DISIS-2016-001-4

Definitive Interconnection System Impact Study Report

Groups 8 & 9 Restudy

Published on April 24, 2019

By Generator Interconnections Dept.

REVISION HISTORY

DATE OR VERSION NUMBER	AUTHOR	CHANGE DESCRIPTION
1/31/2017	SPP	Initial Report, Stability analysis has not been completed yet for groups 2, 6, 8, 9, & 16
2/8/2017	SPP	Added stand-alone results for all groups except 9, 15, and 16; stability results for groups 6 and 8. Final stand-alone and stability results are expected to be posted by Feb. 28, 2017.
2/28/2017	SPP	Reposted to include final revision 0 results
12/8/2017	SPP	DISIS-2016-001-1 Report revision 0 results due to higher queued and equally queued withdrawals. Excludes stability results for group 9 expected to be posted by Dec. 22, 2017.
12/15/2017	SPP	DISIS-2016-001-1 Report revision 1 results due cost allocation updates for Group 8. Group 6 stability final report revision to remove reference to 765kV.
12/22/2017	SPP	DISIS-2016-001-1 Report revision 2 results for Group 9 stability, Group 8 LOIS correction, and Group 9 cost allocations based on latest TO information.
07/29/2018	SPP	DISIS-2016-001-2 Report revision 0 results for groups 3, 6, and 8 power flow due to withdrawal of higher queued and equally queued requests.
11/13/2018	SPP	DISIS-2016-001-2 Report revision 1 to correct cost allocation for Group 6
3/15/2019	SPP	Report Issued for DISIS-2016-001-3, Groups 3, 6, and 7.
3/29/2019	SPP	Report Issued for DISIS-2016-001-4, Groups 8 and 9.
4/19/2019	SPP	Corrections to Group 9 Cost Allocation (Appendix E and F)

DATE OR VERSION NUMBER	AUTHOR	CHANGE DESCRIPTION
4/24/2019	SPP	Correction of power factor requirements in Section 9.1. Correction to Group 9 Cost Allocation (Appendix E), Previously Allocated R-Plan required for all Group 9 requests for stability.

CONTENTS

SECTION 1: INTRODUCTION

Pursuant to the Southwest Power Pool (SPP) Open Access Transmission Tariff (OATT), SPP has conducted this Definitive Interconnection System Impact Study (DISIS) for generation interconnection requests received during the DISIS Queue Cluster Window which closed on March 31, 2016. The customers will be referred to in this study as the DISIS Interconnection Customers. This DISIS analyzes the impact of interconnecting new generation totaling 2,634.80 MW to the SPP Transmission System for Groups 8 and 9. The interconnecting SPP Transmission Owners include:

- Nebraska Public Power District (NPPD)
- Oklahoma Gas and Electric (OGE)
- Westar Energy (WERE)/Kansas City Power and Light (KCPL)
- Western Area Power Administration (WAPA)

The generation interconnection requests included in this System Impact Study are listed in Appendix A by queue number, amount, requested interconnection service type, area, requested interconnection point, proposed interconnection point, and the requested in-service date[1].

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.

[1] The generation interconnection requests in-service dates may need to be deferred based on the required lead time for the Network Upgrades necessary. The Interconnection Customers that proceed to the Facility Study will be provided a new in-service date based on the completion of the Facility Study or as otherwise provided for in the GIP.

SECTION 2: MODEL DEVELOPMENT (STUDY ASSUMPTIONS)

SUBSECTION A: INTERCONNECTION REQUESTS INCLUDED IN THE CLUSTER

This DISIS includes all interconnection requests that were submitted during the DISIS Queue Cluster Window that met all of the requirements of the Generator Interconnection Procedures (GIP) that were in effect at the time this study commenced. Appendix A lists the interconnection requests that are included in this study.

SUBSECTION B: AFFECTED SYSTEM INTERCONNECTION REQUEST

Affected System Interconnection Requests included in this study are listed in Appendix A with the "ASGI" prefix. Affected System Interconnection Requests were only studied in "cluster" scenarios.

SUBSECTION C: 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 requests were dispatched as Energy Resource Interconnection Service (ERIS) resources with equal distribution across the SPP footprint. Prior-queued requests that requested Network Resource Interconnection Service (NRIS) were also dispatched in separate NRIS scenarios sinking into the area of the interconnecting transmission owner.

SUBSECTION D: DEVELOPMENT OF BASE CASES

POWER FLOW

The power flow models used for this study are based on the 2016-series Integrated Transmission Planning models used for the 2017 ITP-Near Term analysis. These models include:

- Year 1 2017 winter peak (17WP)
- Year 2 2018 spring (18G)
- Year 2 2018 summer peak (18SP)
- Year 5 2021 light (21L)
- Year 5 2021 summer (21SP)
- Year 5 2021 winter peak (21WP)
- Year 10 2026 summer peak (26SP)

DYNAMIC STABILITY

The dynamic stability models used for this study are based on the 2016-series SPP Model Development Working Group (MDWG) Models. These models include:

- Year 1 2017 winter peak (17WP)
- Year 2 2018 summer peak (18SP)
- Year 10 2026 summer peak (26SP)

SHORT CIRCUIT

The Year 2 and Year 10 dynamic stability summer peak models were used for short-circuit analysis.

BASE CASE UPGRADES

The facilities listed in the table below are part of the current 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 Interconnection Customers have not been assigned advancement costs for the projects listed below.

The DISIS 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.

NTC	UID	TO	Upgrade	Estimated Date of Upgrade Completion (EOC)
200360	50957	SPS	Intrepid West - Potash Junction 115 kV Ckt 1 Rebuild	4/15/2019
200360	51250	SPS	National Enrichment Plant - Targa 115 kV Ckt 1	4/5/2019
200391	51528	OGE	DeGrasse 345 kV Substation	6/1/2019
200391	51529	OGE	DeGrasse 345/138 kV Transformer	6/1/2019
200391	51530	OGE	DeGrasse - Knob Hill 138 kV New Line	6/1/2019
200391	51569	OGE	DeGrasse 138 kV Substation (OGE)	6/1/2019
200220	50442	NPPD	Cherry Co. (Thedford) - Gentleman 345 kV Ckt 1	1/1/2021
200220	50444	NPPD	Cherry Co. (Thedford) Substation 345 kV	1/1/2021
200220	50445	NPPD	Cherry Co. (Thedford) - Holt Co. 345 kV Ckt 1	1/1/2021
200220	50446	NPPD	Holt Co. Substation 345 kV	1/1/2021
200309	50457	SPS	Hobbs - Yoakum 345 kV Ckt 1	6/1/2020
200395	50447	SPS	Tuco - Yoakum 345 kV Ckt 1	6/1/2020
200395	50451	SPS	Yoakum 345/230 kV Ckt 1 Transformer	6/1/2019
200282	50869	SPS	China Draw - Yeso Hills 115 kV Ckt 1	12/30/2023
200369	51481	SPS	Canyon East Tap - Randall 115 kV Ckt 1 Rebuild	5/15/2020
200396	51531	WFEC	DeGrasse 138 kV Substation (WFEC)	12/31/2019
200395	50920	SPS	Seminole 230/115 kV #1 Transformer	11/14/2019
200262	51039	SPS	Yoakum County Interchange 230/115 kV Ckt 1 Transformer	3/15/2019
200395	50921	SPS	Seminole 230/115 kV #2 Transformer	5/14/2019
200262	51050	SPS	Yoakum County Interchange 230/115 kV Ckt 2 Transformer	5/31/2019

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

Assigned Study	Upgrade Name	Estimated Date of Upgrade Completion (EOC)
DISIS-2015-002	Beatrice - Harbine 115kV Ckt 1	TBD
DISIS-2015-002	Belvidere - Fairbury 115kV CKT 1	TBD
DISIS-2015-002	Border 345 kV Capacitive Reactive Power Support	TBD
DISIS-2015-002	Cleo Corner - Cleo Plnt Tap 138kV CKT 1	TBD
DISIS-2015-002	Cleveland - Silver City 138kV CKT 1	TBD
DISIS-2015-002	Deaf Smith - Plant X 230 kV Ckt 1 Rebuild	TBD
DISIS-2015-002	Deaf Smith 230 kV Capacitive Reactive Power Support	TBD
DISIS-2015-002	Dickinson 230/115kV CKT 2	TBD
DISIS-2015-002	Gavins Point - Yankon Junction 115kV	TBD
DISIS-2015-002	Grapevine - Wheeler 230 kV Ckt 1 Terminal Equipment (SPS)	TBD
DISIS-2015-002	Newhart - Plant X 230 kV Ckt 1 Rebuild	TBD
DISIS-2015-002	Oklaunion 345 kV Capacitive Reactive Power Support	TBD
DISIS-2015-002	Sweetwater - Wheeler 230 kV Ckt 1 Rebuild (AEPW)	TBD
DISIS-2015-002	Sweetwater - Wheeler 230 kV Ckt 1 Terminal Equipment (SPS)	TBD

POTENTIAL UPGRADES NOT IN THE BASE CASE

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

REGIONAL GROUPINGS

The interconnection requests listed in Appendix A are grouped into sixteen (16) active regional groups based on geographical and electrical impacts. These groupings are shown in Appendix C. This restudy is a study of regional grouping(s) 8 (North Oklahoma/South Central Kansas Area) and 9 (Nebraska Area) only.

SUBSECTION E: DEVELOPMENT OF ANALYSIS CASES

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 in the models. These projects are dispatched across the SPP footprint using load factor ratios.

Peaking units are not dispatched in the spring case, or in the "High VER" summer and winter peak cases. To study peaking units' impacts, the Year 1 winter peak and Year 2 summer peak, Year 5 summer and winter peaks, and Year 10 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.

Each interconnection request is included in the power flow analysis models as an equivalent generator(s) dispatched at the applicable percentage of the requested service amount with 0.95 power factor capability. The facility modeling includes explicit representation of equivalent Generator Step-Up (GSU) and main project transformer(s) with impedance data provided in the interconnection request. Equivalent collector system(s) as well as transmission lead line(s) shorter than 20 miles are added to the power flow analysis models with zero impedance branches.

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.

- Each study group includes system adjustments of dispatching, to maximum output, generation interconnected at the same or adjacent substations to a current study request within that group.
- Study Group 9 included an additional dispatch scenario (GGSSI) to evaluate the Gerald Gentleman Station registered NERC flowgate #6006.
- Study Group 16 included system adjustments for the Miles City DC Tie, North Dakota – Canadian border – The phase shifting transformer to Saskatchewan Power (also known as B-10T), and reduction of WAPA (area 652) load and generation:
    - 2017 Winter Peak –
        - Miles City DC Tie– 200MW East to West transfer
        - B-10T – 65MW South to North transfer
    - 2018 Summer Peak –
        - Miles City DC Tie – 200MW East to West transfer
        - B-10T – 200MW North to South transfer
        - 1,100 MW reduction to load and generation (proxy for summer shoulder)
    - 2026 Summer Peak –
        - Miles City DC Tie – 200MW East to West transfer

Each interconnection request is included in the dynamic stability analysis models as an equivalent generator(s) dispatched at the applicable percentage of the aggregate generator nameplate capabilities provided in the interconnection request. The facility modeling includes explicit representation of equivalent Generator Step-up (GSU) transformer(s), equivalent collector system(s), main project transformer(s), and transmission lead line(s) with impedance data provided in the interconnection request.

SHORT CIRCUIT

The Year 2 and Year 10 dynamic stability Summer Peak models were used for this analysis.

SECTION 3: IDENTIFICATION OF NETWORK CONSTRAINTS (SYSTEM PERFORMANCE)

SUBSECTION A: 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 described.

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

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

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

Appropriate transmission reinforcements are identified 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 assigned transmission reinforcements to mitigate the impacts.

SUBSECTION B: VOLTAGE

For non-converged power flow solutions that are determined to be caused by lack of voltage support, appropriate transmission support will be identified 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 voltage criteria is applicable to all SPP facilities 69 kV and greater in the absence of more stringent criteria:

System Intact	Contingency
0.95 – 1.05 per unit	0.90 – 1.05 per unit

Areas and specific buses having more-stringent voltage criteria:

Areas/Facilities	System Intact	Contingency
AEPW – all buses EMDE High Voltage	0.95 – 1.05 per unit	0.92 – 1.05 per unit
WERE Low Voltage	0.95 – 1.05 per unit	0.93 – 1.05 per unit
WERE High Voltage	0.95 – 1.05 per unit	0.95 – 1.05 per unit
TUCO 230 kV Bus #525830	0.925 – 1.05 per unit	0.925 – 1.05 per unit
Wolf Creek 345 kV Bus #532797	0.985 – 1.03 per unit	0.985 – 1.03 per unit
FCS Bus #646251	1.001 – 1.047 per unit	1.001 – 1.047 per unit

First-Tier External Areas facilities 115 kV and greater.

Area	System Intact	Contingency
EES-EAI LAGN EES AMMO CLEC LAFA LEPA XEL MP SMMPA GRE OTP ALTW MEC MDU DPC ALTE	0.95 – 1.05 per unit	0.90 – 1.05 per unit
OTP-H (115kV+)	0.97 – 1.05 per unit	0.92 – 1.10 per unit
SPC	0.95 – 1.05 per unit	0.95 – 1.05 per unit

The constraints identified through the voltage scan are 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.

SUBSECTION C: DYNAMIC STABILITY

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

SUBSECTION D: UPGRADES ASSIGNED

Thermal overloads that require transmission support to mitigate are discussed in Section 8 and listed in Appendix G-T (Cluster Analysis). 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 9 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-T (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.

In no way does the list of constraints in Appendix G-T (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.

SECTION 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 Year 2 spring model. Cost Allocated Network Upgrades of peaking units are determined using the Year 5 summer peak model. A PSS/E and MUST sensitivity analysis is performed to determine the DF 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 for a given project for all responsible GI requests:

$$Request\ X\ Impact\ Factor\ on\ Upgrade\ Project\ 1 = PTDF(\%)(X) \times MW(X) = X1$$

$$Request\ Y\ Impact\ Factor\ on\ Upgrade\ Project\ 1 = PTDF(\%)(Y) \times MW(Y) = Y1$$

$$Request\ Z\ Impact\ Factor\ on\ Upgrade\ Project\ 1 = PTDF(\%)(Z) \times MW(Z) = Z1$$

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

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

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.

SUBSECTION A: CREDITS/COMPENSATION FOR AMOUNTS ADVANCED FOR NETWORK UPGRADES

Interconnection Customer shall be entitled to either credits or potentially incremental Long Term Congestion Rights (iLTCR), 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.

SECTION 5: REQUIRED INTERCONNECTION FACILITIES

The requirement to interconnect the requested 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 Groups 8 and 9 total an estimated **$424.07 million.**

Interconnection Facilities specific to each interconnection request are listed in Appendix E. A preliminary one-line diagram for each request is 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."

SUBSECTION A: 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 in the 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.

SUBSECTION B: 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 an Environmental Review Agreement per Section 8.6.1 of the GIP.

SECTION 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.
- Impacts on Midcontinent Independent System Operator (MISO) – Per SPP's agreement with MISO, MISO will be contacted and provided a list of interconnection requests that proceed to move forward into the Interconnection Facilities Study Queue. MISO will then evaluate the Interconnection Requests for impacts and will be in contact with affected Interconnection Customers. For potential impacts see Appendix H-T – Affected System and Appendix H-V – Affected System.
- Impacts on Minnkota Power Cooperative, Inc (MPC) – MPC will be contacted and provided a list of interconnection requests that proceed to move forward into the Interconnection Facilities Study Queue. MPC will then evaluate the Interconnection Requests for impacts. For potential impacts see Appendix H-T – Affected System and Appendix H-V – Affected System.
- 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.

SECTION 7: POWER FLOW ANALYSIS

SUBSECTION A: 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 control areas external to SPP.

SUBSECTION B: POWER FLOW ANALYSIS

A power flow analysis is conducted for each Interconnection Customer's facility using modified versions of the year 1 winter peak season, the year 2 spring, year 2 summer peak season, year 5 summer and winter peak seasons, year 5 light load season, and year 10 summer peak 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 request. Requests that are pursuing NRIS have an additional analysis conducted for displacing resources in the interconnecting Transmission Owner's balancing area.

SECTION 8: POWER FLOW RESULTS

SUBSECTION A: CLUSTER SCENARIO

The Cluster Scenario considers the Base Case as well as all Interconnection Requests in the DISIS Study Queue and all generating facilities (and with respect to (3) below, any identified Network Upgrades associated with such higher-queued interconnection) that, on the date the DISIS is commenced:

1. are directly connected to the Transmission System;
2. are interconnection to Affected Systems and may have an impact on the Interconnection Request;
3. have a pending higher-queued Interconnection Request to interconnect to the Transmission System; and
4. have no Interconnection Queue Position but have executed a GIA or requested that an unexecuted GIA be filed with FERC.

Constraints and associated mitigations for each Interconnection Request are summarized below. Details are contained in Appendix G-T and Appendix G-V. Cost allocation for the Cluster Scenario is found in Appendix E.

CLUSTER GROUP 8 (NORTH OKLAHOMA/SOUTH CENTRAL KANSAS AREA)

Requests for this study group as well as prior-queued requests are listed in Appendix C.

The following table outlines the incremental mitigation scenarios for Group 8.

Table 8-1 Group 8 Cluster Upgrade Scenarios

Scenario	Constraint Type	Incremental Mitigation
0	Non-Converged	NONE
2	Thermal	New Wolf Creek – Emporia 345kV
2	Thermal	Rebuild Cottonwood Creek – G16-032-Tap 138kV
2	Thermal	Ranch Road - Sooner 345 kV Ckt 1 Terminal Upgrades
3	Voltage	NONE

The following ERIS Non-Convergence constraints were observed for single contingency (N-1), and multi-contingency (P1, P2, etc.) conditions for Group 8. The table below summarizes constraints and associated mitigations.

Table 8-2 Group 8 Cluster ERIS Non-Convergence Constraints

Contingency	Mitigation
None	

The following ERIS thermal constraints were observed for single contingency (N-1), and multi-contingency (P1, P2, etc.) conditions for Group 8. The table below summarizes constraints and associated mitigations.

SPP previously assigned "Lacygne – Waverly 345 kV Ckt 1 Terminal Upgrades" as mitigation for the Lacygne - Waverly 345 kV Ckt 1 overload which had a cost estimate of $1,600,000. The Transmission Owner performed more detailed analysis of the project cost and determined that the conductor would also have to be rebuilt which increased the total upgrade cost to $79,286,657. Therefore, SPP has chosen a new line from Wolf Creek – Emporia 345 kV Ckt 1 as mitigation for the Lacygne - Waverly 345 kV Ckt 1 overload which has a cost estimate of $56,000,000.

In addition, previous DISIS-2016-001 studies did not identify the GEN-2016-032 Tap – Cottonwood Creek thermal constraint. This was due to a modeling error that resulted in a line loading less than 100% of Rate A and Rate B for system intact and contingency conditions, respectively. This modeling error was fixed for this restudy, and therefore the overload of the GEN-2016-032 Tap – Cottonwood Creek is present both system intact and under contingency. The maximum capacity of the GEN-2016-032 wind farm is greater than the summer normal rating of the line; therefore, requiring a full rebuild as the conductor is the most limiting element. The cost estimate for the rebuild of the GEN-2016-032 Tap – Cottonwood Creek 138 kV Ckt 1 is $12,000,000.

Table 8-3 Group 8 Cluster ERIS Thermal Constraints

Monitored Element	Limiting Rate A/B (MVA)	TC %Loading (%MVA)	Contingency	Mitigation
LACYGNE - WAVERLY7 345.00 345KV CKT 1	1141	103.5676	System Intact	New Wolf Creek – Emporia 345kV CKT 1
COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1	194	125.7779	System Intact	Rebuild Cottonwood Creek - G16-032-Tap 138kV CKT 1
COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1	270	137.6935	G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1	Rebuild Cottonwood Creek - G16-032-Tap 138kV CKT 1
RANCHRD7 345.00 - SOONER 345KV CKT 1	1195	102.8081	G15052_T 345.00 - ROSE HILL 345KV CKT 1	Ranch Road - Sooner 345 kV Ckt 1 Terminal Upgrades

The following ERIS voltage constraints were observed for single contingency (N-1), and multi-contingency (P1, P2, etc.) conditions for Group 8. The table below summarizes constraints and associated mitigations.

Table 8-4 Group 8 Cluster ERIS Voltage Constraints

Monitored Element	TC Voltage (PU)	VMIN (PU)	VMAX (PU)	Contingency	Mitigation
None					

The following NRIS thermal constraints were observed for single contingency (N-1), and multi-contingency (P1, P2, etc.) conditions for Group 8. The table below summarizes constraints and associated mitigations.

Table 8-5 Group 8 Cluster NRIS Thermal Constraints

Monitored Element	Limiting Rate A/B (MVA)	TC %Loading (%MVA)	Contingency	Mitigation
COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1	194	115.5629	System Intact	Rebuild Cottonwood Creek - G16-032-Tap 138kV CKT 1

The following NRIS voltage constraints were observed for single contingency (N-1), and multi-contingency (P1, P2, etc.) conditions for Group 8. The table below summarizes constraints and associated mitigations.

Table 8-6 Group 8 Cluster NRIS Voltage Constraints

Monitored Element	TC Voltage (PU)	VMIN (PU)	VMAX (PU)	Contingency	Mitigation
None					

CLUSTER GROUP 9 (NEBRASKA AREA)

Requests for this study group as well as prior-queued requests are listed in Appendix C.

The following table outlines the incremental mitigation scenarios for Group 9.

Table 8-7 Group 9 Cluster Upgrade Scenarios

Scenario	Constraint Type	Incremental Mitigation
0	Non-Converged	New Sidney – Keystone 345 kV CKT 2
		NTC 200220 (R-Plan)
		Reroute and Build Laramie River Station – Stegall 345 kV CKT 2
		New Gerald Gentleman Station – Keystone 345 kV CKT 2
2	Thermal	None
3	Voltage	None

The following ERIS Non-Convergence constraints were observed for single contingency (N-1), and multi-contingency (P1, P2, etc.) conditions for Group 9. The table below summarizes constraints and associated mitigations.

Table 8-8 Group 9 Cluster ERIS Non-Convergence Constraints

Contingency	Mitigation
G1623&1629-T345.00 - SIDNEY2-LNX3345.00 345KV CKT 1	New Sidney – Keystone 345 kV CKT 2 New Gentleman – Keystone 345kV CKT 2 NTC 200220 (R-Plan) Reroute and Build Laramie River Station – Stegall 345 kV CKT 2
KEYSTONE - SIDNEY1-LNX3345.00 345KV CKT 1	
SIDNEY - SIDNEY1-LNX3345.00 345KV CKT Z	
SIDNEY-KEYSTONE-TLINE-REACTORS-CKT1	
GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z	
GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1	
LARAMIE RIVER - STEGALL 345KV CKT 1	

The following ERIS thermal constraints were observed for single contingency (N-1), and multi-contingency (P1, P2, etc.) conditions for Group 9. The table below summarizes constraints and associated mitigations.

Table 8-9 Group 9 Cluster ERIS Thermal Constraints

Monitored Element	Limiting Rate A/B (MVA)	TC %Loading (%MVA)	Contingency	Mitigation
None				

The following ERIS voltage constraints were observed for single contingency (N-1), and multi-contingency (P1, P2, etc.) conditions for Group 9. The table below summarizes constraints and associated mitigations.

Table 8-10 Group 9 Cluster ERIS Voltage Constraints

Monitored Element	TC Voltage (PU)	VMIN (PU)	VMAX (PU)	Contingency	Mitigation
None					

SUBSECTION B: 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. Please refer to Section 8 Subsection A for power flow constraint mitigation.

Table 8-11: Limited Operation Results

Interconnection Request	MW Requested	LOIS Available (MW)
GEN-2015-089	200.0	0.0
GEN-2016-009	29.0	29.0
GEN-2016-021	300.0	300.0
GEN-2016-022	151.8	64.56
GEN-2016-023	150.53	0.0
GEN-2016-029	150.53	0.0
GEN-2016-031	1.5	0.63
GEN-2016-032	200.0	77.3
GEN-2016-043	230.0	230.0
GEN-2016-050	250.7	250.7
GEN-2016-061	250.7	106.62
GEN-2016-068	250.0	106.32
GEN-2016-071	200.1	85.1
GEN-2016-073	220.0	93.56
GEN-2016-075	50.0	0.0

SUBSECTION C: 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.

SECTION 9: STABILITY & SHORT CIRCUIT ANALYSIS

A stability and short-circuit analysis was conducted for each Interconnection Request using modified versions of the MDWG Models dynamic cases. The stability analysis assumes that all upgrades identified in the power flow analysis are in-service 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.

A synopsis is included for each group. The detailed stability study for each group can be found in the Appendices.

A preliminary short-circuit analysis was performed for this study and will be refined in the Interconnection Facilities Study with any additional required upgrades and cost assignment identified at that time.

9.1 POWER FACTOR REQUIREMENTS SUMMARY

Power factor requirements will be in accordance with FERC Order No. 827, Final Rule, Issued June 16, 2016.

9.2 CLUSTER STABILITY AND SHORT-CIRCUIT SUMMARY

CLUSTER GROUP 8 (NORTH OKLAHOMA/SOUTH CENTRAL KANSAS AREA)

The Group 8 stability analysis was not performed again for this restudy. This group was not analyzed for this restudy and previously identified restudy results remain valid.

CLUSTER GROUP 9 (NEBRASKA AREA)

New requests for this study group as well as prior-queued requests are listed in Appendix C.

Generation in this area may require additional upgrades to relieve system reliability constraints related to NERC registered flowgates #5221, #6006, #6007, & #6008. These flowgates require additional review and updates resultant from the inclusion of the assigned network upgrades.

The Group 9 cases included the following system adjustments of dispatching, to maximum output, generation interconnected at the same or adjacent substations to a current study request:

- Laramie River Station units: GEN-2016-023 & GEN-2016-029

- Neal units: GEN-2016-021 & GEN-2016-043
- Ft. Randall units: GEN-2015-089
- Big Bend units: GEN-2016-075

The Group 9 stability analysis for this area was performed by Mitsubishi Electric Power Products (MEPPI). With the new requests modeled, violations of stability damping criteria and voltage recovery criteria were observed. Upgrades identified in the power flow analysis were also tested in the stability analysis.

To mitigate the voltage instability, violations of voltage recovery criteria, and generation tripping off the following upgrades were implemented in each season:

- NTC 200220 (R-Plan)
- Gentleman Gerald Station to Keystone 345 kV circuit #2
- Keystone to Sidney 345 kV circuit #2
- GEN-2016-023 & GEN-2016-029 interconnection substation to include a reroute and termination of Laramie River Station to Stegall 345kV circuit #1

The GGSSI Scenario Stability Analysis determined that with the mitigations applied from the normal dispatch scenario violations of stability damping criteria and voltage recovery criteria were observed.

To mitigate the voltage instability, violations of voltage recovery criteria, and generation tripping off the following upgrades were implemented in each season:

- Gentleman Gerald Station to Keystone 345 kV circuit #2 to include a reconfiguration of Gentleman Gerald Station 345 kV to mitigate TPL-001-4 P4 events

It should be noted that for certain system conditions curtailment may be necessary to maintain system stability for potential circuit outages including TPL-001-4 P6 and P7 events.

With all previously-assigned and currently-assigned Network Upgrades placed in service and identified system adjustments applied, no violations were observed, including violations of low-voltage ride-through requirements, for the probable contingencies studied.

SECTION 10: CONCLUSION

The minimum cost of interconnecting all Group 8 and Group 9 generation interconnection requests included in this Definitive Interconnection System Impact Restudy is estimated at **$424.07 million**, not including the exceptions noted in Section 5.

Allocated costs for Network Upgrades and Transmission Owner Interconnection Facilities are listed in Appendix E and F. For Interconnection Requests that result in an interconnection to, or modification of, 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 an 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.

The Interconnection Facilities Study will be revised, if needed, following the posting of this DISIS. The Interconnection Facilities Study may include additional study analysis, additional facility upgrades not yet identified by this DISIS, such as circuit breaker replacements and affected system facilities, and further refinement of existing cost estimates.

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

APPENDICES

A: GENERATION INTERCONNECTION REQUESTS CONSIDERED FOR IMPACT STUDY

A: Generation Interconnection Requests Considered for Study

Request	Amount	Service	Area	Requested Point of Interconnection	Proposed Point of Interconnection	Requested In-Service Date
ASGI-2016-002	0.35	ER	SPS	SP-Yuma 115kV	SP-Yuma 115kV	
ASGI-2016-003	12	ER	KCPL	Paola 161kV	Paola 161kV	
ASGI-2016-004	5	ER	SPS	Palo Duro 115kV	Palo Duro 115kV	
GEN-2015-036	303.6	ER	OKGE	Johnston County 345kV	Johnston County 345kV	12/31/2017
GEN-2015-041	5	ER	SPS	TUCO Interchange 345kV	TUCO Interchange 345kV	7/1/2015
GEN-2015-082	200	ER	OKGE	Tap Hitchland - Woodward Dbl Ckt (GEN-2011-014 Tap) 345kV	Tap Hitchland - Woodward Dbl Ckt (GEN-2011-014 Tap) 345kV	12/1/2017
GEN-2015-089	200	ER	WAPA	Utica 230kV	Utica 230kV	6/30/2017
GEN-2015-095	176	ER	WFEC	DeGrasse 138kV	DeGrasse 138kV	12/1/2017
GEN-2016-003	248.4	ER	OKGE	Tap Badger - Woodward 345kV	Tap Badger - Woodward 345kV	12/31/2017
GEN-2016-004	202	ER/NR	WAPA	Leland Olds 230kV	Leland Olds 230kV	12/1/2018
GEN-2016-007	100	ER	WAPA	Valley City 115kV	Valley City 115kV	12/31/2018
GEN-2016-009	29	ER	OKGE	Osage 69kV	Osage 69kV	9/30/2018
GEN-2016-013	10	ER	EMDE	La Russell 161kV	La Russell 161kV	4/25/2003
GEN-2016-014	10	ER	EMDE	La Russell 161kV	La Russell 161kV	4/25/2003
GEN-2016-015	100	ER	SPS	Andrews 230kV	Andrews 230kV	10/1/2018
GEN-2016-016	78.2	ER	MIDW	North Kinsley 115kV	North Kinsley 115kV	12/1/2017
GEN-2016-017	250.7	ER	WAPA	Tap Fort Thompson - Leland Olds 345kV	Tap Fort Thompson - Leland Olds 345kV	12/1/2017
GEN-2016-020	150	ER	WFEC	Mooreland 138kV	Mooreland 138kV	12/31/2018
GEN-2016-021	300	ER	NPPD	Hoskins 345kV	Hoskins 345kV	12/1/2018
GEN-2016-022	151.8	ER	OKGE	Ranch Road 345kV	Ranch Road 345kV	12/31/2017
GEN-2016-023	150.5	ER	WAPA	Tap Laramie River – Sidney 345kV	Tap Laramie River – Sidney 345kV	12/31/2017
GEN-2016-028	100	ER	AEPW	Clayton 138kV	Clayton 138kV	12/31/2018
GEN-2016-029	150.5	ER	WAPA	Tap Laramie River – Sidney 345kV	Tap Laramie River – Sidney 345kV	12/31/2017
GEN-2016-030	99.9	ER/NR	OKGE	Brown 138kV	Brown 138kV	1/1/2019
GEN-2016-031	1.5	ER	OKGE	Ranch Road 345kV	Ranch Road 345kV	11/30/2016
GEN-2016-032	200	ER/NR	OKGE	Tap Marshall - Cottonwood Creek 138kV	Tap Marshall - Cottonwood Creek 138kV	10/1/2018
GEN-2016-037	300	ER	AEPW	Tap Chisholm - Gracemont 345kV	Tap Chisholm - Gracemont 345kV	12/1/2018
GEN-2016-043	230	ER	NPPD	Hoskins 345kV	Hoskins 345kV	9/1/2018
GEN-2016-045	499.1	ER	OKGE	Mathewson 345kV	Mathewson 345kV	8/31/2018
GEN-2016-046	299	ER	SUNCMKEC	Tap Clark County - Ironwood 345kV	Tap Clark County - Ironwood 345kV	12/1/2018
GEN-2016-047	24	ER	OKGE	Mustang 69kV	Mustang 69kV	12/31/2017
GEN-2016-050	250.7	ER	NPPD	Tap Axtell - Post Rock 345kV	Tap Axtell - Post Rock 345kV	12/1/2017
GEN-2016-051	9.8	ER	AEPW	Tap Clinton Junction - Weatherford Southeast 138kV	Tap Clinton Junction - Weatherford Southeast 138kV	
GEN-2016-052	3.3	ER	WAPA	Hilken 230kV	Hilken 230kV	12/31/2016
GEN-2016-053	3.3	ER	WAPA	Hilken 230kV	Hilken 230kV	12/31/2016
GEN-2016-054	3.4	ER	WAPA	Wessington Springs 230kV	Wessington Springs 230kV	
GEN-2016-056	200	ER	SPS	Carlisle 230kV	Carlisle 230kV	12/15/2018
GEN-2016-057	499.1	ER	OKGE	Mathewson 345kV	Mathewson 345kV	8/31/2018
GEN-2016-061	250.7	ER	OKGE	Tap Woodring - Sooner 345kV	Tap Woodring - Sooner 345kV	12/1/2017
GEN-2016-062	250.7	ER	SPS	Andrews 230kV	Andrews 230kV	12/1/2018
GEN-2016-063	200	ER/NR	OKGE	Tap Sunnyside – Hugo 345kV	Tap Sunnyside – Hugo 345kV	12/31/2018
GEN-2016-067	73.6	ER	SUNCMKEC	Mingo 345kV	Mingo 345kV	11/1/2017

Request	Amount	Service	Area	Requested Point of Interconnection	Proposed Point of Interconnection	Requested In-Service Date
GEN-2016-068	250	ER	OKGE	Woodring 345kV	Woodring 345kV	12/1/2017
GEN-2016-069	31.4	ER	SPS	Chaves County 115kV	Chaves County 115kV	6/1/2018
GEN-2016-070	5.3	ER	SPS	Martin 115kV	Martin 115kV	11/1/2016
GEN-2016-071	200.1	ER	OKGE	Middleton Tap 138kV	Middleton Tap 138kV	9/30/2018
GEN-2016-073	220	ER	WERE	Tap Thistle – Wichita 345kV Dbl CKT	Tap Thistle – Wichita 345kV Dbl CKT	12/31/2017
GEN-2016-075	50	ER	WAPA	Grand Prairie 345kV	Grand Prairie 345kV	12/31/2017
Total:	**7,087.95**					

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

B: PRIOR-QUEUED INTERCONNECTION REQUESTS

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	
ASGI-2010-010	211.00	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	Commerical Operation
ASGI-2011-002	40.00	SPS	Herring 115kV	Commerical Operation
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-2012-006	22.50	SUNCMKEC	Tap Hugoton - Rolla 69kV	
ASGI-2013-001	11.50	SPS	PanTex South 115kV	
ASGI-2013-002	18.40	SPS	FE Tucumcari 115kV	
ASGI-2013-003	18.40	SPS	FE Clovis 115kV	
ASGI-2013-004	109.80	SUNCMKEC	Morris 115kV	
ASGI-2013-005	1.65	SPS	FE Clovis 115kV	
ASGI-2014-014	169.20	GRDA	Ferguson 69kV	
ASGI-2015-001	6.13	SUNCMKEC	Ninnescah 115kV	
ASGI-2015-002	2.00	SPS	SP-Yuma 69kV	
ASGI-2015-004	169.09	GRDA	Coffeyville City 69kV	
ASGI-2015-006	9.00	SWPA	Tupelo 138kV	
ASGI-2016-005	20.00	WAPA	Tap White Lake - Stickeny 69kV	
ASGI-2016-006	20.00	WAPA	Mitchall	
ASGI-2016-007	20.00	WAPA	Kimball 69kV	
GEN-2001-014	94.50	WFEC	Ft Supply 138kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2001-026	74.25	WFEC	Washita 138kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2001-033	1,440.00	SPS	San Juan Tap 230kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2001-036	80.00	SPS	Norton 115kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2001-037	102.00	OKGE	FPL Moreland Tap 138kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2001-039A	104.00	SUNCMKEC	Shooting Star Tap 115kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2001-039M	100.00	SUNCMKEC	Central Plains Tap 115kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2002-004	400.00	WERE	Latham 345kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2002-005	123.00	WFEC	Red Hills Tap 138kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2002-008	720.00	SPS	Hitchland 345kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2002-008IS	40.50	WAPA	Edgeley 115kV [Pomona 115kV]	Commercial Operation
GEN-2002-009	79.80	SPS	Hansford 115kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2002-009IS	40.00	WAPA	Ft Thompson 69kV [Hyde 69kV]	Commercial Operation
GEN-2002-022	478.40	SPS	Bushland 230kV	IA FULLY EXECUTED/COMMERCIAL OPERATION

Request	Amount	Area	Requested/Proposed Point of Interconnection	Status or In-Service Date
GEN-2002-025A	150.00	SUNCMKEC	Spearville 230kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2003-004	100.00	WFEC	Washita 138kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2003-005	200.00	WFEC	Anadarko - Paradise (Blue Canyon) 138kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2003-006A	403.20	SUNCMKEC	Elm Creek 230kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2003-019	500.00	MIDW	Smoky Hills Tap 230kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2003-020	318.20	SPS	Martin 115kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2003-021N	150.00	NPPD	Ainsworth Wind Tap 115kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2003-022	120.00	AEPW	Weatherford 138kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2004-014	154.50	SUNCMKEC	Spearville 230kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2004-020	27.00	AEPW	Weatherford 138kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2004-023	20.60	WFEC	Washita 138kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2004-023N	75.00	NPPD	Columbus Co 115kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2005-003	30.60	WFEC	Washita 138kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2005-003IS	100.00	WAPA	Nelson 115kV	Commercial Operation
GEN-2005-008	120.00	OKGE	Woodward 138kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2005-008IS	50.00	WAPA	Hilken 230kV [Ecklund 230kV]	Commercial Operation
GEN-2005-012	496.80	SUNCMKEC	Ironwood 345kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2005-013	199.80	WERE	Caney River 345kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2006-002	201.60	AEPW	Sweetwater 230kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
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	3,025.80	SPS	TUCO Interchange 230kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2006-020N	42.00	NPPD	Bloomfield 115kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2006-020S	20.00	SPS	DWS Frisco 115kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2006-021	94.00	SUNCMKEC	Flat Ridge Tap 138kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2006-024S	18.90	WFEC	Buffalo Bear Tap 69kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2006-026	1,812.00	SPS	Hobbs 230kV & Hobbs 115kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2006-035	450.00	AEPW	Sweetwater 230kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2006-037N1	73.10	NPPD	Broken Bow 115kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2006-038N005	79.90	NPPD	Broken Bow 115kV	IA FULLY EXECUTED/COMMERCIAL OPERATION

Request	Amount	Area	Requested/Proposed Point of Interconnection	Status or In-Service Date
GEN-2006-038N019	79.90	NPPD	Petersburg North 115kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2006-043	98.90	AEPW	Sweetwater 230kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2006-044	1,480.00	SPS	Hitchland 345kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2006-044N	40.50	NPPD	North Petersburg 115kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2006-046	129.60	OKGE	Dewey 138kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2007-011N08	81.00	NPPD	Bloomfield 115kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
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	402.00	OKGE	Tatonga 345kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2007-025	598.40	WERE	Viola 345kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2007-040	200.10	SUNCMKEC	Buckner 345kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2007-043	200.00	OKGE	Minco 345kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2007-044	900.00	OKGE	Tatonga 345kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2007-046	400.00	SPS	Hitchland 115kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2007-050	342.00	OKGE	Woodward EHV 138kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2007-052	405.00	WFEC	Anadarko 138kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2007-062	847.20	OKGE	Woodward EHV 345kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2008-003	101.20	OKGE	Woodward EHV 138kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2008-008IS	5.00	WAPA	Nelson 115kV	Commercial Operation
GEN-2008-013	600.00	OKGE	Hunter 345kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2008-018	499.50	SPS	Finney 345kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2008-022	899.10	SPS	Crossroads 345kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2008-023	297.60	AEPW	Hobart Junction 138kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2008-037	99.00	WFEC	Slick Hills 138kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2008-044	395.60	OKGE	Tatonga 345kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2008-047	597.80	OKGE	Beaver County 345kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2008-051	322.00	SPS	Potter County 345kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2008-079	98.90	SUNCMKEC	Crooked Creek 115kV	IA FULLY EXECUTED/COMMERCIAL OPERATION

Request	Amount	Area	Requested/Proposed Point of Interconnection	Status or In-Service Date
GEN-2008-086N02	402.00	NPPD	Meadow Grove 230kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2008-092	401.00	MIDW	Post Rock 230kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2008-098	100.80	WERE	Waverly 345kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2008-119O	60.00	OPPD	S1399 161kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2008-123N	89.66	NPPD	Tap Pauline - Guide Rock (Rosemont) 115kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2008-124	200.10	SUNCMKEC	Ironwood 345kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2008-129	160.00	KCPL	Pleasant Hill 161kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2009-001IS	200.00	WAPA	Groton-Watertown 345kV	On Schedule
GEN-2009-008	198.69	MIDW	South Hays 230kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2009-018IS	99.50	WAPA	Groton 115kV	Commercial Operation
GEN-2009-020	48.30	MIDW	Walnut Creek 69kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2009-020AIS	130.50	WAPA	Tripp Junction 115kV	Commercial Operation
GEN-2009-025	59.80	OKGE	Nardins 69kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2009-026IS	110.00	WAPA	Dickenson-Heskett 230kV	On Schedule
GEN-2009-040	72.00	WERE	Marshall 115kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2010-001	599.40	OKGE	Beaver County 345kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2010-001IS	99.00	WAPA	Bismarck-Glenham 230kV	On Schedule
GEN-2010-003	100.80	WERE	Waverly 345kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2010-003IS	34.00	WAPA	Wessington Springs 230kV	Commercial Operation
GEN-2010-005	598.40	WERE	Viola 345kV	IA FULLY EXECUTED/ON SCHEDULE
GEN-2010-006	205.00	SPS	Jones 230kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2010-009	165.60	SUNCMKEC	Buckner 345kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2010-011	29.70	OKGE	Tatonga 345kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2010-014	717.60	SPS	Hitchland 345kV	IA FULLY EXECUTED/ON SCHEDULE
GEN-2010-036	50.60	WERE	6th Street 115kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2010-040	596.90	OKGE	Cimarron 345kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2010-041	10.29	OPPD	S1399 161kV	IA FULLY EXECUTED/ON SCHEDULE
GEN-2010-046	56.00	SPS	TUCO Interchange 230kV	IA FULLY EXECUTED/ON SCHEDULE
GEN-2010-051	200.00	NPPD	Tap Hoskins - Twin Church (Dixon County) 230kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2010-055	4.50	AEPW	Wekiwa 138kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2010-057	201.00	MIDW	Rice County 230kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2011-008	1,800.00	SUNCMKEC	Clark County 345kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2011-010	100.80	OKGE	Minco 345kV	IA FULLY EXECUTED/COMMERCIAL OPERATION

Request	Amount	Area	Requested/Proposed Point of Interconnection	Status or In-Service Date
GEN-2011-011	50.00	KCPL	Iatan 345kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2011-014	198.00	OKGE	Tap Hitchland - Woodward Dbl Ckt (GEN-2011-014 Tap) 345kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2011-016	200.10	SUNCMKEC	Ironwood 345kV	IA FULLY EXECUTED/ON SUSPENSION
GEN-2011-018	73.60	NPPD	Steele City 115kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2011-019	175.00	OKGE	Woodward 345kV	IA FULLY EXECUTED/ON SCHEDULE
GEN-2011-020	165.60	OKGE	Woodward 345kV	IA FULLY EXECUTED/ON SCHEDULE
GEN-2011-022	598.00	SPS	Hitchland 345kV	IA FULLY EXECUTED/ON SCHEDULE
GEN-2011-025	78.76	SPS	Tap Floyd County - Crosby County 115kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2011-027	120.00	NPPD	Tap Hoskins - Twin Church (Dixon County) 230kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2011-037	7.00	WFEC	Blue Canyon 5 138kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2011-040	222.00	OKGE	Carter County 138kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2011-045	205.00	SPS	Jones 230kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2011-046	27.00	SPS	Lopez 115kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2011-048	175.00	SPS	Mustang 230kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2011-049	250.70	OKGE	Border 345kV	IA FULLY EXECUTED/ON SCHEDULE
GEN-2011-050	108.00	AEPW	Santa Fe Tap 138kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2011-054	600.00	OKGE	Cimarron 345kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2011-056	3.60	NPPD	Jeffrey 115kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2011-056A	3.60	NPPD	John 1 115kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2011-056B	4.50	NPPD	John 2 115kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2011-057	150.00	WERE	Creswell 138kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2012-001	61.20	SPS	Cirrus Tap 230kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2012-004	82.80	OKGE	Carter County 138kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2012-007	1,440.00	SUNCMKEC	Rubart 115kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2012-012IS	75.00	WAPA	Wolf Point-Circle 115kV	On Suspension
GEN-2012-020	956.00	SPS	TUCO 230kV	IA FULLY EXECUTED/ON SCHEDULE
GEN-2012-021	4.80	LES	Terry Bundy Generating Station 115kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2012-024	178.20	SUNCMKEC	Clark County 345kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2012-028	74.00	WFEC	Gotebo 69kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2012-032	598.00	OKGE	Open Sky 345kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2012-033	98.06	OKGE	Tap and Tie South 4th - Bunch Creek & Enid Tap - Fairmont (GEN-2012-033T) 138kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2012-034	7.00	SPS	Mustang 230kV	IA FULLY EXECUTED/COMMERCIAL OPERATION

Request	Amount	Area	Requested/Proposed Point of Interconnection	Status or In-Service Date
GEN-2012-035	7.00	SPS	Mustang 230kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2012-036	7.00	SPS	Mustang 230kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2012-037	203.00	SPS	TUCO 345kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2012-041	121.50	OKGE	Ranch Road 345kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2013-002	50.60	NPPD	Monolith 115kV	IA FULLY EXECUTED/ON SUSPENSION
GEN-2013-007	100.00	OKGE	Tap Prices Falls - Carter 138kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2013-008	1.20	NPPD	Steele City 115kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2013-009IS	19.50	WAPA	Redfield NW 115kV	Commercial Operation
GEN-2013-011	30.00	AEPW	Turk 138kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2013-012	588.00	OKGE	Redbud 345kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2013-016	203.00	SPS	TUCO 345kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2013-019	73.60	NPPD	Monolith 115kV	IA FULLY EXECUTED/ON SUSPENSION
GEN-2013-022	25.00	SPS	Norton 115kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2013-027	148.40	SPS	Tap Tolk - Yoakum 230kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2013-028	1,119.00	GRDA	Tap N Tulsa - GRDA 1 345kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2013-029	598.00	OKGE	Renfrow 345kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2013-030	300.00	OKGE	Beaver County 345kV	IA FULLY EXECUTED/ON SCHEDULE
GEN-2013-032	202.50	NPPD	Antelope 115kV	IA FULLY EXECUTED/ON SCHEDULE
GEN-2013-033	84.00	MIDW	Knoll 115kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2014-001	200.60	WERE	Tap Wichita - Emporia Energy Center (GEN-2014-001 Tap) 345kV	IA FULLY EXECUTED/ON SCHEDULE
GEN-2014-001IS	103.70	WAPA	Newell-Maurine 115kV	IA Pending
GEN-2014-002	10.50	OKGE	Tatonga 345kV (GEN-2007-021 POI)	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2014-003	15.80	OKGE	Tatonga 345kV (GEN-2007-044 POI)	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2014-004	4.00	NPPD	Steele City 115kV (GEN-2011-018 POI)	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2014-005	5.70	OKGE	Minco 345kV (GEN-2011-010 POI)	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2014-006IS	1,500.00	WAPA	Williston 115kV	On Schedule
GEN-2014-010IS	150.00	WAPA	Neset 115kV	On Schedule
GEN-2014-013	73.40	NPPD	Meadow Grove (GEN-2008-086N2 Sub) 230kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2014-014IS	151.50	WAPA	Belfield-Rhame 230kV	On Schedule
GEN-2014-020	99.10	AEPW	Tuttle 138kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2014-021	600.00	KCPL	Tap Nebraska City - Mullin Creek (Holt) 345kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2014-025	2.40	MIDW	Walnut Creek 69kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2014-028	35.00	EMDE	Riverton 161kV	IA FULLY EXECUTED/COMMERCIAL OPERATION

Request	Amount	Area	Requested/Proposed Point of Interconnection	Status or In-Service Date
GEN-2014-031	35.80	NPPD	Meadow Grove 230kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2014-032	20.40	NPPD	Meadow Grove 230kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2014-033	70.00	SPS	Chaves County 115kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2014-034	70.00	SPS	Chaves County 115kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2014-035	30.00	SPS	Chaves County 115kV	IA FULLY EXECUTED/ON SCHEDULE
GEN-2014-039	73.40	NPPD	Friend 115kV	IA FULLY EXECUTED/ON SCHEDULE
GEN-2014-040	319.70	SPS	Castro 115kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2014-056	250.00	OKGE	Minco 345kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2014-057	249.90	AEPW	Tap Lawton - Sunnyside (Terry Road) 345kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2014-064	248.40	OKGE	Otter 138kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2015-001	200.00	OKGE	Ranch Road 345kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2015-004	52.90	OKGE	Border 345kV	IA FULLY EXECUTED/ON SCHEDULE
GEN-2015-005	400.20	KCPL	Tap Nebraska City - Sibley (Ketchem) 345kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2015-007	160.00	NPPD	Hoskins 345kV	IA FULLY EXECUTED/ON SCHEDULE
GEN-2015-013	120.00	WFEC	Synder 138kV	IA FULLY EXECUTED/ON SUSPENSION
GEN-2015-014	150.00	SPS	Tap Cochran - Lehman 115kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2015-015	154.56	OKGE	Road Runner 138kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2015-016	200.00	KCPL	Tap Marmaton - Centerville 161kV	IA FULLY EXECUTED/ON SCHEDULE
GEN-2015-020	100.00	SPS	Oasis 115kV	IA FULLY EXECUTED/ON SCHEDULE
GEN-2015-021	20.00	SUNCMKEC	Johnson Corner 115kV	IA FULLY EXECUTED/ON SCHEDULE
GEN-2015-023	601.40	NPPD	Holt County 345kV	IA FULLY EXECUTED/ON SCHEDULE
GEN-2015-024	217.70	WERE	Tap Thistle - Wichita 345kV Dbl CKT	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2015-025	215.90	WERE	Tap Thistle - Wichita 345kV Dbl CKT	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2015-029	161.00	OKGE	Tatonga 345kV	IA FULLY EXECUTED/ON SCHEDULE
GEN-2015-034	200.00	OKGE	Ranch Road 345kV	IA FULLY EXECUTED/ON SCHEDULE
GEN-2015-045	20.00	AEPW	Tap Lawton - Sunnyside (Terry Road) 345kV	IA FULLY EXECUTED/ON SCHEDULE
GEN-2015-046	300.00	WAPA	Tande 345kV	IA FULLY EXECUTED/ON SCHEDULE
GEN-2015-047	297.80	OKGE	Sooner 345kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2015-048	200.00	OKGE	Cleo Corner 138kV	IA FULLY EXECUTED/ON SUSPENSION
GEN-2015-052	300.00	WERE	Tap Open Sky - Rose Hill 345kV	IA FULLY EXECUTED/ON SCHEDULE
GEN-2015-055	40.00	WFEC	Erick 138kV	IA FULLY EXECUTED/ON SCHEDULE
GEN-2015-056	101.20	SPS	Crossroads 345kV	IA FULLY EXECUTED/ON SCHEDULE
GEN-2015-057	100.00	OKGE	Minco 345kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2015-062	4.50	OKGE	Tap and Tie South 4th - Bunch Creek & Enid Tap - Fairmont (GEN-2012-033T) 138kV	IA FULLY EXECUTED/ON SCHEDULE
GEN-2015-063	300.00	OKGE	Tap Woodring - Mathewson 345kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2015-064	197.80	SUNCMKEC	Mingo 115kV	IA FULLY EXECUTED/ON SCHEDULE
GEN-2015-065	202.40	SUNCMKEC	Mingo 345kV	IA FULLY EXECUTED/ON SCHEDULE

