95 – 1.05 pu	0.90 – 1.05 pu
SWPA	0.95 – 1.05 pu	0.90 – 1.05 pu
OKGE	0.95 – 1.05 pu	0.90 – 1.05 pu
OMPA	0.95 – 1.05 pu	0.90 – 1.05 pu
WFEC	0.95 – 1.05 pu	0.90 – 1.05 pu
SWPS	0.95 – 1.05 pu	0.90 – 1.05 pu
MIDW	0.95 – 1.05 pu	0.90 – 1.05 pu

SUNC	0.95 – 1.05 pu	0.90 – 1.05 pu
KCPL	0.95 – 1.05 pu	0.90 – 1.05 pu
INDN	0.95 – 1.05 pu	0.90 – 1.05 pu
SPRM	0.95 – 1.05 pu	0.90 – 1.05 pu
NPPD	0.95 – 1.05 pu	0.90 – 1.05 pu
WAPA	0.95 – 1.05 pu	0.90 – 1.05 pu
WERE L-V	0.95 – 1.05 pu	0.93 – 1.05 pu
WERE H-V	0.95 – 1.05 pu	0.95 – 1.05 pu
EMDE L-V	0.95 – 1.05 pu	0.90 – 1.05 pu
EMDE H-V	0.95 – 1.05 pu	0.92 – 1.05 pu
LES	0.95 – 1.05 pu	0.90 – 1.05 pu
OPPD	0.95 – 1.05 pu	0.90 – 1.05 pu

SPP Buses with more stringent voltage criteria:

Bus Name/Number	Voltage Criteria (System Intact)	Voltage Criteria (Contingency)
TUCO 230kV 525830	0.925 – 1.05 pu	0.925 – 1.05 pu
Wolf Creek 345 kV 532797	0.985 – 1.03 pu	0.985 – 1.03 pu
FCS 646251	1.001 – 1.047 pu	1.001 – 1.047 pu

Affected System Areas (115kV+):

Transmission Owner	Voltage Criteria (System Intact)	Voltage Criteria (Contingency)
AECI	0.95 – 1.05 pu	0.90 – 1.05 pu
EES-EAI	0.95 – 1.05 pu	0.90 – 1.05 pu
LAGN	0.95 – 1.05 pu	0.90 – 1.05 pu
EES	0.95 – 1.05 pu	0.90 – 1.05 pu
AMMO	0.95 – 1.05 pu	0.90 – 1.05 pu
CLEC	0.95 – 1.05 pu	0.90 – 1.05 pu
LAFA	0.95 – 1.05 pu	0.90 – 1.05 pu
LEPA	0.95 – 1.05 pu	0.90 – 1.05 pu
XEL	0.95 – 1.05 pu	0.90 – 1.05 pu
MP	0.95 – 1.05 pu	0.90 – 1.05 pu
SMMPA	0.95 – 1.05 pu	0.90 – 1.05 pu
GRE	0.95 – 1.05 pu	0.90 – 1.10 pu
OTP	0.95 – 1.05 pu	0.90 – 1.05 pu
OTP-H (115kV+)	0.97 – 1.05 pu	0.92 – 1.10 pu
ALTW	0.95 – 1.05 pu	0.90 – 1.05 pu
MEC	0.95 – 1.05 pu	0.90 – 1.05 pu
MDU	0.95 – 1.05 pu	0.90 – 1.05 pu
SPC	0.95 – 1.05 pu	0.95 – 1.05 pu

DPC	0.95 – 1.05 pu	0.90 – 1.05 pu
ALTE	0.95 – 1.05 pu	0.90 – 1.05 pu

The constraints identified through the voltage scan are then screened for the following for each interconnection request. 1) 3% DF on the contingent element and 2) 2% change in pu voltage. In certain conditions, engineering judgement was used to determine whether or not a generator had impacts to voltage constraints.

3.1.3 Dynamic Stability

Stability issues considered for transmission reinforcement under ERIS. Generators that fail to meet low voltage ride-through requirements (FERC Order #661-A) or SPP's stability criteria for damping or dynamic voltage recovery are assigned upgrades such that these requirements can be met.

3.1.4 Upgrades Assigned

Thermal overloads that require transmission support to mitigate are discussed in Section 8 and listed in Appendix G-T. Voltage constraints that may require transmission support are discussed in Section 8 and listed in Appendix G-V (Cluster Analysis). Constraints that are identified solely through the stability analysis are discussed in Section 8 and the appropriate appendix for the detailed stability study of that Interconnection Request. All of these upgrades are cost assigned in Appendix E and Appendix F.

Other network constraints not requiring transmission reinforcements are shown in Appendix H (Cluster Analysis). 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 (Cluster Analysis) 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.

4 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:

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

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

  Request Z Impact Factor on Upgrade Project 1 = PTDF(%)(Z) * MW(Z) = Z1

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

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

- Repeat previous for each responsible GI request for each Project

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

4.1.1 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.

5 Required Interconnection Facilities

The requirement to interconnect the 6,176.9 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 $5,174,890 for Group 1 Interconnection Customers only and $701,503,724 for all DISIS-2015-002 Interconnection Customers. not including the following costs.

- **Costs Not Included** – Costs on Affected Systems for particularly Associated Electric Cooperative Inc. (AECI) and Mid-Continent Independent System Operator (MISO)..

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.”

5.1.1 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.

5.1.2 Environmental Review

For Interconnection Requests that result in an interconnection to, or modification to, the transmission facilities of the Western-UGP, a National Environmental Policy Act (NEPA) Environmental Review will be required. The Interconnection Customer will be required to execute and Environmental Review Agreement per Section 8.6.1 of the GIP.

6 Affected Systems Coordination

The following procedures are in place to coordinate with Affected Systems.

- Impacts on Associated Electric Cooperative Inc. (AECI) – For any observed violations of thermal overloads on AECI facilities, AECI has been notified by SPP to evaluate the violations for impacts on its transmission system. AECI has instructed SPP to notify the affected Interconnection Customers after posting of this study to contact AECI for an Affected System Study Agreement to further study the impacts on the AECI system. AECI has evaluated the Interconnection Requests affecting their system.

- Impacts on Mid Continent Independent System Operation (MISO) – Per SPP's agreement with MISO, MISO has been contacted and provided a list of interconnection requests that proceed to move forward into the Interconnection Facilities Study Queue. MISO is evaluating the Interconnection Requests for impacts and will be in contact with affected Interconnection Customers.

- Impacts on Minnkota Power Cooperative, Inc (MPC) – MPC has been contacted and provided a list of interconnection requests that proceed to move forward into the Interconnection Facilities Study Queue. MP has evaluated the Interconnection Requests for impacts.

- Impacts to other affected systems – For any observed violations of thermal overloads or voltage constraints, SPP will contact the owner of the facility for further information.

7 Power Flow Analysis

7.1.1 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.

7.1.2 Power Flow Analysis

A power flow analysis is conducted for each Interconnection Customer's facility using modified versions of the 2016 winter peak (16WP) season, the 2017 spring (17G) and 2017 summer peak (17SP) seasons, the 2020 light load (20L), summer (20SP) and winter peak (20WP) seasons, and the 2025 summer peak (25SP) seasonal models. 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 ERIS. Certain requests that are also pursuing NRIS have an additional analysis conducted for displacing resources in the interconnecting Transmission Owner's balancing area.

8 Power Flow Results

8.1 Cluster Group 1 (Woodward Area)

In addition to the 3,685.1 MW of previously queued generation in the area, 550.0 MW of new interconnection service was studied. ERIS thermal constraints were observed for system intact and N-1 conditions including Cleo Corner – Cleo Corner Tap 138kV circuit #1. Terminal equipment upgrade will be required for Cleo Corner – Cleo Corner Tap 138kV circuit #1 will be required to alleviate the thermal violations.