Request	Amount	Area	Requested/Proposed Point of Interconnection	Status or In-Service Date
GEN-2015-066	248.40	OKGE	Tap Cleveland - Sooner 345kV	IA FULLY EXECUTED/ON SUSPENSION
GEN-2015-069	300.00	WERE	Union Ridge 230kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2015-071	200.00	AEPW	Chisholm 345kV	IA FULLY EXECUTED/ON SCHEDULE
GEN-2015-073	200.10	WERE	Emporia Energy Center 345kV	IA FULLY EXECUTED/ON SCHEDULE
GEN-2015-076	316.80	NPPD	Belden 115kV	IA FULLY EXECUTED/ON SUSPENSION
GEN-2015-087	66.00	NPPD	Tap Fairbury - Hebron 115kV	IA FULLY EXECUTED/ON SUSPENSION
GEN-2015-088	300.00	NPPD	Tap Moore - Pauline 345kV	IA FULLY EXECUTED/ON SCHEDULE
GEN-2015-090	220.00	WERE	Tap Thistle - Wichita 345kV Dbl CKT	IA FULLY EXECUTED/COMMERCIAL OPERATION
GEN-2015-092	500.00	AEPW	Tap Lawton - Sunnyside (Terry Road) 345kV	IA FULLY EXECUTED/ON SCHEDULE
GEN-2015-093	500.00	OKGE	Gracemont 345kV	IA FULLY EXECUTED/ON SUSPENSION
GEN-2015-096	150.00	WAPA	Tap Belfield - Rhame 230kV	IA FULLY EXECUTED/COMMERCIAL OPERATION
Gray County Wind (Montezuma)	110.00	SUNCMKEC	Gray County Tap 115kV	
Llano Estacado (White Deer)	80.00	SPS	Llano Wind 115kV	
MPC00100	99.00	OTP	Langdon 115 kV	In Service
MPC00200	120.00	OTP	Langdon 115 kV	In Service
MPC00300	40.50	OTP	Langdon 115 kV	In Service
MPC00500	1,894.00	OTP	Maple River 230 kV	In Service
MPC01200	49.60	OTP	Maple River 230 kV	In Service
MPC01300	455.00	OTP	Square Butte 230 kV	In Service
MPC02100	100.00	OTP	Center - Mandan 230 kV	In Service
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)	24.00	NPPD	Tekamah & Oakland 115kV	
NPPD Distributed (Burwell)	3.00	NPPD	Ord 115kV	
NPPD Distributed (Columbus Hydro)	135.00	NPPD	Columbus 115kV	
NPPD Distributed (North Platte - Lexington)	162.00	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	
SPS Distributed (Carson)	10.00	SPS	Martin 115kV	Commerical Operation
SPS Distributed (Dumas 19th St)	40.00	SPS	Dumas 19th Street 115kV	
SPS Distributed (Etter)	40.00	SPS	Etter 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 (Moore E)	50.00	SPS	Moore East 115kV	
SPS Distributed (Ocotillo)	10.00	SPS	S_Jal 115kV	
SPS Distributed (Sherman)	40.00	SPS	Sherman 115kV	
Sunray	49.50	SPS	Valero 115kV	Commerical Operation
Total:	**59,621.5**			

C: STUDY GROUPINGS

C. Study Groups

GROUP 1: WOODWARD AREA			
Request	**Capacity**	**Area**	**Proposed Point of Interconnection**
GEN-2001-014	94.5	WFEC	Ft Supply 138kV
GEN-2001-037	102	OKGE	FPL Moreland Tap 138kV
GEN-2005-008	120	OKGE	Woodward 138kV
GEN-2006-024S	18.9	WFEC	Buffalo Bear Tap 69kV
GEN-2006-046	129.6	OKGE	Dewey 138kV
GEN-2007-021	201	OKGE	Tatonga 345kV
GEN-2007-043	200	OKGE	Minco 345kV
GEN-2007-044	300	OKGE	Tatonga 345kV
GEN-2007-050	171	OKGE	Woodward EHV 138kV
GEN-2007-062	423.6	OKGE	Woodward EHV 345kV
GEN-2008-003	101.2	OKGE	Woodward EHV 138kV
GEN-2008-044	197.8	OKGE	Tatonga 345kV
GEN-2010-011	29.7	OKGE	Tatonga 345kV
GEN-2010-040	298.45	OKGE	Cimarron 345kV
GEN-2011-010	100.8	OKGE	Minco 345kV
GEN-2011-019	175	OKGE	Woodward 345kV
GEN-2011-020	165.6	OKGE	Woodward 345kV
GEN-2011-054	300	OKGE	Cimarron 345kV
GEN-2014-002	10.5	OKGE	Tatonga 345kV (GEN-2007-021 POI)
GEN-2014-003	15.8	OKGE	Tatonga 345kV (GEN-2007-044 POI)
GEN-2014-005	5.7	OKGE	Minco 345kV (GEN-2011-010 POI)
GEN-2014-020	99.1	AEPW	Tuttle 138kV
GEN-2014-056	250	OKGE	Minco 345kV
GEN-2015-029	161	OKGE	Tatonga 345kV
GEN-2015-048	200	OKGE	Cleo Corner 138kV
GEN-2015-057	100	OKGE	Minco 345kV
GEN-2015-093	250	OKGE	Gracemont 345kV
PRIOR QUEUED SUBTOTAL	**4,221.25**		
GEN-2015-095	176	WFEC	DeGrasse 138kV
GEN-2016-003	248.4	OKGE	Tap Badger - Woodward 345kV
GEN-2016-020	150	WFEC	Mooreland 138kV
GEN-2016-045	499.1	OKGE	Mathewson 345kV
GEN-2016-047	24	OKGE	Mustang 69kV
GEN-2016-057	499.1	OKGE	Mathewson 345kV
CURRENT CLUSTER SUBTOTAL	**1,596.60**		
AREA TOTAL	**5,817.85**		

GROUP 2: HITCHLAND AREA			
Request	**Capacity**	**Area**	**Proposed Point of Interconnection**
ASGI-2011-002	20	SPS	Herring 115kV
ASGI-2013-001	11.5	SPS	PanTex South 115kV
ASGI-2016-010	90	SPS	Powell Corner 115kV
GEN-2002-008	240	SPS	Hitchland 345kV
GEN-2002-009	79.8	SPS	Hansford 115kV
GEN-2002-022	239.2	SPS	Bushland 230kV
GEN-2003-020	159.1	SPS	Martin 115kV
GEN-2006-020S	20	SPS	DWS Frisco 115kV
GEN-2006-044	370	SPS	Hitchland 345kV
GEN-2007-046	200	SPS	Hitchland 115kV
GEN-2008-047	298.9	OKGE	Beaver County 345kV
GEN-2008-051	322	SPS	Potter County 345kV
GEN-2010-001	299.7	OKGE	Beaver County 345kV
GEN-2010-014	358.8	SPS	Hitchland 345kV
GEN-2011-014	198	OKGE	Tap Hitchland - Woodward Dbl Ckt (GEN-2011-014 Tap) 345kV
GEN-2011-022	299	SPS	Hitchland 345kV
GEN-2013-030	300	OKGE	Beaver County 345kV
Llano Estacado (White Deer)	80	SPS	Llano Wind 115kV
SPS Distributed (Carson)	10	SPS	Martin 115kV
SPS Distributed (Dumas 19th St)	20	SPS	Dumas 19th Street 115kV
SPS Distributed (Etter)	20	SPS	Etter 115kV
SPS Distributed (Moore E)	25	SPS	Moore East 115kV
SPS Distributed (Sherman)	20	SPS	Sherman 115kV
PRIOR QUEUED SUBTOTAL	**3,681.00**		
GEN-2015-082	200	OKGE	Tap Hitchland - Woodward Dbl Ckt (GEN-2011-014 Tap) 345kV
GEN-2016-070	5.3	SPS	Martin 115kV
CURRENT CLUSTER SUBTOTAL	**205.30**		
AREA TOTAL	**3,886.30**		

GROUP 3: SPEARVILLE AREA

Request	Capacity	Area	Proposed Point of Interconnection
ASGI-2012-006	22.5	SUNCMKEC	Tap Hugoton - Rolla 69kV
ASGI-2015-001	6.132	SUNCMKEC	Ninnescah 115kV
ASGI-2018-003			Appleton 69 kV
GEN-2001-039A	104	SUNCMKEC	Shooting Star Tap 115kV
GEN-2002-025A	150	SUNCMKEC	Spearville 230kV
GEN-2004-014	154.5	SUNCMKEC	Spearville 230kV
GEN-2005-012	248.4	SUNCMKEC	Ironwood 345kV
GEN-2006-021	94	SUNCMKEC	Flat Ridge Tap 138kV
GEN-2007-040	200.1	SUNCMKEC	Buckner 345kV
GEN-2008-018	249.75	SPS	Finney 345kV
GEN-2008-079	98.9	SUNCMKEC	Crooked Creek 115kV
GEN-2008-124	200.1	SUNCMKEC	Ironwood 345kV
GEN-2010-009	165.6	SUNCMKEC	Buckner 345kV
GEN-2011-008	600	SUNCMKEC	Clark County 345kV
GEN-2011-016	200.1	SUNCMKEC	Ironwood 345kV
GEN-2012-007	120	SUNCMKEC	Rubart 115kV
GEN-2012-024	178.2	SUNCMKEC	Clark County 345kV
GEN-2015-021	20	SUNCMKEC	Johnson Corner 115kV
Gray County Wind (Montezuma)	110	SUNCMKEC	Gray County Tap 115kV
PRIOR QUEUED SUBTOTAL	**2,922.28**		
GEN-2016-016	78.2	MIDW	North Kinsley 115kV
GEN-2016-046	299	SUNCMKEC	Tap Clark County - Ironwood 345kV
CURRENT CLUSTER SUBTOTAL	**377.20**		
AREA TOTAL	**3,299.48**		

GROUP 4: NORTHWEST KANSAS AREA

Request	Capacity	Area	Proposed Point of Interconnection
ASGI-2013-004	36.6	SUNCMKEC	Morris 115kV
GEN-2001-039M	100	SUNCMKEC	Central Plains Tap 115kV
GEN-2003-006A	201.6	SUNCMKEC	Elm Creek 230kV
GEN-2003-019	250	MIDW	Smoky Hills Tap 230kV
GEN-2006-031	75	MIDW	Knoll 115kV
GEN-2008-092	200.5	MIDW	Post Rock 230kV
GEN-2009-008	198.69	MIDW	South Hays 230kV
GEN-2009-020	48.3	MIDW	Walnut Creek 69kV
GEN-2010-057	201	MIDW	Rice County 230kV
GEN-2013-033	28	MIDW	Knoll 115kV
GEN-2014-025	2.4	MIDW	Walnut Creek 69kV
GEN-2015-064	197.8	SUNCMKEC	Mingo 115kV
GEN-2015-065	202.4	SUNCMKEC	Mingo 345kV
PRIOR QUEUED SUBTOTAL	**1,742.29**		
GEN-2016-067	73.6	SUNCMKEC	Mingo 345kV
CURRENT CLUSTER SUBTOTAL	**73.60**		
AREA TOTAL	**1,815.89**		

GROUP 6: SOUTH TEXAS PANHANDLE/NEW MEXICO AREA			
Request	**Capacity**	**Area**	**Proposed Point of Interconnection**
ASGI-2010-010	42.2	SPS	Lovington 115kV
ASGI-2010-020	30	SPS	Tap LE-Tatum - LE-Crossroads 69kV
ASGI-2010-021	15	SPS	Tap LE-Saunders Tap - LE-Anderson 69kV
ASGI-2011-001	27.3	SPS	Lovington 115kV
ASGI-2011-003	10	SPS	Hendricks 69kV
ASGI-2011-004	20	SPS	Pleasant Hill 69kV
ASGI-2012-002	18.15	SPS	FE-Clovis Interchange 115kV
ASGI-2013-002	18.4	SPS	FE Tucumcari 115kV
ASGI-2013-003	18.4	SPS	FE Clovis 115kV
ASGI-2013-005	1.65	SPS	FE Clovis 115kV
ASGI-2015-002	2	SPS	SP-Yuma 69kV
ASGI-2016-001	2.5	SPS	Wolfforth 115kV
ASGI-2016-009	3	SPS	Wolfforth 115kV
GEN-2001-033	180	SPS	San Juan Tap 230kV
GEN-2001-036	80	SPS	Norton 115kV
GEN-2006-018	168.1	SPS	TUCO Interchange 230kV
GEN-2006-026	604	SPS	Hobbs 230kV & Hobbs 115kV
GEN-2008-022	299.7	SPS	Crossroads 345kV
GEN-2010-006	205	SPS	Jones 230kV
GEN-2010-046	56	SPS	TUCO Interchange 230kV
GEN-2011-025	78.76	SPS	Tap Floyd County - Crosby County 115kV
GEN-2011-045	205	SPS	Jones 230kV
GEN-2011-046	27	SPS	Lopez 115kV
GEN-2011-048	175	SPS	Mustang 230kV
GEN-2012-001	61.2	SPS	Cirrus Tap 230kV
GEN-2012-020	478	SPS	TUCO 230kV
GEN-2012-034	7	SPS	Mustang 230kV
GEN-2012-035	7	SPS	Mustang 230kV
GEN-2012-036	7	SPS	Mustang 230kV
GEN-2012-037	203	SPS	TUCO 345kV
GEN-2013-016	203	SPS	TUCO 345kV
GEN-2013-022	25	SPS	Norton 115kV
GEN-2013-027	148.4	SPS	Tap Tolk - Yoakum 230kV
GEN-2014-033	70	SPS	Chaves County 115kV
GEN-2014-034	70	SPS	Chaves County 115kV
GEN-2014-035	30	SPS	Chaves County 115kV
GEN-2014-040	319.7	SPS	Castro 115kV
GEN-2015-014	150	SPS	Tap Cochran - Lehman 115kV
GEN-2015-020	100	SPS	Oasis 115kV
GEN-2015-056	101.2	SPS	Crossroads 345kV
SPS Distributed (Hopi)	10	SPS	Hopi 115kV
SPS Distributed (Jal)	10	SPS	S Jal 115kV
SPS Distributed (Lea Road)	10	SPS	Lea Road 115kV
SPS Distributed (Monument)	10	SPS	Monument 115kV
SPS Distributed (Ocotillo)	10	SPS	S_Jal 115kV
Sunray	49.5	SPS	Valero 115kV
PRIOR QUEUED SUBTOTAL	**4,367.16**		

ASGI-2016-002	0.35	SPS	SP-Yuma 115kV
ASGI-2016-004	5	SPS	Palo Duro 115kV
GEN-2015-041	5	SPS	TUCO Interchange 345kV
GEN-2016-015	100	SPS	Andrews 230kV
GEN-2016-056	200	SPS	Carlisle 230kV
GEN-2016-062	250.7	SPS	Andrews 230kV
GEN-2016-069	31.4	SPS	Chaves County 115kV
CURRENT CLUSTER SUBTOTAL	**592.45**		
AREA TOTAL	**4,959.61**		

GROUP 7: SOUTHWEST OKLAHOMA AREA

Request	Capacity	Area	Proposed Point of Interconnection
GEN-2001-026	74.25	WFEC	Washita 138kV
GEN-2002-005	123	WFEC	Red Hills Tap 138kV
GEN-2003-004	100	WFEC	Washita 138kV
GEN-2003-005	100	WFEC	Anadarko - Paradise (Blue Canyon) 138kV
GEN-2003-022	120	AEPW	Weatherford 138kV
GEN-2004-020	27	AEPW	Weatherford 138kV
GEN-2004-023	20.6	WFEC	Washita 138kV
GEN-2005-003	30.6	WFEC	Washita 138kV
GEN-2006-002	100.8	AEPW	Sweetwater 230kV
GEN-2006-035	225	AEPW	Sweetwater 230kV
GEN-2006-043	98.9	AEPW	Sweetwater 230kV
GEN-2007-052	135	WFEC	Anadarko 138kV
GEN-2008-023	148.8	AEPW	Hobart Junction 138kV
GEN-2008-037	99	WFEC	Slick Hills 138kV
GEN-2011-037	7	WFEC	Blue Canyon 5 138kV
GEN-2011-049	250.7	OKGE	Border 345kV
GEN-2012-028	74	WFEC	Gotebo 69kV
GEN-2015-004	52.9	OKGE	Border 345kV
GEN-2015-013	120	WFEC	Synder 138kV
GEN-2015-055	40	WFEC	Erick 138kV
GEN-2015-071	200	AEPW	Chisholm 345kV
PRIOR QUEUED SUBTOTAL	**2,147.55**		
GEN-2016-037	300	AEPW	Tap Chisholm - Gracemont 345kV
GEN-2016-051	9.8	AEPW	Tap Clinton Junction - Weatherford Southeast 138kV
CURRENT CLUSTER SUBTOTAL	**309.80**		
AREA TOTAL	**2,457.35**		

GROUP 8: NORTH OKLAHOMA/SOUTH CENTRAL KANSAS AREA			
Request	**Capacity**	**Area**	**Proposed Point of Interconnection**
ASGI-2010-006	150	AECI	Remington 138kV
ASGI-2014-014	56.4	GRDA	Ferguson 69kV
ASGI-2015-004	56.364	GRDA	Coffeyville City 69kV
ASGI-2017-008	158.6	AECI	Remington to Shidler 138 kV
ASGI-2018-006			Metz 69 kV
ASGI-2018-013		AECI	Remington 138 kV
GEN-2002-004	200	WERE	Latham 345kV
GEN-2005-013	199.8	WERE	Caney River 345kV
GEN-2007-025	299.2	WERE	Viola 345kV
GEN-2008-013	300	OKGE	Hunter 345kV
GEN-2008-021	42	WERE	Wolf Creek 345kV
GEN-2008-098	100.8	WERE	Waverly 345kV
GEN-2009-025	59.8	OKGE	Nardins 69kV
GEN-2010-003	100.8	WERE	Waverly 345kV
GEN-2010-005	299.2	WERE	Viola 345kV
GEN-2010-055	4.5	AEPW	Wekiwa 138kV
GEN-2011-057	150	WERE	Creswell 138kV
GEN-2012-032	299	OKGE	Open Sky 345kV
GEN-2012-033	98.06	OKGE	Tap and Tie South 4th - Bunch Creek & Enid Tap - Fairmont (GEN-2012-033T) 138kV
GEN-2012-041	121.5	OKGE	Ranch Road 345kV
GEN-2013-012	147	OKGE	Redbud 345kV
GEN-2013-028	559.5	GRDA	Tap N Tulsa - GRDA 1 345kV
GEN-2013-029	299	OKGE	Renfrow 345kV
GEN-2014-001	200.6	WERE	Tap Wichita - Emporia Energy Center (GEN-2014-001 Tap) 345kV
GEN-2014-028	35	EMDE	Riverton 161kV
GEN-2014-064	248.4	OKGE	Otter 138kV
GEN-2015-001	200	OKGE	Ranch Road 345kV
GEN-2015-015	154.56	OKGE	Road Runner 138kV
GEN-2015-016	200	KCPL	Tap Marmaton - Centerville 161kV
GEN-2015-024	217.7	WERE	Tap Thistle - Wichita 345kV Dbl CKT
GEN-2015-025	215.9	WERE	Tap Thistle - Wichita 345kV Dbl CKT
GEN-2015-034	200	OKGE	Ranch Road 345kV
GEN-2015-047	297.8	OKGE	Sooner 345kV
GEN-2015-052	300	WERE	Tap Open Sky - Rose Hill 345kV
GEN-2015-062	4.5	OKGE	Tap and Tie South 4th - Bunch Creek & Enid Tap - Fairmont (GEN-2012-033T) 138kV
GEN-2015-063	300	OKGE	Tap Woodring - Mathewson 345kV
GEN-2015-066	248.4	OKGE	Tap Cleveland - Sooner 345kV
GEN-2015-069	300	WERE	Union Ridge 230kV
GEN-2015-073	200.1	WERE	Emporia Energy Center 345kV
GEN-2015-090	220	WERE	Tap Thistle - Wichita 345kV Dbl CKT
PRIOR QUEUED SUBTOTAL	**7,244.48**		
GEN-2016-009	29	OKGE	Osage 69kV
GEN-2016-022	151.8	OKGE	Ranch Road 345kV
GEN-2016-031	1.5	OKGE	Ranch Road 345kV
GEN-2016-032	200	OKGE	Tap Marshall - Cottonwood Creek 138kV
GEN-2016-061	250.7	OKGE	Tap Woodring - Sooner 345kV
GEN-2016-068	250	OKGE	Woodring 345kV
GEN-2016-071	200.1	OKGE	Middleton Tap 138kV
GEN-2016-073	220	WERE	Tap Thistle – Wichita 345kV Dbl CKT
CURRENT CLUSTER SUBTOTAL	**1,303.10**		
AREA TOTAL	**8,547.58**		

GROUP 9: NEBRASKA AREA Request	Capacity	Area	Proposed Point of Interconnection
GEN-2002-023N	0.8	NPPD	Harmony 115kV
GEN-2003-021N	75	NPPD	Ainsworth Wind Tap 115kV
GEN-2004-023N	75	NPPD	Columbus Co 115kV
GEN-2006-020N	42	NPPD	Bloomfield 115kV
GEN-2006-037N1	73.1	NPPD	Broken Bow 115kV
GEN-2006-038N005	79.9	NPPD	Broken Bow 115kV
GEN-2006-038N019	79.9	NPPD	Petersburg North 115kV
GEN-2006-044N	40.5	NPPD	North Petersburg 115kV
GEN-2007-011N08	81	NPPD	Bloomfield 115kV
GEN-2007-017IS	166	WAPA	Ft Thompson-Grand Island 345kV
GEN-2007-018IS	234	WAPA	Ft Thompson-Grand Island 345kV
GEN-2008-086N02	201	NPPD	Meadow Grove 230kV
GEN-2008-119O	60	OPPD	S1399 161kV
GEN-2008-123N	89.66	NPPD	Tap Pauline - Guide Rock (Rosemont) 115kV
GEN-2009-040	72	WERE	Marshall 115kV
GEN-2010-041	10.29	OPPD	S1399 161kV
GEN-2010-051	200	NPPD	Tap Hoskins - Twin Church (Dixon County) 230kV
GEN-2011-018	73.6	NPPD	Steele City 115kV
GEN-2011-027	120	NPPD	Tap Hoskins - Twin Church (Dixon County) 230kV
GEN-2011-056	3.6	NPPD	Jeffrey 115kV
GEN-2011-056A	3.6	NPPD	John 1 115kV
GEN-2011-056B	4.5	NPPD	John 2 115kV
GEN-2012-021	4.8	LES	Terry Bundy Generating Station 115kV
GEN-2013-002	50.6	NPPD	Monolith 115kV
GEN-2013-008	1.2	NPPD	Steele City 115kV
GEN-2013-019	73.6	NPPD	Monolith 115kV
GEN-2013-032	202.5	NPPD	Antelope 115kV
GEN-2014-004	4	NPPD	Steele City 115kV (GEN-2011-018 POI)
GEN-2014-013	73.4	NPPD	Meadow Grove (GEN-2008-086N2 Sub) 230kV
GEN-2014-031	35.8	NPPD	Meadow Grove 230kV
GEN-2014-032	10.2	NPPD	Meadow Grove 230kV
GEN-2014-039	73.4	NPPD	Friend 115kV
GEN-2015-007	160	NPPD	Hoskins 345kV
GEN-2015-023	300.7	NPPD	Holt County 345kV
GEN-2015-076	158.4	NPPD	Belden 115kV
GEN-2015-087	66	NPPD	Tap Fairbury - Hebron 115kV
GEN-2015-088	300	NPPD	Tap Moore - Pauline 345kV
NPPD Distributed (Broken Bow)	8.3	NPPD	Broken Bow 115kV
NPPD Distributed (Buffalo County Solar)	10	NPPD	Kearney Northeast
NPPD Distributed (Burt County Wind)	12	NPPD	Tekamah & Oakland 115kV
NPPD Distributed (Burwell)	3	NPPD	Ord 115kV
NPPD Distributed (Columbus Hydro)	45	NPPD	Columbus 115kV
NPPD Distributed (North Platte - Lexington)	54	NPPD	Multiple: Jeffrey 115kV, John_1 115kV, John_2 115kV
NPPD Distributed (Ord)	11.9	NPPD	Ord 115kV
NPPD Distributed (Stuart)	2.1	NPPD	Ainsworth 115kV
PRIOR QUEUED SUBTOTAL	**3,446.35**		

GEN-2015-089	200	WAPA	Utica 230kV
GEN-2016-021	300	NPPD	Hoskins 345kV
GEN-2016-023	150.5	WAPA	Tap Laramie River – Sidney 345kV
GEN-2016-029	150.5	WAPA	Tap Laramie River – Sidney 345kV
GEN-2016-043	230	NPPD	Hoskins 345kV
GEN-2016-050	250.7	NPPD	Tap Axtell - Post Rock 345kV
GEN-2016-075	50	WAPA	Grand Prairie 345kV
CURRENT CLUSTER SUBTOTAL	**1,331.70**		
AREA TOTAL	**4,778.05**		

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	AEPW	Turk 138kV
PRIOR QUEUED SUBTOTAL	**30.00**		
GEN-2016-013	10	EMDE	La Russell 161kV
GEN-2016-014	10	EMDE	La Russell 161kV
CURRENT CLUSTER SUBTOTAL	**20.00**		
AREA TOTAL	**50.00**		

GROUP 13: NORTHWEST MISSOURI AREA

Request	Capacity	Area	Proposed Point of Interconnection
ASGI-2017-006	238	AECI	Maryville 161 kV
ASGI-2018-001	230	AECI	Maryville 161 kV
ASGI-2018-007			Salisbury 161 kV
ASGI-2018-008			Centerville 161 kV
ASGI-2018-009			Paola 161kV
ASGI-2018-010			Pleasant Valley 161kV
ASGI-2018-011			South Ottawa 161kV
ASGI-2018-012			South Ottawa 161kV
GEN-2008-129	80	KCPL	Pleasant Hill 161kV
GEN-2010-036	4.6	WERE	6th Street 115kV
GEN-2011-011	50	KCPL	Iatan 345kV
GEN-2014-021	300	KCPL	Tap Nebraska City - Mullin Creek (Holt) 345kV
GEN-2015-005	200.1	KCPL	Tap Nebraska City - Sibley (Ketchem) 345kV
PRIOR QUEUED SUBTOTAL	**1,102.70**		
ASGI-2016-003	12	KCPL	Paola 161kV
CURRENT CLUSTER SUBTOTAL	**12.00**		
AREA TOTAL	**1,114.70**		

GROUP 14: SOUTH CENTRAL OKLAHOMA AREA

Request	Capacity	Area	Proposed Point of Interconnection
ASGI-2015-006	9	SWPA	Tupelo 138kV
ASGI-2016-011	7.407	SWPA	Allen 138 kV
ASGI-2016-012	61.725	SWPA	Tupelo 138 kV
ASGI-2016-013	4.938	WFEC	Ashland 138 kV
GEN-2011-040	111	OKGE	Carter County 138kV
GEN-2011-050	108	AEPW	Santa Fe Tap 138kV
GEN-2012-004	41.4	OKGE	Carter County 138kV
GEN-2013-007	100	OKGE	Tap Prices Falls - Carter 138kV
GEN-2014-057	249.9	AEPW	Tap Lawton - Sunnyside (Terry Road) 345kV
GEN-2015-045	20	AEPW	Tap Lawton - Sunnyside (Terry Road) 345kV
GEN-2015-092	250	AEPW	Tap Lawton - Sunnyside (Terry Road) 345kV
PRIOR QUEUED SUBTOTAL	**963.37**		
GEN-2015-036	303.6	OKGE	Johnston County 345kV
GEN-2016-028	100	AEPW	Clayton 138kV
GEN-2016-030	99.9	OKGE	Brown 138kV
GEN-2016-063	200	OKGE	Tap Sunnyside – Hugo 345kV
CURRENT CLUSTER SUBTOTAL	**703.50**		
AREA TOTAL	**1,666.87**		

GROUP 15: E-SOUTH DAKOTA AREA

Request	Capacity	Area	Proposed Point of Interconnection
ASGI-2016-005	20	WAPA	Tap White Lake - Stickeny 69kV
ASGI-2016-006	20	WAPA	Mitchall
ASGI-2016-007	20	WAPA	Kimball 69kV
GEN-2002-009IS	40	WAPA	Ft Thompson 69kV [Hyde 69kV]
GEN-2007-013IS	50	WAPA	Wessington Springs 230kV
GEN-2007-014IS	100	WAPA	Wessington Springs 230kV
GEN-2009-001IS	200	WAPA	Groton-Watertown 345kV
GEN-2009-018IS	99.5	WAPA	Groton 115kV
GEN-2010-001IS	99	WAPA	Bismarck-Glenham 230kV
GEN-2010-003IS	34	WAPA	Wessington Springs 230kV
GEN-2013-009IS	19.5	WAPA	Redfield NW 115kV
GEN-2014-001IS	103.7	WAPA	Newell-Maurine 115kV
PRIOR QUEUED SUBTOTAL	**805.70**		
GEN-2016-017	250.7	WAPA	Tap Fort Thompson - Leland Olds 345kV
CURRENT CLUSTER SUBTOTAL	**250.70**		
AREA TOTAL	**1,056.40**		

GROUP 16: W-NORTH DAKOTA AREA

Request	Capacity	Area	Proposed Point of Interconnection
GEN-2005-008IS	50	WAPA	Hilken 230kV [Ecklund 230kV]
GEN-2006-015IS	50	WAPA	Hilken 230kV [Ecklund 230kV]
GEN-2007-015IS	100	WAPA	Hilken 230kV [Ecklund 230kV]
GEN-2009-026IS	110	WAPA	Dickenson-Heskett 230kV
GEN-2012-012IS	75	WAPA	Wolf Point-Circle 115kV
GEN-2014-006IS	125	WAPA	Williston 115kV
GEN-2014-010IS	150	WAPA	Neset 115kV
GEN-2014-014IS	151.5	WAPA	Belfield-Rhame 230kV
GEN-2015-046	300	WAPA	Tande 345kV
GEN-2015-096	150	WAPA	Tap Belfield - Rhame 230kV
MPC01300	455	OTP	Square Butte 230 kV
MPC02100	100	OTP	Center - Mandan 230 kV
PRIOR QUEUED SUBTOTAL	**1,816.50**		
GEN-2016-004	202	WAPA	Leland Olds 230kV
GEN-2016-052	3.3	WAPA	Hilken 230kV
GEN-2016-053	3.3	WAPA	Hilken 230kV
CURRENT CLUSTER SUBTOTAL	**208.60**		
AREA TOTAL	**2,025.10**		

GROUP 17: W-SOUTH DAKOTA AREA

Request	Capacity	Area	Proposed Point of Interconnection
GEN-2006-002IS	51	WAPA	Wessington Springs 230kV
GEN-2009-020AIS	130.5	WAPA	Tripp Junction 115kV
PRIOR QUEUED SUBTOTAL	**181.50**		
GEN-2016-054	3.4	WAPA	Wessington Springs 230kV
CURRENT CLUSTER SUBTOTAL	**3.40**		
AREA TOTAL	**184.90**		

GROUP 18: E-NORTH DAKOTA AREA

Request	Capacity	Area	Proposed Point of Interconnection
GEN-2002-008IS	40.5	WAPA	Edgeley 115kV [Pomona 115kV]
GEN-2005-003IS	100	WAPA	Nelson 115kV
GEN-2006-006IS	10	XEL	Marshall 115kV
GEN-2007-020IS	16	WAPA	Nelson 115kV
GEN-2008-008IS	5	WAPA	Nelson 115kV
MPC00100	99	OTP	Langdon 115 kV
MPC00200	60	OTP	Langdon 115 kV
MPC00300	40.5	OTP	Langdon 115 kV
MPC00500	378.8	OTP	Maple River 230 kV
MPC01200	49.6	OTP	Maple River 230 kV
PRIOR QUEUED SUBTOTAL	**799.40**		
GEN-2016-007	100	WAPA	Valley City 115kV
CURRENT CLUSTER SUBTOTAL	**100.00**		
AREA TOTAL	**899.40**		

CLUSTER TOTAL (CURRENT STUDY)	**6,988.0**	**MW**
PQ TOTAL (PRIOR QUEUED)	**35,471.5**	**MW**
CLUSTER TOTAL (INCLUDING PRIOR QUEUED)	**42,459.5**	**MW**

D: PROPOSED POINT OF INTERCONNECTION ONE-LINE DIAGRAMS

Link to 2015 Facility Study Reports: http://opsportal.spp.org/Studies/GenList?yearTypeId=135

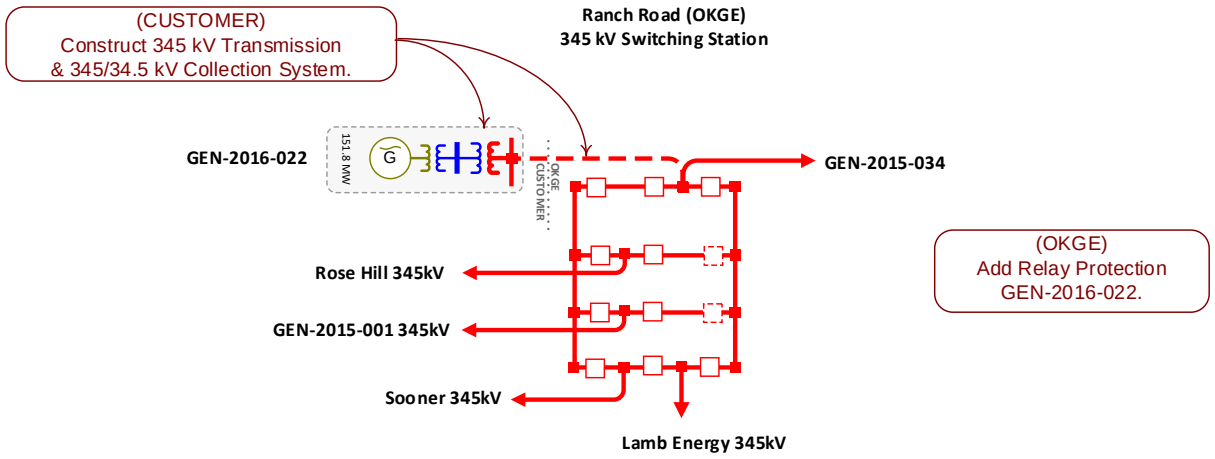
Link to 2016 Facility Study Reports: http://opsportal.spp.org/Studies/GenList?yearTypeId=148

Interconnection Request: GEN-2015-089
See Posted Interconnection Facilties Study for GEN-2015-089

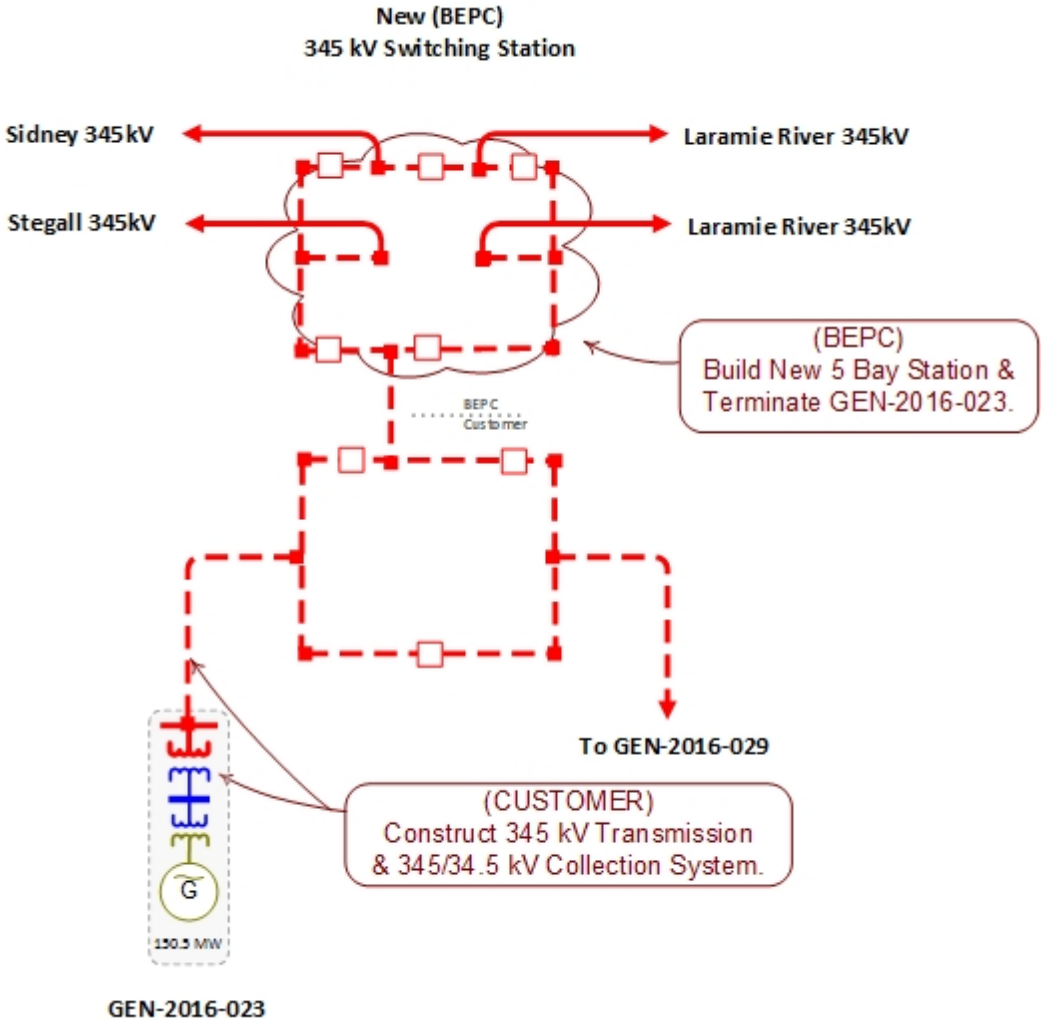
Interconnection Request: GEN-2016-009
See Posted Interconnection Facilties Study for GEN-2016-009

Interconnection Request: GEN-2016-021
See Posted Interconnection Facilties Study for GEN-2016-021

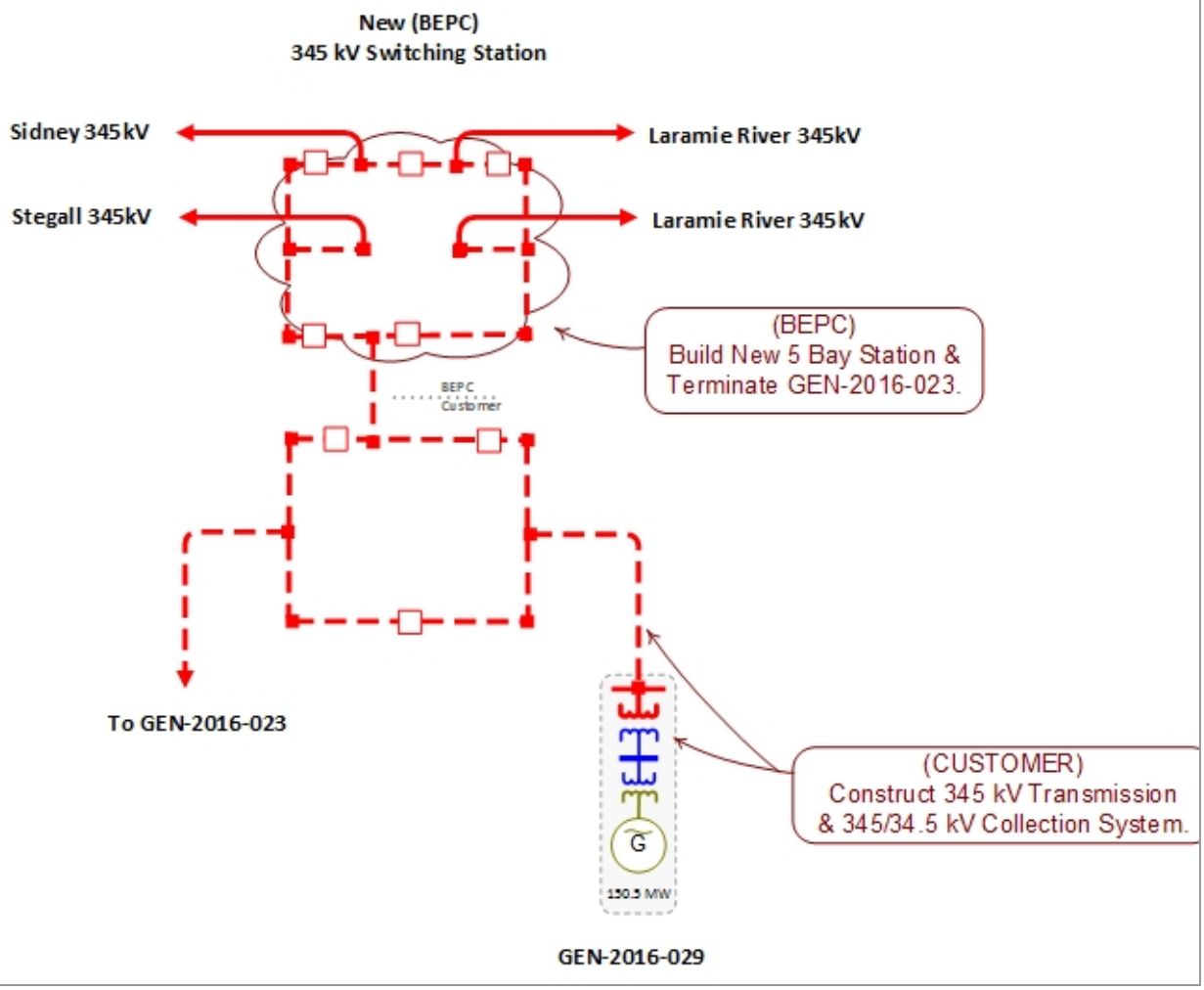
Interconnection Request: GEN-2016-022
Cluster Interconnection Costs: $10,000



Interconnection Request: GEN-2016-023
Cluster Interconnection Costs: $19,264,793



Interconnection Request: GEN-2016-029
Cluster Interconnection Costs: $158,400



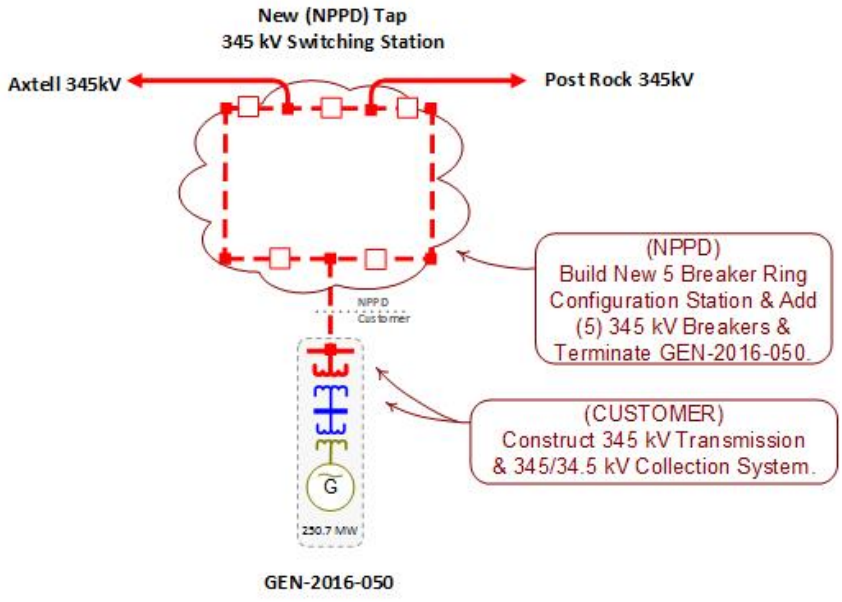
Interconnection Request: GEN-2016-031

See Posted Interconnection Facilties Study for GEN-2016-031

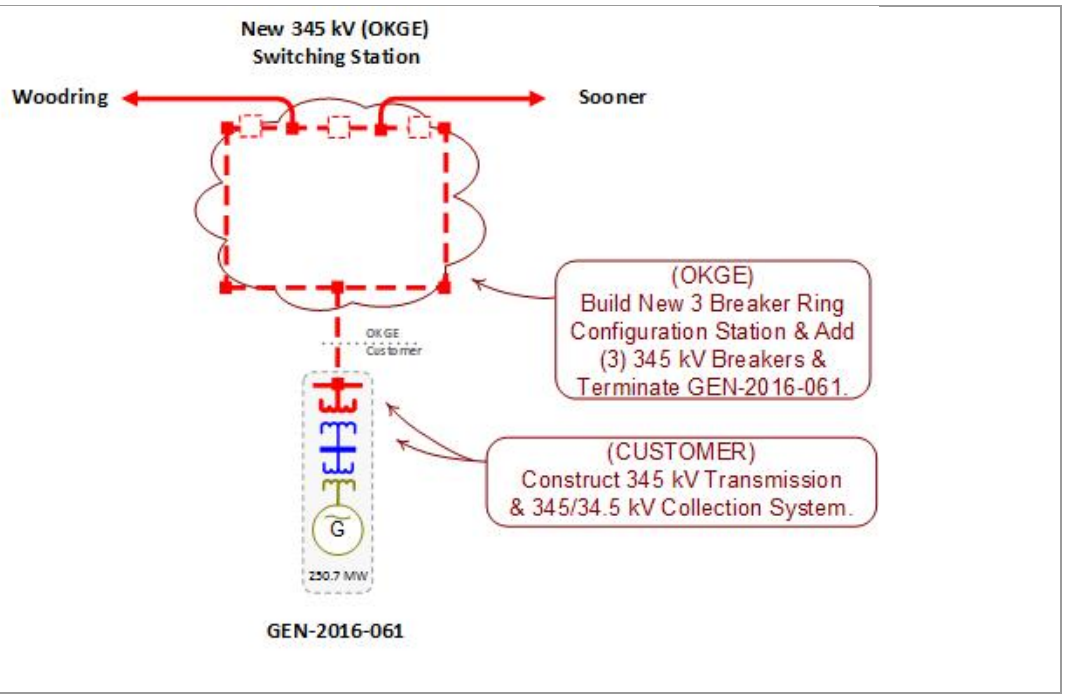
Interconnection Request: GEN-2016-032

See Posted Interconnection Facilties Study for GEN-2016-032

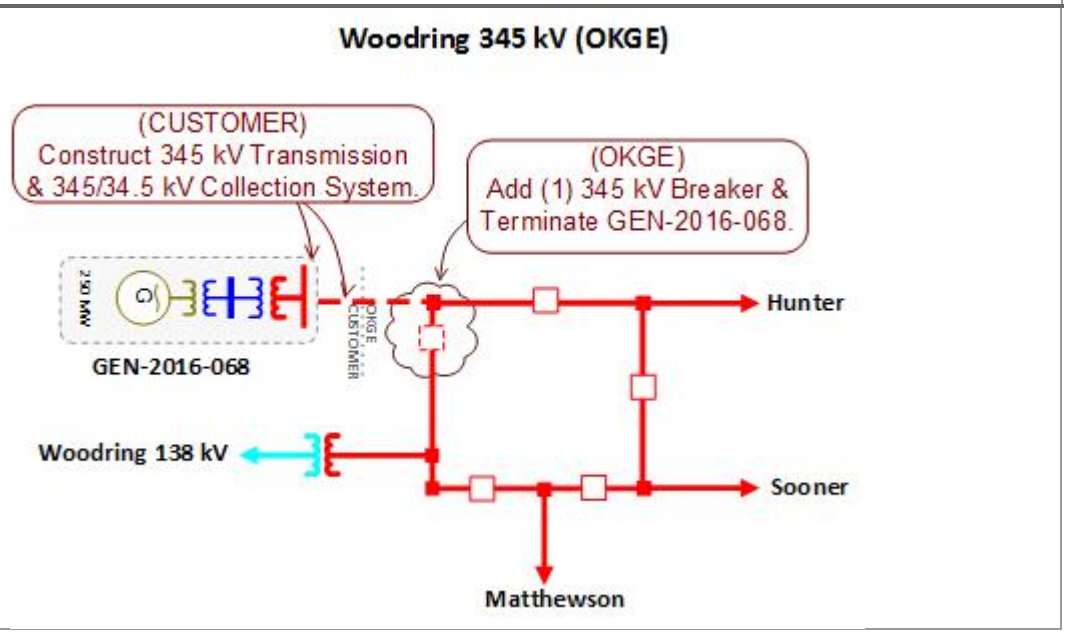
Interconnection Request: GEN-2016-043
See Posted Interconnection Facilties Study for GEN-2016-043

Interconnection Request: GEN-2016-050 **Cluster Interconnection Costs: $16,500,000**


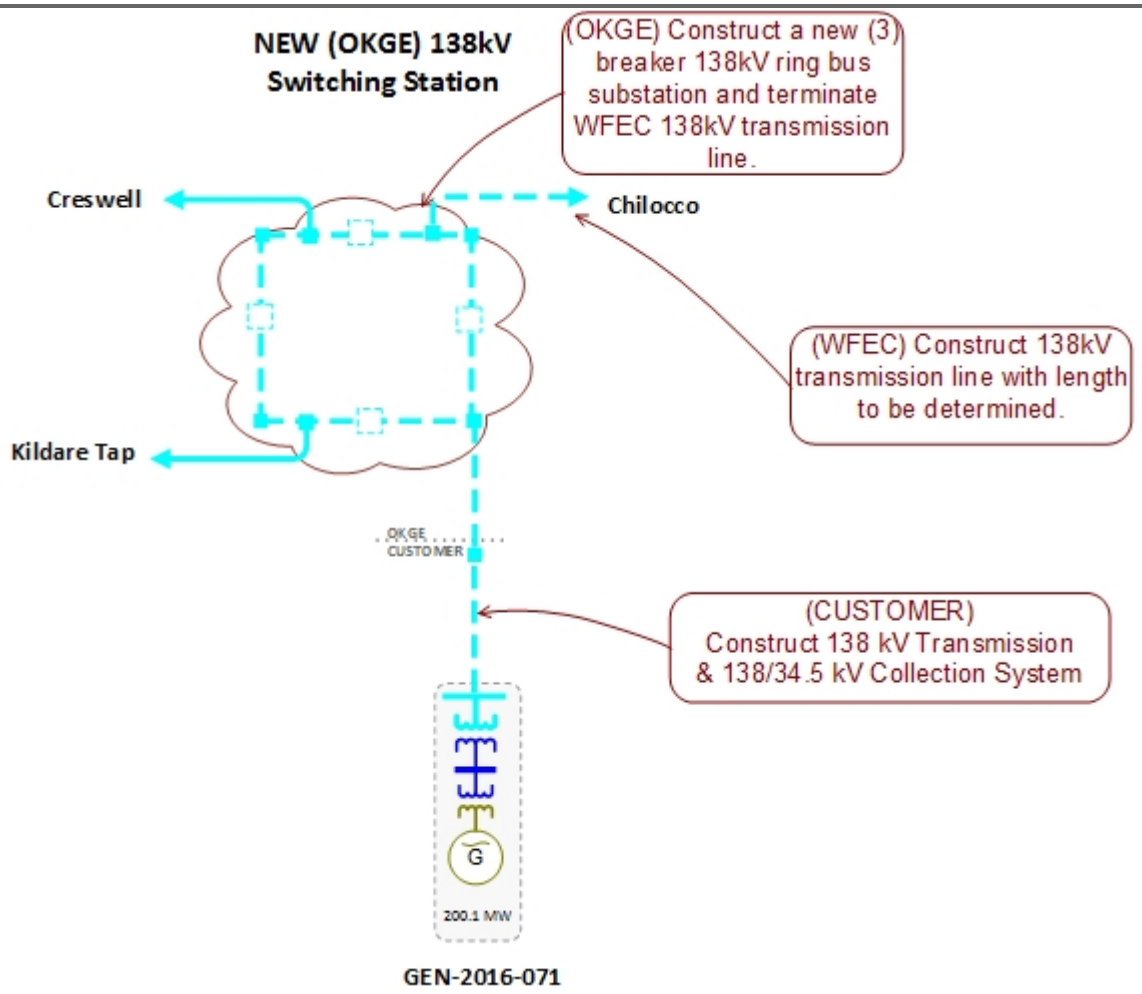
Interconnection Request: GEN-2016-061 **Cluster Interconnection Costs: $11,000,000**



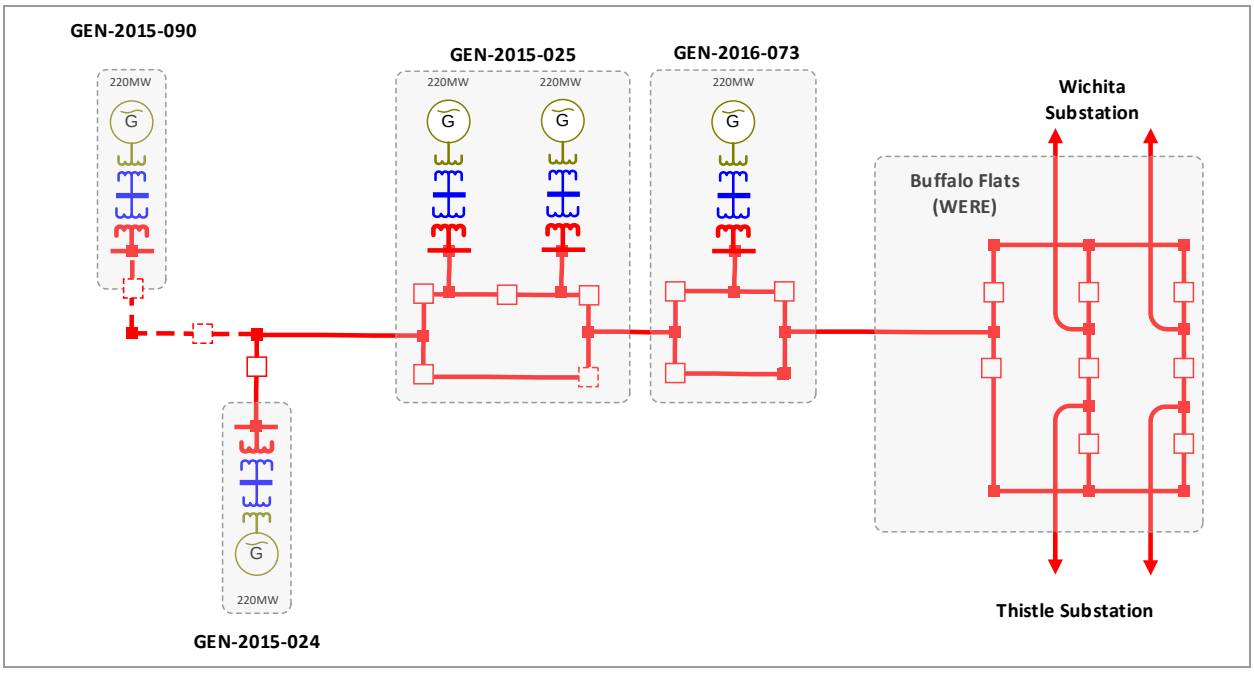
Interconnection Request: GEN-2016-068
Cluster Interconnection Costs: $1,900,000



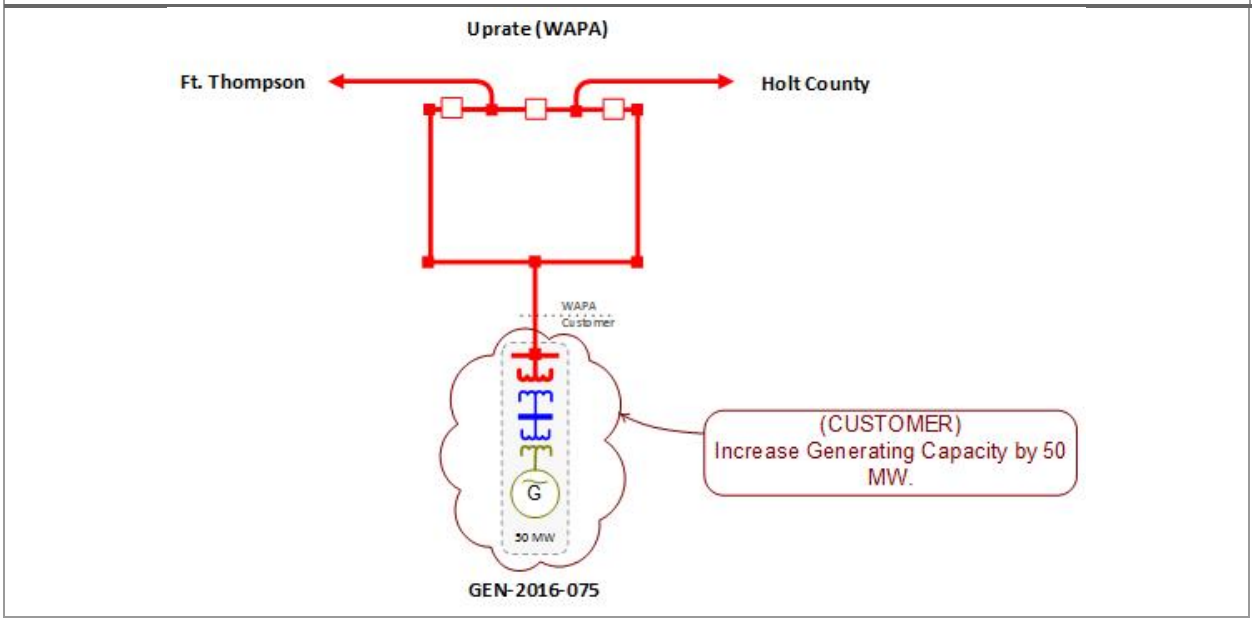
Interconnection Request: GEN-2016-071
Cluster Interconnection Costs: $4,212,190



Interconnection Request: GEN-2016-073
Cluster Interconnection Costs: $2,359,239



Interconnection Request: GEN-2016-075
Cluster Interconnection Costs: $0



E: COST ALLOCATION PER REQUEST

Appendix E. Cost Allocation Per Request

(Including Previously Allocated Network Upgrades*)

Interconnection Request and Upgrades	Upgrade Type	Allocated Cost	Upgrade Cost
ASGI-2016-002			
ASGI-2016-002 Interconnection Costs See One-Line Diagram.	Current Study	$21,750	$21,750
	Current Study Total	$21,750	
ASGI-2016-003			
ASGI-2016-003 Interconnection Costs See One-Line Diagram.	Current Study	$10,000	$10,000
	Current Study Total	$10,000	
ASGI-2016-004			
ASGI-2016-004 Interconnection Costs See One-Line Diagram.	Current Study	$15,000	$15,000
	Current Study Total	$15,000	
GEN-2015-036			
GEN-2015-036 Interconnection Costs See One-Line Diagram.	Current Study	$2,025,000	$2,025,000
	Current Study Total	$2,025,000	
GEN-2015-041			
GEN-2015-041 Interconnection Costs See One-Line Diagram.	Current Study	$107,596	$107,596
	Current Study Total	$107,596	
GEN-2015-082			
GEN-2015-082 Interconnection Costs See One-Line Diagram.	Current Study	$1,930,000	$1,930,000
	Current Study Total	$1,930,000	
GEN-2015-089			
GEN-2015-089 Interconnection Costs See One-Line Diagram.	Current Study	$4,655,244	$4,655,244
SPP-NTC-200220 (R-Plan) Build new 222 mile, 345 kV line from Gentleman - Cherry Co - Holt Co. Build new 345 kV substations at Cherry Co and Holt Co. Terminal upgrades at Gentleman.	Previously Allocated		$412,074,343

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

Interconnection Request and Upgrades	Upgrade Type	Allocated Cost	Upgrade Cost
	Current Study Total	$4,655,244	
GEN-2015-095			
GEN-2015-095 Interconnection Costs See One-Line Diagram.	Current Study	$3,000,000	$3,000,000
	Current Study Total	$3,000,000	
GEN-2016-003			
GEN-2016-003 Interconnection Costs See One-Line Diagram.	Current Study	$15,000,000	$15,000,000
	Current Study Total	$15,000,000	
GEN-2016-004			
GEN-2016-004 Interconnection Costs See One-Line Diagram.	Current Study	$2,871,212	$2,871,212
	Current Study Total	$2,871,212	
GEN-2016-007			
GEN-2016-007 Interconnection Costs See One-Line Diagram.	Current Study	$1,100,000	$1,100,000
	Current Study Total	$1,100,000	
GEN-2016-009			
GEN-2016-009 Interconnection Costs See One-Line Diagram.	Current Study	$650,000	$650,000
	Current Study Total	$650,000	
GEN-2016-013			
GEN-2016-013 Interconnection Costs See One-Line Diagram.	Current Study	$50,000	$50,000
	Current Study Total	$50,000	
GEN-2016-014			
GEN-2016-014 Interconnection Costs See One-Line Diagram.	Current Study	$50,000	$50,000
	Current Study Total	$50,000	

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

Interconnection Request and Upgrades	Upgrade Type	Allocated Cost	Upgrade Cost
GEN-2016-015			
GEN-2016-015 Interconnection Costs See One-Line Diagram.	Current Study	$6,625,863	$6,625,863
	Current Study Total	$6,625,863	
GEN-2016-016			
GEN-2016-016 Interconnection Costs See One-Line Diagram.	Current Study	$4,791,534	$4,791,534
	Current Study Total	$4,791,534	
GEN-2016-017			
GEN-2016-017 Interconnection Costs See One-Line Diagram.	Current Study	$19,264,793	$19,264,793
	Current Study Total	$19,264,793	
GEN-2016-020			
GEN-2016-020 Interconnection Costs See One-Line Diagram.	Current Study	$3,010,000	$3,010,000
	Current Study Total	$3,010,000	
GEN-2016-021			
GEN-2016-021 Interconnection Costs See One-Line Diagram.	Current Study	$7,250,000	$7,250,000
SPP-NTC-200220 (R-Plan) Build new 222 mile, 345 kV line from Gentleman - Cherry Co - Holt Co. Build new 345 kV substations at Cherry Co and Holt Co. Terminal upgrades at Gentleman.	Previously Allocated		$412,074,343
	Current Study Total	$7,250,000	
GEN-2016-022			
GEN-2016-022 Interconnection Costs See One-Line Diagram.	Current Study	$10,000	$10,000
Ranch Road - Sooner 345kV CKT 1 (OKGE) Upgrade terminal equipment to achieve a circuit minimum Rate B of 1229 MVA.	Current Study	$445,597	$450,000
Wolf Creek - Emporia 345kV CKT 1 (WERE) Build ~35 miles of 345kV from Wolf Creek to Emporia, build new bays at Wolf Creek and Emporia to achieve minimum Rate A of 1141 MVA and Rate B of 1195 MVA.	Current Study	$12,597,522	$56,000,000
	Current Study Total	$13,053,119	

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

Interconnection Request and Upgrades	Upgrade Type	Allocated Cost	Upgrade Cost
GEN-2016-023			
GEN-2016-023 Interconnection Costs See One-Line Diagram.	Current Study	$31,864,793	$31,864,793
Keystone - Gentleman 345kV CKT 2 (NPPD) Build ~30 miles of 345kV from Gentleman to Keystone, build new bays at Keystone and Gentleman to achieve minimum Rate A of 956 MVA. Gentleman reconfiguration.	Current Study	$37,700,000	$75,400,000
Laramie Stability Limit (BEPC) Potential mitigation for BEPC Laramie Stability Limit	Current Study	$0	$0
Sidney (BEPC) - Keystone (NPPD) 345kV CKT 2 Build ~95 miles of 345kV from Sidney to Keystone, build new bays at Keystone and Sidney to achieve minimum Rate A of 956 MVA.	Current Study	$92,250,000	$184,500,000
SPP-NTC-200220 (R-Plan) Build new 222 mile, 345 kV line from Gentleman - Cherry Co - Holt Co. Build new 345 kV substations at Cherry Co and Holt Co. Terminal upgrades at Gentleman.	Previously Allocated		$412,074,343
	Current Study Total	$161,814,793	
GEN-2016-028			
GEN-2016-028 Interconnection Costs See One-Line Diagram.	Current Study	$9,100,000	$9,100,000
	Current Study Total	$9,100,000	
GEN-2016-029			
GEN-2016-029 Interconnection Costs See One-Line Diagram.	Current Study	$158,400	$158,400
Keystone - Gentleman 345kV CKT 2 (NPPD) Build ~30 miles of 345kV from Gentleman to Keystone, build new bays at Keystone and Gentleman to achieve minimum Rate A of 956 MVA. Gentleman reconfiguration.	Current Study	$37,700,000	$75,400,000
Laramie Stability Limit (BEPC) Potential mitigation for BEPC Laramie Stability Limit	Current Study	$0	$0
Sidney (BEPC) - Keystone (NPPD) 345kV CKT 2 Build ~95 miles of 345kV from Sidney to Keystone, build new bays at Keystone and Sidney to achieve minimum Rate A of 956 MVA.	Current Study	$92,250,000	$184,500,000
SPP-NTC-200220 (R-Plan) Build new 222 mile, 345 kV line from Gentleman - Cherry Co - Holt Co. Build new 345 kV substations at Cherry Co and Holt Co. Terminal upgrades at Gentleman.	Previously Allocated		$412,074,343
	Current Study Total	$130,108,400	
GEN-2016-030			
GEN-2016-030 Interconnection Costs See One-Line Diagram.	Current Study	$2,183,000	$2,183,000
	Current Study Total	$2,183,000	

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

Interconnection Request and Upgrades	Upgrade Type	Allocated Cost	Upgrade Cost
GEN-2016-031			
GEN-2016-031 Interconnection Costs See One-Line Diagram.	Current Study	$0	$0
Ranch Road - Sooner 345kV CKT 1 (OKGE) Upgrade terminal equipment to achieve a circuit minimum Rate B of 1229 MVA.	Current Study	$4,403	$450,000
Wolf Creek - Emporia 345kV CKT 1 (WERE) Build ~35 miles of 345kV from Wolf Creek to Emporia, build new bays at Wolf Creek and Emporia to achieve minimum Rate A of 1141 MVA and Rate B of 1195 MVA.	Current Study	$124,481	$56,000,000
	Current Study Total	$128,885	
GEN-2016-032			
Cottonwood Creek - G16-032-Tap 138kV CKT 1 (OKGE) Rebuild ~10.5 miles of 138kV with 795ACSR conductor from G16-032 - Cottonwood Creek and rebuild switches, breakers, relays at Cottonwood Creek to achieve minimum Rate A of 245 MVA	Current Study	$12,000,000	$12,000,000
GEN-2016-032 Interconnection Costs See One-Line Diagram.	Current Study	$3,456,024	$3,456,024
Wolf Creek - Emporia 345kV CKT 1 (WERE) Build ~35 miles of 345kV from Wolf Creek to Emporia, build new bays at Wolf Creek and Emporia to achieve minimum Rate A of 1141 MVA and Rate B of 1195 MVA.	Current Study	$8,066,067	$56,000,000
	Current Study Total	$23,522,091	
GEN-2016-037			
GEN-2016-037 Interconnection Costs See One-Line Diagram.	Current Study	$17,105,572	$17,105,572
	Current Study Total	$17,105,572	
GEN-2016-043			
GEN-2016-043 Interconnection Costs See One-Line Diagram.	Current Study	$7,250,000	$7,250,000
SPP-NTC-200220 (R-Plan) Build new 222 mile, 345 kV line from Gentleman - Cherry Co - Holt Co. Build new 345 kV substations at Cherry Co and Holt Co. Terminal upgrades at Gentleman.	Previously Allocated		$412,074,343
	Current Study Total	$7,250,000	
GEN-2016-045			
GEN-2016-045 Interconnection Costs See One-Line Diagram.	Current Study	$15,103,955	$15,103,955
	Current Study Total	$15,103,955	

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

Interconnection Request and Upgrades	Upgrade Type	Allocated Cost	Upgrade Cost
GEN-2016-046			
GEN-2016-046 Interconnection Costs See One-Line Diagram.	Current Study	$9,996,660	$9,996,660
	Current Study Total	$9,996,660	
GEN-2016-047			
GEN-2016-047 Interconnection Costs See One-Line Diagram.	Current Study	$0	$0
	Current Study Total	$0	
GEN-2016-050			
GEN-2016-050 Interconnection Costs See One-Line Diagram.	Current Study	$16,500,000	$16,500,000
SPP-NTC-200220 (R-Plan) Build new 222 mile, 345 kV line from Gentleman - Cherry Co - Holt Co. Build new 345 kV substations at Cherry Co and Holt Co. Terminal upgrades at Gentleman.	Previously Allocated		$412,074,343
	Current Study Total	$16,500,000	
GEN-2016-051			
GEN-2016-051 Interconnection Costs See One-Line Diagram.	Current Study	$18,500	$18,500
	Current Study Total	$18,500	
GEN-2016-052			
GEN-2016-052 Interconnection Costs See One-Line Diagram.	Current Study	$0	$0
	Current Study Total	$0	
GEN-2016-053			
GEN-2016-053 Interconnection Costs See One-Line Diagram.	Current Study	$0	$0
	Current Study Total	$0	
GEN-2016-054			
GEN-2016-054 Interconnection Costs See One-Line Diagram.	Current Study	$0	$0
	Current Study Total	$0	

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

Interconnection Request and Upgrades	Upgrade Type	Allocated Cost	Upgrade Cost
GEN-2016-056			
GEN-2016-056 Interconnection Costs See One-Line Diagram.	Current Study	$4,215,059	$4,215,059
	Current Study Total	$4,215,059	
GEN-2016-057			
GEN-2016-057 Interconnection Costs See One-Line Diagram.	Current Study	$15,103,955	$15,103,955
	Current Study Total	$15,103,955	
GEN-2016-061			
GEN-2016-061 Interconnection Costs See One-Line Diagram.	Current Study	$11,000,000	$11,000,000
Wolf Creek - Emporia 345kV CKT 1 (WERE) Build ~35 miles of 345kV from Wolf Creek to Emporia, build new bays at Wolf Creek and Emporia to achieve minimum Rate A of 1141 MVA and Rate B of 1195 MVA.	Current Study	$12,018,515	$56,000,000
	Current Study Total	$23,018,515	
GEN-2016-062			
GEN-2016-062 Interconnection Costs See One-Line Diagram.	Current Study	$2,197,565	$2,197,565
	Current Study Total	$2,197,565	
GEN-2016-063			
GEN-2016-063 Interconnection Costs See One-Line Diagram.	Current Study	$11,550,000	$11,550,000
	Current Study Total	$11,550,000	
GEN-2016-067			
GEN-2016-067 Interconnection Costs See One-Line Diagram.	Current Study	$15,000	$15,000
	Current Study Total	$15,000	
GEN-2016-068			
GEN-2016-068 Interconnection Costs See One-Line Diagram.	Current Study	$1,900,000	$1,900,000
Wolf Creek - Emporia 345kV CKT 1 (WERE) Build ~35 miles of 345kV from Wolf Creek to Emporia, build new bays at Wolf Creek and Emporia to achieve minimum Rate A of 1141 MVA and Rate B of 1195 MVA.	Current Study	$10,209,408	$56,000,000

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

Interconnection Request and Upgrades	Upgrade Type	Allocated Cost	Upgrade Cost
	Current Study Total	$12,109,408	
GEN-2016-069			
GEN-2016-069 Interconnection Costs See One-Line Diagram.	Current Study	$1,910,989	$1,910,989
	Current Study Total	$1,910,989	
GEN-2016-070			
GEN-2016-070 Interconnection Costs See One-Line Diagram.	Current Study	$0	$0
	Current Study Total	$0	
GEN-2016-071			
GEN-2016-071 Interconnection Costs See One-Line Diagram.	Current Study	$4,212,190	$4,212,190
Wolf Creek - Emporia 345kV CKT 1 (WERE) Build ~35 miles of 345kV from Wolf Creek to Emporia, build new bays at Wolf Creek and Emporia to achieve minimum Rate A of 1141 MVA and Rate B of 1195 MVA.	Current Study	$12,355,616	$56,000,000
	Current Study Total	$16,567,806	
GEN-2016-073			
GEN-2016-073 Interconnection Costs See One-Line Diagram.	Current Study	$2,359,239	$2,359,239
Wolf Creek - Emporia 345kV CKT 1 (WERE) Build ~35 miles of 345kV from Wolf Creek to Emporia, build new bays at Wolf Creek and Emporia to achieve minimum Rate A of 1141 MVA and Rate B of 1195 MVA.	Current Study	$628,390	$56,000,000
	Current Study Total	$2,987,629	
GEN-2016-075			
GEN-2016-075 Interconnection Costs See One-Line Diagram.	Current Study	$0	$0
SPP-NTC-200220 (R-Plan) Build new 222 mile, 345 kV line from Gentleman - Cherry Co - Holt Co. Build new 345 kV substations at Cherry Co and Holt Co. Terminal upgrades at Gentleman.	Previously Allocated		$412,074,343
	Current Study Total	$0	
	TOTAL CURRENT STUDY COSTS:	**$567,988,893**	

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

F: COST ALLOCATION PER PROPOSED STUDY NETWORK UPGRADE

Appendix F. Cost Allocation by Upgrade

ASGI-2016-002 Interconnection Costs			**$21,750**
See One-Line Diagram.			
	ASGI-2016-002	$21,750	
	Total Allocated Costs	**$21,750**	
ASGI-2016-003 Interconnection Costs			**$10,000**
See One-Line Diagram.			
	ASGI-2016-003	$10,000	
	Total Allocated Costs	**$10,000**	
ASGI-2016-004 Interconnection Costs			**$15,000**
See One-Line Diagram.			
	ASGI-2016-004	$15,000	
	Total Allocated Costs	**$15,000**	
Laramie Stability Limit (BEPC)			**$0**
Potential mitigation for BEPC Laramie Stability Limit			
	GEN-2016-023	$0	
	GEN-2016-029	$0	
	Total Allocated Costs	**$0**	
Cottonwood Creek - G16-032-Tap 138kV CKT 1 (OKGE)			**$12,000,000**
Rebuild ~10.5 miles of 138kV with 795ACSR conductor from G16-032 - Cottonwood Creek and rebuild switches, breakers, relays at Cottonwood Creek to ach			
	GEN-2016-032	$12,000,000	
	Total Allocated Costs	**$12,000,000**	
GEN-2015-036 Interconnection Costs			**$2,025,000**
See One-Line Diagram.			
	GEN-2015-036	$2,025,000	
	Total Allocated Costs	**$2,025,000**	
GEN-2015-041 Interconnection Costs			**$107,596**
See One-Line Diagram.			
	GEN-2015-041	$107,596	
	Total Allocated Costs	**$107,596**	

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

GEN-2015-082 Interconnection Costs			**$1,930,000**
See One-Line Diagram.			
	GEN-2015-082	$1,930,000	
	Total Allocated Costs	**$1,930,000**	
GEN-2015-089 Interconnection Costs			**$4,655,244**
See One-Line Diagram.			
	GEN-2015-089	$4,655,244	
	Total Allocated Costs	**$4,655,244**	
GEN-2015-095 Interconnection Costs			**$3,000,000**
See One-Line Diagram.			
	GEN-2015-095	$3,000,000	
	Total Allocated Costs	**$3,000,000**	
GEN-2016-003 Interconnection Costs			**$15,000,000**
See One-Line Diagram.			
	GEN-2016-003	$15,000,000	
	Total Allocated Costs	**$15,000,000**	
GEN-2016-004 Interconnection Costs			**$2,871,212**
See One-Line Diagram.			
	GEN-2016-004	$2,871,212	
	Total Allocated Costs	**$2,871,212**	
GEN-2016-007 Interconnection Costs			**$1,100,000**
See One-Line Diagram.			
	GEN-2016-007	$1,100,000	
	Total Allocated Costs	**$1,100,000**	
GEN-2016-009 Interconnection Costs			**$650,000**
See One-Line Diagram.			
	GEN-2016-009	$650,000	
	Total Allocated Costs	**$650,000**	
GEN-2016-013 Interconnection Costs			**$50,000**
See One-Line Diagram.			
	GEN-2016-013	$50,000	
	Total Allocated Costs	**$50,000**	

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

GEN-2016-014 Interconnection Costs			**$50,000**
See One-Line Diagram.			
	GEN-2016-014	$50,000	
	Total Allocated Costs	**$50,000**	
GEN-2016-015 Interconnection Costs			**$6,625,863**
See One-Line Diagram.			
	GEN-2016-015	$6,625,863	
	Total Allocated Costs	**$6,625,863**	
GEN-2016-016 Interconnection Costs			**$4,791,534**
See One-Line Diagram.			
	GEN-2016-016	$4,791,534	
	Total Allocated Costs	**$4,791,534**	
GEN-2016-017 Interconnection Costs			**$19,264,793**
See One-Line Diagram.			
	GEN-2016-017	$19,264,793	
	Total Allocated Costs	**$19,264,793**	
GEN-2016-020 Interconnection Costs			**$3,010,000**
See One-Line Diagram.			
	GEN-2016-020	$3,010,000	
	Total Allocated Costs	**$3,010,000**	
GEN-2016-021 Interconnection Costs			**$7,250,000**
See One-Line Diagram.			
	GEN-2016-021	$7,250,000	
	Total Allocated Costs	**$7,250,000**	
GEN-2016-022 Interconnection Costs			**$10,000**
See One-Line Diagram.			
	GEN-2016-022	$10,000	
	Total Allocated Costs	**$10,000**	
GEN-2016-023 Interconnection Costs			**$31,864,793**
See One-Line Diagram.			
	GEN-2016-023	$31,864,793	
	Total Allocated Costs	**$31,864,793**	

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

GEN-2016-028 Interconnection Costs			**$9,100,000**
See One-Line Diagram.			
	GEN-2016-028	$9,100,000	
	Total Allocated Costs	**$9,100,000**	
GEN-2016-029 Interconnection Costs			**$158,400**
See One-Line Diagram.			
	GEN-2016-029	$158,400	
	Total Allocated Costs	**$158,400**	
GEN-2016-030 Interconnection Costs			**$2,183,000**
See One-Line Diagram.			
	GEN-2016-030	$2,183,000	
	Total Allocated Costs	**$2,183,000**	
GEN-2016-031 Interconnection Costs			**$0**
See One-Line Diagram.			
	GEN-2016-031	$0	
	Total Allocated Costs	**$0**	
GEN-2016-032 Interconnection Costs			**$3,456,024**
See One-Line Diagram.			
	GEN-2016-032	$3,456,024	
	Total Allocated Costs	**$3,456,024**	
GEN-2016-037 Interconnection Costs			**$17,105,572**
See One-Line Diagram.			
	GEN-2016-037	$17,105,572	
	Total Allocated Costs	**$17,105,572**	
GEN-2016-043 Interconnection Costs			**$7,250,000**
See One-Line Diagram.			
	GEN-2016-043	$7,250,000	
	Total Allocated Costs	**$7,250,000**	
GEN-2016-045 Interconnection Costs			**$15,103,955**
See One-Line Diagram.			
	GEN-2016-045	$15,103,955	
	Total Allocated Costs	**$15,103,955**	

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

GEN-2016-046 Interconnection Costs			**$9,996,660**
See One-Line Diagram.			
	GEN-2016-046	$9,996,660	
	Total Allocated Costs	**$9,996,660**	
GEN-2016-047 Interconnection Costs			**$0**
See One-Line Diagram.			
	GEN-2016-047	$0	
	Total Allocated Costs	**$0**	
GEN-2016-050 Interconnection Costs			**$16,500,000**
See One-Line Diagram.			
	GEN-2016-050	$16,500,000	
	Total Allocated Costs	**$16,500,000**	
GEN-2016-051 Interconnection Costs			**$18,500**
See One-Line Diagram.			
	GEN-2016-051	$18,500	
	Total Allocated Costs	**$18,500**	
GEN-2016-052 Interconnection Costs			**$0**
See One-Line Diagram.			
	GEN-2016-052	$0	
	Total Allocated Costs	**$0**	
GEN-2016-053 Interconnection Costs			**$0**
See One-Line Diagram.			
	GEN-2016-053	$0	
	Total Allocated Costs	**$0**	
GEN-2016-054 Interconnection Costs			**$0**
See One-Line Diagram.			
	GEN-2016-054	$0	
	Total Allocated Costs	**$0**	
GEN-2016-056 Interconnection Costs			**$4,215,059**
See One-Line Diagram.			
	GEN-2016-056	$4,215,059	
	Total Allocated Costs	**$4,215,059**	

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

GEN-2016-057 Interconnection Costs			**$15,103,955**
See One-Line Diagram.			
	GEN-2016-057	$15,103,955	
	Total Allocated Costs	**$15,103,955**	
GEN-2016-061 Interconnection Costs			**$11,000,000**
See One-Line Diagram.			
	GEN-2016-061	$11,000,000	
	Total Allocated Costs	**$11,000,000**	
GEN-2016-062 Interconnection Costs			**$2,197,565**
See One-Line Diagram.			
	GEN-2016-062	$2,197,565	
	Total Allocated Costs	**$2,197,565**	
GEN-2016-063 Interconnection Costs			**$11,550,000**
See One-Line Diagram.			
	GEN-2016-063	$11,550,000	
	Total Allocated Costs	**$11,550,000**	
GEN-2016-067 Interconnection Costs			**$15,000**
See One-Line Diagram.			
	GEN-2016-067	$15,000	
	Total Allocated Costs	**$15,000**	
GEN-2016-068 Interconnection Costs			**$1,900,000**
See One-Line Diagram.			
	GEN-2016-068	$1,900,000	
	Total Allocated Costs	**$1,900,000**	
GEN-2016-069 Interconnection Costs			**$1,910,989**
See One-Line Diagram.			
	GEN-2016-069	$1,910,989	
	Total Allocated Costs	**$1,910,989**	
GEN-2016-070 Interconnection Costs			**$0**
See One-Line Diagram.			
	GEN-2016-070	$0	
	Total Allocated Costs	**$0**	

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

GEN-2016-071 Interconnection Costs **$4,212,190**

See One-Line Diagram.

GEN-2016-071		$4,212,190
Total Allocated Costs	**$4,212,190**	

GEN-2016-073 Interconnection Costs **$2,359,239**

See One-Line Diagram.

GEN-2016-073		$2,359,239
Total Allocated Costs	**$2,359,239**	

GEN-2016-075 Interconnection Costs **$0**

See One-Line Diagram.

GEN-2016-075		$0
Total Allocated Costs	**$0**	

Keystone - Gentleman 345kV CKT 2 (NPPD) **$75,400,000**

Build ~30 miles of 345kV from Gentleman to Keystone, build new bays at Keystone and Gentleman to achieve minimum Rate A of 956 MVA. Gentleman reco

GEN-2016-023		$37,700,000
GEN-2016-029		$37,700,000
Total Allocated Costs	**$75,400,000**	

Ranch Road - Sooner 345kV CKT 1 (OKGE) **$450,000**

Upgrade terminal equipment to achieve a circuit minimum Rate B of 1229 MVA.

GEN-2016-022		$445,597
GEN-2016-031		$4,403
Total Allocated Costs	**$450,000**	

Sidney (BEPC) - Keystone (NPPD) 345kV CKT 2 **$184,500,000**

Build ~95 miles of 345kV from Sidney to Keystone, build new bays at Keystone and Sidney to achieve minimum Rate A of 956 MVA.

GEN-2016-023		$92,250,000
GEN-2016-029		$92,250,000
Total Allocated Costs	**$184,500,000**	

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

Wolf Creek - Emporia 345kV CKT 1 (WERE) **$56,000,000**

Build ~35 miles of 345kV from Wolf Creek to Emporia, build new bays at Wolf Creek and Emporia to achieve minimum Rate A of 1141 MVA and Rate B of

GEN-2016-022	$12,597,522
GEN-2016-031	$124,481
GEN-2016-032	$8,066,067
GEN-2016-061	$12,018,515
GEN-2016-068	$10,209,408
GEN-2016-071	$12,355,616
GEN-2016-073	$628,390
Total Allocated Costs	**$56,000,000**

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

G-T: THERMAL POWER FLOW ANALYSIS (CONSTRAINTS REQUIRING TRANSMISSION REINFORCEMENT)

Legend:

Column	Definition
Solution	Solution Method
Group	Model Case Identification: • ##ALL: ERIS-HVER • 00: ERIS-LVER • ##NR or 00NR: NRIS
Scenario	Upgrade Scenario Identification
Season	Model Year and Season
Source	Gen ID producing the TDF above the limit for the constraint
Monitored Element	Monitored Bus Identification
Rate A	Planning Term Normal Rating
Rate B	Planning Term Emergency Rating
TDF	Transfer Distribution Factor for the Source
TC%LOADING	Post-transfer, loading percent for system intact or contingency
Contingency	Contingency Description

SOLUTION	GROUP	SCENARIO	SEASON	SOURCE	DIRECTION	MONITORED ELEMENT	RATEA (MVA)	RATEB(MVA)	TDF	TC%LOADING (% MVA)	CONTINGENCY
FDNSLock-Blown up	09ALL	0	18SP	G15_089		Non-Converged	720	720	0.0732	86.72832	'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z'
FDNSLock-Blown up	09ALL	0	18SP	G15_089		Non-Converged	720	720	0.0732	86.72832	'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z'
FDNSLock-Blown up	09ALL	0	17WP	G15_089		Non-Converged	720	720	0.06911	61.53727	'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1'
FDNSLock-Blown up	09ALL	0	18G	G15_089		Non-Converged	720	720	0.07215	66.2192	'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1'
FDNSLock-Blown up	09ALL	0	18SP	G15_089		Non-Converged	720	720	0.0732	86.01809	'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1'
FDNSLock-Blown up	09ALL	0	17WP	G15_089		Non-Converged	0	0	0.04815	9999	''P42:345:NPPD:BKR-CPR-3310''
FDNSLock-Blown up	09ALL	0	18G	G15_089		Non-Converged	0	0	0.04302	9999	''P42:345:NPPD:BKR-CPR-3310''
FDNSLock-Blown up	09ALL	0	18SP	G15_089		Non-Converged	0	0	0.04783	9999	''P42:345:NPPD:BKR-CPR-3310''
FDNSLock-Blown up	09ALL	0	18SP	G15_089		Non-Converged	0	0	0.0451	9999	''P42:345:NPPD:BKR-KEY-3310''
FDNSLock-Blown up	09ALL	0	21SP	G15_089		Non-Converged	0	0	0.03503	9999	''P42:345:NPPD:BKR-KEY-3310''
FDNSLock-Blown up	09ALL	0	26SP	G15_089		Non-Converged	0	0	0.03613	9999	''P42:345:NPPD:BKR-KEY-3310''
FDNSLock-Blown up	09ALL	0	17WP	G15_089		Non-Converged	0	0	0.08029	9999	''P42:345:UMZB:# 2494 #: LO IN ND. STUCK BREAKER (2196)''
FDNSLock-Blown up	09ALL	0	21WP	G15_089		Non-Converged	0	0	0.07427	9999	''P42:345:UMZB:# 2494 #: LO IN ND. STUCK BREAKER (2196)''
FDNSLock-Blown up	09ALL	0	17WP	G15_089		Non-Converged	0	0	0.08029	9999	''P42:345:UMZB:# 2495 #: LO IN ND. STUCK BREAKER (2396)''
FDNSLock-Blown up	09ALL	0	21WP	G15_089		Non-Converged	0	0	0.07427	9999	''P42:345:UMZB:# 2495 #: LO IN ND. STUCK BREAKER (2396)''
FDNSLock-Blown up	09ALL	0	17WP	G15_089		Non-Converged	0	0	0.03828	9999	''P42:345:UMZB:# 2503 #: AVS IN ND. STUCK BREAKER (4596)''
FDNSLock-Blown up	09ALL	0	18SP	G15_089		Non-Converged	0	0	0.04624	9999	''P42:345:UMZB:# 2503 #: AVS IN ND. STUCK BREAKER (4596)''
FDNSLock-Blown up	09ALL	0	21SP	G15_089		Non-Converged	0	0	0.03689	9999	''P42:345:UMZB:# 2503 #: AVS IN ND. STUCK BREAKER (4596)''
FDNSLock-Blown up	09ALL	0	21WP	G15_089		Non-Converged	0	0	0.0303	9999	''P42:345:UMZB:# 2503 #: AVS IN ND. STUCK BREAKER (4596)''
FDNSLock-Blown up	09ALL	0	26SP	G15_089		Non-Converged	0	0	0.03783	9999	''P42:345:UMZB:# 2503 #: AVS IN ND. STUCK BREAKER (4596)''
FDNSLock-Blown up	09ALL	0	18SP	G15_089		Non-Converged	0	0	0.03007	9999	'SIDNEY-KEYSTONE-TLINE-REACTORS-CKT1'
FDNSLock-Blown up	09ALL	0	17WP	G16_021		Non-Converged	0	0	0.07466	9999	''P42:345:NPPD:BKR-CPR-3310''
FDNSLock-Blown up	09ALL	0	18G	G16_021		Non-Converged	0	0	0.06948	9999	''P42:345:NPPD:BKR-CPR-3310''
FDNSLock-Blown up	09ALL	0	18SP	G16_021		Non-Converged	0	0	0.0743	9999	''P42:345:NPPD:BKR-CPR-3310''
FDNSLock-Blown up	09ALL	0	17WP	G16_021		Non-Converged	0	0	0.04613	9999	''P42:345:UMZB:# 2494 #: LO IN ND. STUCK BREAKER (2196)''
FDNSLock-Blown up	09ALL	0	21WP	G16_021		Non-Converged	0	0	0.04176	9999	''P42:345:UMZB:# 2494 #: LO IN ND. STUCK BREAKER (2196)''
FDNSLock-Blown up	09ALL	0	17WP	G16_021		Non-Converged	0	0	0.04613	9999	''P42:345:UMZB:# 2495 #: LO IN ND. STUCK BREAKER (2396)''
FDNSLock-Blown up	09ALL	0	21WP	G16_021		Non-Converged	0	0	0.04176	9999	''P42:345:UMZB:# 2495 #: LO IN ND. STUCK BREAKER (2396)''
FDNS	08ALL	0	21L	G16_022	'TO->FROM'	'LACYGNE - WAVERLY7 345.00 345KV CKT 1'	1141	1254	0.07498	103.5676	System Intact
FDNS	08ALL	0	18SP	G16_022	'FROM->TO'	'RANCHRD7 345.00 - SOONER 345KV CKT 1'	1195	1195	1	101.0902	'G15052_T 345.00 - ROSE HILL 345KV CKT 1'
FDNS	08ALL	0	21SP	G16_022	'FROM->TO'	'RANCHRD7 345.00 - SOONER 345KV CKT 1'	1195	1195	1	102.7748	'G15052_T 345.00 - ROSE HILL 345KV CKT 1'
FDNS	08ALL	0	26SP	G16_022	'FROM->TO'	'RANCHRD7 345.00 - SOONER 345KV CKT 1'	1195	1195	1	102.8081	'G15052_T 345.00 - ROSE HILL 345KV CKT 1'
FDNS	08ALL	2	21L	G16_022	'TO->FROM'	'LACYGNE - WAVERLY7 345.00 345KV CKT 1'	1141	1254	0.07498	103.5676	System Intact
FDNS	08ALL	2	18SP	G16_022	'FROM->TO'	'RANCHRD7 345.00 - SOONER 345KV CKT 1'	1195	1195	1	101.0902	'G15052_T 345.00 - ROSE HILL 345KV CKT 1'
FDNS	08ALL	2	21SP	G16_022	'FROM->TO'	'RANCHRD7 345.00 - SOONER 345KV CKT 1'	1195	1195	1	102.7748	'G15052_T 345.00 - ROSE HILL 345KV CKT 1'
FDNS	08ALL	2	26SP	G16_022	'FROM->TO'	'RANCHRD7 345.00 - SOONER 345KV CKT 1'	1195	1195	1	102.8081	'G15052_T 345.00 - ROSE HILL 345KV CKT 1'
FDNS	09ALL	0	17WP	G16_023	'FROM->TO'	'G1623&1629-T345.00 - SIDNEY2-LNX3345.00 345KV CKT 1'	765	765	0.98783	101.2007	'LARAMIE RIVER - STEGALL 345KV CKT 1'
FDNS	09ALL	0	21WP	G16_023	'FROM->TO'	'G1623&1629-T345.00 - SIDNEY2-LNX3345.00 345KV CKT 1'	765	765	0.98819	103.0308	'LARAMIE RIVER - STEGALL 345KV CKT 1'
FDNS	09ALL	0	21WP	G16_023	'FROM->TO'	'LARAMIE RIVER - STEGALL 345KV CKT 1'	765	765	0.98819	102.3059	'G1623&1629-T345.00 - SIDNEY2-LNX3345.00 345KV CKT 1'
FDNSLock	09ALL	0	17WP	G16_023	'FROM->TO'	'LARAMIE RIVER - STEGALL 345KV CKT 1'	765	765	0.98783	104.2357	'G1623&1629-T345.00 - SIDNEY2-LNX3345.00 345KV CKT 1'
FDNSLock	09ALL	0	17WP	G16_023	'FROM->TO'	'LARAMIE RIVER - STEGALL 345KV CKT 1'	765	765	0.98783	101.012	'SIDNEY - SIDNEY2-LNX3345.00 345KV CKT Z'
FDNSLock	09ALL	0	18SP	G16_023	'FROM->TO'	'LARAMIE RIVER - STEGALL 345KV CKT 1'	765	765	0.99006	114.3262	'SIDNEY - SIDNEY2-LNX3345.00 345KV CKT Z'
FDNSLock-Blown up	09ALL	0	18SP	G16_023		Non-Converged	765	765	0.5589	50.28697	'G1623&1629-T345.00 - SIDNEY2-LNX3345.00 345KV CKT 1'
FDNSLock-Blown up	09ALL	0	21SP	G16_023		Non-Converged	765	765	0.56123	50.12238	'G1623&1629-T345.00 - SIDNEY2-LNX3345.00 345KV CKT 1'
FDNSLock-Blown up	09ALL	0	26SP	G16_023		Non-Converged	765	765	0.56152	49.95482	'G1623&1629-T345.00 - SIDNEY2-LNX3345.00 345KV CKT 1'
FDNSLock-Blown up	09ALL	0	18SP	G16_023		Non-Converged	956	956	0.56154	45.35895	'KEYSTONE - SIDNEY1-LNX3345.00 345KV CKT 1'
FDNSLock-Blown up	09ALL	0	21SP	G16_023		Non-Converged	956	956	0.56889	44.20611	'KEYSTONE - SIDNEY1-LNX3345.00 345KV CKT 1'
FDNSLock-Blown up	09ALL	0	26SP	G16_023		Non-Converged	956	956	0.56927	43.55334	'KEYSTONE - SIDNEY1-LNX3345.00 345KV CKT 1'
FDNSLock-Blown up	09ALL	0	18SP	G16_023		Non-Converged	765	765	0.43116	52.00114	'LARAMIE RIVER - STEGALL 345KV CKT 1'
FDNSLock-Blown up	09ALL	0	21SP	G16_023		Non-Converged	765	765	0.42869	53.57927	'LARAMIE RIVER - STEGALL 345KV CKT 1'
FDNSLock-Blown up	09ALL	0	26SP	G16_023		Non-Converged	765	765	0.42907	54.13216	'LARAMIE RIVER - STEGALL 345KV CKT 1'
FDNSLock-Blown up	09ALL	0	18SP	G16_023		Non-Converged	0	0	0.29976	9999	''P23:345:UMZW:# 2425 #: GI IN NE. GI 1196 BKR FAULT''
FDNSLock-Blown up	09ALL	0	18SP	G16_023		Non-Converged	0	0	0.29976	9999	''P23:345:UMZW:# 2428 #: GI IN NE. GI 1192 BKR FAULT''
FDNSLock-Blown up	09ALL	0	18SP	G16_023		Non-Converged	0	0	0.29976	9999	''P23:345:UMZW:# 2438 #: GI IN NE. GI-SWEET LINE FAULT & GI 1492 STUCK BKR''
FDNSLock-Blown up	09ALL	0	18SP	G16_023		Non-Converged	0	0	0.29976	9999	''P23:345:UMZW:# 2445 #: GI IN NE. GI KU1A TRANSFORMER FAULT & GI 1396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	18SP	G16_023		Non-Converged	0	0	0.29976	9999	''P23:345:UMZW:# 2446 #: GI IN NE. GI-FT2 LINE FAULT & GI 1196 STUCK BKR''
FDNSLock-Blown up	09ALL	0	17WP	G16_023		Non-Converged	0	0	0.36949	9999	''P23:345:UMZW:# 821 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	18G	G16_023		Non-Converged	0	0	0.37437	9999	''P23:345:UMZW:# 821 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	18SP	G16_023		Non-Converged	0	0	0.35806	9999	''P23:345:UMZW:# 821 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	21L	G16_023		Non-Converged	0	0	0.51212	9999	''P23:345:UMZW:# 821 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	21SP	G16_023		Non-Converged	0	0	0.47481	9999	''P23:345:UMZW:# 821 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	21WP	G16_023		Non-Converged	0	0	0.48297	9999	''P23:345:UMZW:# 821 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	26SP	G16_023		Non-Converged	0	0	0.47608	9999	''P23:345:UMZW:# 821 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	17WP	G16_023		Non-Converged	0	0	0.36949	9999	''P23:345:UMZW:# 822 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	18G	G16_023		Non-Converged	0	0	0.37437	9999	''P23:345:UMZW:# 822 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	18SP	G16_023		Non-Converged	0	0	0.35806	9999	''P23:345:UMZW:# 822 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	21L	G16_023		Non-Converged	0	0	0.51212	9999	''P23:345:UMZW:# 822 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	21SP	G16_023		Non-Converged	0	0	0.47481	9999	''P23:345:UMZW:# 822 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	21WP	G16_023		Non-Converged	0	0	0.48297	9999	''P23:345:UMZW:# 822 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	26SP	G16_023		Non-Converged	0	0	0.47608	9999	''P23:345:UMZW:# 822 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	17WP	G16_023		Non-Converged	0	0	0.09144	9999	''P42:345:NPPD:BKR-CPR-3310''
FDNSLock-Blown up	09ALL	0	18G	G16_023		Non-Converged	0	0	0.08622	9999	''P42:345:NPPD:BKR-CPR-3310''
FDNSLock-Blown up	09ALL	0	18SP	G16_023		Non-Converged	0	0	0.09067	9999	''P42:345:NPPD:BKR-CPR-3310''
FDNSLock-Blown up	09ALL	0	18SP	G16_023		Non-Converged	0	0	1.68463	9999	''P42:345:NPPD:BKR-KEY-3310''
FDNSLock-Blown up	09ALL	0	21SP	G16_023		Non-Converged	0	0	1.70668	9999	''P42:345:NPPD:BKR-KEY-3310''
FDNSLock-Blown up	09ALL	0	26SP	G16_023		Non-Converged	0	0	1.70781	9999	''P42:345:NPPD:BKR-KEY-3310''
FDNSLock-Blown up	09ALL	0	17WP	G16_023		Non-Converged	0	0	0.06802	9999	''P42:345:UMZB:# 2494 #: LO IN ND. STUCK BREAKER (2196)''
FDNSLock-Blown up	09ALL	0	21WP	G16_023		Non-Converged	0	0	0.08607	9999	''P42:345:UMZB:# 2494 #: LO IN ND. STUCK BREAKER (2196)''
FDNSLock-Blown up	09ALL	0	17WP	G16_023		Non-Converged	0	0	0.06802	9999	''P42:345:UMZB:# 2495 #: LO IN ND. STUCK BREAKER (2396)''
FDNSLock-Blown up	09ALL	0	21WP	G16_023		Non-Converged	0	0	0.08607	9999	''P42:345:UMZB:# 2495 #: LO IN ND. STUCK BREAKER (2396)''
FDNSLock-Blown up	09ALL	0	17WP	G16_023		Non-Converged	0	0	1.53809	9999	''P42:345:UMZB:# 2502 #: AVS IN ND. STUCK BREAKER (4796)''
FDNSLock-Blown up	09ALL	0	18SP	G16_023		Non-Converged	0	0	1.54419	9999	''P42:345:UMZB:# 2502 #: AVS IN ND. STUCK BREAKER (4796)''
FDNSLock-Blown up	09ALL	0	21SP	G16_023		Non-Converged	0	0	1.55062	9999	''P42:345:UMZB:# 2502 #: AVS IN ND. STUCK BREAKER (4796)''
FDNSLock-Blown up	09ALL	0	21WP	G16_023		Non-Converged	0	0	1.54621	9999	''P42:345:UMZB:# 2502 #: AVS IN ND. STUCK BREAKER (4796)''
FDNSLock-Blown up	09ALL	0	26SP	G16_023		Non-Converged	0	0	1.55144	9999	''P42:345:UMZB:# 2502 #: AVS IN ND. STUCK BREAKER (4796)''
FDNSLock-Blown up	09ALL	0	17WP	G16_023		Non-Converged	0	0	1.3301	9999	''P42:345:UMZB:# 2503 #: AVS IN ND. STUCK BREAKER (4596)''
FDNSLock-Blown up	09ALL	0	18SP	G16_023		Non-Converged	0	0	1.33893	9999	''P42:345:UMZB:# 2503 #: AVS IN ND. STUCK BREAKER (4596)''
FDNSLock-Blown up	09ALL	0	21SP	G16_023		Non-Converged	0	0	1.35954	9999	''P42:345:UMZB:# 2503 #: AVS IN ND. STUCK BREAKER (4596)''
FDNSLock-Blown up	09ALL	0	21WP	G16_023		Non-Converged	0	0	1.35295	9999	''P42:345:UMZB:# 2503 #: AVS IN ND. STUCK BREAKER (4596)''
FDNSLock-Blown up	09ALL	0	26SP	G16_023		Non-Converged	0	0	1.3605	9999	''P42:345:UMZB:# 2503 #: AVS IN ND. STUCK BREAKER (4596)''
FDNSLock-Blown up	09ALL	0	17WP	G16_023		Non-Converged	0	0	0.36949	9999	''P42:345:UMZW:# 2435 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1392 STUCK BKR''
FDNSLock-Blown up	09ALL	0	18G	G16_023		Non-Converged	0	0	0.37437	9999	''P42:345:UMZW:# 2435 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1392 STUCK BKR''
FDNSLock-Blown up	09ALL	0	18SP	G16_023		Non-Converged	0	0	0.35806	9999	''P42:345:UMZW:# 2435 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1392 STUCK BKR''
FDNSLock-Blown up	09ALL	0	21L	G16_023		Non-Converged	0	0	0.51212	9999	''P42:345:UMZW:# 2435 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1392 STUCK BKR''
FDNSLock-Blown up	09ALL	0	21SP	G16_023		Non-Converged	0	0	0.47481	9999	''P42:345:UMZW:# 2435 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1392 STUCK BKR''