For Group 1 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**
CLEO CORNER - CLEOPLT4 138.00 138KV CKT 1	191	109.7831	CLEO CORNER (CLEOCOR1) 138/69/13.8KV TRANSFORMER CKT 1
	Mitigation		**Replace terminal equipment**

Cluster NRIS Constraints			
MONITORED ELEMENT	**Limiting Rate A/B (MVA)**	**TC%LOADING (% MVA)**	**CONTINGENCY**
Currently None			

8.1.2 Group 1 (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-2015-048	161	Cleo Corner – Cleo Corner Tap 138kV
GEN-2015-057	100	None
GEN-2015-093	250	None

8.2 Cluster Group 2 (Hitchland Area)

In addition to the 3,626.20 MW of previously queued generation in the area, 200.0 MW of new interconnection service was studied. This group was not analyzed for this restudy and previously identified results remain valid.

8.3 Cluster Group 3 (Spearville Area)

In addition to the 3,230.93 MW of previously queued generation in the area, 0.0 MW of new interconnection service was studied. No current study DISIS-2015-002 Interconnection Customer(s) are located in this geographical group.

8.4 Cluster Group 4 (Northwest Kansas Area)

In addition to the 1,462.2 MW of previously queued generation in the area, 400.2 MW of new interconnection service was studied. This group was not analyzed for this restudy and previously identified results remain valid.

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

In addition to the 4,398.77 MW of previously queued generation in the area, 1,011.60 MW of new interconnection service was studied. This group was not analyzed for this restudy and previously identified results remain valid.

8.6 Cluster Group 7 (Southwestern Oklahoma Area)

In addition to the 1,923.90 MW of previously queued generation in the area, 413.70 MW of new interconnection service was studied. This group was not analyzed for this restudy and previously identified results remain valid.

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

In addition to the 5,226.06 MW of previously queued generation in the area, 2,198.00 MW of new interconnection service was studied. This group was not analyzed for this restudy and previously identified results remain valid.

8.8 Cluster Group 9 (Nebraska Area)

In addition to the 2,927.7 MW of previously queued generation in the area, 574.4 MW of new interconnection service was studied. This group was not analyzed for this restudy and previously identified results remain valid.

8.9 Cluster Group 10 (Southeast Oklahoma/Northeast Texas Area)

There is no current study Interconnection Request(s) in the Group 10 geographical region.

8.10 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. No current study DISIS-2015-002 Interconnection Customer(s) are located in this geographical group.

8.11 Cluster Group 13 (Northeast Kansas/Northwest Missouri Area)

In addition to the 634.7 MW of previously queued generation in the area, 0.0 MW of new interconnection service was studied. No current study DISIS-2015-002 Interconnection Customer(s) are located in this geographical group.

8.12 Cluster Group 14 (South Central Oklahoma Area)

In addition to the 612.50 MW of previously queued generation in the area, 279.0 MW of new interconnection service was studied. This group was not analyzed for this restudy and previously identified results remain valid.

8.13 Group 15 (Eastern South Dakota)

In addition to approximately 1,915.70 MW of previously queued generation in the area, 0.0 MW of new interconnection service was studied. No current study DISIS-2015-002 Interconnection Customer(s) are located in this geographical group.

8.14 Group 16 (Western North Dakota)

In addition to approximately 3,152.71 MW of previously queued generation in the area, 550.0 MW of new interconnection service was studied. This group was not analyzed for this restudy and previously identified results remain valid.

8.15 Group 17 (Western South Dakota)

In addition to approximately 470.5 MW of previously queued generation in the area, 0.0 MW of new interconnection service was studied. No current study DISIS-2015-002 Interconnection Customer(s) are located in this geographical group.

8.16 Group 18 (Eastern North Dakota)

In addition to approximately 161.5 MW of previously queued generation in the area, 0.0 MW of new interconnection service was studied. No current study DISIS-2015-002 Interconnection Customer(s) are located in this geographical group.

8.17 Curtailment and System Reliability

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

9 Stability & Short Circuit Analysis

A stability and short circuit analysis is conducted for each Interconnection Customer using modified versions of the 2015 series SPP Model Development Working Group (MDWG) Models 2016 winter (16WP), 2017 summer (17SP), and 2025 summer peak (25SP) dynamic cases[9]. 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.

9.1 Cluster Group 1 (Woodward Area)

The Group 1 stability analysis was not performed again for this restudy. This group was not analyzed for this restudy and previously identified restudy results remain valid.

9.2 Cluster Group 2 (Hitchland Area)

The Group 2 stability analysis was not performed again for this restudy. This group was not analyzed for this restudy and previously identified restudy results remain valid.

9.3 Cluster Group 3 (Spearville Area)

No current study DISIS-2015-002 Interconnection Customer(s) are located in this geographical group.

9.4 Cluster Group 4 (Northwest Kansas)

The Group 4 stability analysis was not performed again for this restudy. The original analysis in DISIS-2015-002 is still valid.

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

The Group 6 stability analysis was not performed again for this restudy. This group was not analyzed for this restudy and previously identified restudy results remain valid.

[9] Short Circuit analysis performed only on the 2017 and 2025 Summer Peak seasonal model. Group 6 Stability Analysis also includes 2020 Summer and Winter Peak seasons.

9.6 Cluster Group 7 (Southwest Oklahoma)

The Group 7 stability analysis was not performed again for this restudy. The original analysis in DISIS-2015-002 is still valid.

9.7 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-2015-002 is still valid.

9.8 Cluster Group 9 (Nebraska)

The Group 9 stability analysis was not performed again for this restudy. This group was not analyzed for this restudy and previously identified restudy results remain valid.

9.9 Cluster Group 10 (Southeast Oklahoma/Northeast Texas Area)

There is no current study Interconnection Request(s) in the Group 10 geographical region.

9.10 Cluster Group 12 (Northwest Arkansas Area)

There is no current study Interconnection Request(s) in the Group 12 geographical region.

9.11 Cluster Group 13 (Northeast Kansas/Northwest Missouri Area)

There is no current study Interconnection Request(s) in the Group 13 geographical region.

9.12 Cluster Group 14 (South Central Oklahoma)

The Group 14 stability analysis was not performed again for this restudy. The original analysis in DISIS-2015-002 is still valid.

9.13 Cluster Group 15 (Eastern South Dakota)

The Group 15 stability analysis was not performed again for this restudy. The original analysis in DISIS-2015-002 is still valid.

9.14 Cluster Group 16 (Western North Dakota)

The Group 16 stability analysis was not performed again for this restudy. The original analysis in DISIS-2015-002 is still valid.

9.15 Cluster Group 17 (Western South Dakota)

There is no current study Interconnection Request(s) in the Group 17 geographical region.

9.16 Cluster Group 18 (Eastern North Dakota)

There is no current study Interconnection Request(s) in the Group 18 geographical region.

10 Conclusion

The minimum cost of interconnecting 6,176.9 MW of new generation interconnection requests included in this DISIS is estimated at $5,174,890 for Group 1 Interconnection Customers only and $701,503,724 for all DISIS-2015-002 Interconnection Customers not including the following costs.

- **Costs Not Included** – Costs on Affected Systems for particularly Associated Electric Cooperative Inc. (AECI) and the Mid-Continent Independent System Operator (MISO).

Interconnection Requests allocated Network Upgrades and Transmission Owner Interconnection Facilities listed in Appendix E and F. For Interconnection Requests that result in an interconnection to, or modification to, the transmission facilities of the Western-UGP (WAPA), a National Environmental Policy Act (NEPA) Environmental Review will be required. The Interconnection Customer will be required to execute and Environmental Review Agreement per Section 8.6.1 of the GIP.

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).

11 Appendices

11.1 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-2015-006	9.00	ER	SWPA	Tupelo 138kV	Tupelo 138kV		TBD
GEN-2014-037	200.00	ER	SPS	Tap Hitchland - Beaver County Dbl Ckt (Optima) 345kV	Tap Hitchland - Beaver County Dbl Ckt (Optima) 345kV	9/30/2017	TBD
GEN-2015-020	100.00	ER	SPS	Oasis 115kV	Oasis 115kV	12/1/2016	TBD
GEN-2015-031	150.50	ER	SPS	Tap Amarillo South - Swisher 230kV	Tap Amarillo South - Swisher 230kV	9/1/2017	TBD
GEN-2015-034	200.00	ER	OKGE	Ranch Road 345kV	Ranch Road 345kV	10/31/2017	TBD
GEN-2015-045	20.00	ER	AEPW	Tap Lawton - Sunnyside (Terry Road) 345kV	Tap Lawton - Sunnyside (Terry Road) 345kV	12/1/2017	TBD
GEN-2015-046	300.00	ER	WAPA	Tande 345kV	Tande 345kV	12/1/2017	TBD
GEN-2015-047	300.00	ER	OKGE	Sooner 345kV	Sooner 345kV	12/1/2017	TBD
GEN-2015-048	200.00	ER	OKGE	Cleo Corner 138kV	Cleo Corner 138kV	12/1/2017	TBD
GEN-2015-052	300.00	ER	WERE	Tap Open Sky - Rose Hill 345kV	Tap Open Sky - Rose Hill 345kV	12/1/2017	TBD
GEN-2015-053	50.00	ER	NPPD	Antelope 115kV	Antelope 115kV	12/31/2017	TBD
GEN-2015-055	40.00	ER	WFEC	Erick 138kV	Erick 138kV	10/30/2016	TBD
GEN-2015-056	101.20	ER	SPS	Crossroads 345kV	Crossroads 345kV	12/1/2017	TBD
GEN-2015-057	100.00	ER	OKGE	Minco 345kV	Minco 345kV	12/1/2016	TBD
GEN-2015-058	50.00	ER	SPS	Atoka 115kV	Atoka 115kV	10/1/2017	TBD
GEN-2015-062	4.50	ER	OKGE	GEN-2012-033 Tap 138kV	GEN-2012-033 Tap 138kV	3/1/2016	TBD
GEN-2015-063	300.00	ER	OKGE	Tap Woodring - Mathewson 345kV	Tap Woodring - Mathewson 345kV	12/1/2017	TBD
GEN-2015-064	197.80	ER	SUNCMKEC	Mingo 115kV	Mingo 115kV	11/1/2017	TBD
GEN-2015-065	202.40	ER	SUNCMKEC	Mingo 345kV	Mingo 345kV	11/1/2017	TBD
GEN-2015-066	248.40	ER	OKGE	Tap Cleveland - Sooner 345kV	Tap Cleveland - Sooner 345kV	12/1/2017	TBD
GEN-2015-068	300.00	ER	SPS	TUCO Interchange 345kV	TUCO Interchange 345kV	12/1/2017	TBD
GEN-2015-069	300.00	ER	WERE	Union Ridge 230kV	Union Ridge 230kV	12/1/2017	TBD
GEN-2015-071	200.00	ER	AEPW	Chisholm 345kV	Chisholm 345kV	9/30/2017	TBD
GEN-2015-073	200.10	ER/NR	WERE	Emporia Energy Center 345kV	Emporia Energy Center 345kV	12/31/2018	TBD
GEN-2015-075	51.50	ER	SPS	Carlisle 69kV	Carlisle 69kV	12/1/2018	TBD
GEN-2015-076	158.40	ER	NPPD	Belden 115kV	Belden 115kV	7/31/2017	TBD
GEN-2015-079	129.20	ER	SPS	Tap Yoakum - Hobbs Interchange 230kV	Tap Yoakum - Hobbs Interchange 230kV	10/1/2018	TBD
GEN-2015-080	129.20	ER	SPS	Tap Yoakum - Hobbs Interchange 230kV	Tap Yoakum - Hobbs Interchange 230kV	5/1/2019	TBD
GEN-2015-083	125.00	ER	WERE	Belle Plain 138kV	Belle Plain 138kV	12/31/2017	TBD
GEN-2015-084	51.30	ER	AEPW	Hollis 138kV	Hollis 138kV	12/10/2018	TBD
GEN-2015-085	122.40	ER	AEPW	Altus Junction 138kV	Altus Junction 138kV	12/10/2018	TBD
GEN-2015-087	66.00	ER/NR	NPPD	Tap Fairbury - Hebron 115kV	Tap Fairbury - Hebron 115kV	1/1/2019	TBD
GEN-2015-088	300.00	ER/NR	NPPD	Tap Moore - Pauline 345kV	Tap Moore - Pauline 345kV	1/1/2019	TBD
GEN-2015-090	220.00	ER	WERE	Tap Thistle - Wichita 345kV Dbl CKT	Tap Thistle - Wichita 345kV Dbl CKT	12/1/2017	TBD
GEN-2015-092	250.00	ER	AEPW	Tap Lawton - Sunnyside (Terry Road) 345kV	Tap Lawton - Sunnyside (Terry Road) 345kV	12/1/2017	TBD
GEN-2015-093	250.00	ER	OKGE	Gracemont 345kV	Gracemont 345kV	12/1/2017	TBD
GEN-2015-096	150.00	ER	WAPA	Tap Belfied - Rhame 230kV	Tap Belfied - Rhame 230kV	12/31/2017	TBD
GEN-2015-098	100.00	ER	WAPA	Mingusville 230kV	Mingusville 230kV	12/15/2017	TBD
Total:	**6,176.90**						

11.2 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-2014-014	56.40	GRDA	Ferguson 69kV	Under Study (DISIS-2014-002)
ASGI-2015-001	6.13	SUNCMKEC	Ninnescah 115kV	Under Study (DISIS-2015-001)
ASGI-2015-002	2.00	SPS	SP-Yuma 69kV	Under Study (DISIS-2015-001)
ASGI-2015-004	56.36	GRDA	Coffeyville City 69kV	Under Study (DISIS-2015-001)
G176	100.00	XEL	Yankee 115kV	
G255	100.00	XEL	Yankee 115kV	MISO Queued Request
G380	150.00	OTP	Rugby 115kV	MISO Queued Request
G408	12.00	XEL	Tap McHenry - Souris 115kV	MISO Queued Request
G502	50.60	MP	Milton Young 230kV	MISO Queued Request
G586	30.00	XEL	Yankee 115kV	
G645	50.00	GRE	Ladish 115kV	MISO Queued Request
G723	10.00	MDU	Haskett 115kV	MISO Queued Request
G736	200.00	OTP	Big Stone South 230kV	
G752	150.00	MDU	Tap Bison - Hettinger 230kV	MISO Queued Request
G788	49.00	GRE	Ladish 115kV	MISO Queued Request
G830	99.00	GRE	GRE McHenry 115kV	MISO Queued Request
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-2002-008IS	40.50	WAPA	Edgeley 115kV [Pomona 115kV]	Commercial Operation
GEN-2002-009	80.00	SPS	Hansford 115kV	On-Line
GEN-2002-009IS	40.00	WAPA	Ft Thompson 69kV [Hyde 69kV]	Commercial Operation

Request	Amount	Area	Requested/Proposed Point of Interconnection	Status or In-Service Date
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
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-2005-003IS	100.00	WAPA	Nelson 115kV	Commercial Operation
GEN-2005-008	120.00	OKGE	Woodward 138kV	On-Line
GEN-2005-008IS	50.00	WAPA	Hilken 230kV [Ecklund 230kV]	Commercial Operation
GEN-2005-012	250.00	SUNCMKEC	Ironwood 345kV	On-Line at 160MW
GEN-2005-013	201.00	WERE	Caney River 345kV	On-Line
GEN-2006-001IS	10.00	XEL	Marshall 115kV	Commercial Operation
GEN-2006-002	101.00	AEPW	Sweetwater 230kV	On-Line
GEN-2006-002IS	51.00	WAPA	Wessington Springs 230kV	Commercial Operation
GEN-2006-006IS	10.00	XEL	Marshall 115kV	Commercial Operation
GEN-2006-015IS	50.00	WAPA	Hilken 230kV [Ecklund 230kV]	Commercial Operation
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-2007-013IS	50.00	WAPA	Wessington Springs 230kV	Commercial Operation
GEN-2007-014IS	100.00	WAPA	Wessington Springs 230kV	Commercial Operation
GEN-2007-015IS	100.00	WAPA	Hilken 230kV [Ecklund 230kV]	Commercial Operation
GEN-2007-017IS	166.00	WAPA	Ft Thompson-Grand Island 345kV	On Schedule
GEN-2007-018IS	234.00	WAPA	Ft Thompson-Grand Island 345kV	On Schedule
GEN-2007-020IS	16.00	WAPA	Nelson 115kV	Commercial Operation
GEN-2007-021	201.00	OKGE	Tatonga 345kV	On-Line
GEN-2007-023IS	50.00	WAPA	Formit-Summit 115kV	On Suspension
GEN-2007-025	300.00	WERE	Viola 345kV	On-Line