SOLUTION	GROUP	SCENARIO	SEASON	SOURCE	DIRECTION	MONITORED ELEMENT	RATEA (MVA)	RATEB(MVA)	TDF	TC%LOADING (% MVA)	CONTINGENCY
FDNSLock-Blown up	09ALL	0	21WP	G16_023		Non-Converged	0	0	0.48297	9999	''P42:345:UMZW:# 2435 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1392 STUCK BKR''
FDNSLock-Blown up	09ALL	0	26SP	G16_023		Non-Converged	0	0	0.47608	9999	''P42:345:UMZW:# 2435 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1392 STUCK BKR''
FDNSLock-Blown up	09ALL	0	17WP	G16_023		Non-Converged	0	0	0.36949	9999	''P42:345:UMZW:# 2442 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	18G	G16_023		Non-Converged	0	0	0.37437	9999	''P42:345:UMZW:# 2442 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	18SP	G16_023		Non-Converged	0	0	0.35806	9999	''P42:345:UMZW:# 2442 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	21L	G16_023		Non-Converged	0	0	0.51212	9999	''P42:345:UMZW:# 2442 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	21SP	G16_023		Non-Converged	0	0	0.47481	9999	''P42:345:UMZW:# 2442 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	21WP	G16_023		Non-Converged	0	0	0.48297	9999	''P42:345:UMZW:# 2442 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	26SP	G16_023		Non-Converged	0	0	0.47608	9999	''P42:345:UMZW:# 2442 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	17WP	G16_023		Non-Converged	0	0	0.36949	9999	''P43:345:UMZW:# 2420 #: FT2 IN SD. FT2 KU1B TRANSFORMER FAULT & FT2 3396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	18G	G16_023		Non-Converged	0	0	0.37437	9999	''P43:345:UMZW:# 2420 #: FT2 IN SD. FT2 KU1B TRANSFORMER FAULT & FT2 3396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	18SP	G16_023		Non-Converged	0	0	0.35806	9999	''P43:345:UMZW:# 2420 #: FT2 IN SD. FT2 KU1B TRANSFORMER FAULT & FT2 3396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	21L	G16_023		Non-Converged	0	0	0.51212	9999	''P43:345:UMZW:# 2420 #: FT2 IN SD. FT2 KU1B TRANSFORMER FAULT & FT2 3396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	21SP	G16_023		Non-Converged	0	0	0.47481	9999	''P43:345:UMZW:# 2420 #: FT2 IN SD. FT2 KU1B TRANSFORMER FAULT & FT2 3396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	21WP	G16_023		Non-Converged	0	0	0.48297	9999	''P43:345:UMZW:# 2420 #: FT2 IN SD. FT2 KU1B TRANSFORMER FAULT & FT2 3396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	26SP	G16_023		Non-Converged	0	0	0.47608	9999	''P43:345:UMZW:# 2420 #: FT2 IN SD. FT2 KU1B TRANSFORMER FAULT & FT2 3396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	17WP	G16_023		Non-Converged	0	0	0.36949	9999	''P43:345:UMZW:# 2434 #: GI IN NE. GI KU1B TRANSFORMER FAULT & GI 1592 STUCK BKR''
FDNSLock-Blown up	09ALL	0	18G	G16_023		Non-Converged	0	0	0.37437	9999	''P43:345:UMZW:# 2434 #: GI IN NE. GI KU1B TRANSFORMER FAULT & GI 1592 STUCK BKR''
FDNSLock-Blown up	09ALL	0	18SP	G16_023		Non-Converged	0	0	0.35806	9999	''P43:345:UMZW:# 2434 #: GI IN NE. GI KU1B TRANSFORMER FAULT & GI 1592 STUCK BKR''
FDNSLock-Blown up	09ALL	0	21L	G16_023		Non-Converged	0	0	0.51212	9999	''P43:345:UMZW:# 2434 #: GI IN NE. GI KU1B TRANSFORMER FAULT & GI 1592 STUCK BKR''
FDNSLock-Blown up	09ALL	0	21SP	G16_023		Non-Converged	0	0	0.47481	9999	''P43:345:UMZW:# 2434 #: GI IN NE. GI KU1B TRANSFORMER FAULT & GI 1592 STUCK BKR''
FDNSLock-Blown up	09ALL	0	21WP	G16_023		Non-Converged	0	0	0.48297	9999	''P43:345:UMZW:# 2434 #: GI IN NE. GI KU1B TRANSFORMER FAULT & GI 1592 STUCK BKR''
FDNSLock-Blown up	09ALL	0	26SP	G16_023		Non-Converged	0	0	0.47608	9999	''P43:345:UMZW:# 2434 #: GI IN NE. GI KU1B TRANSFORMER FAULT & GI 1592 STUCK BKR''
FDNSLock-Blown up	09ALL	0	18SP	G16_023		Non-Converged	0	0	0.29976	9999	''P44:345:UMZW:# 2436 #: GF IN NE. GI KU4B SW SHUNT FAULT & GI 1192 STUCK BKR''
FDNSLock-Blown up	09ALL	0	18SP	G16_023		Non-Converged	0	0	0.29976	9999	''P44:345:UMZW:# 2443 #: GF IN NE. GI KU4B SW SHUNT FAULT & GI 1196 STUCK BKR''
FDNSLock-Blown up	09ALL	0	21WP	G16_023		Non-Converged	0	0	0.03041	9999	''P45:345:UMZB:# 2515 #: SGQ IN NB. BREAKER FAULT (7196;7092;7292)''
FDNSLock-Blown up	09ALL	0	18SP	G16_023		Non-Converged	0	0	0.86233	9999	''P45:345:UMZW:# 1328 #: GI IN NE.''
FDNSLock-Blown up	09ALL	0	21SP	G16_023		Non-Converged	0	0	0.85738	9999	''P45:345:UMZW:# 1328 #: GI IN NE.''
FDNSLock-Blown up	09ALL	0	21WP	G16_023		Non-Converged	0	0	0.85654	9999	''P45:345:UMZW:# 1328 #: GI IN NE.''
FDNSLock-Blown up	09ALL	0	26SP	G16_023		Non-Converged	0	0	0.85815	9999	''P45:345:UMZW:# 1328 #: GI IN NE.''
FDNSLock-Blown up	09ALL	0	18SP	G16_023		Non-Converged	0	0	0.29976	9999	''P45:345:UMZW:# 1999 #: WHT IN SD. WHT 345 KV S BUS FAULT''
FDNSLock-Blown up	09ALL	0	18SP	G16_023		Non-Converged	956	956	0.56154	45.12143	'SIDNEY - SIDNEY1-LNX3345.00 345KV CKT Z'
FDNSLock-Blown up	09ALL	0	21SP	G16_023		Non-Converged	956	956	0.56889	44.02795	'SIDNEY - SIDNEY1-LNX3345.00 345KV CKT Z'
FDNSLock-Blown up	09ALL	0	26SP	G16_023		Non-Converged	956	956	0.56927	43.38371	'SIDNEY - SIDNEY1-LNX3345.00 345KV CKT Z'
FDNSLock-Blown up	09ALL	0	21SP	G16_023		Non-Converged	765	765	0.56123	50.35241	'SIDNEY - SIDNEY2-LNX3345.00 345KV CKT Z'
FDNSLock-Blown up	09ALL	0	26SP	G16_023		Non-Converged	765	765	0.56152	50.16854	'SIDNEY - SIDNEY2-LNX3345.00 345KV CKT Z'
FDNSLock-Blown up	09ALL	0	18SP	G16_023		Non-Converged	0	0	1.12309	9999	'SIDNEY-KEYSTONE-TLINE-REACTORS-CKT1'
FDNSLock-Blown up	09ALL	0	21SP	G16_023		Non-Converged	0	0	1.13779	9999	'SIDNEY-KEYSTONE-TLINE-REACTORS-CKT1'
FDNSLock-Blown up	09ALL	0	26SP	G16_023		Non-Converged	0	0	1.13854	9999	'SIDNEY-KEYSTONE-TLINE-REACTORS-CKT1'
FDNS	09ALL	0	17WP	G16_023	'TO->FROM'	'OGALLALA - SIDNEY 230KV CKT 1'	320	320	0.51618	117.425	'KEYSTONE - SIDNEY1-LNX3345.00 345KV CKT 1'
FDNSLock	09ALL	0	18G	G16_023	'TO->FROM'	'OGALLALA - SIDNEY 230KV CKT 1'	320	320	0.51606	107.3428	'KEYSTONE - SIDNEY1-LNX3345.00 345KV CKT 1'
FDNSLock	09ALL	0	21WP	G16_023	'TO->FROM'	'OGALLALA - SIDNEY 230KV CKT 1'	320	320	0.5203	126.6031	'KEYSTONE - SIDNEY1-LNX3345.00 345KV CKT 1'
FDNS	09ALL	0	17WP	G16_023	'TO->FROM'	'OGALLALA - SIDNEY 230KV CKT 1'	320	320	0.51618	117.3034	'SIDNEY - SIDNEY1-LNX3345.00 345KV CKT Z'
FDNS	09ALL	0	18G	G16_023	'TO->FROM'	'OGALLALA - SIDNEY 230KV CKT 1'	320	320	0.51606	103.0883	'SIDNEY - SIDNEY1-LNX3345.00 345KV CKT Z'
FDNS	09ALL	0	21WP	G16_023	'TO->FROM'	'OGALLALA - SIDNEY 230KV CKT 1'	320	320	0.5203	116.8389	'SIDNEY - SIDNEY1-LNX3345.00 345KV CKT Z'
FDNS	09ALL	0	17WP	G16_023	'TO->FROM'	'OGALLALA - SIDNEY 230KV CKT 1'	320	320	0.51618	117.2832	'SIDNEY-KEYSTONE-TLINE-REACTORS-CKT1'
FDNS	09ALL	0	21WP	G16_023	'TO->FROM'	'OGALLALA - SIDNEY 230KV CKT 1'	320	320	0.5203	116.4543	'SIDNEY-KEYSTONE-TLINE-REACTORS-CKT1'
FDNSLock	09ALL	0	18G	G16_023	'TO->FROM'	'OGALLALA - SIDNEY 230KV CKT 1'	320	320	0.51606	106.4039	'SIDNEY-KEYSTONE-TLINE-REACTORS-CKT1'
FDNS	09ALL	0	17WP	G16_023	'TO->FROM'	'SIDNEY - SIDNEY TRANSFORMER 230KV CKT 1'	400	400	0.61316	111.3688	'KEYSTONE - SIDNEY1-LNX3345.00 345KV CKT 1'
FDNSLock	09ALL	0	18G	G16_023	'TO->FROM'	'SIDNEY - SIDNEY TRANSFORMER 230KV CKT 1'	400	400	0.61304	100.5973	'KEYSTONE - SIDNEY1-LNX3345.00 345KV CKT 1'
FDNSLock	09ALL	0	21WP	G16_023	'TO->FROM'	'SIDNEY - SIDNEY TRANSFORMER 230KV CKT 1'	400	400	0.61792	119.5809	'KEYSTONE - SIDNEY1-LNX3345.00 345KV CKT 1'
FDNS	09ALL	0	17WP	G16_023	'TO->FROM'	'SIDNEY - SIDNEY TRANSFORMER 230KV CKT 1'	400	400	0.61316	111.1756	'SIDNEY - SIDNEY1-LNX3345.00 345KV CKT Z'
FDNS	09ALL	0	21WP	G16_023	'TO->FROM'	'SIDNEY - SIDNEY TRANSFORMER 230KV CKT 1'	400	400	0.61792	110.6622	'SIDNEY - SIDNEY1-LNX3345.00 345KV CKT Z'
FDNS	09ALL	0	17WP	G16_023	'TO->FROM'	'SIDNEY - SIDNEY TRANSFORMER 230KV CKT 1'	400	400	0.61316	111.1757	'SIDNEY-KEYSTONE-TLINE-REACTORS-CKT1'
FDNS	09ALL	0	21WP	G16_023	'TO->FROM'	'SIDNEY - SIDNEY TRANSFORMER 230KV CKT 1'	400	400	0.61792	110.3694	'SIDNEY-KEYSTONE-TLINE-REACTORS-CKT1'
FDNS	09ALL	0	17WP	G16_023	'TO->FROM'	'SIDNEY - SIDNEY2-LNX3345.00 345KV CKT Z'	765	765	0.98783	102.0572	'LARAMIE RIVER - STEGALL 345KV CKT 1'
FDNS	09ALL	0	21WP	G16_023	'TO->FROM'	'SIDNEY - SIDNEY2-LNX3345.00 345KV CKT Z'	765	765	0.98819	103.8772	'LARAMIE RIVER - STEGALL 345KV CKT 1'
FDNS	09ALL	0	17WP	G16_029	'FROM->TO'	'G1623&1629-T345.00 - SIDNEY2-LNX3345.00 345KV CKT 1'	765	765	0.98783	101.2007	'LARAMIE RIVER - STEGALL 345KV CKT 1'
FDNS	09ALL	0	21WP	G16_029	'FROM->TO'	'G1623&1629-T345.00 - SIDNEY2-LNX3345.00 345KV CKT 1'	765	765	0.98819	103.0308	'LARAMIE RIVER - STEGALL 345KV CKT 1'
FDNS	09ALL	0	21WP	G16_029	'FROM->TO'	'LARAMIE RIVER - STEGALL 345KV CKT 1'	765	765	0.98819	102.3059	'G1623&1629-T345.00 - SIDNEY2-LNX3345.00 345KV CKT 1'
FDNSLock	09ALL	0	17WP	G16_029	'FROM->TO'	'LARAMIE RIVER - STEGALL 345KV CKT 1'	765	765	0.98783	104.2357	'G1623&1629-T345.00 - SIDNEY2-LNX3345.00 345KV CKT 1'
FDNSLock	09ALL	0	17WP	G16_029	'FROM->TO'	'LARAMIE RIVER - STEGALL 345KV CKT 1'	765	765	0.98783	101.012	'SIDNEY - SIDNEY2-LNX3345.00 345KV CKT Z'
FDNSLock	09ALL	0	18SP	G16_029	'FROM->TO'	'LARAMIE RIVER - STEGALL 345KV CKT 1'	765	765	0.99006	114.3262	'SIDNEY - SIDNEY2-LNX3345.00 345KV CKT Z'
FDNSLock-Blown up	09ALL	0	18SP	G16_029		Non-Converged	765	765	0.5589	50.28697	'G1623&1629-T345.00 - SIDNEY2-LNX3345.00 345KV CKT 1'
FDNSLock-Blown up	09ALL	0	21SP	G16_029		Non-Converged	765	765	0.56123	50.12238	'G1623&1629-T345.00 - SIDNEY2-LNX3345.00 345KV CKT 1'
FDNSLock-Blown up	09ALL	0	26SP	G16_029		Non-Converged	765	765	0.56152	49.95482	'G1623&1629-T345.00 - SIDNEY2-LNX3345.00 345KV CKT 1'
FDNSLock-Blown up	09ALL	0	18SP	G16_029		Non-Converged	956	956	0.56154	45.35895	'KEYSTONE - SIDNEY1-LNX3345.00 345KV CKT 1'
FDNSLock-Blown up	09ALL	0	21SP	G16_029		Non-Converged	956	956	0.56889	44.20611	'KEYSTONE - SIDNEY1-LNX3345.00 345KV CKT 1'
FDNSLock-Blown up	09ALL	0	26SP	G16_029		Non-Converged	956	956	0.56927	43.55334	'KEYSTONE - SIDNEY1-LNX3345.00 345KV CKT 1'
FDNSLock-Blown up	09ALL	0	18SP	G16_029		Non-Converged	765	765	0.43116	52.00114	'LARAMIE RIVER - STEGALL 345KV CKT 1'
FDNSLock-Blown up	09ALL	0	21SP	G16_029		Non-Converged	765	765	0.42869	53.57927	'LARAMIE RIVER - STEGALL 345KV CKT 1'
FDNSLock-Blown up	09ALL	0	26SP	G16_029		Non-Converged	765	765	0.42907	54.13216	'LARAMIE RIVER - STEGALL 345KV CKT 1'
FDNSLock-Blown up	09ALL	0	18SP	G16_029		Non-Converged	0	0	0.29976	9999	''P23:345:UMZW:# 2425 #: GI IN NE. GI 1196 BKR FAULT''
FDNSLock-Blown up	09ALL	0	18SP	G16_029		Non-Converged	0	0	0.29976	9999	''P23:345:UMZW:# 2428 #: GI IN NE. GI 1192 BKR FAULT''
FDNSLock-Blown up	09ALL	0	18SP	G16_029		Non-Converged	0	0	0.29976	9999	''P23:345:UMZW:# 2438 #: GI IN NE. GI-SWEET LINE FAULT & GI 1492 STUCK BKR''
FDNSLock-Blown up	09ALL	0	18SP	G16_029		Non-Converged	0	0	0.29976	9999	''P23:345:UMZW:# 2445 #: GI IN NE. GI KU1A TRANSFORMER FAULT & GI 1396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	18SP	G16_029		Non-Converged	0	0	0.29976	9999	''P23:345:UMZW:# 2446 #: GI IN NE. GI-FT2 LINE FAULT & GI 1196 STUCK BKR''
FDNSLock-Blown up	09ALL	0	17WP	G16_029		Non-Converged	0	0	0.36949	9999	''P23:345:UMZW:# 821 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	18G	G16_029		Non-Converged	0	0	0.37437	9999	''P23:345:UMZW:# 821 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	18SP	G16_029		Non-Converged	0	0	0.35806	9999	''P23:345:UMZW:# 821 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	21L	G16_029		Non-Converged	0	0	0.51212	9999	''P23:345:UMZW:# 821 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	21SP	G16_029		Non-Converged	0	0	0.47481	9999	''P23:345:UMZW:# 821 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	21WP	G16_029		Non-Converged	0	0	0.48297	9999	''P23:345:UMZW:# 821 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	26SP	G16_029		Non-Converged	0	0	0.47608	9999	''P23:345:UMZW:# 821 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	17WP	G16_029		Non-Converged	0	0	0.36949	9999	''P23:345:UMZW:# 822 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	18G	G16_029		Non-Converged	0	0	0.37437	9999	''P23:345:UMZW:# 822 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	18SP	G16_029		Non-Converged	0	0	0.35806	9999	''P23:345:UMZW:# 822 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	21L	G16_029		Non-Converged	0	0	0.51212	9999	''P23:345:UMZW:# 822 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	21SP	G16_029		Non-Converged	0	0	0.47481	9999	''P23:345:UMZW:# 822 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	21WP	G16_029		Non-Converged	0	0	0.48297	9999	''P23:345:UMZW:# 822 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	26SP	G16_029		Non-Converged	0	0	0.47608	9999	''P23:345:UMZW:# 822 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	17WP	G16_029		Non-Converged	0	0	0.09144	9999	''P42:345:NPPD:BKR-CPR-3310''
FDNSLock-Blown up	09ALL	0	18G	G16_029		Non-Converged	0	0	0.08622	9999	''P42:345:NPPD:BKR-CPR-3310''
FDNSLock-Blown up	09ALL	0	18SP	G16_029		Non-Converged	0	0	0.09067	9999	''P42:345:NPPD:BKR-CPR-3310''
FDNSLock-Blown up	09ALL	0	18SP	G16_029		Non-Converged	0	0	1.68463	9999	''P42:345:NPPD:BKR-KEY-3310''

SOLUTION	GROUP	SCENARIO	SEASON	SOURCE	DIRECTION	MONITORED ELEMENT	RATEA (MVA)	RATEB(MVA)	TDF	TC%LOADING (% MVA)	CONTINGENCY
FDNSLock-Blown up	09ALL	0	21SP	G16_029		Non-Converged	0	0	1.70668	9999	''P42:345:NPPD:BKR-KEY-3310''
FDNSLock-Blown up	09ALL	0	26SP	G16_029		Non-Converged	0	0	1.70781	9999	''P42:345:NPPD:BKR-KEY-3310''
FDNSLock-Blown up	09ALL	0	17WP	G16_029		Non-Converged	0	0	0.06802	9999	''P42:345:UMZB:# 2494 #: LO IN ND. STUCK BREAKER (2196)''
FDNSLock-Blown up	09ALL	0	21WP	G16_029		Non-Converged	0	0	0.08607	9999	''P42:345:UMZB:# 2494 #: LO IN ND. STUCK BREAKER (2196)''
FDNSLock-Blown up	09ALL	0	17WP	G16_029		Non-Converged	0	0	0.06802	9999	''P42:345:UMZB:# 2495 #: LO IN ND. STUCK BREAKER (2396)''
FDNSLock-Blown up	09ALL	0	21WP	G16_029		Non-Converged	0	0	0.08607	9999	''P42:345:UMZB:# 2495 #: LO IN ND. STUCK BREAKER (2396)''
FDNSLock-Blown up	09ALL	0	17WP	G16_029		Non-Converged	0	0	1.53809	9999	''P42:345:UMZB:# 2502 #: AVS IN ND. STUCK BREAKER (4796)''
FDNSLock-Blown up	09ALL	0	18SP	G16_029		Non-Converged	0	0	1.54419	9999	''P42:345:UMZB:# 2502 #: AVS IN ND. STUCK BREAKER (4796)''
FDNSLock-Blown up	09ALL	0	21SP	G16_029		Non-Converged	0	0	1.55062	9999	''P42:345:UMZB:# 2502 #: AVS IN ND. STUCK BREAKER (4796)''
FDNSLock-Blown up	09ALL	0	21WP	G16_029		Non-Converged	0	0	1.54621	9999	''P42:345:UMZB:# 2502 #: AVS IN ND. STUCK BREAKER (4796)''
FDNSLock-Blown up	09ALL	0	26SP	G16_029		Non-Converged	0	0	1.55144	9999	''P42:345:UMZB:# 2502 #: AVS IN ND. STUCK BREAKER (4796)''
FDNSLock-Blown up	09ALL	0	17WP	G16_029		Non-Converged	0	0	1.3301	9999	''P42:345:UMZB:# 2503 #: AVS IN ND. STUCK BREAKER (4596)''
FDNSLock-Blown up	09ALL	0	18SP	G16_029		Non-Converged	0	0	1.33893	9999	''P42:345:UMZB:# 2503 #: AVS IN ND. STUCK BREAKER (4596)''
FDNSLock-Blown up	09ALL	0	21SP	G16_029		Non-Converged	0	0	1.35954	9999	''P42:345:UMZB:# 2503 #: AVS IN ND. STUCK BREAKER (4596)''
FDNSLock-Blown up	09ALL	0	21WP	G16_029		Non-Converged	0	0	1.35295	9999	''P42:345:UMZB:# 2503 #: AVS IN ND. STUCK BREAKER (4596)''
FDNSLock-Blown up	09ALL	0	26SP	G16_029		Non-Converged	0	0	1.3605	9999	''P42:345:UMZB:# 2503 #: AVS IN ND. STUCK BREAKER (4596)''
FDNSLock-Blown up	09ALL	0	17WP	G16_029		Non-Converged	0	0	0.36949	9999	''P42:345:UMZW:# 2435 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1392 STUCK BKR''
FDNSLock-Blown up	09ALL	0	18G	G16_029		Non-Converged	0	0	0.37437	9999	''P42:345:UMZW:# 2435 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1392 STUCK BKR''
FDNSLock-Blown up	09ALL	0	18SP	G16_029		Non-Converged	0	0	0.35806	9999	''P42:345:UMZW:# 2435 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1392 STUCK BKR''
FDNSLock-Blown up	09ALL	0	21L	G16_029		Non-Converged	0	0	0.51212	9999	''P42:345:UMZW:# 2435 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1392 STUCK BKR''
FDNSLock-Blown up	09ALL	0	21SP	G16_029		Non-Converged	0	0	0.47481	9999	''P42:345:UMZW:# 2435 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1392 STUCK BKR''
FDNSLock-Blown up	09ALL	0	21WP	G16_029		Non-Converged	0	0	0.48297	9999	''P42:345:UMZW:# 2435 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1392 STUCK BKR''
FDNSLock-Blown up	09ALL	0	26SP	G16_029		Non-Converged	0	0	0.47608	9999	''P42:345:UMZW:# 2435 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1392 STUCK BKR''
FDNSLock-Blown up	09ALL	0	17WP	G16_029		Non-Converged	0	0	0.36949	9999	''P42:345:UMZW:# 2442 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	18G	G16_029		Non-Converged	0	0	0.37437	9999	''P42:345:UMZW:# 2442 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	18SP	G16_029		Non-Converged	0	0	0.35806	9999	''P42:345:UMZW:# 2442 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	21L	G16_029		Non-Converged	0	0	0.51212	9999	''P42:345:UMZW:# 2442 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	21SP	G16_029		Non-Converged	0	0	0.47481	9999	''P42:345:UMZW:# 2442 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	21WP	G16_029		Non-Converged	0	0	0.48297	9999	''P42:345:UMZW:# 2442 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	26SP	G16_029		Non-Converged	0	0	0.47608	9999	''P42:345:UMZW:# 2442 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	17WP	G16_029		Non-Converged	0	0	0.36949	9999	''P43:345:UMZW:# 2420 #: FT2 IN SD. FT2 KU1B TRANSFORMER FAULT & FT2 3396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	18G	G16_029		Non-Converged	0	0	0.37437	9999	''P43:345:UMZW:# 2420 #: FT2 IN SD. FT2 KU1B TRANSFORMER FAULT & FT2 3396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	18SP	G16_029		Non-Converged	0	0	0.35806	9999	''P43:345:UMZW:# 2420 #: FT2 IN SD. FT2 KU1B TRANSFORMER FAULT & FT2 3396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	21L	G16_029		Non-Converged	0	0	0.51212	9999	''P43:345:UMZW:# 2420 #: FT2 IN SD. FT2 KU1B TRANSFORMER FAULT & FT2 3396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	21SP	G16_029		Non-Converged	0	0	0.47481	9999	''P43:345:UMZW:# 2420 #: FT2 IN SD. FT2 KU1B TRANSFORMER FAULT & FT2 3396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	21WP	G16_029		Non-Converged	0	0	0.48297	9999	''P43:345:UMZW:# 2420 #: FT2 IN SD. FT2 KU1B TRANSFORMER FAULT & FT2 3396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	26SP	G16_029		Non-Converged	0	0	0.47608	9999	''P43:345:UMZW:# 2420 #: FT2 IN SD. FT2 KU1B TRANSFORMER FAULT & FT2 3396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	17WP	G16_029		Non-Converged	0	0	0.36949	9999	''P43:345:UMZW:# 2434 #: GI IN NE. GI KU1B TRANSFORMER FAULT & GI 1592 STUCK BKR''
FDNSLock-Blown up	09ALL	0	18G	G16_029		Non-Converged	0	0	0.37437	9999	''P43:345:UMZW:# 2434 #: GI IN NE. GI KU1B TRANSFORMER FAULT & GI 1592 STUCK BKR''
FDNSLock-Blown up	09ALL	0	18SP	G16_029		Non-Converged	0	0	0.35806	9999	''P43:345:UMZW:# 2434 #: GI IN NE. GI KU1B TRANSFORMER FAULT & GI 1592 STUCK BKR''
FDNSLock-Blown up	09ALL	0	21L	G16_029		Non-Converged	0	0	0.51212	9999	''P43:345:UMZW:# 2434 #: GI IN NE. GI KU1B TRANSFORMER FAULT & GI 1592 STUCK BKR''
FDNSLock-Blown up	09ALL	0	21SP	G16_029		Non-Converged	0	0	0.47481	9999	''P43:345:UMZW:# 2434 #: GI IN NE. GI KU1B TRANSFORMER FAULT & GI 1592 STUCK BKR''
FDNSLock-Blown up	09ALL	0	21WP	G16_029		Non-Converged	0	0	0.48297	9999	''P43:345:UMZW:# 2434 #: GI IN NE. GI KU1B TRANSFORMER FAULT & GI 1592 STUCK BKR''
FDNSLock-Blown up	09ALL	0	26SP	G16_029		Non-Converged	0	0	0.47608	9999	''P43:345:UMZW:# 2434 #: GI IN NE. GI KU1B TRANSFORMER FAULT & GI 1592 STUCK BKR''
FDNSLock-Blown up	09ALL	0	18SP	G16_029		Non-Converged	0	0	0.29976	9999	''P44:345:UMZW:# 2436 #: GF IN NE. GI KU4B SW SHUNT FAULT & GI 1192 STUCK BKR''
FDNSLock-Blown up	09ALL	0	18SP	G16_029		Non-Converged	0	0	0.29976	9999	''P44:345:UMZW:# 2443 #: GF IN NE. GI KU4B SW SHUNT FAULT & GI 1196 STUCK BKR''
FDNSLock-Blown up	09ALL	0	21WP	G16_029		Non-Converged	0	0	0.03041	9999	''P45:345:UMZB:# 2515 #: SGQ IN NB. BREAKER FAULT (7196;7092;7292)''
FDNSLock-Blown up	09ALL	0	18SP	G16_029		Non-Converged	0	0	0.86233	9999	''P45:345:UMZW:# 1328 #: GI IN NE.''
FDNSLock-Blown up	09ALL	0	21SP	G16_029		Non-Converged	0	0	0.85738	9999	''P45:345:UMZW:# 1328 #: GI IN NE.''
FDNSLock-Blown up	09ALL	0	21WP	G16_029		Non-Converged	0	0	0.85654	9999	''P45:345:UMZW:# 1328 #: GI IN NE.''
FDNSLock-Blown up	09ALL	0	26SP	G16_029		Non-Converged	0	0	0.85815	9999	''P45:345:UMZW:# 1328 #: GI IN NE.''
FDNSLock-Blown up	09ALL	0	18SP	G16_029		Non-Converged	0	0	0.29976	9999	''P45:345:UMZW:# 1999 #: WHT IN SD. WHT 345 KV S BUS FAULT''
FDNSLock-Blown up	09ALL	0	18SP	G16_029		Non-Converged	956	956	0.56154	45.12143	'SIDNEY - SIDNEY1-LNX3345.00 345KV CKT Z'
FDNSLock-Blown up	09ALL	0	21SP	G16_029		Non-Converged	956	956	0.56889	44.02795	'SIDNEY - SIDNEY1-LNX3345.00 345KV CKT Z'
FDNSLock-Blown up	09ALL	0	26SP	G16_029		Non-Converged	956	956	0.56927	43.38371	'SIDNEY - SIDNEY1-LNX3345.00 345KV CKT Z'
FDNSLock-Blown up	09ALL	0	21SP	G16_029		Non-Converged	765	765	0.56123	50.35241	'SIDNEY - SIDNEY2-LNX3345.00 345KV CKT Z'
FDNSLock-Blown up	09ALL	0	26SP	G16_029		Non-Converged	765	765	0.56152	50.16854	'SIDNEY - SIDNEY2-LNX3345.00 345KV CKT Z'
FDNSLock-Blown up	09ALL	0	18SP	G16_029		Non-Converged	0	0	1.12309	9999	'SIDNEY-KEYSTONE-TLINE-REACTORS-CKT1'
FDNSLock-Blown up	09ALL	0	21SP	G16_029		Non-Converged	0	0	1.13779	9999	'SIDNEY-KEYSTONE-TLINE-REACTORS-CKT1'
FDNSLock-Blown up	09ALL	0	26SP	G16_029		Non-Converged	0	0	1.13854	9999	'SIDNEY-KEYSTONE-TLINE-REACTORS-CKT1'
FDNS	09ALL	0	17WP	G16_029	'TO->FROM'	'OGALLALA - SIDNEY 230KV CKT 1'	320	320	0.51618	117.425	'KEYSTONE - SIDNEY1-LNX3345.00 345KV CKT 1'
FDNSLock	09ALL	0	18G	G16_029	'TO->FROM'	'OGALLALA - SIDNEY 230KV CKT 1'	320	320	0.51606	107.3428	'KEYSTONE - SIDNEY1-LNX3345.00 345KV CKT 1'
FDNSLock	09ALL	0	21WP	G16_029	'TO->FROM'	'OGALLALA - SIDNEY 230KV CKT 1'	320	320	0.5203	126.6031	'KEYSTONE - SIDNEY1-LNX3345.00 345KV CKT 1'
FDNS	09ALL	0	17WP	G16_029	'TO->FROM'	'OGALLALA - SIDNEY 230KV CKT 1'	320	320	0.51618	117.3034	'SIDNEY - SIDNEY1-LNX3345.00 345KV CKT Z'
FDNS	09ALL	0	18G	G16_029	'TO->FROM'	'OGALLALA - SIDNEY 230KV CKT 1'	320	320	0.51606	103.0883	'SIDNEY - SIDNEY1-LNX3345.00 345KV CKT Z'
FDNS	09ALL	0	21WP	G16_029	'TO->FROM'	'OGALLALA - SIDNEY 230KV CKT 1'	320	320	0.5203	116.8389	'SIDNEY - SIDNEY1-LNX3345.00 345KV CKT Z'
FDNS	09ALL	0	17WP	G16_029	'TO->FROM'	'OGALLALA - SIDNEY 230KV CKT 1'	320	320	0.51618	117.2832	'SIDNEY-KEYSTONE-TLINE-REACTORS-CKT1'
FDNS	09ALL	0	21WP	G16_029	'TO->FROM'	'OGALLALA - SIDNEY 230KV CKT 1'	320	320	0.5203	116.4543	'SIDNEY-KEYSTONE-TLINE-REACTORS-CKT1'
FDNSLock	09ALL	0	18G	G16_029	'TO->FROM'	'OGALLALA - SIDNEY 230KV CKT 1'	320	320	0.51606	106.4039	'SIDNEY-KEYSTONE-TLINE-REACTORS-CKT1'
FDNS	09ALL	0	17WP	G16_029	'TO->FROM'	'SIDNEY - SIDNEY TRANSFORMER 230KV CKT 1'	400	400	0.61316	111.3688	'KEYSTONE - SIDNEY1-LNX3345.00 345KV CKT 1'
FDNSLock	09ALL	0	18G	G16_029	'TO->FROM'	'SIDNEY - SIDNEY TRANSFORMER 230KV CKT 1'	400	400	0.61304	100.5973	'KEYSTONE - SIDNEY1-LNX3345.00 345KV CKT 1'
FDNSLock	09ALL	0	21WP	G16_029	'TO->FROM'	'SIDNEY - SIDNEY TRANSFORMER 230KV CKT 1'	400	400	0.61792	119.5809	'KEYSTONE - SIDNEY1-LNX3345.00 345KV CKT 1'
FDNS	09ALL	0	17WP	G16_029	'TO->FROM'	'SIDNEY - SIDNEY TRANSFORMER 230KV CKT 1'	400	400	0.61316	111.1756	'SIDNEY - SIDNEY1-LNX3345.00 345KV CKT Z'
FDNS	09ALL	0	21WP	G16_029	'TO->FROM'	'SIDNEY - SIDNEY TRANSFORMER 230KV CKT 1'	400	400	0.61792	110.6622	'SIDNEY - SIDNEY1-LNX3345.00 345KV CKT Z'
FDNS	09ALL	0	17WP	G16_029	'TO->FROM'	'SIDNEY - SIDNEY TRANSFORMER 230KV CKT 1'	400	400	0.61316	111.1757	'SIDNEY-KEYSTONE-TLINE-REACTORS-CKT1'
FDNS	09ALL	0	21WP	G16_029	'TO->FROM'	'SIDNEY - SIDNEY TRANSFORMER 230KV CKT 1'	400	400	0.61792	110.3694	'SIDNEY-KEYSTONE-TLINE-REACTORS-CKT1'
FDNS	09ALL	0	17WP	G16_029	'TO->FROM'	'SIDNEY - SIDNEY2-LNX3345.00 345KV CKT Z'	765	765	0.98783	102.0572	'LARAMIE RIVER - STEGALL 345KV CKT 1'
FDNS	09ALL	0	21WP	G16_029	'TO->FROM'	'SIDNEY - SIDNEY2-LNX3345.00 345KV CKT Z'	765	765	0.98819	103.8772	'LARAMIE RIVER - STEGALL 345KV CKT 1'
FDNS	08ALL	0	21L	G16_031	'TO->FROM'	'LACYGNE - WAVERLY7 345.00 345KV CKT 1'	1141	1254	0.07498	103.5676	System Intact
FDNS	08ALL	0	18SP	G16_031	'FROM->TO'	'RANCHRD7 345.00 - SOONER 345KV CKT 1'	1195	1195	1	101.0902	'G15052_T 345.00 - ROSE HILL 345KV CKT 1'
FDNS	08ALL	0	21SP	G16_031	'FROM->TO'	'RANCHRD7 345.00 - SOONER 345KV CKT 1'	1195	1195	1	102.7748	'G15052_T 345.00 - ROSE HILL 345KV CKT 1'
FDNS	08ALL	0	26SP	G16_031	'FROM->TO'	'RANCHRD7 345.00 - SOONER 345KV CKT 1'	1195	1195	1	102.8081	'G15052_T 345.00 - ROSE HILL 345KV CKT 1'
FDNS	08ALL	2	21L	G16_031	'TO->FROM'	'LACYGNE - WAVERLY7 345.00 345KV CKT 1'	1141	1254	0.07498	103.5676	System Intact
FDNS	08ALL	2	18SP	G16_031	'FROM->TO'	'RANCHRD7 345.00 - SOONER 345KV CKT 1'	1195	1195	1	101.0902	'G15052_T 345.00 - ROSE HILL 345KV CKT 1'
FDNS	08ALL	2	21SP	G16_031	'FROM->TO'	'RANCHRD7 345.00 - SOONER 345KV CKT 1'	1195	1195	1	102.7748	'G15052_T 345.00 - ROSE HILL 345KV CKT 1'
FDNS	08ALL	2	26SP	G16_031	'FROM->TO'	'RANCHRD7 345.00 - SOONER 345KV CKT 1'	1195	1195	1	102.8081	'G15052_T 345.00 - ROSE HILL 345KV CKT 1'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.63684	101.1772	'ARCADIA - COTTONWOOD CREEK 138KV CKT 1'
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.63716	100.7625	'ARCADIA - COTTONWOOD CREEK 138KV CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.63518	100.4129	'ARCADIA - COTTONWOOD CREEK 138KV CKT 1'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68208	104.8616	'ARCADIA - KAMO MEMORIAL 138KV CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67893	114.3617	'ARCADIA - NORTHWEST 345KV CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67939	108.4409	'ARCADIA - SEMINOLE 345KV CKT 1'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68178	104.424	'ARCADIA - SEMINOLE 345KV CKT 1'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68124	107.6028	'ARCADIA (ARCADIA4) 345/138/13.8KV TRANSFORMER CKT 1'
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68132	103.0349	'ARCADIA (ARCADIA4) 345/138/13.8KV TRANSFORMER CKT 1'

SOLUTION	GROUP	SCENARIO	SEASON	SOURCE	DIRECTION	MONITORED ELEMENT	RATEA (MVA)	RATEB(MVA)	TDF	TC%LOADING (% MVA)	CONTINGENCY
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68082	102.6737	'ARCADIA (ARCADIA4) 345/138/13.8KV TRANSFORMER CKT 1'
FDNS	08ALL	0	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68083	101.4125	'ARCADIA (ARCADIA4) 345/138/13.8KV TRANSFORMER CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68016	125.778	System Intact
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68257	121.6071	System Intact
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68258	116.3236	System Intact
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68206	115.866	System Intact
FDNS	08ALL	0	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68207	114.2892	System Intact
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6803	111.788	'CANEYRV7 345.00 - LATHAMS7 345.00 345KV CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6803	112.6525	'CANEYRV7 345.00 - NEOSHO 345KV CKT 1'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6828	108.2597	'CANEYRV7 345.00 - NEOSHO 345KV CKT 1'
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68279	103.6723	'CANEYRV7 345.00 - NEOSHO 345KV CKT 1'
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68228	103.2394	'CANEYRV7 345.00 - NEOSHO 345KV CKT 1'
FDNS	08ALL	0	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68228	101.6296	'CANEYRV7 345.00 - NEOSHO 345KV CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68041	111.8241	'CIMARRON - DRAPER LAKE 345KV CKT 1'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68293	107.9079	'CIMARRON - DRAPER LAKE 345KV CKT 1'
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6829	102.9911	'CIMARRON - DRAPER LAKE 345KV CKT 1'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68495	108.0999	'CLEO CORNER - CLEOPLT4 138.00 138KV CKT 1'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68405	107.9645	'CLEO CORNER - GLASS MOUNTAIN 138KV CKT 1'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68495	108.1796	'CLEOPLT4 138.00 - MEN TAP 138KV CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68072	120.178	'CLEVELAND - G15066_T 345.00 345KV CKT 1'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68423	114.0652	'CLEVELAND - G15066_T 345.00 345KV CKT 1'
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68348	109.7313	'CLEVELAND - G15066_T 345.00 345KV CKT 1'
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6841	109.7104	'CLEVELAND - G15066_T 345.00 345KV CKT 1'
FDNS	08ALL	0	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68349	107.4594	'CLEVELAND - G15066_T 345.00 345KV CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68071	115.378	'CLEVELAND - TULSA NORTH 345KV CKT 1'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68376	110.0778	'CLEVELAND - TULSA NORTH 345KV CKT 1'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68376	110.0778	'CLEVELAND - TULSA NORTH 345KV CKT 1'
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68368	105.3827	'CLEVELAND - TULSA NORTH 345KV CKT 1'
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68368	105.3827	'CLEVELAND - TULSA NORTH 345KV CKT 1'
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6831	105.2833	'CLEVELAND - TULSA NORTH 345KV CKT 1'
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6831	105.2833	'CLEVELAND - TULSA NORTH 345KV CKT 1'
FDNS	08ALL	0	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6831	103.397	'CLEVELAND - TULSA NORTH 345KV CKT 1'
FDNS	08ALL	0	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6831	103.397	'CLEVELAND - TULSA NORTH 345KV CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6663	113.7206	'COTTONWOOD CREEK - CRESENT 138KV CKT 1'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.66898	107.8263	'COTTONWOOD CREEK - CRESENT 138KV CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.64928	102.9849	'COTTONWOOD CREEK - LIBERTY LAKE 138KV CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.66083	107.1117	'COTTONWOOD CREEK - PINE ST 138KV CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6806	112.7831	'COW CREEK - MORRISON 138KV CKT 1'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68312	108.6409	'COW CREEK - MORRISON 138KV CKT 1'
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68317	104.3119	'COW CREEK - MORRISON 138KV CKT 1'
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68264	104.0829	'COW CREEK - MORRISON 138KV CKT 1'
FDNS	08ALL	0	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68265	102.5008	'COW CREEK - MORRISON 138KV CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68605	115.0894	'COW CREEK - WARREN VALLEY 138KV CKT 1'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68797	109.8438	'COW CREEK - WARREN VALLEY 138KV CKT 1'
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68779	105.4346	'COW CREEK - WARREN VALLEY 138KV CKT 1'
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68715	105.3726	'COW CREEK - WARREN VALLEY 138KV CKT 1'
FDNS	08ALL	0	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68715	103.3953	'COW CREEK - WARREN VALLEY 138KV CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6663	113.878	'CRESENT - TWIN LAKES 138KV CKT 1'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.66898	108.2358	'CRESENT - TWIN LAKES 138KV CKT 1'
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.66831	102.6147	'CRESENT - TWIN LAKES 138KV CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67526	111.6304	'DOVER - DOVER SW 138KV CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67526	111.5585	'DOVER - TWIN LAKES 138KV CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6771	118.4659	'DOVER SW - HENESSEY 138KV CKT 1'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67979	115.5188	'DOVER SW - HENESSEY 138KV CKT 1'
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67987	109.8774	'DOVER SW - HENESSEY 138KV CKT 1'
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67946	108.9984	'DOVER SW - HENESSEY 138KV CKT 1'
FDNS	08ALL	0	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67948	108.2111	'DOVER SW - HENESSEY 138KV CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68034	111.4338	'FAIRFAX TAP - SHIDLER 138KV CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68034	111.4338	'FAIRFAX TAP - WEBB CITY TAP 138KV CKT 1'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6843	107.6178	'FAIRMONT TAP - WOODRING 138KV CKT 1'
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6843	103.5201	'FAIRMONT TAP - WOODRING 138KV CKT 1'
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6839	103.0903	'FAIRMONT TAP - WOODRING 138KV CKT 1'
FDNS	08ALL	0	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68391	101.8514	'FAIRMONT TAP - WOODRING 138KV CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.66083	107.3894	'FITZGERALD CREEK - KINZE 138KV CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.66083	107.2887	'FITZGERALD CREEK - PINE ST 138KV CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68204	137.6935	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68494	136.7475	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68527	126.3887	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'
FDNS	08ALL	0	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68478	124.2454	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68475	123.6251	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'
FDNS	08ALL	0	17WP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	249	270	0.6843	113.8112	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'
FDNS	08ALL	0	21WP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	249	270	0.68406	110.817	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68204	129.5306	'G15063_T 345.00 - WOODRING 345KV CKT 1'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68494	127.9835	'G15063_T 345.00 - WOODRING 345KV CKT 1'
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68527	118.1437	'G15063_T 345.00 - WOODRING 345KV CKT 1'
FDNS	08ALL	0	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68478	116.0533	'G15063_T 345.00 - WOODRING 345KV CKT 1'
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68475	115.4724	'G15063_T 345.00 - WOODRING 345KV CKT 1'
FDNS	08ALL	0	17WP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	249	270	0.6843	106.5985	'G15063_T 345.00 - WOODRING 345KV CKT 1'
FDNS	08ALL	0	21WP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	249	270	0.68406	104.0672	'G15063_T 345.00 - WOODRING 345KV CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68072	117.8383	'G15066_T 345.00 - SOONER 345KV CKT 1'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68423	111.7112	'G15066_T 345.00 - SOONER 345KV CKT 1'
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68348	107.4257	'G15066_T 345.00 - SOONER 345KV CKT 1'
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6841	107.383	'G15066_T 345.00 - SOONER 345KV CKT 1'
FDNS	08ALL	0	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68349	105.1664	'G15066_T 345.00 - SOONER 345KV CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68336	112.2015	'G16-061-TAP 345.00 - SOONER 345KV CKT 1'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6855	103.0831	'G16-061-TAP 345.00 - WOODRING 345KV CKT 1'
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68206	102.6229	'GEN336153 1-WATERFORD UNIT#3'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68257	107.514	'GEN336821 1-GRAND GULF UNIT'
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68258	103.2502	'GEN336821 1-GRAND GULF UNIT'
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68206	102.8987	'GEN336821 1-GRAND GULF UNIT'
FDNS	08ALL	0	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68207	101.4689	'GEN336821 1-GRAND GULF UNIT'
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68206	102.5962	'GEN337910 1-ARKANSAS NUCLEAR ONE UNIT #1'
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68258	103.1308	'GEN337911 1-ARKANSAS NUCLEAR ONE UNIT #2'
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68206	102.7925	'GEN337911 1-ARKANSAS NUCLEAR ONE UNIT #2'
FDNS	08ALL	0	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68207	101.3694	'GEN337911 1-ARKANSAS NUCLEAR ONE UNIT #2'

SOLUTION	GROUP	SCENARIO	SEASON	SOURCE	DIRECTION	MONITORED ELEMENT	RATEA (MVA)	RATEB(MVA)	TDF	TC%LOADING (% MVA)	CONTINGENCY
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68016	105.7502	'GEN514643 1-BRKWND11 0.6900'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68257	102.0401	'GEN514643 1-BRKWND11 0.6900'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68016	107.6185	'GEN514805 1-SOONER UNIT 1'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68257	103.165	'GEN514805 1-SOONER UNIT 1'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68257	104.4294	'GEN514806 1-SOONER UNIT 2'
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68258	103.1107	'GEN514936 1-HORSESHOE LAKE 7S'
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68206	102.7761	'GEN514936 1-HORSESHOE LAKE 7S'
FDNS	08ALL	0	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68207	101.4617	'GEN514936 1-HORSESHOE LAKE 7S'
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68258	103.6681	'GEN514939 1-HORSESHOE LAKE 8G'
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68206	103.3592	'GEN514939 1-HORSESHOE LAKE 8G'
FDNS	08ALL	0	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68207	102.0639	'GEN514939 1-HORSESHOE LAKE 8G'
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68258	103.0751	'GEN515040 1-SEMINOLE 1G'
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68206	102.7717	'GEN515040 1-SEMINOLE 1G'
FDNS	08ALL	0	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68207	101.9821	'GEN515040 1-SEMINOLE 1G'
FDNS	08ALL	0	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68207	101.9247	'GEN515041 1-SEMINOLE 2G'
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68258	103.4312	'GEN515042 1-SEMINOLE 3G'
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68206	103.2602	'GEN515042 1-SEMINOLE 3G'
FDNS	08ALL	0	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68207	101.9753	'GEN515042 1-SEMINOLE 3G'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68257	104.8456	'GEN515479 1-CHSHMVE1 0.5750'
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68258	100.2308	'GEN515479 1-CHSHMVE1 0.5750'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68257	104.8461	'GEN515484 1-CHSHMVW1 0.5750'
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68258	100.2311	'GEN515484 1-CHSHMVW1 0.5750'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68016	107.2671	'GEN532751 1-WOLF CREEK GENERATING STATION UNIT 1'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68257	104.0575	'GEN532751 1-WOLF CREEK GENERATING STATION UNIT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68016	101.2942	'GEN562611 1-G14_064_3 0.6900'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68257	104.8434	'GEN562691 1-G15_015_3 0.6900'
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68258	100.2362	'GEN562691 1-G15_015_3 0.6900'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68257	104.8565	'GEN562992 1-G15063_3 0.6900'
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68258	100.1713	'GEN562992 1-G15063_3 0.6900'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68016	107.9756	'GEN587413 1-G16-061-GEN10.6900'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68257	104.2701	'GEN587413 1-G16-061-GEN10.6900'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68016	107.2458	'GEN587463 1-G16-068-GEN10.6900'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68257	103.5254	'GEN587463 1-G16-068-GEN10.6900'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68257	104.7572	'GEN587483 1-G16-071-GEN10.6900'
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68258	100.1158	'GEN587483 1-G16-071-GEN10.6900'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68405	107.8478	'GLASS MOUNTAIN - MOORELAND 138KV CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6771	118.6166	'HENESSEY - WAUKOMIS 138KV CKT 1'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67979	115.9329	'HENESSEY - WAUKOMIS 138KV CKT 1'
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67987	110.5513	'HENESSEY - WAUKOMIS 138KV CKT 1'
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67946	109.6626	'HENESSEY - WAUKOMIS 138KV CKT 1'
FDNS	08ALL	0	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67948	108.8501	'HENESSEY - WAUKOMIS 138KV CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68136	106.4292	'HUNTERS7 345.00 - WOODRING 345KV CKT 1'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68385	103.3561	'HUNTERS7 345.00 - WOODRING 345KV CKT 1'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68495	108.3219	'IMO TAP - MEN TAP 138KV CKT 1'
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68502	103.1502	'IMO TAP - MEN TAP 138KV CKT 1'
FDNS	08ALL	0	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68489	101.4493	'IMO TAP - MEN TAP 138KV CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67605	107.8005	'KETCH - KETCH TAP 138KV CKT 1'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67838	103.6328	'KETCH - KETCH TAP 138KV CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.64928	104.0585	'KETCH TAP - MITCHSB4 138.00 138KV CKT 1'
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67953	103.3477	'KETCH TAP - NORTHWEST 138KV CKT 1'
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67903	103.2184	'KETCH TAP - NORTHWEST 138KV CKT 1'
FDNS	08ALL	0	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67903	101.5903	'KETCH TAP - NORTHWEST 138KV CKT 1'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67835	111.8179	'KINZE - UNVRSTY4 138.00 138KV CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6769	111.6999	'KINZE - UNVRSTY4 138.00 138KV CKT 1'
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67855	106.1575	'KINZE - UNVRSTY4 138.00 138KV CKT 1'
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67917	103.054	'KINZE - UNVRSTY4 138.00 138KV CKT 1'
FDNS	08ALL	0	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67918	101.6757	'KINZE - UNVRSTY4 138.00 138KV CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68035	113.1077	'LACYGNE - WAVERLY7 345.00 345KV CKT 1'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68285	108.4587	'LACYGNE - WAVERLY7 345.00 345KV CKT 1'
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68287	103.8269	'LACYGNE - WAVERLY7 345.00 345KV CKT 1'
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68235	103.3272	'LACYGNE - WAVERLY7 345.00 345KV CKT 1'
FDNS	08ALL	0	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68236	101.7191	'LACYGNE - WAVERLY7 345.00 345KV CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.64928	103.1621	'LIBERTY LAKE - WATERLOO 138KV CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67949	111.8693	'MATHWSN7 345.00 - NORTHWEST 345KV CKT 1'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67835	112.6943	'MCELROY - STILLWATER 138KV CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6769	111.8733	'MCELROY - STILLWATER 138KV CKT 1'
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67855	107.4466	'MCELROY - STILLWATER 138KV CKT 1'
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67917	103.8891	'MCELROY - STILLWATER 138KV CKT 1'
FDNS	08ALL	0	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67918	102.6265	'MCELROY - STILLWATER 138KV CKT 1'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67835	111.9927	'MCELROY - UNVRSTY4 138.00 138KV CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6769	111.7389	'MCELROY - UNVRSTY4 138.00 138KV CKT 1'
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67855	106.4153	'MCELROY - UNVRSTY4 138.00 138KV CKT 1'
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67917	103.2404	'MCELROY - UNVRSTY4 138.00 138KV CKT 1'
FDNS	08ALL	0	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67918	102.0167	'MCELROY - UNVRSTY4 138.00 138KV CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.64928	103.786	'MITCHSB4 138.00 - WHITESB4 138.00 138KV CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6806	112.7624	'MORISNT4 138.00 - MORRISON 138KV CKT 1'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68312	108.583	'MORISNT4 138.00 - MORRISON 138KV CKT 1'
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68317	104.2183	'MORISNT4 138.00 - MORRISON 138KV CKT 1'
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68264	103.9981	'MORISNT4 138.00 - MORRISON 138KV CKT 1'
FDNS	08ALL	0	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68265	102.4166	'MORISNT4 138.00 - MORRISON 138KV CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67937	111.3841	'MORISNT4 138.00 - SOONER 138KV CKT 1'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68195	107.7106	'MORISNT4 138.00 - SOONER 138KV CKT 1'
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68203	103.3042	'MORISNT4 138.00 - SOONER 138KV CKT 1'
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68152	103.0132	'MORISNT4 138.00 - SOONER 138KV CKT 1'
FDNS	08ALL	0	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68154	101.5932	'MORISNT4 138.00 - SOONER 138KV CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67728	120.311	'MORISNT4 138.00 - STILLWATER 138KV CKT 1'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68046	116.3637	'MORISNT4 138.00 - STILLWATER 138KV CKT 1'
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68051	112.5604	'MORISNT4 138.00 - STILLWATER 138KV CKT 1'
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68094	112.4952	'MORISNT4 138.00 - STILLWATER 138KV CKT 1'
FDNS	08ALL	0	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68054	110.7564	'MORISNT4 138.00 - STILLWATER 138KV CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67868	116.2207	'NORTHWEST - SPRING CREEK 345KV CKT 1'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68139	113.7532	'NORTHWEST - SPRING CREEK 345KV CKT 1'
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68164	109.7337	'NORTHWEST - SPRING CREEK 345KV CKT 1'
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68118	108.7677	'NORTHWEST - SPRING CREEK 345KV CKT 1'
FDNS	08ALL	0	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6812	108.2001	'NORTHWEST - SPRING CREEK 345KV CKT 1'