Request	Amount	Area	Requested/Proposed Point of Interconnection	Status or In-Service Date
GEN-2007-027IS	99.00	WAPA	Bismarck-Garrison 230kV #1	On Suspension
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-Line
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	425.00	OKGE	Woodward EHV 345kV	On-Line for 225MW, On Schedule and 2017
GEN-2008-003	101.00	OKGE	Woodward EHV 138kV	On-Line
GEN-2008-008IS	5.00	WAPA	Nelson 115kV	Commercial Operation
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-2008-119O	60.00	OPPD	S1399 161kV	On-Line
GEN-2008-123N	89.70	NPPD	Tap Pauline - Hildreth (Rosemont) 115kV	On Schedule for 2017
GEN-2008-124	200.10	SUNCMKEC	Ironwood 345kV	On-Line
GEN-2008-129	80.00	KCPL	Pleasant Hill 161kV	On-Line
GEN-2009-001IS	200.00	WAPA	Groton-Watertown 345kV	On Schedule
GEN-2009-006IS	90.00	WAPA	Mission 115kV	On Suspension
GEN-2009-007IS	100.00	WAPA	Mission 115kV	On Suspension
GEN-2009-008	199.50	MIDW	South Hays 230kV	On-Line
GEN-2009-018IS	100.00	WAPA	Groton 115kV	Commercial Operation
GEN-2009-020	48.30	MIDW	Walnut Creek 69kV	On-Line
GEN-2009-020AIS	130.50	WAPA	Tripp Junction 115kV	Commercial Operation
GEN-2009-025	59.80	OKGE	Nardins 69kV	On-Line
GEN-2009-026IS	110.00	WAPA	Dickenson-Heskett 230kV	On Schedule
GEN-2009-040	73.80	WERE	Marshall 115kV	On-Line
GEN-2010-001	300.00	OKGE	Beaver County 345kV	On-Line
GEN-2010-001IS	99.00	WAPA	Bismarck-Glenham 230kV	On Schedule
GEN-2010-003	100.80	WERE	Waverly 345kV	On-Line
GEN-2010-003IS	34.00	WAPA	Wessington Springs 230kV	Commercial Operation
GEN-2010-005	299.20	WERE	Viola 345kV	On-Line at 170MW
GEN-2010-006	205.00	SPS	Jones 230kV	On-Line
GEN-2010-007IS	172.50	WAPA	Antelope Valley 345kV	On Suspension
GEN-2010-009	165.60	SUNCMKEC	Buckner 345kV	On-Line
GEN-2010-011	29.70	OKGE	Tatonga 345kV	On-Line
GEN-2010-014	358.80	SPS	Hitchland 345kV	On Schedule for 2018
GEN-2010-036	4.60	WERE	6th Street 115kV	On-Line
GEN-2010-040	300.00	OKGE	Cimarron 345kV	On-Line

Request	Amount	Area	Requested/Proposed Point of Interconnection	Status or In-Service Date
GEN-2010-041	10.50	OPPD	S1399 161kV	On-Line
GEN-2010-045	197.80	SUNCMKEC	Buckner 345kV	On Suspension
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 Schedule for 2018
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-Line
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-Line
GEN-2011-016	200.10	SUNCMKEC	Ironwood 345kV	On Suspension
GEN-2011-018	73.60	NPPD	Steele City 115kV	On-Line
GEN-2011-019	175.00	OKGE	Woodward 345kV	On Schedule for 2017
GEN-2011-020	175.00	OKGE	Woodward 345kV	On Schedule for 2017
GEN-2011-022	299.00	SPS	Hitchland 345kV	On Schedule for 2016 (150MW) and 2017 (149MW)
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 Schedule for 2018
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-Line
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-2012-006IS	125.01	WAPA	Williston-Ch. Creek 230kV	On Schedule
GEN-2012-007	120.00	SUNCMKEC	Rubart 115kV	On-Line
GEN-2012-009IS	99.00	WAPA	Fort Randall 115kV	On Suspension
GEN-2012-012IS	75.00	WAPA	Wolf Point-Circle 115kV	On Suspension
GEN-2012-014IS	99.50	WAPA	Groton 115kV	On Schedule
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 2017
GEN-2012-028	74.80	WFEC	Gotebo 69kV	On-Line
GEN-2012-032	300.00	OKGE	Open Sky 345kV	On-Line
GEN-2012-033	98.10	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-2013-001IS	90.00	WAPA	Summit-Watertown 115kV	On Suspension

Request	Amount	Area	Requested/Proposed Point of Interconnection	Status or In-Service Date
GEN-2013-002	50.60	LES	Tap Sheldon - Folsom & Pleasant Hill (GEN-2013-002 Tap) 115kV CKT 2	On Suspension
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-2013-009IS	19.50	WAPA	Redfield NW 115kV	Commercial Operation
GEN-2013-010	99.00	SUNCMKEC	Tap Spearville - Post Rock (North of GEN-2011-017 Tap) 345kV	On Suspension
GEN-2013-011	30.00	AEPW	Turk 138kV	On-Line
GEN-2013-012	147.00	OKGE	Redbud 345kV	On-Line
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 Suspension
GEN-2013-022	25.00	SPS	Norton 115kV	On-Line
GEN-2013-027	150.00	SPS	Tap Tolk - Yoakum 230kV	On Schedule for 2018
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-Line for 151.6MW
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-Line
GEN-2014-001	200.60	WERE	Tap Wichita - Emporia Energy Center (GEN-2014-001 Tap) 345kV	On Suspension
GEN-2014-001IS	103.70	WAPA	Newell-Maurine 115kV	On Suspension
GEN-2014-002	10.50	OKGE	Tatonga 345kV (GEN-2007-021 POI)	On-Line
GEN-2014-003	15.80	OKGE	Tatonga 345kV (GEN-2007-044 POI)	On-Line
GEN-2014-003IS	91.00	WAPA	Culbertson 115kV	On Schedule
GEN-2014-004	4.00	NPPD	Steele City 115kV (GEN-2011-018 POI)	On-Line
GEN-2014-004IS	384.20	WAPA	Charlie Creek 345kV	IA Pending
GEN-2014-005	5.70	OKGE	Minco 345kV (GEN-2011-010 POI)	On-Line
GEN-2014-006IS	125.00	WAPA	Williston 115kV	On Schedule
GEN-2014-010IS	150.00	WAPA	Neset 115kV	On Schedule
GEN-2014-012	225.00	SPS	Tap Hobbs Interchange - Andrews 230kV	On Suspension
GEN-2014-013	73.50	NPPD	Meadow Grove (GEN-2008-086N2 Sub) 230kV	On-Line
GEN-2014-014IS	151.50	WAPA	Belfield-Rhame 230kV	On Schedule
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 2017
GEN-2014-025	2.40	MIDW	Walnut Creek 69kV	On-Line
GEN-2014-028	35.00	EMDE	Riverton 161kV	On-Line
GEN-2014-031	35.80	NPPD	Meadow Grove 230kV	On-Line
GEN-2014-032	10.20	NPPD	Meadow Grove 230kV	On Schedule for 2016
GEN-2014-033	70.00	SPS	Chaves County 115kV	On-Line
GEN-2014-034	70.00	SPS	Chaves County 115kV	On-Line
GEN-2014-035	30.00	SPS	Chaves County 115kV	On Schedule for 2018
GEN-2014-039	73.40	NPPD	Friend 115kV	On Schedule for 2017
GEN-2014-040	320.40	SPS	Castro 115kV	On-Line
GEN-2014-041	120.80	SUNCMKEC	Arnold 115kV	On Suspension
GEN-2014-047	40.00	SPS	Crossroads 345kV	On Schedule for 2017
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-Line
GEN-2014-064	248.40	OKGE	Otter 138kV	On Suspension
GEN-2015-001	200.00	OKGE	Ranch Road 345kV	On-Line

Request	Amount	Area	Requested/Proposed Point of Interconnection	Status or In-Service Date
GEN-2015-004	52.90	OKGE	Border 345kV	On Schedule for 2017
GEN-2015-005	200.10	KCPL	Tap Nebraska City - Sibley 345kV	On-Line
GEN-2015-007	160.00	NPPD	Hoskins 345kV	On Schedule for 2019
GEN-2015-013	120.00	WFEC	Synder 138kV	FACILITY STUDY STAGE
GEN-2015-014	150.00	SPS	Tap Cochran - Lehman 115kV	FACILITY STUDY STAGE
GEN-2015-015	154.60	OKGE	Tap Medford Tap - Coyote 138kV	On Schedule for 2017
GEN-2015-016	200.00	KCPL	Tap Marmaton - Centerville 161kV	On Schedule for 2018
GEN-2015-021	20.00	SUNCMKEC	Johnson Corner 115kV	On Schedule for 2019
GEN-2015-022	112.00	SPS	Swisher 115kV	FACILITY STUDY STAGE
GEN-2015-023	300.70	NPPD	Holt County 345kV	On Schedule for 2020
GEN-2015-024	220.00	WERE	Tap Thistle - Wichita 345kV Dbl CKT	On-Line
GEN-2015-025	220.00	WERE	Tap Thistle - Wichita 345kV Dbl CKT	On-Line
GEN-2015-029	161.00	OKGE	Tatonga 345kV	On Suspension
GEN-2015-030	200.10	OKGE	Sooner 345kV	On Suspension
Gray County Wind (Montezuma)	110.00	SUNCMKEC	Gray County Tap 115kV	On-Line
J003	20.00	MDU	Baker 115kV	MISO Queued Request
J249	180.00	MDU	MDU Tatanka 230kV	MISO Queued Request
J262	100.00	OTP	Jamestown 345	MISO Queued Request
J263	100.00	OTP	Jamestown 345	MISO Queued Request
J290	150.00	XEL	Tap Glenboro South - Rugby 230kV	MISO Queued Request
J316	150.00	MDU	MDU 230 kV Tatanka-Ellendale line	MISO Queued Request
J436	150.00	OTP	Big Stone South 345kV	MISO Queued Request
J437	150.00	OTP	Big Stone South 345kV	MISO Queued Request
J442	200.00	OTP	Big Stone 230 kV	MISO Queued Request
Llano Estacado (White Deer)	80.00	SPS	Llano Wind 115kV	On-Line
MPC01200	98.90	OTP	Maple River 230kV	IA Pending
MPC02100	100.00	OTP	Tap Center - Mandan 230kV	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 (Carson)	10.00	SPS	Martin 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:	**33,478.5**			

11.3 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	425.00	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	175.00	OKGE	Woodward 345kV
GEN-2011-020	175.00	OKGE	Woodward 345kV
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
GEN-2015-029	161.00	OKGE	Tatonga 345kV
PRIOR QUEUED SUBTOTAL	**3,685.10**		
GEN-2015-048	200.00	OKGE	Cleo Corner 138kV
GEN-2015-057	100.00	OKGE	Minco 345kV
GEN-2015-093	250.00	OKGE	Gracemont 345kV
CURRENT CLUSTER SUBTOTAL	**550.00**		
AREA TOTAL	**4,235.10**		

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 (Carson)	10.00	SPS	Martin 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	**3,626.20**		
GEN-2014-037	200.00	SPS	Tap Hitchland - Beaver County Dbl Ckt (Optima) 345kV
CURRENT CLUSTER SUBTOTAL	**200.00**		
AREA TOTAL	**3,826.20**		

GROUP 3: SPEARVILLE AREA

Request	Capacity	Area	Proposed Point of Interconnection
ASGI-2012-006	22.50	SUNCMKEC	Tap Hugoton - Rolla 69kV
ASGI-2015-001	6.13	SUNCMKEC	Ninnescah 115kV
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
GEN-2015-021	20.00	SUNCMKEC	Johnson Corner 115kV
Gray County Wind (Montezuma)	110.00	SUNCMKEC	Gray County Tap 115kV
PRIOR QUEUED SUBTOTAL	**3,230.93**		
AREA TOTAL	**3,230.93**		

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-2015-064	197.80	SUNCMKEC	Mingo 115kV
GEN-2015-065	202.40	SUNCMKEC	Mingo 345kV
CURRENT CLUSTER SUBTOTAL	**400.20**		
AREA TOTAL	**1,862.40**		

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-2015-002	2.00	SPS	SP-Yuma 69kV
GEN-2001-033	180.00	SPS	San Juan Tap 230kV
GEN-2001-036	80.00	SPS	Norton 115kV
GEN-2006-018	170.00	SPS	TUCO Interchange 230kV
GEN-2006-026	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
GEN-2015-014	150.00	SPS	Tap Cochran - Lehman 115kV
GEN-2015-022	112.00	SPS	Swisher 115kV
SPS Distributed (Hopi)	10.00	SPS	Hopi 115kV
SPS Distributed (Jal)	10.00	SPS	S Jal 115kV
SPS Distributed (Lea Road)	10.00	SPS	Lea Road 115kV
SPS Distributed (Monument)	10.00	SPS	Monument 115kV
SPS Distributed (Ocotillo)	10.00	SPS	S_Jal 115kV
SPS Distributed (Yuma)	2.57	SPS	SP-Yuma 69kV
PRIOR QUEUED SUBTOTAL	**4,398.77**		

GEN-2015-020	100.00	SPS	Oasis 115kV
GEN-2015-031	150.50	SPS	Tap Amarillo South - Swisher 230kV
GEN-2015-056	101.20	SPS	Crossroads 345kV
GEN-2015-058	50.00	SPS	Atoka 115kV
GEN-2015-068	300.00	SPS	TUCO Interchange 345kV
GEN-2015-075	51.50	SPS	Carlisle 69kV
GEN-2015-079	129.20	SPS	Tap Yoakum - Hobbs Interchange 230kV
GEN-2015-080	129.20	SPS	Tap Yoakum - Hobbs Interchange 230kV
CURRENT CLUSTER SUBTOTAL	**1,011.60**		
AREA TOTAL	**5,410.37**		

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
GEN-2015-004	52.90	OKGE	Border 345kV
GEN-2015-013	120.00	WFEC	Synder 138kV
PRIOR QUEUED SUBTOTAL	**1,923.90**		
GEN-2015-055	40.00	WFEC	Erick 138kV
GEN-2015-071	200.00	AEPW	Chisholm 345kV
GEN-2015-084	51.30	AEPW	Hollis 138kV
GEN-2015-085	122.40	AEPW	Altus Junction 138kV
CURRENT CLUSTER SUBTOTAL	**413.70**		
AREA TOTAL	**2,337.60**		

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
ASGI-2015-004	56.36	GRDA	Coffeyville City 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-2012-032	300.00	OKGE	Open Sky 345kV
GEN-2012-033	98.10	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
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-2015-030	200.10	OKGE	Sooner 345kV
PRIOR QUEUED SUBTOTAL	**5,226.06**		
GEN-2015-034	200.00	OKGE	Ranch Road 345kV
GEN-2015-047	300.00	OKGE	Sooner 345kV
GEN-2015-052	300.00	WERE	Tap Open Sky - Rose Hill 345kV
GEN-2015-062	4.50	OKGE	Tap and Tie South 4th - Bunch Creek & Enid Tap - Fairmont (GEN-2012-033T) 138kV
GEN-2015-063	300.00	OKGE	Tap Woodring - Mathewson 345kV
GEN-2015-066	248.40	OKGE	Tap Cleveland - Sooner 345kV
GEN-2015-069	300.00	WERE	Union Ridge 230kV
GEN-2015-073	200.10	WERE	Emporia Energy Center 345kV
GEN-2015-083	125.00	WERE	Belle Plain 138kV
GEN-2015-090	220.00	WERE	Tap Thistle - Wichita 345kV Dbl CKT
CURRENT CLUSTER SUBTOTAL	**2,198.00**		
AREA TOTAL	**7,424.06**		