SOLUTION	GROUP	SCENARIO	SEASON	SOURCE	DIRECTION	MONITORED ELEMENT	RATEA (MVA)	RATEB(MVA)	TDF	TC%LOADING (% MVA)	CONTINGENCY
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67983	108.4	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67983	108.4	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68034	111.7429	'OSAGE - WEBB CITY TAP 138KV CKT 1'
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68306	103.2014	'OSAGE - WEBB CITY TAP 138KV CKT 1'
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6825	102.8157	'OSAGE - WEBB CITY TAP 138KV CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68605	115.4308	'OTTER - WARREN VALLEY 138KV CKT 1'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68797	110.133	'OTTER - WARREN VALLEY 138KV CKT 1'
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68779	105.8288	'OTTER - WARREN VALLEY 138KV CKT 1'
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68715	105.8077	'OTTER - WARREN VALLEY 138KV CKT 1'
FDNS	08ALL	0	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68715	103.8724	'OTTER - WARREN VALLEY 138KV CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68605	102.2887	'OTTER - WOODRING 138KV CKT 1'
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68262	103.6134	''P12:069:OKGE:3TERM4''
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6821	103.1412	''P12:069:OKGE:3TERM4''
FDNS	08ALL	0	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68211	101.6938	''P12:069:OKGE:3TERM4''
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68034	111.7496	''P12:138:AEPW-OGE:SHIDLER4:OSAGE 4''
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68306	103.2046	''P12:138:AEPW-OGE:SHIDLER4:OSAGE 4''
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6825	102.8191	''P12:138:AEPW-OGE:SHIDLER4:OSAGE 4''
FDNS	08ALL	0	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68251	101.2533	''P12:138:AEPW-OGE:SHIDLER4:OSAGE 4''
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67752	118.8503	''P12:138:OKGE:3TERM1''
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68017	116.5052	''P12:138:OKGE:3TERM1''
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68025	111.3751	''P12:138:OKGE:3TERM1''
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67988	110.4459	''P12:138:OKGE:3TERM1''
FDNS	08ALL	0	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6799	109.6458	''P12:138:OKGE:3TERM1''
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.64904	103.2341	''P12:138:OKGE:3TERM11''
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67794	120.3879	''P12:138:OKGE:3TERM2''
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68105	116.3296	''P12:138:OKGE:3TERM2''
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68105	112.5374	''P12:138:OKGE:3TERM2''
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6815	112.4681	''P12:138:OKGE:3TERM2''
FDNS	08ALL	0	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68109	110.679	''P12:138:OKGE:3TERM2''
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68441	107.5911	''P12:138:OKGE:3TERM61''
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6844	103.5167	''P12:138:OKGE:3TERM61''
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68401	103.0961	''P12:138:OKGE:3TERM61''
FDNS	08ALL	0	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68401	101.8595	''P12:138:OKGE:3TERM61''
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68032	107.5284	''P12:138:OKGE:3TERM7''
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6829	104.333	''P12:138:OKGE:3TERM7''
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67891	107.5798	''P23:345:AEPW:RIVERSIDE CB 3401A NBTB''
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67895	107.6958	''P23:345:AEPW:RIVERSIDE CB 3405A NBTB''
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68107	100.2828	''P23:345:AEPW:RIVERSIDE CB 3405A NBTB''
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6806	115.245	''P23:345:AEPW:TULSA NORTH CB 3413A NBTB''
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68364	109.9034	''P23:345:AEPW:TULSA NORTH CB 3413A NBTB''
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68355	105.2157	''P23:345:AEPW:TULSA NORTH CB 3413A NBTB''
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68297	105.1245	''P23:345:AEPW:TULSA NORTH CB 3413A NBTB''
FDNS	08ALL	0	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68298	103.1466	''P23:345:AEPW:TULSA NORTH CB 3413A NBTB''
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68066	120.1058	''P23:345:GRDA:CLEVLND_BRK10180''
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68415	114.1235	''P23:345:GRDA:CLEVLND_BRK10180''
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6834	109.838	''P23:345:GRDA:CLEVLND_BRK10180''
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68402	109.8278	''P23:345:GRDA:CLEVLND_BRK10180''
FDNS	08ALL	0	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68341	107.5847	''P23:345:GRDA:CLEVLND_BRK10180''
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68066	117.2937	'P23:345:GRDA:CLEVLND_BRK13280-G15066TAP''
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68415	111.2725	'P23:345:GRDA:CLEVLND_BRK13280-G15066TAP''
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6834	107.0755	'P23:345:GRDA:CLEVLND_BRK13280-G15066TAP''
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68402	107.0508	'P23:345:GRDA:CLEVLND_BRK13280-G15066TAP''
FDNS	08ALL	0	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68341	104.8233	'P23:345:GRDA:CLEVLND_BRK13280-G15066TAP''
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6803	112.2028	''P23:345:WERE:CANR_BKRS::''
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6828	107.894	''P23:345:WERE:CANR_BKRS::''
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68279	103.2932	''P23:345:WERE:CANR_BKRS::''
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68228	102.866	''P23:345:WERE:CANR_BKRS::''
FDNS	08ALL	0	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68228	101.2528	''P23:345:WERE:CANR_BKRS::''
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6803	111.3778	''P23:345:WERE:LATH_BKRS::''
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68018	112.3197	''P23:345:WERE:N345_345-20::''
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68262	103.0922	''P23:345:WERE:N345_345-20::''
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6821	102.6926	''P23:345:WERE:N345_345-20::''
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68035	112.7578	''P23:345:WERE:WAVS_BKRS::''
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68285	108.0731	''P23:345:WERE:WAVS_BKRS::''
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68287	103.4488	''P23:345:WERE:WAVS_BKRS::''
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68235	102.9403	''P23:345:WERE:WAVS_BKRS::''
FDNS	08ALL	0	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68236	101.3386	''P23:345:WERE:WAVS_BKRS::''
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68498	113.5702	'P23:345:WERE:WICH_345-116::-BUFFALOFLATS''
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68098	112.6438	'P23:345:WERE:WICH_345-116::-BUFFALOFLATS''
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68382	104.7275	'P23:345:WERE:WICH_345-116::-BUFFALOFLATS''
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68312	104.1375	'P23:345:WERE:WICH_345-116::-BUFFALOFLATS''
FDNS	08ALL	0	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68313	102.5925	'P23:345:WERE:WICH_345-116::-BUFFALOFLATS''
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68036	112.9847	''P23:345:WERE:WOLF_345-120::''
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68286	108.2644	''P23:345:WERE:WOLF_345-120::''
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68288	103.6531	''P23:345:WERE:WOLF_345-120::''
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68237	103.1493	''P23:345:WERE:WOLF_345-120::''
FDNS	08ALL	0	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68237	101.5305	''P23:345:WERE:WOLF_345-120::''
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67891	107.564	'REDBUD - RIVERSIDE STATION 345KV CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67891	107.564	'REDBUD - RIVERSIDE STATION 345KV CKT 1'
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68524	103.6675	'RENFROW7 345.00 - VIOLA 7 345.00 345KV CKT 1'
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68422	103.6573	'RENFROW7 345.00 - VIOLA 7 345.00 345KV CKT 1'
FDNS	08ALL	0	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68423	102.0662	'RENFROW7 345.00 - VIOLA 7 345.00 345KV CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67868	116.2889	'SOONER - SPRING CREEK 345KV CKT 1'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68139	113.7511	'SOONER - SPRING CREEK 345KV CKT 1'
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68168	107.6347	'SOONER - SPRING CREEK 345KV CKT 1'
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68123	106.5789	'SOONER - SPRING CREEK 345KV CKT 1'
FDNS	08ALL	0	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68125	105.9591	'SOONER - SPRING CREEK 345KV CKT 1'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68499	113.582	'VIOLA 7 345.00 - WICHITA 345KV CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68098	112.6552	'VIOLA 7 345.00 - WICHITA 345KV CKT 1'
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68383	104.767	'VIOLA 7 345.00 - WICHITA 345KV CKT 1'
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68312	104.1412	'VIOLA 7 345.00 - WICHITA 345KV CKT 1'
FDNS	08ALL	0	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68313	102.6011	'VIOLA 7 345.00 - WICHITA 345KV CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.64928	103.4684	'WATERLOO - WHITESB4 138.00 138KV CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6771	118.7346	'WAUKOMIS - WAUKOMIS TAP 138KV CKT 1'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67979	116.2443	'WAUKOMIS - WAUKOMIS TAP 138KV CKT 1'

SOLUTION	GROUP	SCENARIO	SEASON	SOURCE	DIRECTION	MONITORED ELEMENT	RATEA (MVA)	RATEB(MVA)	TDF	TC%LOADING (% MVA)	CONTINGENCY
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67987	111.0523	'WAUKOMIS - WAUKOMIS TAP 138KV CKT 1'
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67946	110.1448	'WAUKOMIS - WAUKOMIS TAP 138KV CKT 1'
FDNS	08ALL	0	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67948	109.3039	'WAUKOMIS - WAUKOMIS TAP 138KV CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68078	111.2923	'WAUKOMIS TAP - WOODRING 138KV CKT 1'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68316	108.2579	'WAUKOMIS TAP - WOODRING 138KV CKT 1'
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68317	103.8843	'WAUKOMIS TAP - WOODRING 138KV CKT 1'
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68275	103.378	'WAUKOMIS TAP - WOODRING 138KV CKT 1'
FDNS	08ALL	0	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68276	102.1365	'WAUKOMIS TAP - WOODRING 138KV CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68035	112.6183	'WAVERLY7 345.00 - WOLF CREEK 345KV CKT 1'
FDNS	08ALL	0	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68285	107.9396	'WAVERLY7 345.00 - WOLF CREEK 345KV CKT 1'
FDNS	08ALL	0	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68287	103.3147	'WAVERLY7 345.00 - WOLF CREEK 345KV CKT 1'
FDNS	08ALL	0	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68235	102.8094	'WAVERLY7 345.00 - WOLF CREEK 345KV CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.72166	106.3176	'WOODRING (WOODRNG2) 345/138/13.8KV TRANSFORMER CKT 1'
FDNS	08ALL	0	21L	G16_032	'TO->FROM'	'LACYGNE - WAVERLY7 345.00 345KV CKT 1'	1141	1254	0.0341	103.5676	System Intact
FDNS	08ALL	2	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.63684	101.1772	'ARCADIA - COTTONWOOD CREEK 138KV CKT 1'
FDNS	08ALL	2	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.63716	100.7625	'ARCADIA - COTTONWOOD CREEK 138KV CKT 1'
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.63518	100.4129	'ARCADIA - COTTONWOOD CREEK 138KV CKT 1'
FDNS	08ALL	2	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68208	104.8616	'ARCADIA - KAMO MEMORIAL 138KV CKT 1'
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67893	114.3617	'ARCADIA - NORTHWEST 345KV CKT 1'
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67939	108.4409	'ARCADIA - SEMINOLE 345KV CKT 1'
FDNS	08ALL	2	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68178	104.424	'ARCADIA - SEMINOLE 345KV CKT 1'
FDNS	08ALL	2	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68124	107.6028	'ARCADIA (ARCADIA4) 345/138/13.8KV TRANSFORMER CKT 1'
FDNS	08ALL	2	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68132	103.0349	'ARCADIA (ARCADIA4) 345/138/13.8KV TRANSFORMER CKT 1'
FDNS	08ALL	2	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68082	102.6737	'ARCADIA (ARCADIA4) 345/138/13.8KV TRANSFORMER CKT 1'
FDNS	08ALL	2	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68083	101.4125	'ARCADIA (ARCADIA4) 345/138/13.8KV TRANSFORMER CKT 1'
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68016	125.778	System Intact
FDNS	08ALL	2	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68257	121.6071	System Intact
FDNS	08ALL	2	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68258	116.3236	System Intact
FDNS	08ALL	2	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68206	115.866	System Intact
FDNS	08ALL	2	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68207	114.2892	System Intact
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6803	111.788	'CANEYRV7 345.00 - LATHAMS7 345.00 345KV CKT 1'
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6803	112.6525	'CANEYRV7 345.00 - NEOSHO 345KV CKT 1'
FDNS	08ALL	2	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6828	108.2597	'CANEYRV7 345.00 - NEOSHO 345KV CKT 1'
FDNS	08ALL	2	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68279	103.6723	'CANEYRV7 345.00 - NEOSHO 345KV CKT 1'
FDNS	08ALL	2	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68228	103.2394	'CANEYRV7 345.00 - NEOSHO 345KV CKT 1'
FDNS	08ALL	2	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68228	101.6296	'CANEYRV7 345.00 - NEOSHO 345KV CKT 1'
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68041	111.8241	'CIMARRON - DRAPER LAKE 345KV CKT 1'
FDNS	08ALL	2	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68293	107.9079	'CIMARRON - DRAPER LAKE 345KV CKT 1'
FDNS	08ALL	2	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6829	102.9911	'CIMARRON - DRAPER LAKE 345KV CKT 1'
FDNS	08ALL	2	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68495	108.0999	'CLEO CORNER - CLEOPLT4 138.00 138KV CKT 1'
FDNS	08ALL	2	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68405	107.9645	'CLEO CORNER - GLASS MOUNTAIN 138KV CKT 1'
FDNS	08ALL	2	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68495	108.1796	'CLEOPLT4 138.00 - MEN TAP 138KV CKT 1'
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68072	120.178	'CLEVELAND - G15066_T 345.00 345KV CKT 1'
FDNS	08ALL	2	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68423	114.0652	'CLEVELAND - G15066_T 345.00 345KV CKT 1'
FDNS	08ALL	2	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68348	109.7313	'CLEVELAND - G15066_T 345.00 345KV CKT 1'
FDNS	08ALL	2	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6841	109.7104	'CLEVELAND - G15066_T 345.00 345KV CKT 1'
FDNS	08ALL	2	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68349	107.4594	'CLEVELAND - G15066_T 345.00 345KV CKT 1'
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68071	115.378	'CLEVELAND - TULSA NORTH 345KV CKT 1'
FDNS	08ALL	2	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68376	110.0778	'CLEVELAND - TULSA NORTH 345KV CKT 1'
FDNS	08ALL	2	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68376	110.0778	'CLEVELAND - TULSA NORTH 345KV CKT 1'
FDNS	08ALL	2	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68368	105.3827	'CLEVELAND - TULSA NORTH 345KV CKT 1'
FDNS	08ALL	2	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68368	105.3827	'CLEVELAND - TULSA NORTH 345KV CKT 1'
FDNS	08ALL	2	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6831	105.2833	'CLEVELAND - TULSA NORTH 345KV CKT 1'
FDNS	08ALL	2	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6831	105.2833	'CLEVELAND - TULSA NORTH 345KV CKT 1'
FDNS	08ALL	2	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6831	103.397	'CLEVELAND - TULSA NORTH 345KV CKT 1'
FDNS	08ALL	2	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6831	103.397	'CLEVELAND - TULSA NORTH 345KV CKT 1'
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6663	113.7206	'COTTONWOOD CREEK - CRESENT 138KV CKT 1'
FDNS	08ALL	2	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.66898	107.8263	'COTTONWOOD CREEK - CRESENT 138KV CKT 1'
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.64928	102.9849	'COTTONWOOD CREEK - LIBERTY LAKE 138KV CKT 1'
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.66083	107.1117	'COTTONWOOD CREEK - PINE ST 138KV CKT 1'
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6806	112.7831	'COW CREEK - MORRISON 138KV CKT 1'
FDNS	08ALL	2	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68312	108.6409	'COW CREEK - MORRISON 138KV CKT 1'
FDNS	08ALL	2	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68317	104.3119	'COW CREEK - MORRISON 138KV CKT 1'
FDNS	08ALL	2	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68264	104.0829	'COW CREEK - MORRISON 138KV CKT 1'
FDNS	08ALL	2	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68265	102.5008	'COW CREEK - MORRISON 138KV CKT 1'
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68605	115.0894	'COW CREEK - WARREN VALLEY 138KV CKT 1'
FDNS	08ALL	2	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68797	109.8438	'COW CREEK - WARREN VALLEY 138KV CKT 1'
FDNS	08ALL	2	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68779	105.4346	'COW CREEK - WARREN VALLEY 138KV CKT 1'
FDNS	08ALL	2	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68715	105.3726	'COW CREEK - WARREN VALLEY 138KV CKT 1'
FDNS	08ALL	2	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68715	103.3953	'COW CREEK - WARREN VALLEY 138KV CKT 1'
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6663	113.878	'CRESENT - TWIN LAKES 138KV CKT 1'
FDNS	08ALL	2	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.66898	108.2358	'CRESENT - TWIN LAKES 138KV CKT 1'
FDNS	08ALL	2	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.66831	102.6147	'CRESENT - TWIN LAKES 138KV CKT 1'
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67526	111.6304	'DOVER - DOVER SW 138KV CKT 1'
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67526	111.5585	'DOVER - TWIN LAKES 138KV CKT 1'
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6771	118.4659	'DOVER SW - HENESSEY 138KV CKT 1'
FDNS	08ALL	2	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67979	115.5188	'DOVER SW - HENESSEY 138KV CKT 1'
FDNS	08ALL	2	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67987	109.8774	'DOVER SW - HENESSEY 138KV CKT 1'
FDNS	08ALL	2	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67946	108.9984	'DOVER SW - HENESSEY 138KV CKT 1'
FDNS	08ALL	2	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67948	108.2111	'DOVER SW - HENESSEY 138KV CKT 1'
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68034	111.4338	'FAIRFAX TAP - SHIDLER 138KV CKT 1'
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68034	111.4338	'FAIRFAX TAP - WEBB CITY TAP 138KV CKT 1'
FDNS	08ALL	2	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6843	107.6178	'FAIRMONT TAP - WOODRING 138KV CKT 1'
FDNS	08ALL	2	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6843	103.5201	'FAIRMONT TAP - WOODRING 138KV CKT 1'
FDNS	08ALL	2	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6839	103.0903	'FAIRMONT TAP - WOODRING 138KV CKT 1'
FDNS	08ALL	2	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68391	101.8514	'FAIRMONT TAP - WOODRING 138KV CKT 1'
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.66083	107.3894	'FITZGERALD CREEK - KINZE 138KV CKT 1'
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.66083	107.2887	'FITZGERALD CREEK - PINE ST 138KV CKT 1'
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68204	137.6935	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'
FDNS	08ALL	2	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68494	136.7475	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'
FDNS	08ALL	2	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68527	126.3887	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'
FDNS	08ALL	2	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68478	124.2454	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'
FDNS	08ALL	2	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68475	123.6251	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'
FDNS	08ALL	2	17WP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	249	270	0.6843	113.8112	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'
FDNS	08ALL	2	21WP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	249	270	0.68406	110.817	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'

SOLUTION	GROUP	SCENARIO	SEASON	SOURCE	DIRECTION	MONITORED ELEMENT	RATEA (MVA)	RATEB(MVA)	TDF	TC%LOADING (% MVA)	CONTINGENCY
FDNS	08ALL		2 21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68204	129.5306	'G15063_T 345.00 - WOODRING 345KV CKT 1'
FDNS	08ALL		2 18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68494	127.9835	'G15063_T 345.00 - WOODRING 345KV CKT 1'
FDNS	08ALL		2 18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68527	118.1437	'G15063_T 345.00 - WOODRING 345KV CKT 1'
FDNS	08ALL		2 26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68478	116.0533	'G15063_T 345.00 - WOODRING 345KV CKT 1'
FDNS	08ALL		2 21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68475	115.4724	'G15063_T 345.00 - WOODRING 345KV CKT 1'
FDNS	08ALL		2 17WP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	249	270	0.6843	106.5985	'G15063_T 345.00 - WOODRING 345KV CKT 1'
FDNS	08ALL		2 21WP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	249	270	0.68406	104.0672	'G15063_T 345.00 - WOODRING 345KV CKT 1'
FDNS	08ALL		2 21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68072	117.8383	'G15066_T 345.00 - SOONER 345KV CKT 1'
FDNS	08ALL		2 18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68423	111.7112	'G15066_T 345.00 - SOONER 345KV CKT 1'
FDNS	08ALL		2 21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68348	107.4257	'G15066_T 345.00 - SOONER 345KV CKT 1'
FDNS	08ALL		2 18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6841	107.383	'G15066_T 345.00 - SOONER 345KV CKT 1'
FDNS	08ALL		2 26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68349	105.1664	'G15066_T 345.00 - SOONER 345KV CKT 1'
FDNS	08ALL		2 21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68336	112.2015	'G16-061-TAP 345.00 - SOONER 345KV CKT 1'
FDNS	08ALL		2 18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6855	103.0831	'G16-061-TAP 345.00 - WOODRING 345KV CKT 1'
FDNS	08ALL		2 21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68206	102.6229	'GEN336153 1-WATERFORD UNIT#3'
FDNS	08ALL		2 18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68257	107.514	'GEN336821 1-GRAND GULF UNIT'
FDNS	08ALL		2 18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68258	103.2502	'GEN336821 1-GRAND GULF UNIT'
FDNS	08ALL		2 21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68206	102.8987	'GEN336821 1-GRAND GULF UNIT'
FDNS	08ALL		2 26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68207	101.4689	'GEN336821 1-GRAND GULF UNIT'
FDNS	08ALL		2 21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68206	102.5962	'GEN337910 1-ARKANSAS NUCLEAR ONE UNIT #1'
FDNS	08ALL		2 18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68258	103.1308	'GEN337911 1-ARKANSAS NUCLEAR ONE UNIT #2'
FDNS	08ALL		2 21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68206	102.7925	'GEN337911 1-ARKANSAS NUCLEAR ONE UNIT #2'
FDNS	08ALL		2 26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68207	101.3694	'GEN337911 1-ARKANSAS NUCLEAR ONE UNIT #2'
FDNS	08ALL		2 21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68016	105.7502	'GEN514643 1-BRKWND11 0.6900'
FDNS	08ALL		2 18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68257	102.0401	'GEN514643 1-BRKWND11 0.6900'
FDNS	08ALL		2 21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68016	107.6185	'GEN514805 1-SOONER UNIT 1'
FDNS	08ALL		2 18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68257	103.165	'GEN514805 1-SOONER UNIT 1'
FDNS	08ALL		2 18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68257	104.4294	'GEN514806 1-SOONER UNIT 2'
FDNS	08ALL		2 18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68258	103.1107	'GEN514936 1-HORSESHOE LAKE 7S'
FDNS	08ALL		2 21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68206	102.7761	'GEN514936 1-HORSESHOE LAKE 7S'
FDNS	08ALL		2 26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68207	101.4617	'GEN514936 1-HORSESHOE LAKE 7S'
FDNS	08ALL		2 18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68258	103.6681	'GEN514939 1-HORSESHOE LAKE 8G'
FDNS	08ALL		2 21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68206	103.3592	'GEN514939 1-HORSESHOE LAKE 8G'
FDNS	08ALL		2 26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68207	102.0639	'GEN514939 1-HORSESHOE LAKE 8G'
FDNS	08ALL		2 18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68258	103.0751	'GEN515040 1-SEMINOLE 1G'
FDNS	08ALL		2 21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68206	102.7717	'GEN515040 1-SEMINOLE 1G'
FDNS	08ALL		2 26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68207	101.9821	'GEN515040 1-SEMINOLE 1G'
FDNS	08ALL		2 26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68207	101.9247	'GEN515041 1-SEMINOLE 2G'
FDNS	08ALL		2 18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68258	103.4312	'GEN515042 1-SEMINOLE 3G'
FDNS	08ALL		2 21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68206	103.2602	'GEN515042 1-SEMINOLE 3G'
FDNS	08ALL		2 26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68207	101.9753	'GEN515042 1-SEMINOLE 3G'
FDNS	08ALL		2 18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68257	104.8456	'GEN515479 1-CHSHMVE1 0.5750'
FDNS	08ALL		2 18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68258	100.2308	'GEN515479 1-CHSHMVE1 0.5750'
FDNS	08ALL		2 18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68257	104.8461	'GEN515484 1-CHSHMVW1 0.5750'
FDNS	08ALL		2 18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68258	100.2311	'GEN515484 1-CHSHMVW1 0.5750'
FDNS	08ALL		2 21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68016	107.2671	'GEN532751 1-WOLF CREEK GENERATING STATION UNIT 1'
FDNS	08ALL		2 18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68257	104.0575	'GEN532751 1-WOLF CREEK GENERATING STATION UNIT 1'
FDNS	08ALL		2 21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68016	101.2942	'GEN562611 1-G14_064_3 0.6900'
FDNS	08ALL		2 18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68257	104.8434	'GEN562691 1-G15_015_3 0.6900'
FDNS	08ALL		2 18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68258	100.2362	'GEN562691 1-G15_015_3 0.6900'
FDNS	08ALL		2 18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68257	104.8565	'GEN562992 1-G15063_3 0.6900'
FDNS	08ALL		2 18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68258	100.1713	'GEN562992 1-G15063_3 0.6900'
FDNS	08ALL		2 21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68016	107.9756	'GEN587413 1-G16-061-GEN10.6900'
FDNS	08ALL		2 18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68257	104.2701	'GEN587413 1-G16-061-GEN10.6900'
FDNS	08ALL		2 21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68016	107.2458	'GEN587463 1-G16-068-GEN10.6900'
FDNS	08ALL		2 18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68257	103.5254	'GEN587463 1-G16-068-GEN10.6900'
FDNS	08ALL		2 18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68257	104.7572	'GEN587483 1-G16-071-GEN10.6900'
FDNS	08ALL		2 18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68258	100.1158	'GEN587483 1-G16-071-GEN10.6900'
FDNS	08ALL		2 18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68405	107.8478	'GLASS MOUNTAIN - MOORELAND 138KV CKT 1'
FDNS	08ALL		2 21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6771	118.6166	'HENESSEY - WAUKOMIS 138KV CKT 1'
FDNS	08ALL		2 18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67979	115.9329	'HENESSEY - WAUKOMIS 138KV CKT 1'
FDNS	08ALL		2 18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67987	110.5513	'HENESSEY - WAUKOMIS 138KV CKT 1'
FDNS	08ALL		2 21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67946	109.6626	'HENESSEY - WAUKOMIS 138KV CKT 1'
FDNS	08ALL		2 26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67948	108.8501	'HENESSEY - WAUKOMIS 138KV CKT 1'
FDNS	08ALL		2 21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68136	106.4292	'HUNTERS7 345.00 - WOODRING 345KV CKT 1'
FDNS	08ALL		2 18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68385	103.3561	'HUNTERS7 345.00 - WOODRING 345KV CKT 1'
FDNS	08ALL		2 18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68495	108.3219	'IMO TAP - MEN TAP 138KV CKT 1'
FDNS	08ALL		2 18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68502	103.1502	'IMO TAP - MEN TAP 138KV CKT 1'
FDNS	08ALL		2 26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68489	101.4493	'IMO TAP - MEN TAP 138KV CKT 1'
FDNS	08ALL		2 21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67605	107.8005	'KETCH - KETCH TAP 138KV CKT 1'
FDNS	08ALL		2 18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67838	103.6328	'KETCH - KETCH TAP 138KV CKT 1'
FDNS	08ALL		2 21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.64928	104.0585	'KETCH TAP - MITCHSB4 138.00 138KV CKT 1'
FDNS	08ALL		2 18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67953	103.3477	'KETCH TAP - NORTHWEST 138KV CKT 1'
FDNS	08ALL		2 21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67903	103.2184	'KETCH TAP - NORTHWEST 138KV CKT 1'
FDNS	08ALL		2 26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67903	101.5903	'KETCH TAP - NORTHWEST 138KV CKT 1'
FDNS	08ALL		2 18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67835	111.8179	'KINZE - UNVRSTY4 138.00 138KV CKT 1'
FDNS	08ALL		2 21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6769	111.6999	'KINZE - UNVRSTY4 138.00 138KV CKT 1'
FDNS	08ALL		2 18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67855	106.1575	'KINZE - UNVRSTY4 138.00 138KV CKT 1'
FDNS	08ALL		2 21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67917	103.054	'KINZE - UNVRSTY4 138.00 138KV CKT 1'
FDNS	08ALL		2 26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67918	101.6757	'KINZE - UNVRSTY4 138.00 138KV CKT 1'
FDNS	08ALL		2 21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68035	113.1077	'LACYGNE - WAVERLY7 345.00 345KV CKT 1'
FDNS	08ALL		2 18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68285	108.4587	'LACYGNE - WAVERLY7 345.00 345KV CKT 1'
FDNS	08ALL		2 18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68287	103.8269	'LACYGNE - WAVERLY7 345.00 345KV CKT 1'
FDNS	08ALL		2 21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68235	103.3272	'LACYGNE - WAVERLY7 345.00 345KV CKT 1'
FDNS	08ALL		2 26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68236	101.7191	'LACYGNE - WAVERLY7 345.00 345KV CKT 1'
FDNS	08ALL		2 21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.64928	103.1621	'LIBERTY LAKE - WATERLOO 138KV CKT 1'
FDNS	08ALL		2 21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67949	111.8693	'MATHWSN7 345.00 - NORTHWEST 345KV CKT 1'
FDNS	08ALL		2 18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67835	112.6943	'MCELROY - STILLWATER 138KV CKT 1'
FDNS	08ALL		2 21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6769	111.8733	'MCELROY - STILLWATER 138KV CKT 1'
FDNS	08ALL		2 18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67855	107.4466	'MCELROY - STILLWATER 138KV CKT 1'
FDNS	08ALL		2 21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67917	103.8891	'MCELROY - STILLWATER 138KV CKT 1'
FDNS	08ALL		2 26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67918	102.6265	'MCELROY - STILLWATER 138KV CKT 1'
FDNS	08ALL		2 18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67835	111.9927	'MCELROY - UNVRSTY4 138.00 138KV CKT 1'
FDNS	08ALL		2 21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6769	111.7389	'MCELROY - UNVRSTY4 138.00 138KV CKT 1'
FDNS	08ALL		2 18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67855	106.4153	'MCELROY - UNVRSTY4 138.00 138KV CKT 1'

SOLUTION	GROUP	SCENARIO	SEASON	SOURCE	DIRECTION	MONITORED ELEMENT	RATEA (MVA)	RATEB(MVA)	TDF	TC%LOADING (% MVA)	CONTINGENCY
FDNS	08ALL	2	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67917	103.2404	'MCELROY - UNVRSTY4 138.00 138KV CKT 1'
FDNS	08ALL	2	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67918	102.0167	'MCELROY - UNVRSTY4 138.00 138KV CKT 1'
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.64928	103.786	'MITCHSB4 138.00 - WHITESB4 138.00 138KV CKT 1'
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6806	112.7624	'MORISNT4 138.00 - MORRISON 138KV CKT 1'
FDNS	08ALL	2	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68312	108.583	'MORISNT4 138.00 - MORRISON 138KV CKT 1'
FDNS	08ALL	2	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68317	104.2183	'MORISNT4 138.00 - MORRISON 138KV CKT 1'
FDNS	08ALL	2	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68264	103.9981	'MORISNT4 138.00 - MORRISON 138KV CKT 1'
FDNS	08ALL	2	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68265	102.4166	'MORISNT4 138.00 - MORRISON 138KV CKT 1'
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67937	111.3841	'MORISNT4 138.00 - SOONER 138KV CKT 1'
FDNS	08ALL	2	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68195	107.7106	'MORISNT4 138.00 - SOONER 138KV CKT 1'
FDNS	08ALL	2	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68203	103.3042	'MORISNT4 138.00 - SOONER 138KV CKT 1'
FDNS	08ALL	2	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68152	103.0132	'MORISNT4 138.00 - SOONER 138KV CKT 1'
FDNS	08ALL	2	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68154	101.5932	'MORISNT4 138.00 - SOONER 138KV CKT 1'
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67728	120.311	'MORISNT4 138.00 - STILLWATER 138KV CKT 1'
FDNS	08ALL	2	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68046	116.3637	'MORISNT4 138.00 - STILLWATER 138KV CKT 1'
FDNS	08ALL	2	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68051	112.5604	'MORISNT4 138.00 - STILLWATER 138KV CKT 1'
FDNS	08ALL	2	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68094	112.4952	'MORISNT4 138.00 - STILLWATER 138KV CKT 1'
FDNS	08ALL	2	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68054	110.7564	'MORISNT4 138.00 - STILLWATER 138KV CKT 1'
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67868	116.2207	'NORTHWEST - SPRING CREEK 345KV CKT 1'
FDNS	08ALL	2	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68139	113.7532	'NORTHWEST - SPRING CREEK 345KV CKT 1'
FDNS	08ALL	2	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68164	109.7337	'NORTHWEST - SPRING CREEK 345KV CKT 1'
FDNS	08ALL	2	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68118	108.7677	'NORTHWEST - SPRING CREEK 345KV CKT 1'
FDNS	08ALL	2	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6812	108.2001	'NORTHWEST - SPRING CREEK 345KV CKT 1'
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67983	108.4	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67983	108.4	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68034	111.7429	'OSAGE - WEBB CITY TAP 138KV CKT 1'
FDNS	08ALL	2	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68306	103.2014	'OSAGE - WEBB CITY TAP 138KV CKT 1'
FDNS	08ALL	2	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6825	102.8157	'OSAGE - WEBB CITY TAP 138KV CKT 1'
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68605	115.4308	'OTTER - WARREN VALLEY 138KV CKT 1'
FDNS	08ALL	2	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68797	110.133	'OTTER - WARREN VALLEY 138KV CKT 1'
FDNS	08ALL	2	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68779	105.8288	'OTTER - WARREN VALLEY 138KV CKT 1'
FDNS	08ALL	2	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68715	105.8077	'OTTER - WARREN VALLEY 138KV CKT 1'
FDNS	08ALL	2	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68715	103.8724	'OTTER - WARREN VALLEY 138KV CKT 1'
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68605	102.2887	'OTTER - WOODRING 138KV CKT 1'
FDNS	08ALL	2	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68262	103.6134	''P12:069:OKGE:3TERM4''
FDNS	08ALL	2	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6821	103.1412	''P12:069:OKGE:3TERM4''
FDNS	08ALL	2	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68211	101.6938	''P12:069:OKGE:3TERM4''
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68034	111.7496	''P12:138:AEPW-OGE:SHIDLER4:OSAGE 4''
FDNS	08ALL	2	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68306	103.2046	''P12:138:AEPW-OGE:SHIDLER4:OSAGE 4''
FDNS	08ALL	2	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6825	102.8191	''P12:138:AEPW-OGE:SHIDLER4:OSAGE 4''
FDNS	08ALL	2	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68251	101.2533	''P12:138:AEPW-OGE:SHIDLER4:OSAGE 4''
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67752	118.8503	''P12:138:OKGE:3TERM1''
FDNS	08ALL	2	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68017	116.5052	''P12:138:OKGE:3TERM1''
FDNS	08ALL	2	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68025	111.3751	''P12:138:OKGE:3TERM1''
FDNS	08ALL	2	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67988	110.4459	''P12:138:OKGE:3TERM1''
FDNS	08ALL	2	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6799	109.6458	''P12:138:OKGE:3TERM1''
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.64904	103.2341	''P12:138:OKGE:3TERM11''
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67794	120.3879	''P12:138:OKGE:3TERM2''
FDNS	08ALL	2	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68105	116.3296	''P12:138:OKGE:3TERM2''
FDNS	08ALL	2	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68105	112.5374	''P12:138:OKGE:3TERM2''
FDNS	08ALL	2	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6815	112.4681	''P12:138:OKGE:3TERM2''
FDNS	08ALL	2	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68109	110.679	''P12:138:OKGE:3TERM2''
FDNS	08ALL	2	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68441	107.5911	''P12:138:OKGE:3TERM61''
FDNS	08ALL	2	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6844	103.5167	''P12:138:OKGE:3TERM61''
FDNS	08ALL	2	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68401	103.0961	''P12:138:OKGE:3TERM61''
FDNS	08ALL	2	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68401	101.8595	''P12:138:OKGE:3TERM61''
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68032	107.5284	''P12:138:OKGE:3TERM7''
FDNS	08ALL	2	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6829	104.333	''P12:138:OKGE:3TERM7''
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67891	107.5798	''P23:345:AEPW:RIVERSIDE CB 3401A NBTB''
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67895	107.6958	''P23:345:AEPW:RIVERSIDE CB 3405A NBTB''
FDNS	08ALL	2	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68107	100.2828	''P23:345:AEPW:RIVERSIDE CB 3405A NBTB''
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6806	115.245	''P23:345:AEPW:TULSA NORTH CB 3413A NBTB''
FDNS	08ALL	2	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68364	109.9034	''P23:345:AEPW:TULSA NORTH CB 3413A NBTB''
FDNS	08ALL	2	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68355	105.2157	''P23:345:AEPW:TULSA NORTH CB 3413A NBTB''
FDNS	08ALL	2	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68297	105.1245	''P23:345:AEPW:TULSA NORTH CB 3413A NBTB''
FDNS	08ALL	2	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68298	103.1466	''P23:345:AEPW:TULSA NORTH CB 3413A NBTB''
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68066	120.1058	''P23:345:GRDA:CLEVLND_BRK10180''
FDNS	08ALL	2	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68415	114.1235	''P23:345:GRDA:CLEVLND_BRK10180''
FDNS	08ALL	2	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6834	109.838	''P23:345:GRDA:CLEVLND_BRK10180''
FDNS	08ALL	2	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68402	109.8278	''P23:345:GRDA:CLEVLND_BRK10180''
FDNS	08ALL	2	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68341	107.5847	''P23:345:GRDA:CLEVLND_BRK10180''
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68066	117.2937	'P23:345:GRDA:CLEVLND_BRK13280-G15066TAP''
FDNS	08ALL	2	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68415	111.2725	'P23:345:GRDA:CLEVLND_BRK13280-G15066TAP''
FDNS	08ALL	2	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6834	107.0755	'P23:345:GRDA:CLEVLND_BRK13280-G15066TAP''
FDNS	08ALL	2	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68402	107.0508	'P23:345:GRDA:CLEVLND_BRK13280-G15066TAP''
FDNS	08ALL	2	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68341	104.8233	'P23:345:GRDA:CLEVLND_BRK13280-G15066TAP''
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6803	112.2028	''P23:345:WERE:CANR_BKRS::''
FDNS	08ALL	2	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6828	107.894	''P23:345:WERE:CANR_BKRS::''
FDNS	08ALL	2	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68279	103.2932	''P23:345:WERE:CANR_BKRS::''
FDNS	08ALL	2	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68228	102.866	''P23:345:WERE:CANR_BKRS::''
FDNS	08ALL	2	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68228	101.2528	''P23:345:WERE:CANR_BKRS::''
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6803	111.3778	''P23:345:WERE:LATH_BKRS::''
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68018	112.3197	''P23:345:WERE:N345_345-20::''
FDNS	08ALL	2	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68262	103.0922	''P23:345:WERE:N345_345-20::''
FDNS	08ALL	2	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6821	102.6926	''P23:345:WERE:N345_345-20::''
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68035	112.7578	''P23:345:WERE:WAVS_BKRS::''
FDNS	08ALL	2	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68285	108.0731	''P23:345:WERE:WAVS_BKRS::''
FDNS	08ALL	2	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68287	103.4488	''P23:345:WERE:WAVS_BKRS::''
FDNS	08ALL	2	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68235	102.9403	''P23:345:WERE:WAVS_BKRS::''
FDNS	08ALL	2	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68236	101.3386	''P23:345:WERE:WAVS_BKRS::''
FDNS	08ALL	2	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68498	113.5702	'P23:345:WERE:WICH_345-116::-BUFFALOFLATS''
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68098	112.6438	'P23:345:WERE:WICH_345-116::-BUFFALOFLATS''
FDNS	08ALL	2	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68382	104.7275	'P23:345:WERE:WICH_345-116::-BUFFALOFLATS''
FDNS	08ALL	2	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68312	104.1375	'P23:345:WERE:WICH_345-116::-BUFFALOFLATS''
FDNS	08ALL	2	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68313	102.5925	'P23:345:WERE:WICH_345-116::-BUFFALOFLATS''

SOLUTION	GROUP	SCENARIO	SEASON	SOURCE	DIRECTION	MONITORED ELEMENT	RATEA (MVA)	RATEB(MVA)	TDF	TC%LOADING (% MVA)	CONTINGENCY
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68036	112.9847	''P23:345:WERE:WOLF_345-120::''
FDNS	08ALL	2	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68286	108.2644	''P23:345:WERE:WOLF_345-120::''
FDNS	08ALL	2	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68288	103.6531	''P23:345:WERE:WOLF_345-120::''
FDNS	08ALL	2	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68237	103.1493	''P23:345:WERE:WOLF_345-120::''
FDNS	08ALL	2	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68237	101.5305	''P23:345:WERE:WOLF_345-120::''
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67891	107.564	'REDBUD - RIVERSIDE STATION 345KV CKT 1'
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67891	107.564	'REDBUD - RIVERSIDE STATION 345KV CKT 1'
FDNS	08ALL	2	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68524	103.6675	'RENFROW7 345.00 - VIOLA 7 345.00 345KV CKT 1'
FDNS	08ALL	2	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68422	103.6573	'RENFROW7 345.00 - VIOLA 7 345.00 345KV CKT 1'
FDNS	08ALL	2	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68423	102.0662	'RENFROW7 345.00 - VIOLA 7 345.00 345KV CKT 1'
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67868	116.2889	'SOONER - SPRING CREEK 345KV CKT 1'
FDNS	08ALL	2	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68139	113.7511	'SOONER - SPRING CREEK 345KV CKT 1'
FDNS	08ALL	2	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68168	107.6347	'SOONER - SPRING CREEK 345KV CKT 1'
FDNS	08ALL	2	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68123	106.5789	'SOONER - SPRING CREEK 345KV CKT 1'
FDNS	08ALL	2	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68125	105.9591	'SOONER - SPRING CREEK 345KV CKT 1'
FDNS	08ALL	2	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68499	113.582	'VIOLA 7 345.00 - WICHITA 345KV CKT 1'
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68098	112.6552	'VIOLA 7 345.00 - WICHITA 345KV CKT 1'
FDNS	08ALL	2	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68383	104.767	'VIOLA 7 345.00 - WICHITA 345KV CKT 1'
FDNS	08ALL	2	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68312	104.1412	'VIOLA 7 345.00 - WICHITA 345KV CKT 1'
FDNS	08ALL	2	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68313	102.6011	'VIOLA 7 345.00 - WICHITA 345KV CKT 1'
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.64928	103.4684	'WATERLOO - WHITESB4 138.00 138KV CKT 1'
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.6771	118.7346	'WAUKOMIS - WAUKOMIS TAP 138KV CKT 1'
FDNS	08ALL	2	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67979	116.2443	'WAUKOMIS - WAUKOMIS TAP 138KV CKT 1'
FDNS	08ALL	2	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67987	111.0523	'WAUKOMIS - WAUKOMIS TAP 138KV CKT 1'
FDNS	08ALL	2	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67946	110.1448	'WAUKOMIS - WAUKOMIS TAP 138KV CKT 1'
FDNS	08ALL	2	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.67948	109.3039	'WAUKOMIS - WAUKOMIS TAP 138KV CKT 1'
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68078	111.2923	'WAUKOMIS TAP - WOODRING 138KV CKT 1'
FDNS	08ALL	2	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68316	108.2579	'WAUKOMIS TAP - WOODRING 138KV CKT 1'
FDNS	08ALL	2	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68317	103.8843	'WAUKOMIS TAP - WOODRING 138KV CKT 1'
FDNS	08ALL	2	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68275	103.378	'WAUKOMIS TAP - WOODRING 138KV CKT 1'
FDNS	08ALL	2	26SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68276	102.1365	'WAUKOMIS TAP - WOODRING 138KV CKT 1'
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68035	112.6183	'WAVERLY7 345.00 - WOLF CREEK 345KV CKT 1'
FDNS	08ALL	2	18G	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68285	107.9396	'WAVERLY7 345.00 - WOLF CREEK 345KV CKT 1'
FDNS	08ALL	2	18SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68287	103.3147	'WAVERLY7 345.00 - WOLF CREEK 345KV CKT 1'
FDNS	08ALL	2	21SP	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.68235	102.8094	'WAVERLY7 345.00 - WOLF CREEK 345KV CKT 1'
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'COTTONWOOD CREEK - G16-032-TAP 138.00 138KV CKT 1'	194	222	0.72166	106.3176	'WOODRING (WOODRNG2) 345/138/13.8KV TRANSFORMER CKT 1'
FDNS	08ALL	2	21L	G16_032	'TO->FROM'	'LACYGNE - WAVERLY7 345.00 345KV CKT 1'	1141	1254	0.0341	103.5676	System Intact
FDNSLock-Blown up	09ALL	0	17WP	G16_043		Non-Converged	0	0	0.07466	9999	''P42:345:NPPD:BKR-CPR-3310''
FDNSLock-Blown up	09ALL	0	18G	G16_043		Non-Converged	0	0	0.06948	9999	''P42:345:NPPD:BKR-CPR-3310''
FDNSLock-Blown up	09ALL	0	18SP	G16_043		Non-Converged	0	0	0.0743	9999	''P42:345:NPPD:BKR-CPR-3310''
FDNSLock-Blown up	09ALL	0	17WP	G16_043		Non-Converged	0	0	0.04613	9999	''P42:345:UMZB:# 2494 #: LO IN ND. STUCK BREAKER (2196)''
FDNSLock-Blown up	09ALL	0	21WP	G16_043		Non-Converged	0	0	0.04176	9999	''P42:345:UMZB:# 2494 #: LO IN ND. STUCK BREAKER (2196)''
FDNSLock-Blown up	09ALL	0	17WP	G16_043		Non-Converged	0	0	0.04613	9999	''P42:345:UMZB:# 2495 #: LO IN ND. STUCK BREAKER (2396)''
FDNSLock-Blown up	09ALL	0	21WP	G16_043		Non-Converged	0	0	0.04176	9999	''P42:345:UMZB:# 2495 #: LO IN ND. STUCK BREAKER (2396)''
FDNSLock-Blown up	09ALL	0	18SP	G16_050		Non-Converged	0	0	0.19319	9999	''P23:345:UMZW:# 2425 #: GI IN NE. GI 1196 BKR FAULT''
FDNSLock-Blown up	09ALL	0	18SP	G16_050		Non-Converged	0	0	0.19319	9999	''P23:345:UMZW:# 2428 #: GI IN NE. GI 1192 BKR FAULT''
FDNSLock-Blown up	09ALL	0	18SP	G16_050		Non-Converged	0	0	0.19319	9999	''P23:345:UMZW:# 2438 #: GI IN NE. GI-SWEET LINE FAULT & GI 1492 STUCK BKR''
FDNSLock-Blown up	09ALL	0	18SP	G16_050		Non-Converged	0	0	0.19319	9999	''P23:345:UMZW:# 2445 #: GI IN NE. GI KU1A TRANSFORMER FAULT & GI 1396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	18SP	G16_050		Non-Converged	0	0	0.19319	9999	''P23:345:UMZW:# 2446 #: GI IN NE. GI-FT2 LINE FAULT & GI 1196 STUCK BKR''
FDNSLock-Blown up	09ALL	0	17WP	G16_050		Non-Converged	0	0	0.3224	9999	''P23:345:UMZW:# 821 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	18G	G16_050		Non-Converged	0	0	0.32733	9999	''P23:345:UMZW:# 821 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	18SP	G16_050		Non-Converged	0	0	0.3123	9999	''P23:345:UMZW:# 821 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	21L	G16_050		Non-Converged	0	0	0.37131	9999	''P23:345:UMZW:# 821 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	21SP	G16_050		Non-Converged	0	0	0.334	9999	''P23:345:UMZW:# 821 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	21WP	G16_050		Non-Converged	0	0	0.34216	9999	''P23:345:UMZW:# 821 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	26SP	G16_050		Non-Converged	0	0	0.33526	9999	''P23:345:UMZW:# 821 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	17WP	G16_050		Non-Converged	0	0	0.3224	9999	''P23:345:UMZW:# 822 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	18G	G16_050		Non-Converged	0	0	0.32733	9999	''P23:345:UMZW:# 822 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	18SP	G16_050		Non-Converged	0	0	0.3123	9999	''P23:345:UMZW:# 822 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	21L	G16_050		Non-Converged	0	0	0.37131	9999	''P23:345:UMZW:# 822 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	21SP	G16_050		Non-Converged	0	0	0.334	9999	''P23:345:UMZW:# 822 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	21WP	G16_050		Non-Converged	0	0	0.34216	9999	''P23:345:UMZW:# 822 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	26SP	G16_050		Non-Converged	0	0	0.33526	9999	''P23:345:UMZW:# 822 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	17WP	G16_050		Non-Converged	0	0	0.09605	9999	''P42:345:NPPD:BKR-CPR-3310''
FDNSLock-Blown up	09ALL	0	18G	G16_050		Non-Converged	0	0	0.09078	9999	''P42:345:NPPD:BKR-CPR-3310''
FDNSLock-Blown up	09ALL	0	18SP	G16_050		Non-Converged	0	0	0.09521	9999	''P42:345:NPPD:BKR-CPR-3310''
FDNSLock-Blown up	09ALL	0	17WP	G16_050		Non-Converged	0	0	0.06934	9999	''P42:345:UMZB:# 2494 #: LO IN ND. STUCK BREAKER (2196)''
FDNSLock-Blown up	09ALL	0	21WP	G16_050		Non-Converged	0	0	0.07333	9999	''P42:345:UMZB:# 2494 #: LO IN ND. STUCK BREAKER (2196)''
FDNSLock-Blown up	09ALL	0	17WP	G16_050		Non-Converged	0	0	0.06934	9999	''P42:345:UMZB:# 2495 #: LO IN ND. STUCK BREAKER (2396)''
FDNSLock-Blown up	09ALL	0	21WP	G16_050		Non-Converged	0	0	0.07333	9999	''P42:345:UMZB:# 2495 #: LO IN ND. STUCK BREAKER (2396)''
FDNSLock-Blown up	09ALL	0	17WP	G16_050		Non-Converged	0	0	0.3224	9999	''P42:345:UMZW:# 2435 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1392 STUCK BKR''
FDNSLock-Blown up	09ALL	0	18G	G16_050		Non-Converged	0	0	0.32733	9999	''P42:345:UMZW:# 2435 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1392 STUCK BKR''
FDNSLock-Blown up	09ALL	0	18SP	G16_050		Non-Converged	0	0	0.3123	9999	''P42:345:UMZW:# 2435 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1392 STUCK BKR''
FDNSLock-Blown up	09ALL	0	21L	G16_050		Non-Converged	0	0	0.37131	9999	''P42:345:UMZW:# 2435 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1392 STUCK BKR''
FDNSLock-Blown up	09ALL	0	21SP	G16_050		Non-Converged	0	0	0.334	9999	''P42:345:UMZW:# 2435 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1392 STUCK BKR''
FDNSLock-Blown up	09ALL	0	21WP	G16_050		Non-Converged	0	0	0.34216	9999	''P42:345:UMZW:# 2435 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1392 STUCK BKR''
FDNSLock-Blown up	09ALL	0	26SP	G16_050		Non-Converged	0	0	0.33526	9999	''P42:345:UMZW:# 2435 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1392 STUCK BKR''
FDNSLock-Blown up	09ALL	0	17WP	G16_050		Non-Converged	0	0	0.3224	9999	''P42:345:UMZW:# 2442 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	18G	G16_050		Non-Converged	0	0	0.32733	9999	''P42:345:UMZW:# 2442 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	18SP	G16_050		Non-Converged	0	0	0.3123	9999	''P42:345:UMZW:# 2442 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	21L	G16_050		Non-Converged	0	0	0.37131	9999	''P42:345:UMZW:# 2442 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	21SP	G16_050		Non-Converged	0	0	0.334	9999	''P42:345:UMZW:# 2442 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	21WP	G16_050		Non-Converged	0	0	0.34216	9999	''P42:345:UMZW:# 2442 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	26SP	G16_050		Non-Converged	0	0	0.33526	9999	''P42:345:UMZW:# 2442 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	17WP	G16_050		Non-Converged	0	0	0.3224	9999	''P43:345:UMZW:# 2420 #: FT2 IN SD. FT2 KU1B TRANSFORMER FAULT & FT2 3396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	18G	G16_050		Non-Converged	0	0	0.32733	9999	''P43:345:UMZW:# 2420 #: FT2 IN SD. FT2 KU1B TRANSFORMER FAULT & FT2 3396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	18SP	G16_050		Non-Converged	0	0	0.3123	9999	''P43:345:UMZW:# 2420 #: FT2 IN SD. FT2 KU1B TRANSFORMER FAULT & FT2 3396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	21L	G16_050		Non-Converged	0	0	0.37131	9999	''P43:345:UMZW:# 2420 #: FT2 IN SD. FT2 KU1B TRANSFORMER FAULT & FT2 3396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	21SP	G16_050		Non-Converged	0	0	0.334	9999	''P43:345:UMZW:# 2420 #: FT2 IN SD. FT2 KU1B TRANSFORMER FAULT & FT2 3396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	21WP	G16_050		Non-Converged	0	0	0.34216	9999	''P43:345:UMZW:# 2420 #: FT2 IN SD. FT2 KU1B TRANSFORMER FAULT & FT2 3396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	26SP	G16_050		Non-Converged	0	0	0.33526	9999	''P43:345:UMZW:# 2420 #: FT2 IN SD. FT2 KU1B TRANSFORMER FAULT & FT2 3396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	17WP	G16_050		Non-Converged	0	0	0.3224	9999	''P43:345:UMZW:# 2434 #: GI IN NE. GI KU1B TRANSFORMER FAULT & GI 1592 STUCK BKR''
FDNSLock-Blown up	09ALL	0	18G	G16_050		Non-Converged	0	0	0.32733	9999	''P43:345:UMZW:# 2434 #: GI IN NE. GI KU1B TRANSFORMER FAULT & GI 1592 STUCK BKR''
FDNSLock-Blown up	09ALL	0	18SP	G16_050		Non-Converged	0	0	0.3123	9999	''P43:345:UMZW:# 2434 #: GI IN NE. GI KU1B TRANSFORMER FAULT & GI 1592 STUCK BKR''
FDNSLock-Blown up	09ALL	0	21L	G16_050		Non-Converged	0	0	0.37131	9999	''P43:345:UMZW:# 2434 #: GI IN NE. GI KU1B TRANSFORMER FAULT & GI 1592 STUCK BKR''