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-2007-017IS	166.00	WAPA	Ft Thompson-Grand Island 345kV
GEN-2007-018IS	234.00	WAPA	Ft Thompson-Grand Island 345kV
GEN-2008-086N02	201.00	NPPD	Meadow Grove 230kV
GEN-2008-119O	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-2013-019	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
GEN-2015-007	160.00	NPPD	Hoskins 345kV
GEN-2015-023	300.70	NPPD	Holt County 345kV
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	**2,927.70**		
GEN-2015-053	50.00	NPPD	Antelope 115kV
GEN-2015-076	158.40	NPPD	Belden 115kV
GEN-2015-087	66.00	NPPD	Tap Fairbury - Hebron 115kV
GEN-2015-088	300.00	NPPD	Tap Moore - Pauline 345kV
CURRENT CLUSTER SUBTOTAL	**574.40**		
AREA TOTAL	**3,502.10**		

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
GEN-2015-005	200.10	KCPL	Tap Nebraska City - Sibley 345kV
PRIOR QUEUED SUBTOTAL	**634.70**		
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**		
ASGI-2015-006	9.00	SWPA	Tupelo 138kV
GEN-2015-045	20.00	AEPW	Tap Lawton - Sunnyside (Terry Road) 345kV
GEN-2015-092	250.00	AEPW	Tap Lawton - Sunnyside (Terry Road) 345kV
CURRENT CLUSTER SUBTOTAL	**279.00**		
AREA TOTAL	**891.50**		

GROUP 15: E-SOUTH DAKOTA AREA			
Request	**Capacity**	**Area**	**Proposed Point of Interconnection**
G176	100.00	XEL	Yankee 115kV
G255	100.00	XEL	Yankee 115kV
G586	30.00	XEL	Yankee 115kV
G736	200.00	OTP	Big Stone South 230kV
GEN-2002-009IS	40.00	WAPA	Ft Thompson 69kV [Hyde 69kV]
GEN-2007-013IS	50.00	WAPA	Wessington Springs 230kV
GEN-2007-014IS	100.00	WAPA	Wessington Springs 230kV
GEN-2007-023IS	50.00	WAPA	Formit-Summit 115kV
GEN-2009-001IS	200.00	WAPA	Groton-Watertown 345kV
GEN-2009-018IS	100.00	WAPA	Groton 115kV
GEN-2010-001IS	99.00	WAPA	Bismarck-Glenham 230kV
GEN-2010-003IS	34.00	WAPA	Wessington Springs 230kV
GEN-2012-014IS	99.50	WAPA	Groton 115kV
GEN-2013-001IS	90.00	WAPA	Summit-Watertown 115kV
GEN-2013-009IS	19.50	WAPA	Redfield NW 115kV
GEN-2014-001IS	103.70	WAPA	Newell-Maurine 115kV
J436	150.00	OTP	Big Stone South 345kV
J437	150.00	OTP	Big Stone South 345kV
J442	200.00	OTP	Big Stone 230 kV
PRIOR QUEUED SUBTOTAL	**1,915.70**		
AREA TOTAL	**1,915.70**		

GROUP 16: W-NORTH DAKOTA AREA			
Request	**Capacity**	**Area**	**Proposed Point of Interconnection**
G380	150.00	OTP	Rugby 115kV
G408	12.00	XEL	Tap McHenry - Souris 115kV
G502	50.60	MP	Milton Young 230kV
G645	50.00	GRE	Ladish 115kV
G723	10.00	MDU	Haskett 115kV
G752	150.00	MDU	Tap Bison - Hettinger 230kV
G788	49.00	GRE	Ladish 115kV
G830	99.00	GRE	GRE McHenry 115kV
GEN-2005-008IS	50.00	WAPA	Hilken 230kV [Ecklund 230kV]
GEN-2006-015IS	50.00	WAPA	Hilken 230kV [Ecklund 230kV]
GEN-2007-015IS	100.00	WAPA	Hilken 230kV [Ecklund 230kV]
GEN-2007-027IS	99.00	WAPA	Bismarck-Garrison 230kV #1
GEN-2009-026IS	110.00	WAPA	Dickenson-Heskett 230kV
GEN-2010-007IS	172.50	WAPA	Antelope Valley 345kV
GEN-2012-006IS	125.01	WAPA	Williston-Ch. Creek 230kV
GEN-2012-012IS	75.00	WAPA	Wolf Point-Circle 115kV
GEN-2014-003IS	91.00	WAPA	Culbertson 115kV
GEN-2014-004IS	384.20	WAPA	Charlie Creek 345kV
GEN-2014-006IS	125.00	WAPA	Williston 115kV
GEN-2014-010IS	150.00	WAPA	Neset 115kV
GEN-2014-014IS	151.50	WAPA	Belfield-Rhame 230kV
J003	20.00	MDU	Baker 115kV
J249	180.00	MDU	MDU Tatanka 230kV
J262	100.00	OTP	Jamestown 345
J263	100.00	OTP	Jamestown 345
J290	150.00	XEL	Tap Glenboro South - Rugby 230kV
J316	150.00	MDU	MDU 230 kV Tatanka-Ellendale line
MPC01200	98.90	OTP	Maple River 230kV
MPC02100	100.00	OTP	Tap Center - Mandan 230kV
PRIOR QUEUED SUBTOTAL	**3,152.71**		
GEN-2015-046	300.00	WAPA	Tande 345kV
GEN-2015-096	150.00	WAPA	Tap Belfied - Rhame 230kV
GEN-2015-098	100.00	WAPA	Mingusville 230kV
CURRENT CLUSTER SUBTOTAL	**550.00**		
AREA TOTAL	**3,702.71**		

GROUP 17: W-SOUTH DAKOTA AREA

Request	Capacity	Area	Proposed Point of Interconnection
GEN-2006-002IS	51.00	WAPA	Wessington Springs 230kV
GEN-2009-006IS	90.00	WAPA	Mission 115kV
GEN-2009-007IS	100.00	WAPA	Mission 115kV
GEN-2009-020AIS	130.50	WAPA	Tripp Junction 115kV
GEN-2012-009IS	99.00	WAPA	Fort Randall 115kV
PRIOR QUEUED SUBTOTAL	**470.50**		
AREA TOTAL	**470.00**		

GROUP 18: E-NORTH DAKOTA AREA

Request	Capacity	Area	Proposed Point of Interconnection
GEN-2002-008IS	40.50	WAPA	Edgeley 115kV [Pomona 115kV]
GEN-2005-003IS	100.00	WAPA	Nelson 115kV
GEN-2007-020IS	16.00	WAPA	Nelson 115kV
GEN-2008-008IS	5.00	WAPA	Nelson 115kV
PRIOR QUEUED SUBTOTAL	**161.50**		
AREA TOTAL	**161.50**		

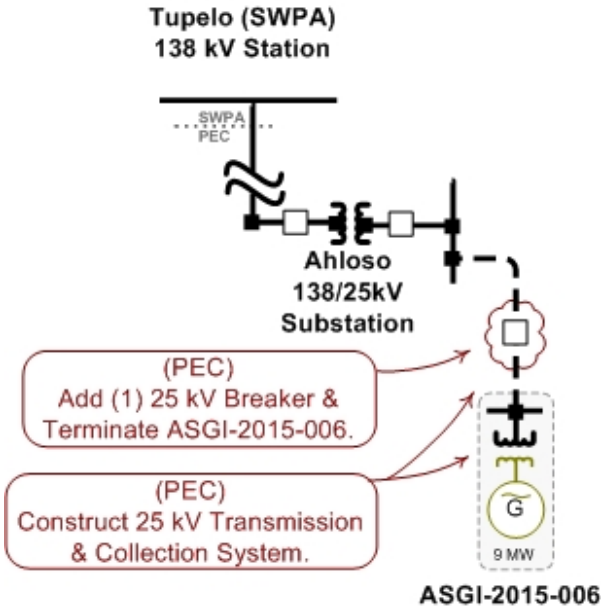
CLUSTER TOTAL (CURRENT STUDY)	**6,176.9**	**MW**
PQ TOTAL (PRIOR QUEUED)	**33,478.5**	**MW**
CLUSTER TOTAL (INCLUDING PRIOR QUEUED)	**39,655.4**	**MW**

11.4 D: Proposed Point of Interconnection One Line Diagrams

See next page

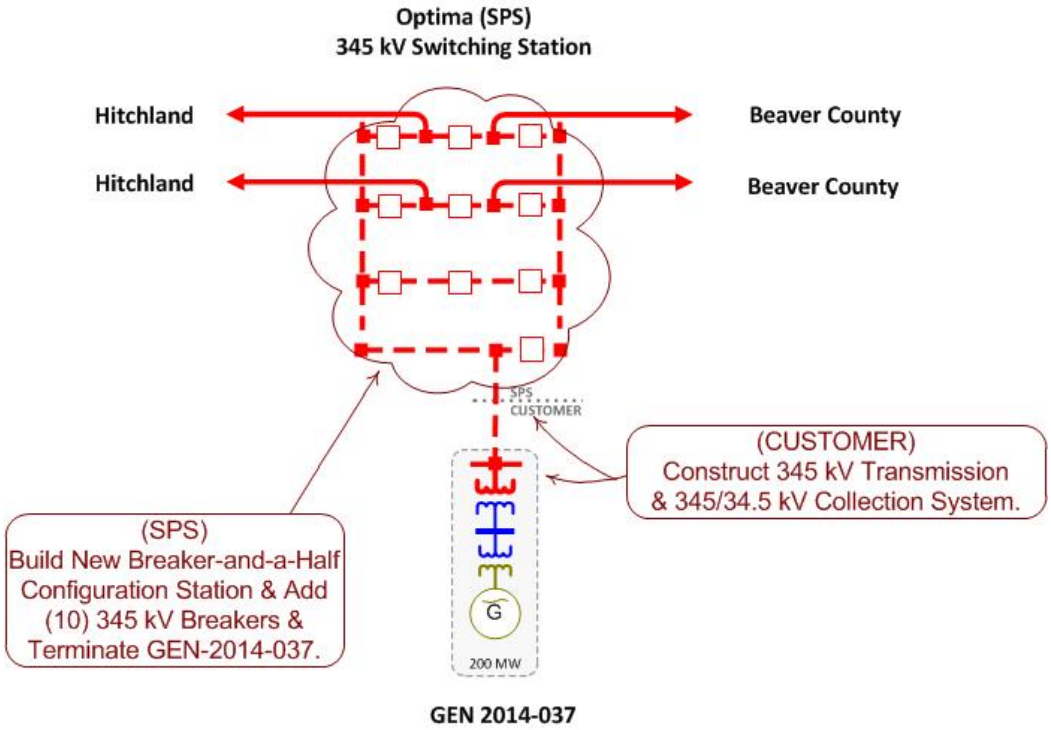
*Note: If not denoted otherwise for Affected System Generator Interconnection Requests (ASGI) interconnection cost estimate could include distribution system or third party system network upgrades and costs estimates.

ASGI-2015-006
Estimated Cluster Analysis Interconnection Cost: $0



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

GEN-2014-037
Estimated Cluster Analysis Interconnection Cost: $20,334,923



GEN-2015-020

Please refer to the Interconnection Facility Study (IFS) Report for latest cost and upgrade descriptions

GEN-2015-031

Please refer to the Interconnection Facility Study (IFS) Report for latest cost and upgrade descriptions

GEN-2015-034

Please refer to the Interconnection Facility Study (IFS) Report for latest cost and upgrade descriptions

GEN-2015-045

Please refer to the Interconnection Facility Study (IFS) Report for latest cost and upgrade descriptions

GEN-2015-046

Please refer to the Interconnection Facility Study (IFS) Report for latest cost and upgrade descriptions

GEN-2015-047

Please refer to the Interconnection Facility Study (IFS) Report for latest cost and upgrade descriptions

GEN-2015-048

Please refer to the Interconnection Facility Study (IFS) Report for latest cost and upgrade descriptions

GEN-2015-052

Please refer to the Interconnection Facility Study (IFS) Report for latest cost and upgrade descriptions

GEN-2015-053

Please refer to the Interconnection Facility Study (IFS) Report for latest cost and upgrade descriptions

GEN-2015-055

Please refer to the Interconnection Facility Study (IFS) Report for latest cost and upgrade descriptions

GEN-2015-056

Please refer to the Interconnection Facility Study (IFS) Report for latest cost and upgrade descriptions

GEN-2015-057

Please refer to the Interconnection Facility Study (IFS) Report for latest cost and upgrade descriptions

GEN-2015-058

Please refer to the Interconnection Facility Study (IFS) Report for latest cost and upgrade descriptions

GEN-2015-062

Please refer to the Interconnection Facility Study (IFS) Report for latest cost and upgrade descriptions

GEN-2015-063

Please refer to the Interconnection Facility Study (IFS) Report for latest cost and upgrade descriptions

GEN-2015-064

Please refer to the Interconnection Facility Study (IFS) Report for latest cost and upgrade descriptions

GEN-2015-065

Please refer to the Interconnection Facility Study (IFS) Report for latest cost and upgrade descriptions

GEN-2015-066

Please refer to the Interconnection Facility Study (IFS) Report for latest cost and upgrade descriptions

GEN-2015-068

Please refer to the Interconnection Facility Study (IFS) Report for latest cost and upgrade descriptions

GEN-2015-069

Please refer to the Interconnection Facility Study (IFS) Report for latest cost and upgrade descriptions

GEN-2015-071

Please refer to the Interconnection Facility Study (IFS) Report for latest cost and upgrade descriptions

GEN-2015-073

Please refer to the Interconnection Facility Study (IFS) Report for latest cost and upgrade descriptions

GEN-2015-075

Please refer to the Interconnection Facility Study (IFS) Report for latest cost and upgrade descriptions

GEN-2015-076

Please refer to the Interconnection Facility Study (IFS) Report for latest cost and upgrade descriptions

GEN-2015-079

Please refer to the Interconnection Facility Study (IFS) Report for latest cost and upgrade descriptions

GEN-2015-080

Please refer to the Interconnection Facility Study (IFS) Report for latest cost and upgrade descriptions

GEN-2015-083

Please refer to the Interconnection Facility Study (IFS) Report for latest cost and upgrade descriptions

GEN-2015-084

Please refer to the Interconnection Facility Study (IFS) Report for latest cost and upgrade descriptions

GEN-2015-085

Please refer to the Interconnection Facility Study (IFS) Report for latest cost and upgrade descriptions

GEN-2015-087

Please refer to the Interconnection Facility Study (IFS) Report for latest cost and upgrade descriptions

GEN-2015-088

Please refer to the Interconnection Facility Study (IFS) Report for latest cost and upgrade descriptions

GEN-2015-090

Please refer to the Interconnection Facility Study (IFS) Report for latest cost and upgrade descriptions

GEN-2015-092

Please refer to the Interconnection Facility Study (IFS) Report for latest cost and upgrade descriptions

GEN-2015-093

Please refer to the Interconnection Facility Study (IFS) Report for latest cost and upgrade descriptions

GEN-2015-096

Please refer to the Interconnection Facility Study (IFS) Report for latest cost and upgrade descriptions

GEN-2015-098

Please refer to the Interconnection Facility Study (IFS) Report for latest cost and upgrade descriptions