SOLUTION	GROUP	SCENARIO	SEASON	SOURCE	DIRECTION	MONITORED ELEMENT	RATEA (MVA)	RATEB(MVA)	TDF	TC%LOADING (% MVA)	CONTINGENCY
FDNSLock-Blown up	09ALL	0	21SP	G16_050		Non-Converged	0	0	0.334	9999	''P43:345:UMZW:# 2434 #: GI IN NE. GI KU1B TRANSFORMER FAULT & GI 1592 STUCK BKR''
FDNSLock-Blown up	09ALL	0	21WP	G16_050		Non-Converged	0	0	0.34216	9999	''P43:345:UMZW:# 2434 #: GI IN NE. GI KU1B TRANSFORMER FAULT & GI 1592 STUCK BKR''
FDNSLock-Blown up	09ALL	0	26SP	G16_050		Non-Converged	0	0	0.33526	9999	''P43:345:UMZW:# 2434 #: GI IN NE. GI KU1B TRANSFORMER FAULT & GI 1592 STUCK BKR''
FDNSLock-Blown up	09ALL	0	18SP	G16_050		Non-Converged	0	0	0.19319	9999	''P44:345:UMZW:# 2436 #: GF IN NE. GI KU4B SW SHUNT FAULT & GI 1192 STUCK BKR''
FDNSLock-Blown up	09ALL	0	18SP	G16_050		Non-Converged	0	0	0.19319	9999	''P44:345:UMZW:# 2443 #: GF IN NE. GI KU4B SW SHUNT FAULT & GI 1196 STUCK BKR''
FDNSLock-Blown up	09ALL	0	18SP	G16_050		Non-Converged	0	0	0.19319	9999	''P45:345:UMZW:# 1999 #: WHT IN SD. WHT 345 KV S BUS FAULT''
FDNS	08ALL	0	17WP	G16_061	'FROM->TO'	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'	1192	1192	0.29771	107.1802	'NORTHWEST - SPRING CREEK 345KV CKT 1'
FDNS	08ALL	0	18G	G16_061	'FROM->TO'	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'	1192	1192	0.29815	107.0686	'NORTHWEST - SPRING CREEK 345KV CKT 1'
FDNS	08ALL	0	21L	G16_061	'FROM->TO'	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'	1192	1192	0.28515	100.8835	'NORTHWEST - SPRING CREEK 345KV CKT 1'
FDNS	08ALL	0	17WP	G16_061	'FROM->TO'	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'	1192	1192	0.30337	106.1684	'P23:345:WERE:WICH_345-116::-BUFFALOFLATS''
FDNS	08ALL	0	18G	G16_061	'FROM->TO'	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'	1192	1192	0.30255	106.0454	'P23:345:WERE:WICH_345-116::-BUFFALOFLATS''
FDNS	08ALL	0	17WP	G16_061	'FROM->TO'	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'	1192	1192	0.29771	107.1948	'SOONER - SPRING CREEK 345KV CKT 1'
FDNS	08ALL	0	18G	G16_061	'FROM->TO'	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'	1192	1192	0.29815	107.0835	'SOONER - SPRING CREEK 345KV CKT 1'
FDNS	08ALL	0	21L	G16_061	'FROM->TO'	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'	1192	1192	0.28515	101.0678	'SOONER - SPRING CREEK 345KV CKT 1'
FDNS	08ALL	0	17WP	G16_061	'FROM->TO'	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'	1192	1192	0.30339	106.4011	'VIOLA 7 345.00 - WICHITA 345KV CKT 1'
FDNS	08ALL	0	18G	G16_061	'FROM->TO'	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'	1192	1192	0.30259	106.2736	'VIOLA 7 345.00 - WICHITA 345KV CKT 1'
FDNS	08ALL	0	21L	G16_061	'TO->FROM'	'LACYGNE - WAVERLY7 345.00 345KV CKT 1'	1141	1254	0.04654	103.5676	System Intact
FDNS	08ALL	2	17WP	G16_061	'FROM->TO'	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'	1192	1192	0.29771	107.1802	'NORTHWEST - SPRING CREEK 345KV CKT 1'
FDNS	08ALL	2	18G	G16_061	'FROM->TO'	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'	1192	1192	0.29815	107.0686	'NORTHWEST - SPRING CREEK 345KV CKT 1'
FDNS	08ALL	2	21L	G16_061	'FROM->TO'	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'	1192	1192	0.28515	100.8835	'NORTHWEST - SPRING CREEK 345KV CKT 1'
FDNS	08ALL	2	17WP	G16_061	'FROM->TO'	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'	1192	1192	0.30337	106.1684	'P23:345:WERE:WICH_345-116::-BUFFALOFLATS''
FDNS	08ALL	2	18G	G16_061	'FROM->TO'	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'	1192	1192	0.30255	106.0454	'P23:345:WERE:WICH_345-116::-BUFFALOFLATS''
FDNS	08ALL	2	17WP	G16_061	'FROM->TO'	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'	1192	1192	0.29771	107.1948	'SOONER - SPRING CREEK 345KV CKT 1'
FDNS	08ALL	2	18G	G16_061	'FROM->TO'	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'	1192	1192	0.29815	107.0835	'SOONER - SPRING CREEK 345KV CKT 1'
FDNS	08ALL	2	21L	G16_061	'FROM->TO'	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'	1192	1192	0.28515	101.0678	'SOONER - SPRING CREEK 345KV CKT 1'
FDNS	08ALL	2	17WP	G16_061	'FROM->TO'	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'	1192	1192	0.30339	106.4011	'VIOLA 7 345.00 - WICHITA 345KV CKT 1'
FDNS	08ALL	2	18G	G16_061	'FROM->TO'	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'	1192	1192	0.30259	106.2736	'VIOLA 7 345.00 - WICHITA 345KV CKT 1'
FDNS	08ALL	2	21L	G16_061	'TO->FROM'	'LACYGNE - WAVERLY7 345.00 345KV CKT 1'	1141	1254	0.04654	103.5676	System Intact
FDNS	08ALL	0	17WP	G16_068	'FROM->TO'	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'	1192	1192	0.37668	107.1802	'NORTHWEST - SPRING CREEK 345KV CKT 1'
FDNS	08ALL	0	18G	G16_068	'FROM->TO'	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'	1192	1192	0.37712	107.0686	'NORTHWEST - SPRING CREEK 345KV CKT 1'
FDNS	08ALL	0	21L	G16_068	'FROM->TO'	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'	1192	1192	0.36499	100.8835	'NORTHWEST - SPRING CREEK 345KV CKT 1'
FDNS	08ALL	0	17WP	G16_068	'FROM->TO'	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'	1192	1192	0.42776	106.1684	'P23:345:WERE:WICH_345-116::-BUFFALOFLATS''
FDNS	08ALL	0	18G	G16_068	'FROM->TO'	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'	1192	1192	0.42694	106.0454	'P23:345:WERE:WICH_345-116::-BUFFALOFLATS''
FDNS	08ALL	0	17WP	G16_068	'FROM->TO'	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'	1192	1192	0.37668	107.1948	'SOONER - SPRING CREEK 345KV CKT 1'
FDNS	08ALL	0	18G	G16_068	'FROM->TO'	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'	1192	1192	0.37712	107.0835	'SOONER - SPRING CREEK 345KV CKT 1'
FDNS	08ALL	0	21L	G16_068	'FROM->TO'	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'	1192	1192	0.36499	101.0678	'SOONER - SPRING CREEK 345KV CKT 1'
FDNS	08ALL	0	17WP	G16_068	'FROM->TO'	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'	1192	1192	0.42784	106.4011	'VIOLA 7 345.00 - WICHITA 345KV CKT 1'
FDNS	08ALL	0	18G	G16_068	'FROM->TO'	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'	1192	1192	0.42704	106.2736	'VIOLA 7 345.00 - WICHITA 345KV CKT 1'
FDNS	08ALL	0	21L	G16_068	'TO->FROM'	'LACYGNE - WAVERLY7 345.00 345KV CKT 1'	1141	1254	0.04591	103.5676	System Intact
FDNS	08ALL	2	17WP	G16_068	'FROM->TO'	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'	1192	1192	0.37668	107.1802	'NORTHWEST - SPRING CREEK 345KV CKT 1'
FDNS	08ALL	2	18G	G16_068	'FROM->TO'	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'	1192	1192	0.37712	107.0686	'NORTHWEST - SPRING CREEK 345KV CKT 1'
FDNS	08ALL	2	21L	G16_068	'FROM->TO'	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'	1192	1192	0.36499	100.8835	'NORTHWEST - SPRING CREEK 345KV CKT 1'
FDNS	08ALL	2	17WP	G16_068	'FROM->TO'	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'	1192	1192	0.42776	106.1684	'P23:345:WERE:WICH_345-116::-BUFFALOFLATS''
FDNS	08ALL	2	18G	G16_068	'FROM->TO'	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'	1192	1192	0.42694	106.0454	'P23:345:WERE:WICH_345-116::-BUFFALOFLATS''
FDNS	08ALL	2	17WP	G16_068	'FROM->TO'	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'	1192	1192	0.37668	107.1948	'SOONER - SPRING CREEK 345KV CKT 1'
FDNS	08ALL	2	18G	G16_068	'FROM->TO'	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'	1192	1192	0.37712	107.0835	'SOONER - SPRING CREEK 345KV CKT 1'
FDNS	08ALL	2	21L	G16_068	'FROM->TO'	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'	1192	1192	0.36499	101.0678	'SOONER - SPRING CREEK 345KV CKT 1'
FDNS	08ALL	2	17WP	G16_068	'FROM->TO'	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'	1192	1192	0.42784	106.4011	'VIOLA 7 345.00 - WICHITA 345KV CKT 1'
FDNS	08ALL	2	18G	G16_068	'FROM->TO'	'G15063_T 345.00 - MATHWSN7 345.00 345KV CKT 1'	1192	1192	0.42704	106.2736	'VIOLA 7 345.00 - WICHITA 345KV CKT 1'
FDNS	08ALL	2	21L	G16_068	'TO->FROM'	'LACYGNE - WAVERLY7 345.00 345KV CKT 1'	1141	1254	0.04591	103.5676	System Intact
FDNS	08ALL	0	21L	G16_071	'TO->FROM'	'LACYGNE - WAVERLY7 345.00 345KV CKT 1'	1141	1254	0.06639	103.5676	System Intact
FDNS	08ALL	2	21L	G16_071	'TO->FROM'	'LACYGNE - WAVERLY7 345.00 345KV CKT 1'	1141	1254	0.06639	103.5676	System Intact
FDNS	08ALL	0	21L	G16_073	'TO->FROM'	'LACYGNE - WAVERLY7 345.00 345KV CKT 1'	1141	1254	0.07313	103.5676	System Intact
FDNSLock-Blown up	08ALL	0	18SP	G16_073		Non-Converged	0	0	0.04993	9999	''P23:345:WERE:JEC_345-16::''
FDNS	08ALL	2	21L	G16_073	'TO->FROM'	'LACYGNE - WAVERLY7 345.00 345KV CKT 1'	1141	1254	0.07313	103.5676	System Intact
FDNS	09ALL	0	17WP	G16_075	'TO->FROM'	'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z'	720	720	1	111.1231	'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z'
FDNS	09ALL	0	17WP	G16_075	'TO->FROM'	'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z'	720	720	1	111.1231	'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z'
FDNS	09ALL	0	17WP	G16_075	'TO->FROM'	'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z'	720	720	1	111.6685	''P23:345:UMZW:# 2425 #: GI IN NE. GI 1196 BKR FAULT''
FDNSLock	09ALL	0	18G	G16_075	'TO->FROM'	'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z'	720	720	1	110.916	''P23:345:UMZW:# 2425 #: GI IN NE. GI 1196 BKR FAULT''
FDNS	09ALL	0	17WP	G16_075	'TO->FROM'	'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z'	720	720	1	111.6685	''P23:345:UMZW:# 2427 #: GI IN NE. GI 1392 BKR FAULT''
FDNS	09ALL	0	17WP	G16_075	'TO->FROM'	'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z'	720	720	1	111.6685	''P23:345:UMZW:# 2428 #: GI IN NE. GI 1192 BKR FAULT''
FDNSLock	09ALL	0	18G	G16_075	'TO->FROM'	'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z'	720	720	1	110.916	''P23:345:UMZW:# 2428 #: GI IN NE. GI 1192 BKR FAULT''
FDNS	09ALL	0	17WP	G16_075	'TO->FROM'	'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z'	720	720	1	111.6685	''P23:345:UMZW:# 2438 #: GI IN NE. GI-SWEET LINE FAULT & GI 1492 STUCK BKR''
FDNSLock	09ALL	0	18G	G16_075	'TO->FROM'	'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z'	720	720	1	110.916	''P23:345:UMZW:# 2438 #: GI IN NE. GI-SWEET LINE FAULT & GI 1492 STUCK BKR''
FDNS	09ALL	0	17WP	G16_075	'TO->FROM'	'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z'	720	720	1	111.6685	''P23:345:UMZW:# 2445 #: GI IN NE. GI KU1A TRANSFORMER FAULT & GI 1396 STUCK BKR''
FDNSLock	09ALL	0	18G	G16_075	'TO->FROM'	'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z'	720	720	1	110.916	''P23:345:UMZW:# 2445 #: GI IN NE. GI KU1A TRANSFORMER FAULT & GI 1396 STUCK BKR''
FDNS	09ALL	0	17WP	G16_075	'TO->FROM'	'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z'	720	720	1	111.6685	''P23:345:UMZW:# 2446 #: GI IN NE. GI-FT2 LINE FAULT & GI 1196 STUCK BKR''
FDNSLock	09ALL	0	18G	G16_075	'TO->FROM'	'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z'	720	720	1	110.916	''P23:345:UMZW:# 2446 #: GI IN NE. GI-FT2 LINE FAULT & GI 1196 STUCK BKR''
FDNS	09ALL	0	17WP	G16_075	'TO->FROM'	'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z'	720	720	1	111.6685	''P23:345:UMZW:# 628 #: BEF IN ND. BREAKER FAULT (396; 492; 292)''
FDNS	09ALL	0	17WP	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.41897	104.3659	'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z'
FDNS	09ALL	0	17WP	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.41897	108.232	'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z'
FDNS	09ALL	0	17WP	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.41897	108.232	'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z'
FDNS	09ALL	0	17WP	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.41897	104.3659	'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z'
FDNS	09ALL	0	17WP	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.41894	104.4581	''P23:345:UMZW:# 2425 #: GI IN NE. GI 1196 BKR FAULT''
FDNS	09ALL	0	17WP	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.41894	108.4109	''P23:345:UMZW:# 2425 #: GI IN NE. GI 1196 BKR FAULT''
FDNSLock	09ALL	0	18G	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.41819	111.4926	''P23:345:UMZW:# 2425 #: GI IN NE. GI 1196 BKR FAULT''
FDNSLock	09ALL	0	18G	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.41819	117.6816	''P23:345:UMZW:# 2425 #: GI IN NE. GI 1196 BKR FAULT''
FDNS	09ALL	0	17WP	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.41894	104.4581	''P23:345:UMZW:# 2427 #: GI IN NE. GI 1392 BKR FAULT''
FDNS	09ALL	0	17WP	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.41894	108.4109	''P23:345:UMZW:# 2427 #: GI IN NE. GI 1392 BKR FAULT''
FDNS	09ALL	0	17WP	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.41894	108.4109	''P23:345:UMZW:# 2428 #: GI IN NE. GI 1192 BKR FAULT''
FDNS	09ALL	0	17WP	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.41894	104.4581	''P23:345:UMZW:# 2428 #: GI IN NE. GI 1192 BKR FAULT''
FDNSLock	09ALL	0	18G	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.41819	111.4926	''P23:345:UMZW:# 2428 #: GI IN NE. GI 1192 BKR FAULT''
FDNSLock	09ALL	0	18G	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.41819	117.6816	''P23:345:UMZW:# 2428 #: GI IN NE. GI 1192 BKR FAULT''
FDNS	09ALL	0	17WP	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.41894	104.4581	''P23:345:UMZW:# 2438 #: GI IN NE. GI-SWEET LINE FAULT & GI 1492 STUCK BKR''
FDNS	09ALL	0	17WP	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.41894	108.4109	''P23:345:UMZW:# 2438 #: GI IN NE. GI-SWEET LINE FAULT & GI 1492 STUCK BKR''
FDNSLock	09ALL	0	18G	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.41819	111.4926	''P23:345:UMZW:# 2438 #: GI IN NE. GI-SWEET LINE FAULT & GI 1492 STUCK BKR''
FDNSLock	09ALL	0	18G	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.41819	117.6816	''P23:345:UMZW:# 2438 #: GI IN NE. GI-SWEET LINE FAULT & GI 1492 STUCK BKR''
FDNS	09ALL	0	17WP	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.41894	108.4109	''P23:345:UMZW:# 2445 #: GI IN NE. GI KU1A TRANSFORMER FAULT & GI 1396 STUCK BKR''
FDNS	09ALL	0	17WP	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.41894	104.4581	''P23:345:UMZW:# 2445 #: GI IN NE. GI KU1A TRANSFORMER FAULT & GI 1396 STUCK BKR''
FDNSLock	09ALL	0	18G	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.41819	111.4926	''P23:345:UMZW:# 2445 #: GI IN NE. GI KU1A TRANSFORMER FAULT & GI 1396 STUCK BKR''
FDNSLock	09ALL	0	18G	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.41819	117.6816	''P23:345:UMZW:# 2445 #: GI IN NE. GI KU1A TRANSFORMER FAULT & GI 1396 STUCK BKR''
FDNS	09ALL	0	17WP	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.41894	108.4109	''P23:345:UMZW:# 2446 #: GI IN NE. GI-FT2 LINE FAULT & GI 1196 STUCK BKR''
FDNS	09ALL	0	17WP	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.41894	104.4581	''P23:345:UMZW:# 2446 #: GI IN NE. GI-FT2 LINE FAULT & GI 1196 STUCK BKR''
FDNSLock	09ALL	0	18G	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.41819	117.6816	''P23:345:UMZW:# 2446 #: GI IN NE. GI-FT2 LINE FAULT & GI 1196 STUCK BKR''
FDNSLock	09ALL	0	18G	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.41819	111.4926	''P23:345:UMZW:# 2446 #: GI IN NE. GI-FT2 LINE FAULT & GI 1196 STUCK BKR''

SOLUTION	GROUP	SCENARIO	SEASON	SOURCE	DIRECTION	MONITORED ELEMENT	RATEA (MVA)	RATEB(MVA)	TDF	TC%LOADING (% MVA)	CONTINGENCY
FDNS	09ALL	0	17WP	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.41894	104.4581	''P23:345:UMZW:# 628 #: BEF IN ND. BREAKER FAULT (396; 492; 292)''
FDNS	09ALL	0	17WP	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.41894	108.4109	''P23:345:UMZW:# 628 #: BEF IN ND. BREAKER FAULT (396; 492; 292)''
FDNS	09ALL	0	17WP	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.4196	104.5236	'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z'
FDNS	09ALL	0	17WP	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.4196	108.3957	'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z'
FDNS	09ALL	0	17WP	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.4196	108.3957	'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z'
FDNS	09ALL	0	17WP	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.4196	104.5236	'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z'
FDNS	09ALL	0	17WP	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.41957	104.6159	''P23:345:UMZW:# 2425 #: GI IN NE. GI 1196 BKR FAULT''
FDNS	09ALL	0	17WP	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.41957	108.5749	''P23:345:UMZW:# 2425 #: GI IN NE. GI 1196 BKR FAULT''
FDNSLock	09ALL	0	18G	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.41882	115.4464	''P23:345:UMZW:# 2425 #: GI IN NE. GI 1196 BKR FAULT''
FDNSLock	09ALL	0	18G	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.41882	111.4279	''P23:345:UMZW:# 2425 #: GI IN NE. GI 1196 BKR FAULT''
FDNS	09ALL	0	17WP	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.41957	104.6159	''P23:345:UMZW:# 2427 #: GI IN NE. GI 1392 BKR FAULT''
FDNS	09ALL	0	17WP	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.41957	108.5749	''P23:345:UMZW:# 2427 #: GI IN NE. GI 1392 BKR FAULT''
FDNS	09ALL	0	17WP	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.41957	104.6159	''P23:345:UMZW:# 2428 #: GI IN NE. GI 1192 BKR FAULT''
FDNS	09ALL	0	17WP	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.41957	108.5749	''P23:345:UMZW:# 2428 #: GI IN NE. GI 1192 BKR FAULT''
FDNSLock	09ALL	0	18G	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.41882	111.4279	''P23:345:UMZW:# 2428 #: GI IN NE. GI 1192 BKR FAULT''
FDNSLock	09ALL	0	18G	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.41882	115.4464	''P23:345:UMZW:# 2428 #: GI IN NE. GI 1192 BKR FAULT''
FDNS	09ALL	0	17WP	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.41957	108.5749	''P23:345:UMZW:# 2438 #: GI IN NE. GI-SWEET LINE FAULT & GI 1492 STUCK BKR''
FDNS	09ALL	0	17WP	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.41957	104.6159	''P23:345:UMZW:# 2438 #: GI IN NE. GI-SWEET LINE FAULT & GI 1492 STUCK BKR''
FDNSLock	09ALL	0	18G	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.41882	111.4279	''P23:345:UMZW:# 2438 #: GI IN NE. GI-SWEET LINE FAULT & GI 1492 STUCK BKR''
FDNSLock	09ALL	0	18G	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.41882	115.4464	''P23:345:UMZW:# 2438 #: GI IN NE. GI-SWEET LINE FAULT & GI 1492 STUCK BKR''
FDNS	09ALL	0	17WP	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.41957	104.6159	''P23:345:UMZW:# 2445 #: GI IN NE. GI KU1A TRANSFORMER FAULT & GI 1396 STUCK BKR''
FDNS	09ALL	0	17WP	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.41957	108.5749	''P23:345:UMZW:# 2445 #: GI IN NE. GI KU1A TRANSFORMER FAULT & GI 1396 STUCK BKR''
FDNSLock	09ALL	0	18G	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.41882	111.4279	''P23:345:UMZW:# 2445 #: GI IN NE. GI KU1A TRANSFORMER FAULT & GI 1396 STUCK BKR''
FDNSLock	09ALL	0	18G	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.41882	115.4464	''P23:345:UMZW:# 2445 #: GI IN NE. GI KU1A TRANSFORMER FAULT & GI 1396 STUCK BKR''
FDNS	09ALL	0	17WP	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.41957	108.5749	''P23:345:UMZW:# 2446 #: GI IN NE. GI-FT2 LINE FAULT & GI 1196 STUCK BKR''
FDNS	09ALL	0	17WP	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.41957	104.6159	''P23:345:UMZW:# 2446 #: GI IN NE. GI-FT2 LINE FAULT & GI 1196 STUCK BKR''
FDNSLock	09ALL	0	18G	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.41882	115.4464	''P23:345:UMZW:# 2446 #: GI IN NE. GI-FT2 LINE FAULT & GI 1196 STUCK BKR''
FDNSLock	09ALL	0	18G	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.41882	111.4279	''P23:345:UMZW:# 2446 #: GI IN NE. GI-FT2 LINE FAULT & GI 1196 STUCK BKR''
FDNS	09ALL	0	17WP	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.41957	104.6159	''P23:345:UMZW:# 628 #: BEF IN ND. BREAKER FAULT (396; 492; 292)''
FDNS	09ALL	0	17WP	G16_075	'FROM->TO'	'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1'	250	313	0.41957	108.5749	''P23:345:UMZW:# 628 #: BEF IN ND. BREAKER FAULT (396; 492; 292)''
FDNS	09ALL	0	17WP	G16_075	'TO->FROM'	'FTTHOM2-LNX3345.00 - GRPRAR2-LNX3345.00 345KV CKT 1'	720	720	1	109.258	'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z'
FDNS	09ALL	0	17WP	G16_075	'TO->FROM'	'FTTHOM2-LNX3345.00 - GRPRAR2-LNX3345.00 345KV CKT 1'	720	720	1	109.258	'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z'
FDNS	09ALL	0	17WP	G16_075	'TO->FROM'	'FTTHOM2-LNX3345.00 - GRPRAR2-LNX3345.00 345KV CKT 1'	720	720	1	109.806	''P23:345:UMZW:# 2425 #: GI IN NE. GI 1196 BKR FAULT''
FDNSLock	09ALL	0	18G	G16_075	'TO->FROM'	'FTTHOM2-LNX3345.00 - GRPRAR2-LNX3345.00 345KV CKT 1'	720	720	1	109.047	''P23:345:UMZW:# 2425 #: GI IN NE. GI 1196 BKR FAULT''
FDNS	09ALL	0	17WP	G16_075	'TO->FROM'	'FTTHOM2-LNX3345.00 - GRPRAR2-LNX3345.00 345KV CKT 1'	720	720	1	109.806	''P23:345:UMZW:# 2427 #: GI IN NE. GI 1392 BKR FAULT''
FDNS	09ALL	0	17WP	G16_075	'TO->FROM'	'FTTHOM2-LNX3345.00 - GRPRAR2-LNX3345.00 345KV CKT 1'	720	720	1	109.806	''P23:345:UMZW:# 2428 #: GI IN NE. GI 1192 BKR FAULT''
FDNSLock	09ALL	0	18G	G16_075	'TO->FROM'	'FTTHOM2-LNX3345.00 - GRPRAR2-LNX3345.00 345KV CKT 1'	720	720	1	109.047	''P23:345:UMZW:# 2428 #: GI IN NE. GI 1192 BKR FAULT''
FDNS	09ALL	0	17WP	G16_075	'TO->FROM'	'FTTHOM2-LNX3345.00 - GRPRAR2-LNX3345.00 345KV CKT 1'	720	720	1	109.806	''P23:345:UMZW:# 2438 #: GI IN NE. GI-SWEET LINE FAULT & GI 1492 STUCK BKR''
FDNSLock	09ALL	0	18G	G16_075	'TO->FROM'	'FTTHOM2-LNX3345.00 - GRPRAR2-LNX3345.00 345KV CKT 1'	720	720	1	109.047	''P23:345:UMZW:# 2438 #: GI IN NE. GI-SWEET LINE FAULT & GI 1492 STUCK BKR''
FDNS	09ALL	0	17WP	G16_075	'TO->FROM'	'FTTHOM2-LNX3345.00 - GRPRAR2-LNX3345.00 345KV CKT 1'	720	720	1	109.806	''P23:345:UMZW:# 2445 #: GI IN NE. GI KU1A TRANSFORMER FAULT & GI 1396 STUCK BKR''
FDNSLock	09ALL	0	18G	G16_075	'TO->FROM'	'FTTHOM2-LNX3345.00 - GRPRAR2-LNX3345.00 345KV CKT 1'	720	720	1	109.047	''P23:345:UMZW:# 2445 #: GI IN NE. GI KU1A TRANSFORMER FAULT & GI 1396 STUCK BKR''
FDNS	09ALL	0	17WP	G16_075	'TO->FROM'	'FTTHOM2-LNX3345.00 - GRPRAR2-LNX3345.00 345KV CKT 1'	720	720	1	109.806	''P23:345:UMZW:# 2446 #: GI IN NE. GI-FT2 LINE FAULT & GI 1196 STUCK BKR''
FDNSLock	09ALL	0	18G	G16_075	'TO->FROM'	'FTTHOM2-LNX3345.00 - GRPRAR2-LNX3345.00 345KV CKT 1'	720	720	1	109.047	''P23:345:UMZW:# 2446 #: GI IN NE. GI-FT2 LINE FAULT & GI 1196 STUCK BKR''
FDNS	09ALL	0	17WP	G16_075	'TO->FROM'	'FTTHOM2-LNX3345.00 - GRPRAR2-LNX3345.00 345KV CKT 1'	720	720	1	109.806	''P23:345:UMZW:# 628 #: BEF IN ND. BREAKER FAULT (396; 492; 292)''
FDNS	09ALL	0	17WP	G16_075	'FROM->TO'	'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z'	720	720	1	106.1333	'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z'
FDNS	09ALL	0	18G	G16_075	'FROM->TO'	'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z'	720	720	1	105.5985	'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z'
FDNS	09ALL	0	18SP	G16_075	'FROM->TO'	'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z'	720	720	1	106.5023	'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z'
FDNS	09ALL	0	17WP	G16_075	'FROM->TO'	'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z'	720	720	1	107.3224	'FTTHOM2-LNX3345.00 - GRPRAR2-LNX3345.00 345KV CKT 1'
FDNS	09ALL	0	18G	G16_075	'FROM->TO'	'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z'	720	720	1	106.6455	'FTTHOM2-LNX3345.00 - GRPRAR2-LNX3345.00 345KV CKT 1'
FDNS	09ALL	0	18SP	G16_075	'FROM->TO'	'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z'	720	720	1	108.1227	'FTTHOM2-LNX3345.00 - GRPRAR2-LNX3345.00 345KV CKT 1'
FDNS	09ALL	0	17WP	G16_075	'FROM->TO'	'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z'	720	720	1	107.3131	'FTTHOMPSON-GRANDPRAIRIE-TLINE-REACTOR-CKT1'
FDNS	09ALL	0	18G	G16_075	'FROM->TO'	'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z'	720	720	1	106.6452	'FTTHOMPSON-GRANDPRAIRIE-TLINE-REACTOR-CKT1'
FDNS	09ALL	0	18SP	G16_075	'FROM->TO'	'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z'	720	720	1	108.121	'FTTHOMPSON-GRANDPRAIRIE-TLINE-REACTOR-CKT1'
FDNS	09ALL	0	17WP	G16_075	'FROM->TO'	'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z'	720	720	1	105.524	'GRANDPRAIRIE-FTTHOMPSON-TLINE-REACTORS-CKT1'
FDNS	09ALL	0	18G	G16_075	'FROM->TO'	'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z'	720	720	1	104.971	'GRANDPRAIRIE-FTTHOMPSON-TLINE-REACTORS-CKT1'
FDNS	09ALL	0	18SP	G16_075	'FROM->TO'	'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z'	720	720	1	105.8842	'GRANDPRAIRIE-FTTHOMPSON-TLINE-REACTORS-CKT1'
FDNS	09ALL	0	17WP	G16_075	'FROM->TO'	'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z'	720	720	1	105.5296	'GRPRAR2-LNX3345.00 - YANKTON 345KV CKT Z'
FDNS	09ALL	0	18G	G16_075	'FROM->TO'	'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z'	720	720	1	104.9712	'GRPRAR2-LNX3345.00 - YANKTON 345KV CKT Z'
FDNS	09ALL	0	18SP	G16_075	'FROM->TO'	'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z'	720	720	1	105.8835	'GRPRAR2-LNX3345.00 - YANKTON 345KV CKT Z'
FDNS	09ALL	0	17WP	G16_075	'FROM->TO'	'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z'	720	720	1	107.313	''P23:345:UMZW:# 2422 #: GI IN NE. GI 1796 BKR FAULT''
FDNS	09ALL	0	18G	G16_075	'FROM->TO'	'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z'	720	720	1	106.6447	''P23:345:UMZW:# 2422 #: GI IN NE. GI 1796 BKR FAULT''
FDNS	09ALL	0	18SP	G16_075	'FROM->TO'	'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z'	720	720	1	108.1197	''P23:345:UMZW:# 2422 #: GI IN NE. GI 1796 BKR FAULT''
FDNS	09ALL	0	17WP	G16_075	'FROM->TO'	'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z'	720	720	1	107.313	''P23:345:UMZW:# 2423 #: GI IN NE. GI 1596 BKR FAULT''
FDNS	09ALL	0	18G	G16_075	'FROM->TO'	'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z'	720	720	1	106.6449	''P23:345:UMZW:# 2423 #: GI IN NE. GI 1596 BKR FAULT''
FDNS	09ALL	0	18SP	G16_075	'FROM->TO'	'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z'	720	720	1	108.1197	''P23:345:UMZW:# 2423 #: GI IN NE. GI 1596 BKR FAULT''
FDNS	09ALL	0	17WP	G16_075	'TO->FROM'	'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1'	720	720	1	105.3702	'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z'
FDNS	09ALL	0	18G	G16_075	'TO->FROM'	'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1'	720	720	1	104.8645	'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z'
FDNS	09ALL	0	18SP	G16_075	'TO->FROM'	'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1'	720	720	1	105.7196	'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z'
FDNS	09ALL	0	17WP	G16_075	'TO->FROM'	'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1'	720	720	1	105.3702	'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z'
FDNS	09ALL	0	18G	G16_075	'TO->FROM'	'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1'	720	720	1	104.8645	'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z'
FDNS	09ALL	0	18SP	G16_075	'TO->FROM'	'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1'	720	720	1	105.7196	'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z'
FDNS	09ALL	0	17WP	G16_075	'TO->FROM'	'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1'	720	720	1	106.6081	'FTTHOM2-LNX3345.00 - GRPRAR2-LNX3345.00 345KV CKT 1'
FDNS	09ALL	0	18G	G16_075	'TO->FROM'	'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1'	720	720	1	105.9545	'FTTHOM2-LNX3345.00 - GRPRAR2-LNX3345.00 345KV CKT 1'
FDNS	09ALL	0	18SP	G16_075	'TO->FROM'	'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1'	720	720	1	107.4043	'FTTHOM2-LNX3345.00 - GRPRAR2-LNX3345.00 345KV CKT 1'
FDNS	09ALL	0	17WP	G16_075	'TO->FROM'	'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1'	720	720	1	106.599	'FTTHOMPSON-GRANDPRAIRIE-TLINE-REACTOR-CKT1'
FDNS	09ALL	0	18G	G16_075	'TO->FROM'	'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1'	720	720	1	105.9543	'FTTHOMPSON-GRANDPRAIRIE-TLINE-REACTOR-CKT1'
FDNS	09ALL	0	18SP	G16_075	'TO->FROM'	'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1'	720	720	1	107.4027	'FTTHOMPSON-GRANDPRAIRIE-TLINE-REACTOR-CKT1'
FDNS	09ALL	0	17WP	G16_075	'TO->FROM'	'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1'	720	720	1	104.7269	'GRANDPRAIRIE-FTTHOMPSON-TLINE-REACTORS-CKT1'
FDNS	09ALL	0	18G	G16_075	'TO->FROM'	'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1'	720	720	1	104.2035	'GRANDPRAIRIE-FTTHOMPSON-TLINE-REACTORS-CKT1'
FDNS	09ALL	0	18SP	G16_075	'TO->FROM'	'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1'	720	720	1	105.0681	'GRANDPRAIRIE-FTTHOMPSON-TLINE-REACTORS-CKT1'
FDNS	09ALL	0	17WP	G16_075	'TO->FROM'	'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1'	720	720	1	104.7323	'GRPRAR2-LNX3345.00 - YANKTON 345KV CKT Z'
FDNS	09ALL	0	18G	G16_075	'TO->FROM'	'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1'	720	720	1	104.2037	'GRPRAR2-LNX3345.00 - YANKTON 345KV CKT Z'
FDNS	09ALL	0	18SP	G16_075	'TO->FROM'	'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1'	720	720	1	105.0673	'GRPRAR2-LNX3345.00 - YANKTON 345KV CKT Z'
FDNS	09ALL	0	17WP	G16_075	'TO->FROM'	'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1'	720	720	1	106.5989	''P23:345:UMZW:# 2422 #: GI IN NE. GI 1796 BKR FAULT''
FDNS	09ALL	0	18G	G16_075	'TO->FROM'	'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1'	720	720	1	105.9538	''P23:345:UMZW:# 2422 #: GI IN NE. GI 1796 BKR FAULT''
FDNS	09ALL	0	18SP	G16_075	'TO->FROM'	'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1'	720	720	1	107.4013	''P23:345:UMZW:# 2422 #: GI IN NE. GI 1796 BKR FAULT''
FDNS	09ALL	0	17WP	G16_075	'TO->FROM'	'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1'	720	720	1	106.5989	''P23:345:UMZW:# 2423 #: GI IN NE. GI 1596 BKR FAULT''
FDNS	09ALL	0	18G	G16_075	'TO->FROM'	'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1'	720	720	1	105.954	''P23:345:UMZW:# 2423 #: GI IN NE. GI 1596 BKR FAULT''
FDNS	09ALL	0	18SP	G16_075	'TO->FROM'	'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1'	720	720	1	107.4013	''P23:345:UMZW:# 2423 #: GI IN NE. GI 1596 BKR FAULT''
FDNS	09ALL	0	17WP	G16_075	'TO->FROM'	'GRPRAR2-LNX3345.00 - YANKTON 345KV CKT Z'	720	720	1	109.9085	'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z'
FDNS	09ALL	0	17WP	G16_075	'TO->FROM'	'GRPRAR2-LNX3345.00 - YANKTON 345KV CKT Z'	720	720	1	109.9085	'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z'
FDNS	09ALL	0	17WP	G16_075	'TO->FROM'	'GRPRAR2-LNX3345.00 - YANKTON 345KV CKT Z'	720	720	1	110.4391	''P23:345:UMZW:# 2425 #: GI IN NE. GI 1196 BKR FAULT''

SOLUTION	GROUP	SCENARIO	SEASON	SOURCE	DIRECTION	MONITORED ELEMENT	RATEA (MVA)	RATEB(MVA)	TDF	TC%LOADING (% MVA)	CONTINGENCY
FDNSLock	09ALL	0	18G	G16_075	'TO->FROM'	'GRPRAR2-LNX3345.00 - YANKTON 345KV CKT Z'	720	720	1	109.6997	''P23:345:UMZW:# 2425 #: GI IN NE. GI 1196 BKR FAULT''
FDNS	09ALL	0	17WP	G16_075	'TO->FROM'	'GRPRAR2-LNX3345.00 - YANKTON 345KV CKT Z'	720	720	1	110.4391	''P23:345:UMZW:# 2427 #: GI IN NE. GI 1392 BKR FAULT''
FDNS	09ALL	0	17WP	G16_075	'TO->FROM'	'GRPRAR2-LNX3345.00 - YANKTON 345KV CKT Z'	720	720	1	110.4391	''P23:345:UMZW:# 2428 #: GI IN NE. GI 1192 BKR FAULT''
FDNSLock	09ALL	0	18G	G16_075	'TO->FROM'	'GRPRAR2-LNX3345.00 - YANKTON 345KV CKT Z'	720	720	1	109.6997	''P23:345:UMZW:# 2428 #: GI IN NE. GI 1192 BKR FAULT''
FDNS	09ALL	0	17WP	G16_075	'TO->FROM'	'GRPRAR2-LNX3345.00 - YANKTON 345KV CKT Z'	720	720	1	110.4391	''P23:345:UMZW:# 2438 #: GI IN NE. GI-SWEET LINE FAULT & GI 1492 STUCK BKR''
FDNSLock	09ALL	0	18G	G16_075	'TO->FROM'	'GRPRAR2-LNX3345.00 - YANKTON 345KV CKT Z'	720	720	1	109.6997	''P23:345:UMZW:# 2438 #: GI IN NE. GI-SWEET LINE FAULT & GI 1492 STUCK BKR''
FDNS	09ALL	0	17WP	G16_075	'TO->FROM'	'GRPRAR2-LNX3345.00 - YANKTON 345KV CKT Z'	720	720	1	110.4391	''P23:345:UMZW:# 2445 #: GI IN NE. GI KU1A TRANSFORMER FAULT & GI 1396 STUCK BKR''
FDNSLock	09ALL	0	18G	G16_075	'TO->FROM'	'GRPRAR2-LNX3345.00 - YANKTON 345KV CKT Z'	720	720	1	109.6997	''P23:345:UMZW:# 2445 #: GI IN NE. GI KU1A TRANSFORMER FAULT & GI 1396 STUCK BKR''
FDNS	09ALL	0	17WP	G16_075	'TO->FROM'	'GRPRAR2-LNX3345.00 - YANKTON 345KV CKT Z'	720	720	1	110.4391	''P23:345:UMZW:# 2446 #: GI IN NE. GI-FT2 LINE FAULT & GI 1196 STUCK BKR''
FDNSLock	09ALL	0	18G	G16_075	'TO->FROM'	'GRPRAR2-LNX3345.00 - YANKTON 345KV CKT Z'	720	720	1	109.6997	''P23:345:UMZW:# 2446 #: GI IN NE. GI-FT2 LINE FAULT & GI 1196 STUCK BKR''
FDNS	09ALL	0	17WP	G16_075	'TO->FROM'	'GRPRAR2-LNX3345.00 - YANKTON 345KV CKT Z'	720	720	1	110.4391	''P23:345:UMZW:# 628 #: BEF IN ND. BREAKER FAULT (396; 492; 292)''
FDNSLock-Blown up	09ALL	0	18SP	G16_075		Non-Converged	720	720	0.57377	86.72832	'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z'
FDNSLock-Blown up	09ALL	0	18SP	G16_075		Non-Converged	720	720	0.57377	86.72832	'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z'
FDNSLock-Blown up	09ALL	0	17WP	G16_075		Non-Converged	720	720	0.56955	61.53727	'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1'
FDNSLock-Blown up	09ALL	0	18G	G16_075		Non-Converged	720	720	0.57258	66.2192	'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1'
FDNSLock-Blown up	09ALL	0	18SP	G16_075		Non-Converged	720	720	0.57377	86.01809	'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1'
FDNSLock-Blown up	09ALL	0	18SP	G16_075		Non-Converged	0	0	0.81206	9999	''P23:345:UMZW:# 2425 #: GI IN NE. GI 1196 BKR FAULT''
FDNSLock-Blown up	09ALL	0	18SP	G16_075		Non-Converged	0	0	0.81206	9999	''P23:345:UMZW:# 2428 #: GI IN NE. GI 1192 BKR FAULT''
FDNSLock-Blown up	09ALL	0	18SP	G16_075		Non-Converged	0	0	0.81206	9999	''P23:345:UMZW:# 2438 #: GI IN NE. GI-SWEET LINE FAULT & GI 1492 STUCK BKR''
FDNSLock-Blown up	09ALL	0	18SP	G16_075		Non-Converged	0	0	0.81206	9999	''P23:345:UMZW:# 2445 #: GI IN NE. GI KU1A TRANSFORMER FAULT & GI 1396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	18SP	G16_075		Non-Converged	0	0	0.81206	9999	''P23:345:UMZW:# 2446 #: GI IN NE. GI-FT2 LINE FAULT & GI 1196 STUCK BKR''
FDNSLock-Blown up	09ALL	0	17WP	G16_075		Non-Converged	0	0	1.67272	9999	''P23:345:UMZW:# 821 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	18G	G16_075		Non-Converged	0	0	1.67752	9999	''P23:345:UMZW:# 821 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	18SP	G16_075		Non-Converged	0	0	1.66452	9999	''P23:345:UMZW:# 821 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	21L	G16_075		Non-Converged	0	0	1.46107	9999	''P23:345:UMZW:# 821 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	21SP	G16_075		Non-Converged	0	0	1.42376	9999	''P23:345:UMZW:# 821 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	21WP	G16_075		Non-Converged	0	0	1.43192	9999	''P23:345:UMZW:# 821 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	26SP	G16_075		Non-Converged	0	0	1.42508	9999	''P23:345:UMZW:# 821 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	17WP	G16_075		Non-Converged	0	0	1.67272	9999	''P23:345:UMZW:# 822 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	18G	G16_075		Non-Converged	0	0	1.67752	9999	''P23:345:UMZW:# 822 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	18SP	G16_075		Non-Converged	0	0	1.66452	9999	''P23:345:UMZW:# 822 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	21L	G16_075		Non-Converged	0	0	1.46107	9999	''P23:345:UMZW:# 822 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	21SP	G16_075		Non-Converged	0	0	1.42376	9999	''P23:345:UMZW:# 822 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	21WP	G16_075		Non-Converged	0	0	1.43192	9999	''P23:345:UMZW:# 822 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	26SP	G16_075		Non-Converged	0	0	1.42508	9999	''P23:345:UMZW:# 822 #: WH IN SD. TRANSFORMER FAULT.''
FDNSLock-Blown up	09ALL	0	17WP	G16_075		Non-Converged	0	0	0.0998	9999	''P42:345:NPPD:BKR-CPR-3310''
FDNSLock-Blown up	09ALL	0	18G	G16_075		Non-Converged	0	0	0.09463	9999	''P42:345:NPPD:BKR-CPR-3310''
FDNSLock-Blown up	09ALL	0	18SP	G16_075		Non-Converged	0	0	0.09934	9999	''P42:345:NPPD:BKR-CPR-3310''
FDNSLock-Blown up	09ALL	0	17WP	G16_075		Non-Converged	0	0	0.29537	9999	''P42:345:UMZB:# 2494 #: LO IN ND. STUCK BREAKER (2196)''
FDNSLock-Blown up	09ALL	0	21WP	G16_075		Non-Converged	0	0	0.26348	9999	''P42:345:UMZB:# 2494 #: LO IN ND. STUCK BREAKER (2196)''
FDNSLock-Blown up	09ALL	0	17WP	G16_075		Non-Converged	0	0	0.29537	9999	''P42:345:UMZB:# 2495 #: LO IN ND. STUCK BREAKER (2396)''
FDNSLock-Blown up	09ALL	0	21WP	G16_075		Non-Converged	0	0	0.26348	9999	''P42:345:UMZB:# 2495 #: LO IN ND. STUCK BREAKER (2396)''
FDNSLock-Blown up	09ALL	0	17WP	G16_075		Non-Converged	0	0	1.67272	9999	''P42:345:UMZW:# 2435 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1392 STUCK BKR''
FDNSLock-Blown up	09ALL	0	18G	G16_075		Non-Converged	0	0	1.67752	9999	''P42:345:UMZW:# 2435 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1392 STUCK BKR''
FDNSLock-Blown up	09ALL	0	18SP	G16_075		Non-Converged	0	0	1.66452	9999	''P42:345:UMZW:# 2435 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1392 STUCK BKR''
FDNSLock-Blown up	09ALL	0	21L	G16_075		Non-Converged	0	0	1.46107	9999	''P42:345:UMZW:# 2435 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1392 STUCK BKR''
FDNSLock-Blown up	09ALL	0	21SP	G16_075		Non-Converged	0	0	1.42376	9999	''P42:345:UMZW:# 2435 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1392 STUCK BKR''
FDNSLock-Blown up	09ALL	0	21WP	G16_075		Non-Converged	0	0	1.43192	9999	''P42:345:UMZW:# 2435 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1392 STUCK BKR''
FDNSLock-Blown up	09ALL	0	26SP	G16_075		Non-Converged	0	0	1.42508	9999	''P42:345:UMZW:# 2435 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1392 STUCK BKR''
FDNSLock-Blown up	09ALL	0	17WP	G16_075		Non-Converged	0	0	1.67272	9999	''P42:345:UMZW:# 2442 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	18G	G16_075		Non-Converged	0	0	1.67752	9999	''P42:345:UMZW:# 2442 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	18SP	G16_075		Non-Converged	0	0	1.66452	9999	''P42:345:UMZW:# 2442 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	21L	G16_075		Non-Converged	0	0	1.46107	9999	''P42:345:UMZW:# 2442 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	21SP	G16_075		Non-Converged	0	0	1.42376	9999	''P42:345:UMZW:# 2442 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	21WP	G16_075		Non-Converged	0	0	1.43192	9999	''P42:345:UMZW:# 2442 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	26SP	G16_075		Non-Converged	0	0	1.42508	9999	''P42:345:UMZW:# 2442 #: GI IN NE. GI MCCOOL LINE FAULT & GI 1396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	17WP	G16_075		Non-Converged	0	0	1.67272	9999	''P43:345:UMZW:# 2420 #: FT2 IN SD. FT2 KU1B TRANSFORMER FAULT & FT2 3396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	18G	G16_075		Non-Converged	0	0	1.67752	9999	''P43:345:UMZW:# 2420 #: FT2 IN SD. FT2 KU1B TRANSFORMER FAULT & FT2 3396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	18SP	G16_075		Non-Converged	0	0	1.66452	9999	''P43:345:UMZW:# 2420 #: FT2 IN SD. FT2 KU1B TRANSFORMER FAULT & FT2 3396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	21L	G16_075		Non-Converged	0	0	1.46107	9999	''P43:345:UMZW:# 2420 #: FT2 IN SD. FT2 KU1B TRANSFORMER FAULT & FT2 3396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	21SP	G16_075		Non-Converged	0	0	1.42376	9999	''P43:345:UMZW:# 2420 #: FT2 IN SD. FT2 KU1B TRANSFORMER FAULT & FT2 3396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	21WP	G16_075		Non-Converged	0	0	1.43192	9999	''P43:345:UMZW:# 2420 #: FT2 IN SD. FT2 KU1B TRANSFORMER FAULT & FT2 3396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	26SP	G16_075		Non-Converged	0	0	1.42508	9999	''P43:345:UMZW:# 2420 #: FT2 IN SD. FT2 KU1B TRANSFORMER FAULT & FT2 3396 STUCK BKR''
FDNSLock-Blown up	09ALL	0	17WP	G16_075		Non-Converged	0	0	1.67272	9999	''P43:345:UMZW:# 2434 #: GI IN NE. GI KU1B TRANSFORMER FAULT & GI 1592 STUCK BKR''
FDNSLock-Blown up	09ALL	0	18G	G16_075		Non-Converged	0	0	1.67752	9999	''P43:345:UMZW:# 2434 #: GI IN NE. GI KU1B TRANSFORMER FAULT & GI 1592 STUCK BKR''
FDNSLock-Blown up	09ALL	0	18SP	G16_075		Non-Converged	0	0	1.66452	9999	''P43:345:UMZW:# 2434 #: GI IN NE. GI KU1B TRANSFORMER FAULT & GI 1592 STUCK BKR''
FDNSLock-Blown up	09ALL	0	21L	G16_075		Non-Converged	0	0	1.46107	9999	''P43:345:UMZW:# 2434 #: GI IN NE. GI KU1B TRANSFORMER FAULT & GI 1592 STUCK BKR''
FDNSLock-Blown up	09ALL	0	21SP	G16_075		Non-Converged	0	0	1.42376	9999	''P43:345:UMZW:# 2434 #: GI IN NE. GI KU1B TRANSFORMER FAULT & GI 1592 STUCK BKR''
FDNSLock-Blown up	09ALL	0	21WP	G16_075		Non-Converged	0	0	1.43192	9999	''P43:345:UMZW:# 2434 #: GI IN NE. GI KU1B TRANSFORMER FAULT & GI 1592 STUCK BKR''
FDNSLock-Blown up	09ALL	0	26SP	G16_075		Non-Converged	0	0	1.42508	9999	''P43:345:UMZW:# 2434 #: GI IN NE. GI KU1B TRANSFORMER FAULT & GI 1592 STUCK BKR''
FDNSLock-Blown up	09ALL	0	18SP	G16_075		Non-Converged	0	0	0.81206	9999	''P44:345:UMZW:# 2436 #: GF IN NE. GI KU4B SW SHUNT FAULT & GI 1192 STUCK BKR''
FDNSLock-Blown up	09ALL	0	18SP	G16_075		Non-Converged	0	0	0.81206	9999	''P44:345:UMZW:# 2443 #: GF IN NE. GI KU4B SW SHUNT FAULT & GI 1196 STUCK BKR''
FDNSLock-Blown up	09ALL	0	17WP	G16_075		Non-Converged	0	0	0.13467	9999	''P45:345:UMZB:# 2515 #: SGQ IN NB. BREAKER FAULT (7196;7092;7292)''
FDNSLock-Blown up	09ALL	0	18G	G16_075		Non-Converged	0	0	0.1342	9999	''P45:345:UMZB:# 2515 #: SGQ IN NB. BREAKER FAULT (7196;7092;7292)''
FDNSLock-Blown up	09ALL	0	21WP	G16_075		Non-Converged	0	0	0.11912	9999	''P45:345:UMZB:# 2515 #: SGQ IN NB. BREAKER FAULT (7196;7092;7292)''
FDNSLock-Blown up	09ALL	0	18SP	G16_075		Non-Converged	0	0	0.81206	9999	''P45:345:UMZW:# 1999 #: WHT IN SD. WHT 345 KV S BUS FAULT''