11.5 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
GEN-2015-048			
Cleo Corner - Cleo Plant Tap 138kV CKT 1 Replace terminal equipment to at least 1200 amps	Current Study	$61,890	$61,890
GEN-2015-048 Interconnection Costs See One-Line Diagram.	Current Study	$2,968,000	$2,968,000
Woodward EHV Phase Shifting Transformer CKT 1 Install one phase shifting transformer at Woodward	Previously Allocated		$7,200,000
	Current Study Total	$3,029,890	
GEN-2015-057			
GEN-2015-057 Interconnection Costs See One-Line Diagram.	Current Study	$20,000	$20,000
	Current Study Total	$20,000	
GEN-2015-093			
GEN-2015-093 Interconnection Costs See One-Line Diagram.	Current Study	$2,125,000	$2,125,000
	Current Study Total	$2,125,000	
	TOTAL CURRENT STUDY COSTS:	**$5,174,890***	

* Total Current Study Costs reported are for Group 1 Interconnection Requests only

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

11.6 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

Cleo Corner - Cleo Plant Tap 138kV CKT 1			**$61,890**
Replace terminal equipment to at least 1200 amps			
	GEN-2015-048	$61,890	
	Total Allocated Costs	**$61,890**	
GEN-2015-048 Interconnection Costs			**$2,968,000**
See One-Line Diagram.			
	GEN-2015-048	$2,968,000	
	Total Allocated Costs	**$2,968,000**	
GEN-2015-057 Interconnection Costs			**$20,000**
See One-Line Diagram.			
	GEN-2015-057	$20,000	
	Total Allocated Costs	**$20,000**	
GEN-2015-093 Interconnection Costs			**$2,125,000**
See One-Line Diagram.			
	GEN-2015-093	$2,125,000	
	Total Allocated Costs	**$2,125,000**	

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

11.7 G-T: Thermal 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	01ALL	0	17SP	G15_048	FROM->TO	CLEO CORNER - CLEOPLT4 138.00 138KV CKT 1	191	191	0.64105	109.7831	CLEO CORNER (CLEOCOR1) 138/69/13.8KV TRANSFORMER CKT 1
FDNS	01ALL	0	16WP	G15_048	FROM->TO	CLEO CORNER - CLEOPLT4 138.00 138KV CKT 1	191	191	0.64103	108.5615	CLEO CORNER (CLEOCOR1) 138/69/13.8KV TRANSFORMER CKT 1
FDNS	01ALL	0	20WP	G15_048	FROM->TO	CLEO CORNER - CLEOPLT4 138.00 138KV CKT 1	191	191	0.64066	107.0074	CLEO CORNER (CLEOCOR1) 138/69/13.8KV TRANSFORMER CKT 1
FDNS	01ALL	0	20SP	G15_048	FROM->TO	CLEO CORNER - CLEOPLT4 138.00 138KV CKT 1	191	191	0.64104	105.6577	CLEO CORNER (CLEOCOR1) 138/69/13.8KV TRANSFORMER CKT 1
FDNS	01ALL	0	17G	G15_048	FROM->TO	CLEO CORNER - CLEOPLT4 138.00 138KV CKT 1	191	191	0.64145	105.6206	CLEO CORNER (CLEOCOR1) 138/69/13.8KV TRANSFORMER CKT 1
FDNS	01ALL	0	17SP	G15_048	FROM->TO	CLEO CORNER - CLEOPLT4 138.00 138KV CKT 1	191	191	0.5993	102.158	CLEO CORNER - CLEO JCT 69KV CKT 1
FDNS	01ALL	0	17SP	G15_048	FROM->TO	CLEO CORNER - CLEOPLT4 138.00 138KV CKT 1	191	191	0.5993	102.1553	CLEO JCT - RINGWOOD 69KV CKT 1
FDNS	01ALL	0	17SP	G15_048	FROM->TO	CLEO CORNER - CLEOPLT4 138.00 138KV CKT 1	191	191	0.57494	101.9532	CEDARDALE - PIC4 138.00 138KV CKT 1
FDNS	01ALL	0	17SP	G15_048	FROM->TO	CLEO CORNER - CLEOPLT4 138.00 138KV CKT 1	191	191	0.57494	101.7746	CEDARDALE - OKEENE 138KV CKT 1
FDNS	01ALL	0	16WP	G15_048	FROM->TO	CLEO CORNER - CLEOPLT4 138.00 138KV CKT 1	191	191	0.57492	101.6161	CEDARDALE - PIC4 138.00 138KV CKT 1
FDNS	01ALL	0	17SP	G15_048	FROM->TO	CLEO CORNER - CLEOPLT4 138.00 138KV CKT 1	191	191	0.57878	101.6	BEARCAT 138.00 - MOORELAND 138KV CKT 1
FDNS	01ALL	0	16WP	G15_048	FROM->TO	CLEO CORNER - CLEOPLT4 138.00 138KV CKT 1	191	191	0.57492	101.4241	CEDARDALE - OKEENE 138KV CKT 1
FDNS	01ALL	0	16WP	G15_048	FROM->TO	CLEO CORNER - CLEOPLT4 138.00 138KV CKT 1	191	191	0.59929	101.1924	CLEO CORNER - CLEO JCT 69KV CKT 1
FDNS	01ALL	0	16WP	G15_048	FROM->TO	CLEO CORNER - CLEOPLT4 138.00 138KV CKT 1	191	191	0.59929	101.1898	CLEO JCT - RINGWOOD 69KV CKT 1
FDNS	01ALL	0	17SP	G15_048	FROM->TO	CLEO CORNER - CLEOPLT4 138.00 138KV CKT 1	191	191	0.57878	101.1442	BEARCAT 138.00 - NINE MILE 138KV CKT 1
FDNS	01ALL	0	16WP	G15_048	FROM->TO	CLEO CORNER - CLEOPLT4 138.00 138KV CKT 1	191	191	0.57872	101.1292	BEARCAT 138.00 - MOORELAND 138KV CKT 1
FDNS	01ALL	0	17SP	G15_048	FROM->TO	CLEO CORNER - CLEOPLT4 138.00 138KV CKT 1	191	191	0.60262	100.8052	CLEO CORNER - CLEOTP 2 69.000 69KV CKT 1
FDNS	01ALL	0	16WP	G15_048	FROM->TO	CLEO CORNER - CLEOPLT4 138.00 138KV CKT 1	191	191	0.57872	100.6725	BEARCAT 138.00 - NINE MILE 138KV CKT 1
FDNS	01ALL	0	17SP	G15_048	FROM->TO	CLEO CORNER - CLEOPLT4 138.00 138KV CKT 1	191	191	0.60262	100.4615	ALINETP2 69.000 - CLEOTP 2 69.000 69KV CKT 1
FDNS	01ALL	0	17SP	G15_048	FROM->TO	CLEO CORNER - CLEOPLT4 138.00 138KV CKT 1	191	191	0.60262	100.3091	ALINETP2 69.000 - ALVA 69KV CKT 1
FDNS	01ALL	0	16WP	G15_048	FROM->TO	CLEO CORNER - CLEOPLT4 138.00 138KV CKT 1	191	191	0.60261	100.193	CLEO CORNER - CLEOTP 2 69.000 69KV CKT 1
FDNS	01ALL	0	16WP	G15_048	FROM->TO	CLEO CORNER - CLEOPLT4 138.00 138KV CKT 1	191	191	0.60261	100	ALINETP2 69.000 - CLEOTP 2 69.000 69KV CKT 1
FDNS	01ALL	0	16WP	G15_048	FROM->TO	CLEO CORNER - CLEOPLT4 138.00 138KV CKT 1	191	191	0.60261	99.9	ALINETP2 69.000 - ALVA 69KV CKT 1

11.8 G-V: Voltage Power Flow Analysis (Constraints Requiring Transmission Reinforcement)

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

11.9 H-T: Thermal Power Flow Analysis (Other Constraints Not Requiring Transmission Reinforcement)

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

11.10 H-T-AS: Affected System Thermal Power Flow Analysis (Constraints for Potential Upgrades)

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

11.11 H-V-AS: Affected System Voltage Power Flow Analysis(Constraints for Potential Upgrades)

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

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

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