G-V: VOLTAGE POWER FLOW ANALYSIS (CONSTRAINTS REQUIRING TRANSMISSION REINFORCEMENT)

Legend:

Column	Definition
Solution	Solution Method
Group	Model Case Identification: • ##ALL: ERIS-HVER • 00: ERIS-LVER • ##NR or 00NR: NRIS
Scenario	Upgrade Scenario Identification
Season	Model Year and Season
Source	Gen ID producing the TDF above the limit for the constraint
Monitored Element	Monitored Bus Identification
BC Voltage (pu)	Pre-transfer, post-contingency voltage
TC Voltage (pu)	Post-transfer, post-contingency voltage
Voltage Differ (pu)	TC Voltage - BC Voltage
VINIT (pu)	Post-transfer, pre-contingency (system intact) voltage
VMIN (pu)	Lower Voltage Limit
VMAX (pu)	Upper Voltage Limit
TDF	Transfer Distribution Factor for the Source
Contingency	Contingency Description

SOLUTION	GROUP	SCENARIO	SEASON	SOURCE	MONITORED ELEMENT	BC Voltage (PU)	TC Voltage (PU)	Voltage Differ (PU)	VINIT (PU)	VMIN (PU)	VMAX(PU)	TDF	CONTINGENCY
FDNS	09ALL	0	17WP	G15_089	'EAU CLAIRE 345KV'	1.031582	1.052311	0.0207293	1.04309	0.9	1.05	0.04278	'ARPIN B4 345.00 - EAU CLAIRE 345KV CKT 1'
FDNS	09ALL	0	21SP	G15_089	'ROSEAU 500KV'	1	1.098661	0.0986613	1.0915	0.9	1.05	0.03316	'AS KING - EAU CLAIRE 345KV CKT 1'
FDNS	08ALL	0	21L	G16_022	'WOLF CREEK 345KV'	1.004692	0.981448	0.0232437	1.015	0.985	1.03	0.34702	'GEN532751 1-WOLF CREEK GENERATING STATION UNIT 1'
FDNS	08ALL	2	21L	G16_022	'WOLF CREEK 345KV'	1.004692	0.981448	0.0232437	1.015	0.985	1.03	0.34702	'GEN532751 1-WOLF CREEK GENERATING STATION UNIT 1'
FDNSLock	09ALL	0	21WP	G16_023	'ALIANCE7 115.00 115KV'	1.000237	0.898296	0.101941	1.02382	0.9	1.05	0.56656	'KEYSTONE - SIDNEY1-LNX3345.00 345KV CKT 1'
FDNSLock	09ALL	0	18SP	G16_023	'ALIANCE7 115.00 115KV'	1.003037	0.862901	0.140136	1.0115	0.9	1.05	0.5589	'SIDNEY - SIDNEY2-LNX3345.00 345KV CKT Z'
FDNSLock	09ALL	0	21WP	G16_023	'BOXBUTE7 115.00 115KV'	1.000121	0.897513	0.102608	1.0256	0.9	1.05	0.56656	'KEYSTONE - SIDNEY1-LNX3345.00 345KV CKT 1'
FDNSLock	09ALL	0	18SP	G16_023	'BOXBUTE7 115.00 115KV'	1.000493	0.864176	0.136317	1.00927	0.9	1.05	0.5589	'SIDNEY - SIDNEY2-LNX3345.00 345KV CKT Z'
FDNSLock	09ALL	0	18SP	G16_023	'COVALT 7 115.00 115KV'	1.003372	0.886732	0.11664	1.00741	0.9	1.05	0.5589	'SIDNEY - SIDNEY2-LNX3345.00 345KV CKT Z'
FDNSLock	09ALL	0	18SP	G16_023	'CRAWFORD 115KV'	1.01403	0.89302	0.12101	1.02309	0.9	1.05	0.5589	'SIDNEY - SIDNEY2-LNX3345.00 345KV CKT Z'
FDNSLock	09ALL	0	21WP	G16_023	'DRY CREEK 4230.00 230KV'	1.032437	1.062199	0.0297627	1.04524	0.9	1.05	0.05298	'BISON - MAURINE 230KV CKT 1'
FDNSLock	09ALL	0	21WP	G16_023	'DRY CREEK 4230.00 230KV'	1.028465	1.052816	0.0243511	1.04524	0.9	1.05	0.13638	'STEGALL - STEGALL-LNX3230.00 230KV CKT Z'
FDNSLock	09ALL	0	21WP	G16_023	'DRY CREEK 4230.00 230KV'	1.028332	1.05267	0.0243387	1.04524	0.9	1.05	0.27276	'STEGALL-WAYSIDE-TLINE-REACTOR-CKT1'
FDNSLock	09ALL	0	21WP	G16_023	'DRY CREEK 7115.00 115KV'	1.025144	1.054795	0.0296503	1.03832	0.9	1.05	0.05298	'BISON - MAURINE 230KV CKT 1'
FDNSLock	09ALL	0	21WP	G16_023	'DUNLAP 7 115.00 115KV'	1.000638	0.898025	0.102612	1.02816	0.9	1.05	0.56656	'KEYSTONE - SIDNEY1-LNX3345.00 345KV CKT 1'
FDNSLock	09ALL	0	18SP	G16_023	'DUNLAP 7 115.00 115KV'	1.002621	0.87394	0.128681	1.01153	0.9	1.05	0.5589	'SIDNEY - SIDNEY2-LNX3345.00 345KV CKT Z'
FDNSLock	09ALL	0	18SP	G16_023	'GERINGT7 115.00 115KV'	1.01881	0.891387	0.127423	1.02884	0.9	1.05	0.5589	'SIDNEY - SIDNEY2-LNX3345.00 345KV CKT Z'
FDNSLock	09ALL	0	21WP	G16_023	'GORDON 115KV'	0.979908	0.880334	0.0995736	1.01245	0.9	1.05	0.56656	'KEYSTONE - SIDNEY1-LNX3345.00 345KV CKT 1'
FDNSLock	09ALL	0	18SP	G16_023	'GORDON 115KV'	0.993573	0.8917	0.101873	0.99932	0.9	1.05	0.5589	'SIDNEY - SIDNEY2-LNX3345.00 345KV CKT Z'
FDNSLock	09ALL	0	21WP	G16_023	'HEMINGF7 115.00 115KV'	0.99921	0.896442	0.102768	1.02473	0.9	1.05	0.56656	'KEYSTONE - SIDNEY1-LNX3345.00 345KV CKT 1'
FDNSLock	09ALL	0	18SP	G16_023	'HEMINGF7 115.00 115KV'	0.993655	0.856144	0.137511	1.0025	0.9	1.05	0.5589	'SIDNEY - SIDNEY2-LNX3345.00 345KV CKT Z'
FDNSLock	09ALL	0	18SP	G16_023	'LYNN 7 115.00 115KV'	0.999751	0.871252	0.1285	1.00577	0.9	1.05	0.5589	'SIDNEY - SIDNEY2-LNX3345.00 345KV CKT Z'
FDNSLock	09ALL	0	18SP	G16_023	'MORRILL7 115.00 115KV'	1.001627	0.86484	0.136787	1.00991	0.9	1.05	0.5589	'SIDNEY - SIDNEY2-LNX3345.00 345KV CKT Z'
FDNSLock	09ALL	0	21WP	G16_023	'NUNDRWD 230KV'	1.022671	1.05174	0.0290697	1.03524	0.9	1.05	0.05298	'BISON - MAURINE 230KV CKT 1'
FDNSLock	09ALL	0	21WP	G16_023	'NUNDRWD-LNX3230.00 230KV'	1.022671	1.05174	0.0290697	1.03524	0.9	1.05	0.05298	'BISON - MAURINE 230KV CKT 1'
FDNSLock	09ALL	0	21WP	G16_023	'RAPID CITY 115KV'	1.021725	1.051266	0.0295403	1.03482	0.9	1.05	0.05298	'BISON - MAURINE 230KV CKT 1'
FDNSLock	09ALL	0	21WP	G16_023	'RCDC EAST 4230.00 230KV'	1.032513	1.062282	0.0297686	1.04532	0.9	1.05	0.05298	'BISON - MAURINE 230KV CKT 1'
FDNSLock	09ALL	0	21WP	G16_023	'RCDC EAST 4230.00 230KV'	1.028545	1.052894	0.024349	1.04532	0.9	1.05	0.13638	'STEGALL - STEGALL-LNX3230.00 230KV CKT Z'
FDNSLock	09ALL	0	21WP	G16_023	'RCDC EAST 4230.00 230KV'	1.028412	1.052748	0.0243367	1.04532	0.9	1.05	0.27276	'STEGALL-WAYSIDE-TLINE-REACTOR-CKT1'
FDNSLock	09ALL	0	21WP	G16_023	'RUSHVILLE 115KV'	0.981787	0.878945	0.102843	1.01444	0.9	1.05	0.56656	'KEYSTONE - SIDNEY1-LNX3345.00 345KV CKT 1'
FDNSLock	09ALL	0	18SP	G16_023	'RUSHVILLE 115KV'	0.995422	0.888167	0.107256	1.00191	0.9	1.05	0.5589	'SIDNEY - SIDNEY2-LNX3345.00 345KV CKT Z'
FDNSLock	09ALL	0	18SP	G16_023	'SCOTTSBLUFF 115KV'	1.020339	0.894123	0.126216	1.03053	0.9	1.05	0.5589	'SIDNEY - SIDNEY2-LNX3345.00 345KV CKT Z'
FDNSLock	09ALL	0	21WP	G16_023	'SHANNON 115KV'	0.978134	0.891788	0.0863465	1.00799	0.9	1.05	0.56656	'KEYSTONE - SIDNEY1-LNX3345.00 345KV CKT 1'
FDNSLock	09ALL	0	18SP	G16_023	'SNAKECK7 115.00 115KV'	1.001697	0.865297	0.1364	1.00947	0.9	1.05	0.5589	'SIDNEY - SIDNEY2-LNX3345.00 345KV CKT Z'
FDNSLock	09ALL	0	18SP	G16_023	'STEGALL 230KV'	1.009267	0.884053	0.125214	1.00954	0.9	1.05	0.5589	'SIDNEY - SIDNEY2-LNX3345.00 345KV CKT Z'
FDNSLock	09ALL	0	18SP	G16_023	'STEGALL 345KV'	1.012121	0.890997	0.121124	1.01367	0.9	1.05	0.5589	'SIDNEY - SIDNEY2-LNX3345.00 345KV CKT Z'
FDNSLock	09ALL	0	18SP	G16_023	'STEGALL TRANSFORMER 230KV'	1.009156	0.884943	0.124213	1.00971	0.9	1.05	0.5589	'SIDNEY - SIDNEY2-LNX3345.00 345KV CKT Z'
FDNSLock	09ALL	0	18SP	G16_023	'STEGALL-LNX3230.00 230KV'	1.009267	0.884053	0.125214	1.00954	0.9	1.05	0.5589	'SIDNEY - SIDNEY2-LNX3345.00 345KV CKT Z'
FDNSLock	09ALL	0	18SP	G16_023	'VICTORY HILL 115KV'	1.020453	0.897914	0.122539	1.03176	0.9	1.05	0.5589	'SIDNEY - SIDNEY2-LNX3345.00 345KV CKT Z'
FDNSLock	09ALL	0	18SP	G16_023	'VICTORY HILL 230KV'	1.009094	0.87994	0.129154	1.00834	0.9	1.05	0.5589	'SIDNEY - SIDNEY2-LNX3345.00 345KV CKT Z'
FDNSLock	09ALL	0	21WP	G16_023	'WAYSIDE 230KV'	0.990376	0.893457	0.0969185	1.01232	0.9	1.05	0.56656	'KEYSTONE - SIDNEY1-LNX3345.00 345KV CKT 1'
FDNSLock	09ALL	0	21WP	G16_029	'ALIANCE7 115.00 115KV'	1.000237	0.898296	0.101941	1.02382	0.9	1.05	0.56656	'KEYSTONE - SIDNEY1-LNX3345.00 345KV CKT 1'
FDNSLock	09ALL	0	18SP	G16_029	'ALIANCE7 115.00 115KV'	1.003037	0.862901	0.140136	1.0115	0.9	1.05	0.5589	'SIDNEY - SIDNEY2-LNX3345.00 345KV CKT Z'
FDNSLock	09ALL	0	21WP	G16_029	'BOXBUTE7 115.00 115KV'	1.000121	0.897513	0.102608	1.0256	0.9	1.05	0.56656	'KEYSTONE - SIDNEY1-LNX3345.00 345KV CKT 1'
FDNSLock	09ALL	0	18SP	G16_029	'BOXBUTE7 115.00 115KV'	1.000493	0.864176	0.136317	1.00927	0.9	1.05	0.5589	'SIDNEY - SIDNEY2-LNX3345.00 345KV CKT Z'
FDNSLock	09ALL	0	18SP	G16_029	'COVALT 7 115.00 115KV'	1.003372	0.886732	0.11664	1.00741	0.9	1.05	0.5589	'SIDNEY - SIDNEY2-LNX3345.00 345KV CKT Z'
FDNSLock	09ALL	0	18SP	G16_029	'CRAWFORD 115KV'	1.01403	0.89302	0.12101	1.02309	0.9	1.05	0.5589	'SIDNEY - SIDNEY2-LNX3345.00 345KV CKT Z'
FDNSLock	09ALL	0	21WP	G16_029	'DRY CREEK 4230.00 230KV'	1.032437	1.062199	0.0297627	1.04524	0.9	1.05	0.05298	'BISON - MAURINE 230KV CKT 1'
FDNSLock	09ALL	0	21WP	G16_029	'DRY CREEK 4230.00 230KV'	1.028465	1.052816	0.0243511	1.04524	0.9	1.05	0.13638	'STEGALL - STEGALL-LNX3230.00 230KV CKT Z'
FDNSLock	09ALL	0	21WP	G16_029	'DRY CREEK 4230.00 230KV'	1.028332	1.05267	0.0243387	1.04524	0.9	1.05	0.27276	'STEGALL-WAYSIDE-TLINE-REACTOR-CKT1'
FDNSLock	09ALL	0	21WP	G16_029	'DRY CREEK 7115.00 115KV'	1.025144	1.054795	0.0296503	1.03832	0.9	1.05	0.05298	'BISON - MAURINE 230KV CKT 1'
FDNSLock	09ALL	0	21WP	G16_029	'DUNLAP 7 115.00 115KV'	1.000638	0.898025	0.102612	1.02816	0.9	1.05	0.56656	'KEYSTONE - SIDNEY1-LNX3345.00 345KV CKT 1'
FDNSLock	09ALL	0	18SP	G16_029	'DUNLAP 7 115.00 115KV'	1.002621	0.87394	0.128681	1.01153	0.9	1.05	0.5589	'SIDNEY - SIDNEY2-LNX3345.00 345KV CKT Z'
FDNSLock	09ALL	0	18SP	G16_029	'GERINGT7 115.00 115KV'	1.01881	0.891387	0.127423	1.02884	0.9	1.05	0.5589	'SIDNEY - SIDNEY2-LNX3345.00 345KV CKT Z'
FDNSLock	09ALL	0	21WP	G16_029	'GORDON 115KV'	0.979908	0.880334	0.0995736	1.01245	0.9	1.05	0.56656	'KEYSTONE - SIDNEY1-LNX3345.00 345KV CKT 1'
FDNSLock	09ALL	0	18SP	G16_029	'GORDON 115KV'	0.993573	0.8917	0.101873	0.99932	0.9	1.05	0.5589	'SIDNEY - SIDNEY2-LNX3345.00 345KV CKT Z'
FDNSLock	09ALL	0	21WP	G16_029	'HEMINGF7 115.00 115KV'	0.99921	0.896442	0.102768	1.02473	0.9	1.05	0.56656	'KEYSTONE - SIDNEY1-LNX3345.00 345KV CKT 1'
FDNSLock	09ALL	0	18SP	G16_029	'HEMINGF7 115.00 115KV'	0.993655	0.856144	0.137511	1.0025	0.9	1.05	0.5589	'SIDNEY - SIDNEY2-LNX3345.00 345KV CKT Z'
FDNSLock	09ALL	0	18SP	G16_029	'LYNN 7 115.00 115KV'	0.999751	0.871252	0.1285	1.00577	0.9	1.05	0.5589	'SIDNEY - SIDNEY2-LNX3345.00 345KV CKT Z'
FDNSLock	09ALL	0	18SP	G16_029	'MORRILL7 115.00 115KV'	1.001627	0.86484	0.136787	1.00991	0.9	1.05	0.5589	'SIDNEY - SIDNEY2-LNX3345.00 345KV CKT Z'
FDNSLock	09ALL	0	21WP	G16_029	'NUNDRWD 230KV'	1.022671	1.05174	0.0290697	1.03524	0.9	1.05	0.05298	'BISON - MAURINE 230KV CKT 1'
FDNSLock	09ALL	0	21WP	G16_029	'NUNDRWD-LNX3230.00 230KV'	1.022671	1.05174	0.0290697	1.03524	0.9	1.05	0.05298	'BISON - MAURINE 230KV CKT 1'
FDNSLock	09ALL	0	21WP	G16_029	'RAPID CITY 115KV'	1.021725	1.051266	0.0295403	1.03482	0.9	1.05	0.05298	'BISON - MAURINE 230KV CKT 1'

SOLUTION	GROUP	SCENARIO	SEASON	SOURCE	MONITORED ELEMENT	BC Voltage (PU)	TC Voltage (PU)	Voltage Differ (PU)	VINIT (PU)	VMIN (PU)	VMAX(PU)	TDF	CONTINGENCY
FDNSLock	09ALL	0	21WP	G16_029	'RCDC EAST 4230.00 230KV'	1.032513	1.062282	0.0297686	1.04532	0.9	1.05	0.05298	'BISON - MAURINE 230KV CKT 1'
FDNSLock	09ALL	0	21WP	G16_029	'RCDC EAST 4230.00 230KV'	1.028545	1.052894	0.024349	1.04532	0.9	1.05	0.13638	'STEGALL - STEGALL-LNX3230.00 230KV CKT Z'
FDNSLock	09ALL	0	21WP	G16_029	'RCDC EAST 4230.00 230KV'	1.028412	1.052748	0.0243367	1.04532	0.9	1.05	0.27276	'STEGALL-WAYSIDE-TLINE-REACTOR-CKT1'
FDNSLock	09ALL	0	21WP	G16_029	'RUSHVILLE 115KV'	0.981787	0.878945	0.102843	1.01444	0.9	1.05	0.56656	'KEYSTONE - SIDNEY1-LNX3345.00 345KV CKT 1'
FDNSLock	09ALL	0	18SP	G16_029	'RUSHVILLE 115KV'	0.995422	0.888167	0.107256	1.00191	0.9	1.05	0.5589	'SIDNEY - SIDNEY2-LNX3345.00 345KV CKT Z'
FDNSLock	09ALL	0	18SP	G16_029	'SCOTTSBLUFF 115KV'	1.020339	0.894123	0.126216	1.03053	0.9	1.05	0.5589	'SIDNEY - SIDNEY2-LNX3345.00 345KV CKT Z'
FDNSLock	09ALL	0	21WP	G16_029	'SHANNON 115KV'	0.978134	0.891788	0.0863465	1.00799	0.9	1.05	0.56656	'KEYSTONE - SIDNEY1-LNX3345.00 345KV CKT 1'
FDNSLock	09ALL	0	18SP	G16_029	'SNAKECK7 115.00 115KV'	1.001697	0.865297	0.1364	1.00947	0.9	1.05	0.5589	'SIDNEY - SIDNEY2-LNX3345.00 345KV CKT Z'
FDNSLock	09ALL	0	18SP	G16_029	'STEGALL 230KV'	1.009267	0.884053	0.125214	1.00954	0.9	1.05	0.5589	'SIDNEY - SIDNEY2-LNX3345.00 345KV CKT Z'
FDNSLock	09ALL	0	18SP	G16_029	'STEGALL 345KV'	1.012121	0.890997	0.121124	1.01367	0.9	1.05	0.5589	'SIDNEY - SIDNEY2-LNX3345.00 345KV CKT Z'
FDNSLock	09ALL	0	18SP	G16_029	'STEGALL TRANSFORMER 230KV'	1.009156	0.884943	0.124213	1.00971	0.9	1.05	0.5589	'SIDNEY - SIDNEY2-LNX3345.00 345KV CKT Z'
FDNSLock	09ALL	0	18SP	G16_029	'STEGALL-LNX3230.00 230KV'	1.009267	0.884053	0.125214	1.00954	0.9	1.05	0.5589	'SIDNEY - SIDNEY2-LNX3345.00 345KV CKT Z'
FDNSLock	09ALL	0	18SP	G16_029	'VICTORY HILL 115KV'	1.020453	0.897914	0.122539	1.03176	0.9	1.05	0.5589	'SIDNEY - SIDNEY2-LNX3345.00 345KV CKT Z'
FDNSLock	09ALL	0	18SP	G16_029	'VICTORY HILL 230KV'	1.009094	0.87994	0.129154	1.00834	0.9	1.05	0.5589	'SIDNEY - SIDNEY2-LNX3345.00 345KV CKT Z'
FDNSLock	09ALL	0	21WP	G16_029	'WAYSIDE 230KV'	0.990376	0.893457	0.0969185	1.01232	0.9	1.05	0.56656	'KEYSTONE - SIDNEY1-LNX3345.00 345KV CKT 1'
FDNS	08ALL	0	21L	G16_031	'WOLF CREEK 345KV'	1.004692	0.981448	0.0232437	1.015	0.985	1.03	0.34702	'GEN532751 1-WOLF CREEK GENERATING STATION UNIT 1'
FDNS	08ALL	2	21L	G16_031	'WOLF CREEK 345KV'	1.004692	0.981448	0.0232437	1.015	0.985	1.03	0.34702	'GEN532751 1-WOLF CREEK GENERATING STATION UNIT 1'
FDNS	08ALL	0	21L	G16_032	'WOLF CREEK 345KV'	1.004692	0.981448	0.0232437	1.015	0.985	1.03	0.0349	'GEN532751 1-WOLF CREEK GENERATING STATION UNIT 1'
FDNS	08ALL	2	21L	G16_032	'WOLF CREEK 345KV'	1.004692	0.981448	0.0232437	1.015	0.985	1.03	0.0349	'GEN532751 1-WOLF CREEK GENERATING STATION UNIT 1'
FDNSLock	09ALL	0	21WP	G16_050	'DRY CREEK 4230.00 230KV'	1.028332	1.05267	0.0243387	1.04524	0.9	1.05	0.0332	'STEGALL-WAYSIDE-TLINE-REACTOR-CKT1'
FDNSLock	09ALL	0	21WP	G16_050	'RCDC EAST 4230.00 230KV'	1.028412	1.052748	0.0243367	1.04532	0.9	1.05	0.0332	'STEGALL-WAYSIDE-TLINE-REACTOR-CKT1'
FDNS	08ALL	0	21L	G16_061	'WOLF CREEK 345KV'	1.004692	0.981448	0.0232437	1.015	0.985	1.03	0.0889	'GEN532751 1-WOLF CREEK GENERATING STATION UNIT 1'
FDNS	08ALL	2	21L	G16_061	'WOLF CREEK 345KV'	1.004692	0.981448	0.0232437	1.015	0.985	1.03	0.0889	'GEN532751 1-WOLF CREEK GENERATING STATION UNIT 1'
FDNS	08ALL	0	21L	G16_068	'WOLF CREEK 345KV'	1.004692	0.981448	0.0232437	1.015	0.985	1.03	0.04627	'GEN532751 1-WOLF CREEK GENERATING STATION UNIT 1'
FDNS	08ALL	2	21L	G16_068	'WOLF CREEK 345KV'	1.004692	0.981448	0.0232437	1.015	0.985	1.03	0.04627	'GEN532751 1-WOLF CREEK GENERATING STATION UNIT 1'
FDNS	09ALL	0	17WP	G16_075	'EAU CLAIRE 345KV'	1.031582	1.052311	0.0207293	1.04309	0.9	1.05	0.03424	'ARPIN B4 345.00 - EAU CLAIRE 345KV CKT 1'

H-T: THERMAL POWER FLOW ANALYSIS (OTHER CONSTRAINTS NOT REQUIRING TRANSMISSION REINFORCEMENT)

Available upon request

H-T-AS: AFFECTED SYSTEM THERMAL POWER FLOW ANALYSIS (CONSTRAINTS FOR POTENTIAL UPGRADES)

Available upon request

H-V-AS: AFFECTED SYSTEM VOLTAGE POWER FLOW ANALYSIS (CONSTRAINTS FOR POTENTIAL UPGRADES)

Available upon request

I: DYNAMIC STABILITY ANALYSIS REPORTS

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Southwest Power Pool, Inc. (SPP)

DISIS-2016-001-4 (Group 09)
Definitive Impact Study

Final Report

REP-0486
Revision #00

March 2019

Submitted By:
Mitsubishi Electric Power Products, Inc. (MEPPI)
Power Systems Engineering Division
Warrendale, PA

Title: **DISIS-2016-001-4 (Group 09) Definitive Impact Study: Final Report REP-0486**
Date: March 2019

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EXECUTIVE SUMMARY

SPP requested a Definitive Interconnection System Impact Study (DISIS). The DISIS required a Stability Analysis. Analysis detailing the impacts of the interconnecting projects as shown in Table ES-1.

Table ES-1
Interconnection Projects Evaluated

Request	Size (MW)	Generator Model (Gen Bus Number)	Point of Interconnection
GEN-2015-089	200	GE 2.0 MW Wind (563232)	Utica 230 kV (652526)
GEN-2016-021	300	Vestas V110 VCSS 2.0MW Wind (587153)	Hoskins 345kV (640226)
GEN-2016-023	150.5	GE 2.0MW and 1.79MW Wind (587093, 587095)	Tap Sidney (659426) - Laramie River (659131) 345kV (560075)
GEN-2016-029	150.5	GE 2.0MW and 1.79MW Wind (587193,587195)	Tap Sidney (659426) - Laramie River (659131) 345kV (560075)
GEN-2016-043	230	Vestas V136 3.6MW/Vestas V136 3.45MW Wind (587283, 587286)	Hoskins 345kV (640226)
GEN-2016-050	250.7	GE 2.3MW Wind (587353)	Axtell (640065)-Post Rock (530583) 345 kV (560082)
GEN-2016-075	50	Vestas V110 VCSS 2.0MW Wind (579459)	Tap Ft. Thompson-Grand Island 345 kV (Grand Prairie, 652532)

SUMMARY OF STABILITY ANALYSIS

The Stability Analysis determined there were multiple contingencies that resulted in system/voltage instability, generation tripping offline, and poor post-fault voltage recovery when all generation interconnection requests were at 100% output. To mitigate the system/voltage instability and low post-fault steady-state voltages, the following upgrades were provided by SPP and implemented in all seasons:

- SPP R Plan (16WP and 17SP only)
  - Cherry County/Thedford 345/115/13.8 kV transformer
  - Gentleman to Cherry County 345 kV circuit #1
  - Holt County to Cherry County 345 kV circuit #1
- Gerald Gentleman Station to Keystone 345 kV circuit #2
- Keystone to Sidney 345 kV circuit #2
- Reroute the Laramie River Station to Stegall 345 kV line through the GEN-2016-023 Substation and equipment necessary to achieve a fault clearing within 5 cycles.

After implementing the above upgrades, the contingency analysis was re-simulated for all contingencies. With the upgrades, the Stability Analysis determined that there was no generation tripping or system instability observed as a result of interconnecting all study projects at 100% output.

High GGS Sensitivity Scenario

The High GGS Scenario Stability Analysis determined there were multiple contingencies that resulted in system/voltage instability, generation tripping offline, and poor post-fault voltage recovery when all generation interconnection requests were at 100% output. In addition to the upgrades identified above, to mitigate the voltage instability and low post-fault steady-state voltages, the following upgrade was provided by SPP and implemented in all seasons:

- Reconfigure Gerald Gentleman Station to include additional breakers between the Sweetwater and Red Willow terminals

After implementing the above upgrade, the contingency analysis for the GGS scenario was re-simulated for all contingencies. With the upgrades, the Stability Analysis determined that there was no generation tripping or system instability observed as a result of interconnecting all study projects at 100% output.

Table of Contents

SECTION 1: OBJECTIVES

The objective of this report is to provide Southwest Power Pool, Inc. (SPP) with the deliverables for the DISIS-2016-001-4 (Group 09) Definitive Impact Study. SPP requested an Interconnection System Impact Study for seven (7) generation interconnections for 2017 Winter Peak, 2018 Summer Peak, and 2026 Summer Peak, which requires a Stability Analysis and an Impact Study Report.

SECTION 2: BACKGROUND

The Siemens Power Technologies International PSS/E power system simulation program Version 33.10.0 was used for this study. SPP provided the stability database cases for 2017 Winter Peak, 2018 Summer Peak, and 2026 Summer Peak conditions and a list of contingencies to be examined. The model includes the study projects shown in Table 2-1 and the previously queued projects listed in Table 2-2. Refer to Section 3.1 for the changes made to the base cases to reflect the most up to date topology and dispatch for the DISIS-2016-001 requests. Refer to Appendix A for the steady-state and dynamic model data for the study projects. A power flow one-line diagram for each generation interconnection project is shown in Figures 2-1 through 2-5. Note that the one-line diagrams represent the 2017 Winter Peak case.

The Stability Analysis determined the impacts of the new interconnecting projects on the stability and voltage recovery of the nearby system and the ability of the interconnecting projects to meet FERC Order 661A. If problems with stability or voltage recovery are identified, the need for reactive compensation or system upgrades will be investigated. Three-phase faults and single line-to-ground faults will be examined as listed in Table 2-3. Note that all contingencies listed were examined for the Cluster Scenario.

Table 2-1
Interconnection Projects Evaluated

Request	Size (MW)	Generator Model (Gen Bus Number)	Point of Interconnection
GEN-2015-089	200	GE 2.0 MW Wind (563232)	Utica 230 kV (652526)
GEN-2016-021	300	Vestas V110 VCSS 2.0MW Wind (587153)	Hoskins 345kV (640226)
GEN-2016-023	150.5	GE 2.0MW and 1.79MW Wind (587093, 587095)	Tap Sidney (659426) - Laramie River (659131) 345kV (560075)
GEN-2016-029	150.5	GE 2.0MW and 1.79MW Wind (587193,587195)	Tap Sidney (659426) - Laramie River (659131) 345kV (560075)
GEN-2016-043	230	Vestas V136 3.6MW/Vestas V136 3.45MW Wind (587283, 587286)	Hoskins 345kV (640226)
GEN-2016-050	250.7	GE 2.3MW Wind (587353)	Axtell (640065)-Post Rock (530583) 345 kV (560082)
GEN-2016-075	50	Vestas V110 VCSS 2.0MW Wind (579459)	Tap Ft. Thompson-Grand Island 345 kV (Grand Prairie, 652532)

Table 2-2
Previously Queued Nearby Interconnection Projects Included

Request	Size (MW)	Generator Model (Gen Bus Number)	Point of Interconnection
GEN-2003-021N	75	WT12A1,WT12T1,WT1G1 (640026)	Tap on the Ainsworth – Calamus 115kV line (640050)
GEN-2004-023N	75	EXAC2,GENROU,IEEEG1 (640028)	Columbus 115kV (640119)
GEN-2006-020N	42	Vestas V90 VCUS 1.8 & 3.0 MW (640421,579441)	Bloomfield 115kV (640084)
GEN-2006-037N1	73.1	GE 1.7MW (640449)	Broken Bow 115kV (640089)
GEN-2006-038N005	80	GE 1.6MW (640428)	Broken Bow 115kV (640089)
GEN-2006-038N019	81	GE 1.5MW (640431)	Petersburg 115kV (640444)
GEN-2006-044N	40.5	GE 1.5MW (645062)	Petersburg 115kV (640444)
GEN-2007-011N08	81	Vestas V90 VCRS 3.0MW (640418)	Bloomfield 115kV (640084)
GEN-2008-086N02/GEN-2014-032	211.22	GE 100m 1.79MW (645063 and 645064)	Meadow Grove 230kV (GEN-2008-086N02 POI) (640540)
GEN-2008-119O	60	GE 1.5MW (645061)	S1399 161kV (646399)
GEN-2008-123N	89.66	GE 2.3MW (572054), GE 2.0MW (572055), GE 1.79MW (572056)	Tap Pauline (640313) – Guide (640206) POI (Rosemont 115 kV, 560134)
GEN-2007-017IS/018IS	400	Vestas V110 VCSS 2.0MW (652353, 579456)	Tap Ft. Thompson-Hope County 345 kV (Grand Prarie, 652532)
GEN-2009-040	72	Vestas V100 VCSS 2.0MW (532904)	Marshall 115kV (533303)
GEN-2010-041	10.5	GE 1.5MW (580071)	S1399 161kV (646399)

Request	Size (MW)	Generator Model (Gen Bus Number)	Point of Interconnection
GEN-2010-051	200	GE 100m 1.7MW (580014, 580017, 580020)	Tap on the Twin Church – Hoskins 230kV line (560347)
GEN-2011-018/GEN-2013-008/GEN-2014-004	78.76	GE 1.79MW (640555)	Steele County 115kV (640426)
GEN-2011-027	120	GE 1.85MW (580022, 580021, 580023)	Tap Twin Church-Hoskins 230kV (560347)
GEN-2011-056	3.6 MW increase (Pgen=21.6MW)	ESAC8B,GENESAL,PIDGOV (640013)	Jeffrey 115kV (640238)
GEN-2011-056A	3.6 MW increase (Pgen=21.6MW)	ESAC8B,GENESAL,PIDGOV (640014)	Johnson 1 115kV (640240)
GEN-2011-056B	4.5 MW increase (Pgen=23.5MW)	ESAC8B,GENESAL,PIDGOV (640015)	Johnson 2 115kV (640242)
GEN-2012-021	4.8 MW	GENSAE,AC8B,GGOV1 IEEEVC (650010)	84th & Bluff 115kV (650275)
GEN-2013-002	50.6	Siemens 2.3MW VS (583703)	Tap Sheldon - SW7&Bennet - Folsom/Pleasant Hill 115kV (560746)
GEN-2013-019	73.6	Siemens 2.3MW VS (583703)	Tap Sheldon - SW7&Bennet - Folsom/Pleasant Hill 115kV (560746)
GEN-2013-032	202.5	GE 2..5MW (583783 & 583786)	Neligh 115kV (640293)
GEN-2014-013	73.5	GE 1.79MW (583833)	Meadow Grove 230kV (GEN-2008-086N02 POI) (640540)
GEN-2014-031	35.8	GE 1.79MW (583836)	Meadow Grove 230kV (GEN-2008-086N02 POI) (640540)
GEN-2014-039	73.39	Vestas V110 VCSS 2.0MW Vestas V110 VCSS 1.905MW (584093)	Friend 115kV (640174)

Request	Size (MW)	Generator Model (Gen Bus Number)	Point of Interconnection
GEN-2015-007	160.0	GE 116m 2.0MW (wind; 584513)	Hoskins 345kV (640226)
GEN-2015-023	300.72	GE 100m 1.79MW (wind; 584653, 584656)	Holt County 345kV (640510)
GEN-2015-053	50	GE 2.5MW (wind; 583783 & 583786)	Antelope 115kV (640521)
GEN-2015-076	158.4	Vestas 3.3-117 3.3 MW (wind; 585133, 585136)	Belden 115kV (640080)
GEN-2015-087	66	Vestas V100 2.0 MW (wind; 585233)	Tap on Fairbury(640169) to Hebron (640218) 115kV
GEN-2015-088	300	Vestas V100 2.0 MW (wind; 585243)	Tap on Moore (640277) to Pauline (640312) 345kV

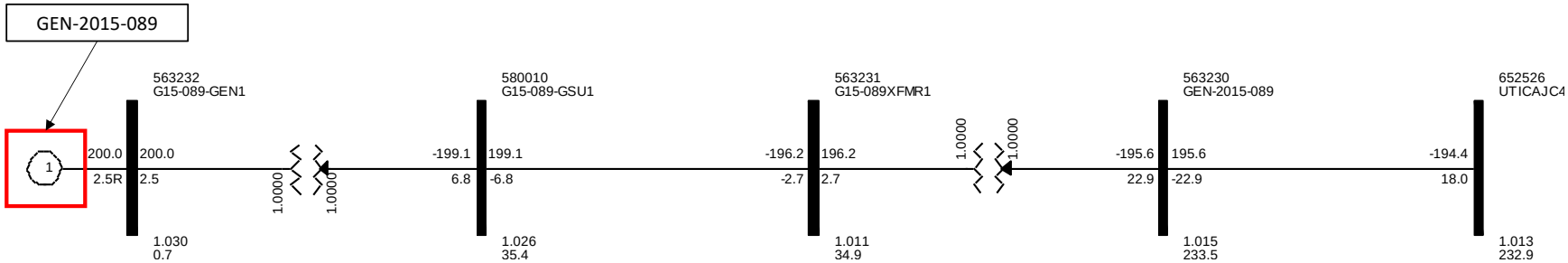

Figure 2-1. Power flow one-line diagram for interconnection project at the Utica 230kV POI (GEN-2015-089).

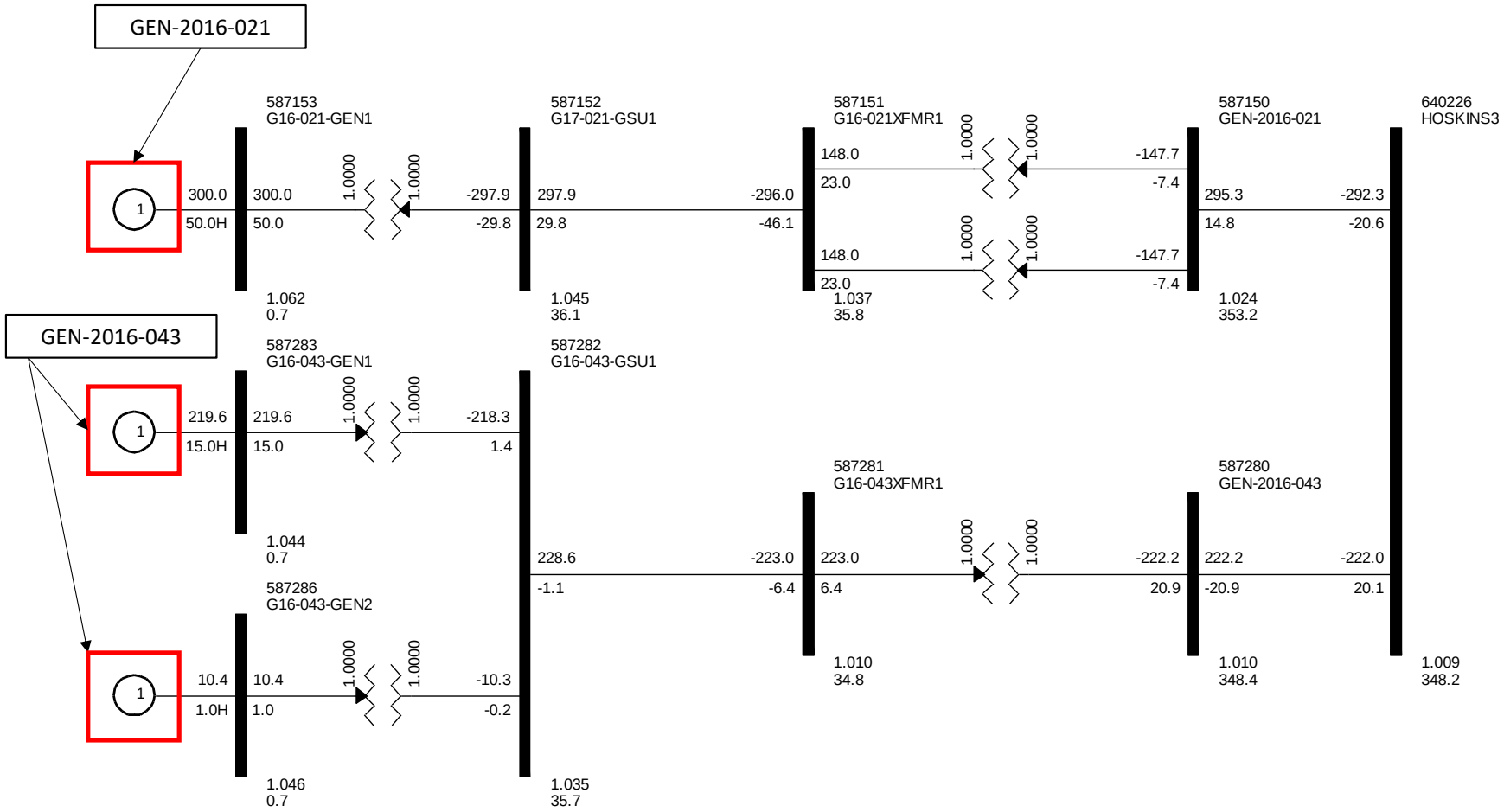

Figure 2-2. Power flow one-line diagram for interconnection project at the Hoskins 345kV POI (GEN-2016-021 and GEN-2016-043).

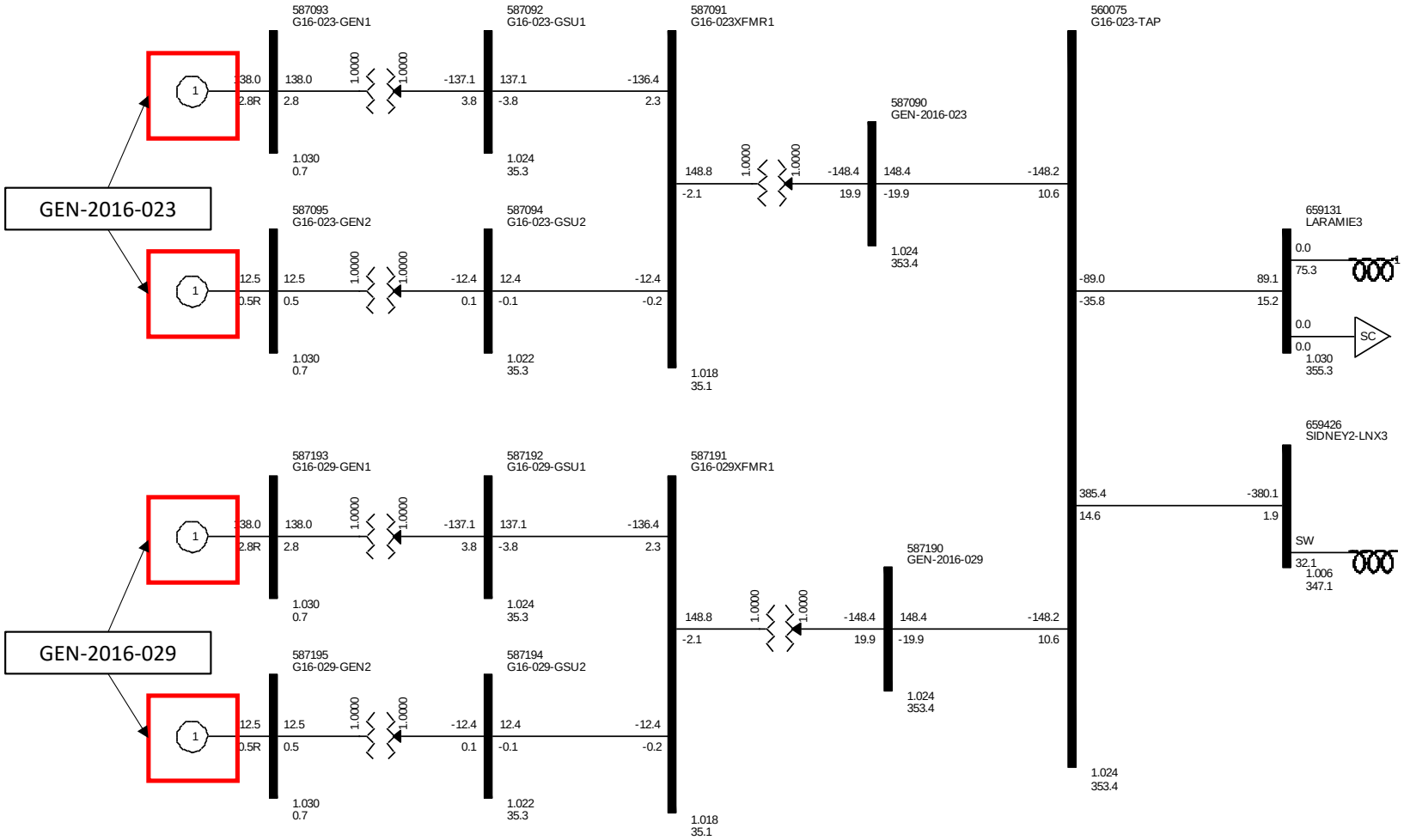

Figure 2-3. Power flow one-line diagram for interconnection project at the Tap Sidney – Laramie River 345kV POI (GEN-2016-023 and GEN-2016-029).

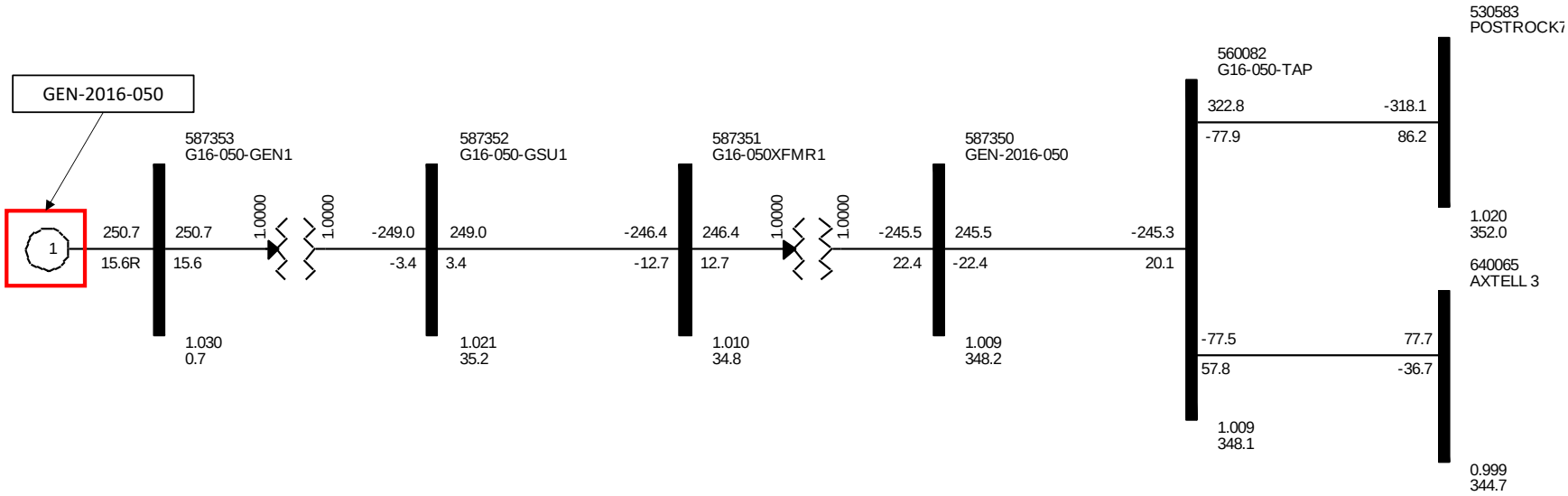

Figure 2-4. Power flow one-line diagram for interconnection project at the Axtell – Post Rock 345kV POI (GEN-2016-050).

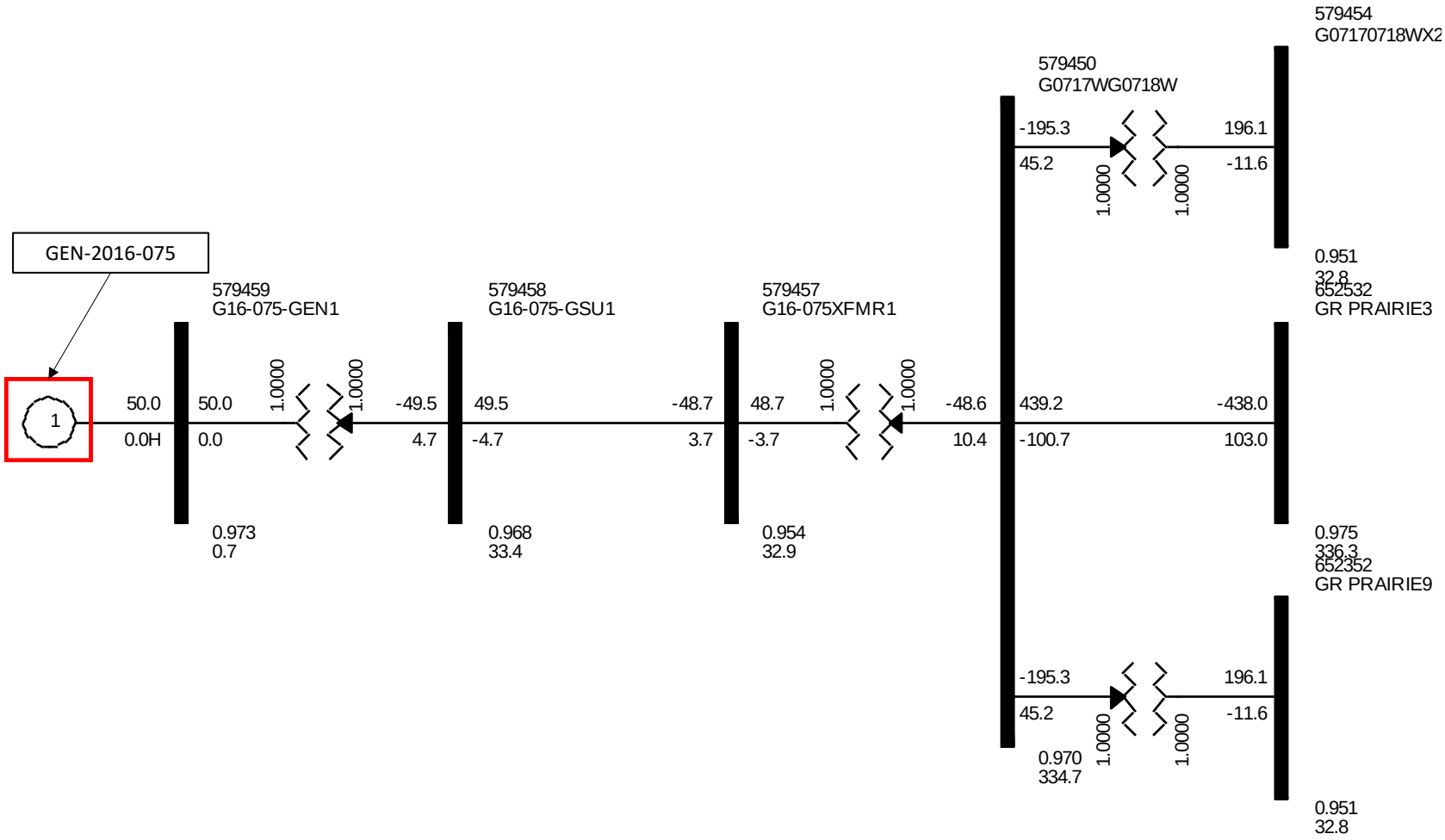

Figure 2-5. Power flow one-line diagram for interconnection project at the Tap Ft. Thompson – Hope County 345kV POI (GEN-2016-075).

Table 2-3
Case List with Contingency Description

	Cont. Name	Description
1	FLT01-3PH	3 phase fault on the G16-023-Tap (560075) to Sidney2-LNX3 (659426) to Sidney (659133) 345 kV line circuit 1, near G16-023-Tap. a. Apply fault at the G16-023-Tap 345kV bus. b. Clear fault after 6 cycles by tripping the faulted line.
2	FLT02-3PH	3 phase fault on the G16-023-Tap (560075) to G16-023 (587090) 345 kV line circuit 1, near G16-023-Tap. a. Apply fault at the G16-023-Tap 345kV bus. b. Clear fault after 6 cycles by tripping the faulted line.
3	FLT03-3PH	3 phase fault on the Stegall (659135) to Laramie (659131) 345kV line circuit 1, near Stegall. a. Apply fault at the Stegall 345kV bus. b. Clear fault after 6 cycles by tripping the faulted line.
4	FLT04-3PH	3 phase fault on the Laramie (659131) to Stegall (659135) 345kV line circuit 1, near Laramie. a. Apply fault at the Laramie 345kV bus. b. Clear fault after 6 cycles by tripping the faulted line.
5	FLT05-3PH	3 phase fault on the Sidney (659133) to SIDNEY1-LNX (659425) to Keystone (640252) 345kV line circuit 1, near Sidney. a. Apply fault at the Sidney 345kV bus. b. Clear fault after 6 cycles by tripping the faulted line.
6	FLT06-3PH	3 phase fault on the Sidney 345/230/13.8kV (659133/659210/659168) Transformer, near Sidney. a. Apply fault at the Sidney 345kV bus. b. Clear fault after 6 cycles by tripping the faulted line.
7	FLT07-3PH	3 phase fault on the Ogalala 230/115/13.8kV (640302/640304/643115) Transformer circuit 1, near Ogalala 230 kV. a. Apply fault at the Ogalala 230 kV bus. b. Clear fault after 6 cycles and trip the faulted transformer.
8	FLT08-3PH	3 phase fault on the Ogalala (640302) to Gentleman (640184) 230 kV line circuit 1, near Ogalala. a. Apply fault at the Ogalala 230kV bus. b. Clear fault after 6 cycles and trip the faulted line and remove fault.

	Cont. Name	Description
9	FLT09-3PH	3 phase fault on the Sidney (659134) to Sidney West (652584) 230kV line circuit 1, near Sidney. a. Apply fault at the Sidney 230 kV bus. b. Clear fault after 6 cycles, trip the faulted line, and remove the fault. c. Block the DC tie at SIDNEY 4.
10	FLT10-SB	**G16-023-TAP 345 kV Stuck Breaker Scenario 1** a. Apply single phase fault at the G16-023-TAP (560075) 345kV bus. b. Wait 16 cycles and remove fault. c. Trip G16-023-TAP (560075) to Sidney2-LNX3 (659426) to Sidney (659133) 345kV line circuit 1. d. Trip G16-023-TAP (560075) to GEN-2016-023 (587090) 345kV line circuit 1.
11	FLT11-SB	**Sidney 230 kV Stuck Breaker Scenario 2** a. Apply single phase fault at the Sidney (659134) 230kV bus. b. Wait 16 cycles and remove fault. c. Trip Sidney (659134) to Sidney Xfmr (659210) 230kV line circuit 1. d. Trip Sidney (659134) to Ogalala (640302) 230kV line circuit 1.
12	FLT12-SB	**Sidney 230 kV Stuck Breaker Scenario 3** a. Apply single phase fault at the Sidney (659134) 230 kV bus. b. Wait 16 cycles and remove fault. c. Trip Sidney (659134) to Sidney Xfmr (659210) 230 kV line circuit 1. d. Trip Sidney (659134) 230 kV / (652572) 115 kV / (659803) 13.8 kV transformer circuit 1.
13	FLT13-SB	**Stegall 345 kV Stuck Breaker Scenario 1** a. Apply single phase fault at the Stegall (659135) 345kV bus. b. Wait 16 cycles and remove fault. c. Trip Stegall (659135) to Laramie (659131) 345kV line circuit 1. d. Trip Stegall (659135) to Sidney (659133) 345kV line circuit 1
14	FLT14-PO	**Prior outage on the G16-023-TAP (560075) – Sidney (659133) 345 kV line circuit 1** 3 phase fault on the Sidney (659133) to Stegall (659135) 345kV line circuit 1, near Sydney. a. Apply fault at the Sidney 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line.

	Cont. Name	Description
15	FLT15-PO	**Prior outage on the G16-023-TAP (560075) – Sidney (659133) 345 kV line circuit 1** 3 phase fault on the G16-023-TAP (560075) to G16-023 (587090) 345kV line circuit 1, near Sydney. a. Apply fault at the Sidney 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
16	FLT16-PO	**Prior outage on the Sidney (659134) – Sidney Xfmr (659210) 230 kV line circuit 1** 3 phase fault on the Sidney (659133) to Stegall (659135) 345kV line circuit 1, near Sydney. a. Apply fault at the Sidney 345kV bus. b. Clear fault after 6 cycles by tripping the faulted line.
17	FLT17-PO	**Prior outage on the Sidney (659134) – Sidney Xfmr (659210) 230 kV line circuit 1** 3 phase fault on the Sidney (659133) to Sidney2-LNX3 (659426) to G16-023-TAP (560075) 345kV line circuit 1, near Sydney. a. Apply fault at the Sidney 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
18	FLT18-3PH	3 phase fault on the Sweetwater (640374) to Axtell (640065) 345kV line circuit 1, near Sweetwater. a. Apply fault at the Sweetwater 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
19	FLT19-3PH	3 phase fault on the Sweetwater (640374) to Grand Island (653571) 345kV line circuit 1, near Sweetwater. a. Apply fault at the Sweetwater 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
20	FLT20-3PH	3 phase fault on the Sweetwater (640374) to Gentleman (640183) 345kV line circuit 1, near Sweetwater. a. Apply fault at the Sweetwater 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
21	FLT21-3PH	3 phase fault on the Axtell (640065) to Pauline (640312) 345kV line circuit 1, near Axtell. a. Apply fault at the Axtell 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
22	FLT22-3PH	3 phase fault on the Axtell 345/115/13.8kV (640065/640066/640067) Transformer, near Axtell. a. Apply fault at the Axtell 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line.

	Cont. Name	Description
23	FLT23-3PH	3 phase fault on the Grand Island (653571) to McCool 3 (640271) 345kV line circuit 1, near Sweetwater. a. Apply fault at the Grand Island 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
24	FLT24-3PH	3 phase fault on the Gentleman (640183) to Keystone (640252) 345kV line circuit 1, near Sweetwater. a. Apply fault at the Gentleman 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
25	FLT25-3PH	3 phase fault on the Gentleman 345/230/13.8kV (640183/640184/643066) Transformer, near Gentleman. a. Apply fault at the Gentleman 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
26	FLT25-3PH	3 phase fault on the Gentleman 345/230/13.8kV (640183/640184/640185) Transformer, near Gentleman. a. Apply fault at the Gentleman 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
27	FLT27-3PH	3 phase fault on the Gentleman (640183) to Red Willow (640325) 345kV line circuit 1, near Sweetwater. a. Apply fault at the Gentleman 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
28	FLT28-SB	**Sweetwater 345 kV Stuck Breaker Scenario 1** a. Apply single phase fault at the Sweetwater (640374) 345kV bus. b. Wait 16 cycles and remove fault. c. Trip Sweetwater (640374) to Gentleman (640183) 345kV line circuit 1. d. Trip Sweetwater (640374) to Axtell (640065) 345kV line circuit 1.
29	FLT29-SB	**Sweetwater 345 kV Stuck Breaker Scenario 2** a. Apply single phase fault at the Sweetwater (640374) 345kV bus. b. Wait 16 cycles and remove fault. c. Trip Sweetwater (640374) to Gentleman (640183) 345kV line circuit 1. d. Trip Sweetwater (640374) to Grand Island (653571) 345kV line circuit 1.
30	FLT30-SB	**Sweetwater 345 kV Stuck Breaker Scenario 3** a. Apply single phase fault at the Sweetwater (640374) 345kV bus. b. Wait 16 cycles and remove fault. c. Trip Sweetwater (640374) to Axtell (640065) 345kV line circuit 1. d. Trip Sweetwater (640374) to Gentleman (640183) 345kV line circuit 1.

	Cont. Name	Description
31	FLT31-SB	**Keystone 345 kV Stuck Breaker Scenario 1** a. Apply single phase fault at the Keystone (640252) 345kV b. Run 16 cycles, remove fault. c. Trip line from Keystone (640252) to Sidney (659133) 345kV. d. Trip line from Keystone (640252) to Gentleman (640183) 345kV.
32	FLT32-SB	**Keystone 345 kV Stuck Breaker Scenario 2** a. Apply single phase fault at the Keystone (640252) 345kV b. Run 16 cycles, remove fault. c. Trip line from Keystone (640252) to Gentleman (640183) 345kV. d. Disconnect three winding transformer at bus 640252/640253/640254.
33	FLT33-PO	**Prior outage on the Sweetwater (640374) – Axtell (640065) 345 kV line circuit 1** 3 phase fault on the Sweetwater (640374) to Grand Island (653571) 345kV line circuit 1, near Sweetwater. a. Apply fault at the Sweetwater 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
34	FLT34-PO	**Prior outage on the Sweetwater (640374) – Gentleman (640183) 345 kV line circuit 1** 3 phase fault on the Sweetwater (640374) to Grand Island (653571) 345kV line circuit 1, near Sweetwater. a. Apply fault at the Sweetwater 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
35	FLT35-PO	**Prior outage on the Sweetwater (640374) – Axtell (640065) 345 kV line circuit 1** 3 phase fault on the Sweetwater (640374) to Gentleman (640183) 345kV line circuit 1, near Sweetwater. a. Apply fault at the Sweetwater 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
36	FLT36-PO	**Prior outage on the Axtell (640065/640066/640067) 345/115/13.8 kV transformer** 3 phase fault on the Pauline (640312) to Axtell (640065) 345kV line circuit 1, near Sweetwater. a. Apply fault at the Axtell 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
37	FLT37-PO	**Prior outage on the Gentleman (640183/640184/640067) 345/230/13.8kV transformer** 3 phase fault on the Keystone (640252) to Gentleman (640183) 345kV line circuit 1, near Sweetwater. a. Apply fault at the Gentleman 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line.

	Cont. Name	Description
38	FLT38-PO	**Prior outage on the Gentleman (640183/640185/640067) 345/230/13.8kV transformer** 3 phase fault on the Red Willow (640325) to Gentleman (640183) 345kV line circuit 1, near Sweetwater. a. Apply fault at the Gentleman 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
39	FLT39-PO	**Prior outage on the Gentleman (640183/640185/640067) 345/230/13.8kV transformer** 3 phase fault on the Sweetwater (640325) to Gentleman (640183) 345kV line circuit 1, near Sweetwater. a. Apply fault at the Gentleman 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
40	FLT40-3PH	3 phase fault on the G16-096-TAP (587784) to Pauline (640312) 345kV line circuit 1, near G16-096-TAP. a. Apply fault at the G16-096-TAP 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
41	FLT41-3PH	3 phase fault on the G16-096-TAP (587784) to G15-088-TAP (560062) 345kV line circuit 1, near G16-096-TAP. a. Apply fault at the G16-096-TAP 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
42	FLT43-3PH	3 phase fault on the Pauline 345/115/13.8kV (640312/640313/640315) Transformer, near Pauline. a. Apply fault at the Pauline45kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
43	FLT44-3PH	3 phase fault on the G15-088-TAP (560062) to Moore (640277) 345kV line circuit 1, near G16-088-TAP. a. Apply fault at the G16-088-TAP 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
44	FLT45-SB	**Pauline 345 kV Stuck Breaker Scenario 1** a. Apply single phase fault at the Pauline (640312) 345kV bus. b. Wait 16 cycles and remove fault. c. Trip Pauline 345/115/13.8kV (640312/640313/640315) transformer. d. Trip Pauline (640312) to Axtell (640065) 345kV line circuit 1.
45	FLT45-SB	**Pauline 345 kV Stuck Breaker Scenario 2** a. Apply single phase fault at the Pauline (640312) 345kV bus. b. Wait 16 cycles and remove fault. c. Trip Pauline 345/115/13.8kV (640312/640313/640315) transformer. d. Trip Pauline (640312) to G16-096-TAP (587784) 345kV line circuit 1.

	Cont. Name	Description
46	FLT46-SB	**Moore 345 kV Stuck Breaker Scenario 1** a. Apply single phase fault at the Moore (640277) 345kV bus. b. Wait 16 cycles and remove fault. c. Trip Moore 345/115/13.8kV (640277/640278/640280) transformer. d. Trip Moore (640277) to Mccool 3 (640271) 345kV line circuit 1.
47	FLT47-SB	**Moore 345 kV Stuck Breaker Scenario 2** a. Apply single phase fault at the Moore (640277) 345kV bus. b. Wait 16 cycles and remove fault. c. Trip Moore (640277) to NW68HOLDRG3 (650114) 345kV line circuit 1. d. Trip Moore (640277) to 103&ROKEBY3 (650189) 345kV line circuit 1.
48	FLT48-SB	**Moore 345 kV Stuck Breaker Scenario 3** a. Apply single phase fault at the Moore (640277) 345kV bus. b. Wait 16 cycles and remove fault. c. Trip Moore (640277) to COOPER 3 (640139) 345kV line circuit 1. d. Trip Moore (640277) to G15-088-TAP (560062) 345kV line circuit 1.
49	FLT49-SB	**Axtell 345 kV Stuck Breaker** a. Apply single phase fault at the Axtell (640065) 345kV bus. b. Wait 16 cycles and remove fault. c. Trip Axtell (640065) to Pauline (640312) 345kV line circuit 1. d. Trip Axtell (640065) to SWEET 3 (640374) 345kV line circuit 1.
50	FLT50-PO	**Prior outage on the Pauline 345/115/13.8kV (640312/640313/640315) transformer** 3 phase fault on the Pauline (640312) to Axtell (640065) 345kV line circuit 1, near Sweetwater. a. Apply fault at the Axtell 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
51	FLT51-PO	**Prior outage on the Axtell 345/115/13.8 kV (640065/640066/640067) transformer** 3 phase fault on the Pauline (640312) to Axtell (640065) 345kV line circuit 1, near Sweetwater. a. Apply fault at the Axtell 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
52	FLT52-PO	**Prior outage on the Moore 345/115/13.8kV (640277/640278/640280) transformer** 3 phase fault on the Moore (640277) to COOPER 3 (640139) 345kV line circuit 1, near Moore. a. Apply fault at the Moore 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line.

	Cont. Name	Description
53	FLT53-PO	**Prior outage on the Moore (640277) - COOPER 3 (640139) 345kV kV line circuit 1** 3 phase fault on the Moore (640277) to 103&ROKEBY3 (650189) 345kV line circuit 1, near Moore. a. Apply fault at the Moore 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
54	FLT54-PO	**Prior outage on the Moore (640277) - COOPER 3 (640139) 345kV kV line circuit 1** 3 phase fault on the Moore (640277) to NW68HOLDRG3 (650114) 345kV line circuit 1, near Moore. a. Apply fault at the Moore 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
55	FLT55-PO	**Prior outage on the Moore (640277) - NW68HOLDRG3 (650114) 345kV kV line circuit 1** 3 phase fault Pauline (640312) to Axtell (640065) 345kV line circuit 1 a. Apply fault at the Moore 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
56	FLT56-PO	**Prior outage on the G16-096-TAP (587784) - G15-088-TAP (560062) 345kV kV line circuit 1** 3 phase fault Pauline (640312) to Axtell (640065) 345kV line circuit 1 a. Apply fault at the Moore 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
57	FLT57-SB	**Gentleman 345 kV Stuck Breaker Scenario 1** a. Apply single phase fault at the Gentleman (640183) 345kV bus. b. Wait 16 cycles and remove fault. c. Trip Sweetwater (640374) to Gentleman (640183) 345kV line circuit 1. d. Trip Gentleman (640183) to Keystone (640252) 345kV line circuit 1.
58	FLT58-SB	**Gentleman 230 kV Stuck Breaker Scenario 2** a. Apply single phase fault at the Gentleman (640184) 230kV bus. b. Wait 16 cycles and remove fault. c. Trip Gentleman (640183) to Sweetwater (640374) 345kV line circuit 1. d. Trip Gentleman 345/230/13.8kV (640183/640184/640185) Transformer.
59	FLT59-SB	**Gentleman 345 kV Stuck Breaker Scenario 3** a. Apply single phase fault at the Gentleman (640183) 345kV bus. b. Wait 16 cycles and remove fault. c. Trip Sweetwater (640374) to Gentleman (640183) 345kV line circuit 1. d. Trip Gentleman 345/230/13.8kV (640183/640184/643066) Transformer.

	Cont. Name	Description
60	FLT60-SB	**Gentleman 345 kV Stuck Breaker Scenario 4** a. Apply single phase fault at the Gentleman (640183) 345kV bus. b. Wait 16 cycles and remove fault. c. Trip Sweetwater (640374) to Gentleman (640183) 345kV line circuit 1. d. Trip Red Willow (640325) to Gentleman (640183) 345kV line circuit 1.
61	FLT61-SB	**Gentleman 345 kV Stuck Breaker Scenario 5** a. Apply single phase fault at the Gentleman (640183) 345kV bus. b. Wait 16 cycles and remove fault. c. Trip Red Willow (640325) to Gentleman (640183) 345kV line circuit 1. d. Trip Gentleman 345/230/13.8kV (640183/640184/640185) Transformer.
62	FLT62-SB	**Gentleman 345 kV Stuck Breaker Scenario 6** a. Apply single phase fault at the Gentleman (640183) 345kV bus. b. Wait 16 cycles and remove fault. c. Trip Red Willow (640325) to Gentleman (640183) 345kV line circuit 1. d. Trip Gentleman 345/230/13.8kV (640183/640184/643066) Transformer.
63	FLT63-SB	**Gentleman 345 kV Stuck Breaker Scenario 7** a. Apply single phase fault at the Gentleman (640183) 345kV bus. b. Wait 16 cycles and remove fault. c. Trip Red Willow (640325) to Gentleman (640183) 345kV line circuit 1. d. Trip Keystone (640252) to Gentleman (640183) 345kV line circuit 1.
64	FLT66a-3PH	3 phase fault on the G16-023-TAP (560075) to Stegall 3 (659135) 345kV line circuit 1, near Stegall 3. a. Apply fault at the Stegall 3 345kV bus. b. Clear fault after 6 cycles by tripping the faulted line.
66	FLT68-3PH	3 phase fault on the Stegall 3 (659135) to Sidney (659133) 345kV line circuit 1, near Stegall 3. a. Apply fault at the Stegall 3 345kV bus. b. Clear fault after 6 cycles by tripping the faulted line.
67	FLT69-3PH	3 phase fault on the Stegall 345/230/13.8kV (659135/659206/659167) Transformer, near Stegall3. a. Apply fault at the Stegall 345kV bus. b. Clear fault after 6 cycles by tripping the faulted line.
69	FLT71-SB	**Stegall 345 kV Stuck Breaker Scenario 2** a. Apply single phase fault at the Stegall (659135) 345kV bus. b. Wait 16 cycles and remove fault. c. Trip Stegall (659135) to G16-023-TAP (560075) 345kV line circuit 1 d. Trip Stegall (659135) to Sidney (659133) 345kV line circuit 1

	Cont. Name	Description
70	FLT72-SB	**Stegall 345 kV Stuck Breaker Scenario 3** a. Apply single phase fault at the Stegall (659135) 345kV bus. b. Wait 16 cycles and remove fault. c. Trip Stegall 345/230/13.8kV (659135/659206/659167) Transformer d. Trip Stegall 345/115/13.8kV (659135/640530/640531) Transformer
71	FLT73-PO	**Prior outage on the Sidney (659134) to Sidney Xfmr (659210) 345 kV line circuit 1** 3 phase fault on the Sidney (659133) to G16-023-Tap (560075) 345kV line circuit 1, near Sydney. a. Apply fault at the Sidney 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
72	FLT74-PO	**Prior outage on the Laramie3 (659131) to Stegall (659135) 345 kV line circuit 1** 3 phase fault on the Stegall (659135) to G16-023-TAP (560075) 345kV line circuit 1, near Stegall. a. Apply fault at the Stegall 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
73	FLT75-PO	**Prior outage on the Sidney (659133) to Stegall (659135) 345 kV line circuit 1** 3 phase fault on the G16-023-TAP (560075) to GEN-2016-023 345 kV line circuit 1, near G16-023-TAP. a. Apply fault at the G16-023-TAP 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
74	FLT76-3PH	3 phase fault on the Sidney (653572) to Colton (659817) 115kV line circuit 1, near Sidney. a. Apply fault at the Sidney 115kV bus. b. Clear fault after 6.5 cycles by tripping the faulted line.
75	FLT77-3PH	3 phase fault on the Sidney (653572/659134/659803) 115/230/13.8kV transformer, near Sidney. a. Apply fault at the Sidney 115kV bus. b. Clear fault after 6.5 cycles by tripping the faulted line.
76	FLT78-3PH	3 phase fault on the Colton (659817) to Chappel (65330) 115kV line circuit 1, near Colton. a. Apply fault at the Colton 115kV bus. b. Clear fault after 6.5 cycles by tripping the faulted line.
77	FLT79-3PH	3 phase fault on the Sidney (659134) to Sidxfmr (659210) 230kV line circuit 1, near Sidney. a. Apply fault at the Sidney 230kV bus. b. Clear fault after 6 cycles by tripping the faulted line.

	Cont. Name	Description
78	FLT80-3PH	3 phase fault on the Sidney (659134) to Sidney West (6452584) 230kV line circuit 1, near Sidney. a. Apply fault at the Sidney 230kV bus. b. Clear fault after 6 cycles, trip the faulted line, and remove the fault. c. Block the DC tie at SIDNEY 4.
79	FLT81-3PH	3 phase fault on the Chappel (65330) to JULSTAP7 (640246) 115kV line circuit 1, near Colton. a. Apply fault at the Chappel 115kV bus. b. Clear fault after 6.5 cycles by tripping the faulted line.
80	FLT82-SB	**Sidney 115 kV Stuck Breaker** a. Apply single phase fault at the Sidney (653572) 115kV bus. b. Wait 16 cycles and remove fault. c. Trip Sidney (653572) to Colton (659817) 115kV line circuit 1. d. Trip Sidney (653572/659134/659803) 115/230/13.8kV transformer.
81	FLT83-SB	**Sidney 230 kV Stuck Breaker Scenario 4** a. Apply single phase fault at the Sidney (659134) 230kV bus. b. Wait 16 cycles and remove fault. c. Trip Sidney (659134) to Sidney Xfmr (659210) 230kV line circuit 1. d. Trip Sidney (659134) to Ogalala (640302) 230kV line circuit 1. e. Block the DC tie at SIDNEY 4 f. Drop shunt at SIDNEY 4
82	FLT84-SB	**Sidney 230 kV Stuck Breaker Scenario 5** a. Apply single phase fault at the Sidney (659134) 230kV bus. b. Wait 16 cycles and remove fault. c. Trip Sidney (659134) to Sidney Xfmr (659210) 230kV line circuit 1. d. Trip Sidney (659134) 230 kV / (652572) 115 kV / (659803) 13.8 kV transformer circuit 1. e. Block the DC tie at SIDNEY 4 f. Drop shunt at SIDNEY 4
83	FLT85-SB	**JULSTAP7 115 kV Stuck Breaker** a. Apply single phase fault at the JULSTAP7 (640246) 115kV bus. b. Wait 16 cycles and remove fault. c. Trip JULSTAP7 (640246) to Highline (653303) 115kV line circuit 1. d. Trip JULSTAP7 (640246) to CHAPPEL7 (653300) 115kV line circuit 1.

	Cont. Name	Description
84	FLT86-PO	**Prior Outage of Sidney (653572) to Colton (659817) 115kV line circuit 1;** 3 phase fault on the Sidney (653572/659134/659803) 115/230/13.8kV transformer, near Sidney. a. Apply fault at the Sidney 115kV bus. b. Clear fault after 6.5 cycles by tripping the faulted line.
85	FLT87-PO	**Prior outage on the Sidney (659134) – Sidney Xfmr (659210) 230 kV line circuit 1;** 3 phase fault on the Sidney (659134) to Ogalala (640302) 230kV line circuit 1, near Sidney. a. Apply fault at the Sidney 230kV bus. b. Clear fault after 6 cycles by tripping the faulted line. c. Block the DC tie at SIDNEY 4 d. Drop shunt at SIDNEY 4
86	FLT88-PO	**Prior outage on the Sidney (659134) – Sidney Xfmr (659210) 230 kV line circuit 1;** 3 phase fault on the Sidney (659134) to Sidney West (6452584) 230kV line circuit 1, near Sidney. a. Apply fault at the Sidney 230kV bus. b. Clear fault after 6 cycles by tripping the faulted line. c. Block the DC tie at SIDNEY 4 d. Drop shunt at SIDNEY 4
87	FLT89-3PH	3 phase fault on the Hoskins (640226) to Antelope (640520) 345kV line circuit 1, near Hoskins. a. Apply fault at the Hoskins 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
88	FLT90-3PH	3 phase fault on the Hoskins (640226) to Shell Creek (640342) 345kV line circuit 1, near Hoskins. a. Apply fault at the Hoskins 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
89	FLT91-3PH	3 phase fault on the Hoskins (640226) to Raun (635200) 345kV line circuit 1, near Hoskins. a. Apply fault at the Hoskins 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
90	FLT92-3PH	3 phase fault on the Hoskins 345/230/13.8kV (640226/640227/643082) transformer, near Hoskins. a. Apply fault at the Hoskins 345kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.

	Cont. Name	Description
91	FLT93-3PH	3 phase fault on the Hoskins 345/115/13.8kV (640226/640228/640231) transformer, near Hoskins. a. Apply fault at the Hoskins 345kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.
92	FLT94-3PH	3 phase fault on the Raun (635200) to Sioux City (652564) 345kV line circuit 1, near Raun. a. Apply fault at the Raun 345kV bus. b. Clear fault after 6 cycles by tripping the faulted line.
93	FLT95-3PH	3 phase fault on the Raun (635200) to Lehigh (636010) 345kV line circuit 1, near Raun. a. Apply fault at the Raun 345kV bus. b. Clear fault after 6 cycles by tripping the faulted line.
94	FLT96-3PH	3 phase fault on the Raun (635200) to S3451 (645451) 345kV line circuit 1, near Raun. a. Apply fault at the Raun 345kV bus. b. Clear fault after 6 cycles by tripping the faulted line.
95	FLT97-3PH	3 phase fault on the Raun (635200) to Highland (635400) 345kV line circuit 1, near Raun. a. Apply fault at the Raun 345kV bus. b. Clear fault after 6 cycles by tripping the faulted line.
96	FLT98-3PH	3 phase fault on the Raun 345/161kV (635200/635201) transformer, near Raun. a. Apply fault at the Raun 345kV bus. b. Clear fault after 6 cycles by tripping the faulted line.
97	FLT99-3PH	3 phase fault on the Raun (635200) to Highland (635400) 345kV line circuit 1, near Raun. a. Apply fault at the Raun 345kV bus. b. Clear fault after 6 cycles by tripping the faulted line.
98	FLT100-3PH	3 phase fault on the Shell Creek (640342) to Columbus (640125) 345kV line circuit 1, near Shell Creek. a. Apply fault at the Shell Creek 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
99	FLT101-3PH	3 phase fault on the Shell Creek 345/230/13.8kV (640342/640343/643136) transformer, near Shell Creek. a. Apply fault at the Shell Creek 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line.

	Cont. Name	Description
100	FLT102-3PH	3 phase fault on the Antelope 345/115/13.8kV (640520/640521/640524) transformer, near Antelope. a. Apply fault at the Antelope 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
101	FLT103-3PH	3 phase fault on the Hoskins 230/115/13.8kV (640227/640228/643083) transformer, near Hoskins. a. Apply fault at the Hoskins 345kV bus. b. Clear fault after 6 cycles by tripping the faulted line.
102	FLT104-3PH	3 phase fault on the Hoskins (640227) to G10-051-Tap (560347) 230kV line circuit 1, near Hoskins. a. Apply fault at the Hoskins 230kV bus. b. Clear fault after 6 cycles by tripping the faulted line.
103	FLT105-3PH	3 phase fault on the Hoskins (640228) to Norfolk (640298) 115kV line circuit 1, near Hoskins. a. Apply fault at the Hoskins 115kV bus. b. Clear fault after 6.5 cycles by tripping the faulted line.
104	FLT106-3PH	3 phase fault on the Hoskins (640228) to Belden (640080) 115kV line circuit 1, near Hoskins. a. Apply fault at the Hoskins 115kV bus. b. Clear fault after 6.5 cycles by tripping the faulted line.
105	FLT107-3PH	3 phase fault on the Hoskins (640228) to Norfolk North (640296) 115kV line circuit 1, near Hoskins. a. Apply fault at the Hoskins 115kV bus. b. Clear fault after 6.5 cycles by tripping the faulted line.
106	FLT108-3PH	3 phase fault on the Hoskins (640228) to Stanton West (640363) 115kV line circuit 1, near Hoskins. a. Apply fault at the Hoskins 115kV bus. b. Clear fault after 6.5 cycles by tripping the faulted line.
107	FLT109-SB	**Hoskins 345 kV Stuck Breaker Scenario 1** a. Apply fault at the Hoskins 345kV bus. b. Clear fault after 16 cycles and trip the following elements c. Hoskins (640226) – Shell Creek (640342) 345kV d. Hoskins 345/230/13.8kV (640226/640227/643082) transformer
108	FLT110-SB	**Hoskins 345 kV Stuck Breaker Scenario 2** a. Apply fault at the Hoskins 345kV bus. b. Clear fault after 16 cycles and trip the following elements c. Hoskins (640226) – Shell Creek (640342) 345kV d. Hoskins (640226) – Antelope (640520) 345kV

	Cont. Name	Description
109	FLT111-SB	**Hoskins 345 kV Stuck Breaker Scenario 3** a. Apply fault at the Hoskins 345kV bus. b. Clear fault after 16 cycles and trip the following elements c. Hoskins 345/230/13.8kV (640226/640227/643082) transformer d. Hoskins 345/115/13.8kV (640226/640228/640231) transformer
110	FLT112-PO	**Prior Outage of Hoskins 345 kV (640226) to Raun 345 kV (635200) CKT 1;** 3 phase fault on Hoskins 345kV (640226) to Antelope 345kV (640520), near Hoskins. a. Apply fault at the Hoskins 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
111	FLT113-PO	**Prior Outage of Hoskins 345 kV (640226) to Raun 345 kV (635200) CKT 1;** 3 phase fault on Hoskins 345kV (640226) to Shell Creek 345kV (640342), near Hoskins. a. Apply fault at the Hoskins 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
112	FLT114-PO	**Prior Outage of Hoskins 345 kV (640226) to Raun 345 kV (635200) CKT 1;** 3 phase fault on Hoskins 345/115/13.8kV (640226/640228/640231) transformer, near Hoskins. a. Apply fault at the Hoskins 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
113	FLT115-PO	**Prior Outage of Hoskins 345 kV (640226) to Antelope 345 kV (640520) CKT 1;** 3 phase fault on Hoskins 345kV (640226) to Raun 345kV (635200), near Hoskins. a. Apply fault at the Hoskins 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
114	FLT116-PO	**Prior Outage of Hoskins 345 kV (640226) to Antelope 345 kV (640520) CKT 1;** 3 phase fault on Hoskins 345kV (640226) to Shell Creek 345kV (640342), near Hoskins. a. Apply fault at the Hoskins 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
115	FLT117-PO	**Prior Outage of Hoskins 345 kV (640226) to Antelope 345 kV (640520) CKT 1;** 3 phase fault on Hoskins 345/115/13.8kV (640226/640228/640298) transformer, near Hoskins. a. Apply fault at the Hoskins 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
116	FLT118-PO	**Prior Outage of Hoskins 345/230/13.8 kV (640226/640227/643082) Transformer;** 3 phase fault on Hoskins 345kV (640226) to Antelope 345kV (640520), near Hoskins. a. Apply fault at the Hoskins 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line.

	Cont. Name	Description
117	FLT119-PO	**Prior Outage of Hoskins 345/230/13.8 kV (640226/640227/643082) Transformer;** 3 phase fault on Hoskins 345kV (640226) to Shell Creek 345kV (640342), near Hoskins. a. Apply fault at the Hoskins 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
118	FLT120-PO	**Prior Outage of Hoskins 345/230/13.8 kV (640226/640227/643082) Transformer;** 3 phase fault on Hoskins 345kV (640226) to Raun 345kV (635200), near Hoskins. a. Apply fault at the Hoskins 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
120	FLT122-3PH	3 phase fault on the Holt County (640510) to GR ISLD-LNX3 (653871) to Grand Island (653571) 345kV line circuit 1, near Holt County. a. Apply fault at the Holt County 345kV bus. b. Clear fault after 6 cycles by tripping the faulted line.
121	FLT123-3PH	3 phase fault on the Grand Prairie (652532) to GRPRAR1-LNX3 (652832) to Holt County (640510) 345kV line circuit 1, near Grand Prairie. a. Apply fault at the Grand Prairie 345kV bus. b. Clear fault after 6 cycles by tripping the faulted line.
122	FLT124-3PH	3 phase fault on the Grand Prairie (652532) to Grand Prairie (648513) 345kV line circuit 1, near Grand Prairie. a. Apply fault at the Grand Prairie 345kV bus. b. Clear fault after 6 cycles by tripping the faulted line.
123	FLT125-3PH	3 phase fault on the Grand Prairie (652532) to GRPRAR1-LNX2 (652833) to Fort Thompson (652807) 345kV line circuit 1, near Grand Prairie. a. Apply fault at the Grand Prairie 345kV bus. b. Clear fault after 6 cycles by tripping the faulted line.
124	FLT126-3PH	3 phase fault on the Holt County (640510) to GR ISLD-LNX3 (653871) to Grand Island (652871) 345kV line circuit 1, near Holt County. a. Apply fault at the Holt County 345kV bus. b. Clear fault after 6 cycles by tripping the faulted line.
125	FLT127-3PH	**Holt 345 kV Stuck Breaker** a. Apply fault at the Holt 345kV bus. b. Clear fault after 16 cycles and trip the following elements c. Holt County (640510) to GR ISLD-LNX3 (653871) to Grand Island (653571) 345kV d. Holt County (640510) to G16-165-TAP (588344)

	Cont. Name	Description
126	FLT128-SB	**Grand Island 345 kV Stuck Breaker Scenario** a. Apply fault at the Grand Island 345kV bus. b. Clear fault after 16 cycles and trip the following elements c. Holt County (640510) to GR ISLD-LNX3 (653871) to Grand Island (653571) 345kV d. SWEET 3 (640374) to Grand Island (653571) 345kV
127	FLT129-PO	**Prior Outage of Grand Prairie 345 kV (652532) to GRPRAR1-LNX3 (652832) to Holt County (640510) 345 kV CKT 1;** 3 phase fault on the Grand Prairie 345 kV (652532) to GRPRAR2-LNX3 (652833) to FTTHOM2-LNX3 (652807) to Ft Thompson (652506) 345kV line circuit 1, near Ft Thompson. a. Apply fault at the Ft Thompson 345kV bus. b. Clear fault after 6.5 cycles by tripping the faulted line.
128	FLT130-PO	**Prior Outage of Grand Prairie 345 kV (652532) to GRPRAR1-LNX3 (652832) to Holt County (640510) 345 kV CKT 1;** 3 phase fault on the Ft Thompson 345/230/14.8kV (652506/652507/652273) transformer, near Ft Thompson. a. Apply fault at the Ft Thompson 345kV bus. b. Clear fault after 6.5 cycles by tripping the faulted line.
129	FLT131-SB	**Gentleman 345 kV Stuck Breaker Scenario 8** a. Apply single phase fault at the Gentleman (640183) 345kV bus. b. Wait 13.5 cycles and remove fault. c. Trip Red Willow (640325) to Gentleman (640183) 345kV line circuit 1. d. Trip Sweetwater (640374) to Gentleman (640183) 345kV line circuit 2.
130	FLT132-SB	**Gentleman 345 kV Stuck Breaker Scenario 9** a. Apply single phase fault at the Gentleman (640183) 345kV bus. b. Wait 13.5 cycles and remove fault. c. Trip Keystone (640252) to Gentleman (640183) 345kV line circuit 1. d. Trip Gentleman 345/230/13.8kV (640183/640184/643066) Transformer.
131	FLT133-SB	**Gentleman 230 kV Stuck Breaker Scenario 8** a. Apply single phase fault at the Gentleman (640184) 230kV bus. b. Wait 13.5 cycles and remove fault. c. Trip North Platte (640286) to Gentleman (640184) 230kV line circuit 1. d. Trip North Platte (640286) to Gentleman (640184) 230kV line circuit 2.
132	FLT134-3PH	3 phase fault on the Laramie (659131) to G16-023-TAP (560075) 345kV line circuit 1, near Laramie. a. Apply fault at the Laramie 345kV bus. b. Clear fault after 6 cycles by tripping the faulted line.

	Cont. Name	Description
133	FLT138-3PH	3 phase fault on the G16-023-Tap (560075) to Laramie (659131) 345kV line circuit 1, near G16-023-TAP. a. Apply fault at the G16-023-TAP 345kV bus. b. Clear fault after 6 cycles by tripping the faulted line.
134	FLT139-3PH	3 phase fault on the Laramie (659131) to Stegall (659135) 345kV line circuit 1, near Laramie. a. Apply fault at the Laramie 345kV bus. b. Clear fault after 6 cycles by tripping the faulted line.
135	FLT140-3PH	3 phase fault on the G16-023-Tap (560075) to Sidney LNX3 (659426) to Sidney (659131) 345kV line circuit 1, near G16-023-TAP. a. Apply fault at the G16-023-TAP 345kV bus. b. Clear fault after 6 cycles by tripping the faulted line.
136	FLT141-3PH	3 phase fault on the Stegall (659135) to G16-023-Tap (560075) 345kV line circuit 1, near Stegall. a. Apply fault at the Stegall 345kV bus. b. Clear fault after 6 cycles by tripping the faulted line.
138	FLT143-3PH	Single phase fault on the Gentleman (640183) to Red Willow (640325) 345kV line circuit 1 and Gentleman (640183) to Sweetwater (640374) 345kV line circuit 2, near Gentleman. a. Apply fault at the Gentleman 345kV bus. b. Clear fault after 5 cycles by tripping the faulted lines.

SECTION 3: STABILITY ANALYSIS

The objective of the Stability Analysis was to determine the impacts of the generator interconnections on the stability and voltage recovery on the SPP transmission system. If problems with stability or voltage recovery were identified, the need for reactive compensation or system upgrades was investigated.

3.1 Approach

MEPPI utilized the six following DISIS-2016-002-1 power flow cases and dynamic databases:

- MDWG16-17WP_DIS16021_G09
- MDWG16-17WP_DIS16021_G09GGS
- MDWG16-18SP_DIS16021_G09
- MDWG16-18SP_DIS16021_G09GGS
- MDWG16-26SP_DIS16021_G09
- MDWG16-26SP_DIS16021_G09GGS

The analysis was performed on three normally dispatched cases (17W, 18S, and 26S) and three sensitivity dispatched cases with the Gerald Gentleman Station Stability Interface (High GGS) dispatch (17W-GGS, 18S-GGS, and 26S-GGS). Each case was examined prior to the Stability Analysis to ensure the case contained the proposed study projects and any previously queued projects listed in Tables 2-1 and 2-2 respectively. In order to match conditions for the DISIS-2016-001 requests, the lower queued DISIS-2016-002 requests and upgrades were removed from the cases. The following upgrades were removed/confirmed to be removed from each case to begin the study:

- Keystone to Red Willow 345 kV circuit #1
- Post Rock to Red Willow 345 kV circuit #1
- Antelope to Grand Prairie 345 kV circuit #1
- Reroute Laramie River Station to Stegall 345kV circuit #1 through the GEN-2016-023-Tap substation
- SVC with +100MVAR injection at Keystone 345kV

Prior to performing the Stability Analysis, the following upgrades were added to all base cases as identified in the DISIS-2016-001-1 Group 09 study:

- SPP R Plan (16WP and 17SP only)
    - Cherry County/Thedford 345/115/13.8 kV transformer
    - Gentleman to Cherry County 345 kV circuit #1
    - Holt County to Cherry County 345 kV circuit #1
- Gerald Gentleman Station to Keystone 345 kV circuit #2

- Keystone to Sidney 345 kV circuit #2 (alternate upgrade for Keystone to Banner County 345 kV circuit with reduced route due to withdrawal of GEN-2016-034 from DISIS-2016-001)

After updating the power flow cases with the above changes and dispatching units local to the study area according to SPP criteria, there was no suspect power flow data in the study area. The dynamic datasets were also verified and stable initial system conditions (i.e., "flat lines") were achieved. Three-phase and single phase-to-ground faults listed in Table 2-3 were examined. Single-phase fault impedances were calculated for each season to result in a voltage of approximately 60% of the pre-fault voltage. Refer to Table 3-1 for a list of the calculated single-phase fault impedances.

Table 3-1
Calculated Single-Phase Fault Impedances for Cluster Scenario

[1]Ref. No.	Cont. Name	Faulted Bus	Single-Phase Fault Impedance (MVA)		
			2017 Winter	2018 Summer	2026 Summer
1	FLT10-SB	G16-023-TAP (560075) 345kV	-2304.7	-2304.7	-2304.7
2	FLT11-SB	Sidney (659134) 230kV	-1375.0	-1375.0	-1375.0
3	FLT12-SB	Sidney (659134) 230 kV	-1375.0	-1375.0	-1375.0
4	FLT13-SB	Stegall (659135) 345kV	-1750.0	-1750.0	-1750.0
5	FLT28-SB	Sweetwater (640374) 345kV	-3828.1	-3828.1	-3828.1
6	FLT29-SB	Sweetwater (640374) 345kV	-3828.1	-3828.1	-3828.1
7	FLT30-SB	Sweetwater (640374) 345kV	-3828.1	-3828.1	-3828.1
8	FLT31-SB	Keystone (640252) 345kV	-4031.3	-4031.3	-4031.3
10	FLT32-SB	Keystone (640252) 345kV	-2304.7	-2304.7	-2304.7
11	FLT44-SB	G15-088-TAP (560062) 345kV	-3015.6	-3015.6	-3015.6
12	FLT45-SB	Pauline (640312) 345kV	-3015.6	-3015.6	-3015.6
13	FLT46-SB	Moore (640277) 345kV	-1750.0	-1750.0	-1750.0
14	FLT47-SB	Moore (640277) 345kV	-7687.5	-7687.5	-7687.5
15	FLT48-SB	Moore (640277) 345kV	-7687.5	-7687.5	-7687.5
16	FLT49-SB	Axtell (640065) 345kV	-3218.8	-3218.8	-3218.8
17	FLT57-SB	Gentleman (640183) 345kV	-5000.0	-5000.0	-5000.0
18	FLT58-SB	Gentleman (640184) 230kV	-4800.0	-4800.0	-4800.0
19	FLT59-SB	Gentleman (640183) 345kV	-5000.0	-5000.0	-5000.0
20	FLT60-SB	Gentleman (640183) 345kV	-5000.0	-5000.0	-5000.0

21	FLT61-SB	Gentleman (640183) 345kV	-5000.0	-5000.0	-5000.0
22	FLT62-SB	Gentleman (640183) 345kV	-5000.0	-5000.0	-5000.0
23	FLT63-SB	Gentleman (640183) 345kV	-5000.0	-5000.0	-5000.0
24	FLT71-SB	Stegall (659135) 345kV	-1750.0	-1750.0	-1750.0
25	FLT72-SB	Stegall (659135) 345kV	-1750.0	-1750.0	-1750.0
26	FLT82-SB	Sidney (653572) 115kV	-562.5	-562.5	-562.5
27	FLT83-SB	Sidney (659134) 230kV	-1375.0	-1375.0	-1375.0
28	FLT84-SB	Sidney (659134) 230kV	-1375.0	-1375.0	-1375.0
29	FLT85-SB	JULSTAP7 (640246) 115kV	-500.0	-500.0	-500.0
30	FLT109-SB	Hoskins (640226) 345kV	-4437.5	-4437.5	-4437.5
31	FLT110-SB	Hoskins (640226) 345kV	-4437.5	-4437.5	-4437.5
32	FLT111-SB	Hoskins (640226) 345kV	-4437.5	-4437.5	-4437.5
33	FLT128-SB	Grand Island (653571) 345kV	-4234.4	-4234.4	-4234.4
34	FLT131-SB	Gentleman (640183) 345kV	-5000.0	-5000.0	-5000.0
35	FLT132-SB	Gentleman (640183) 345kV	-5000.0	-5000.0	-5000.0
36	FLT133-SB	Gentleman (640183) 345kV	-4800.0	-4800.0	-4800.0

(1) Refer to Table 2-3 for a description of the contingency scenario

Bus voltages, machine rotor angles, and previously queued generation in the study area were monitored in addition to bus voltages and machine rotor angles in the following areas:

- 640 NPPD
- 645 OPPD
- 650 LES
- 652 WAPA
- 600 XEL
- 608 MP
- 613 SMMPA
- 615 GRE
- 620 OTP
- 661 MDU

Requested and previously queued generation outside the above study area was also monitored.

The results of the analysis determined if reactive compensation or system upgrades were required to obtain acceptable system performance. If additional reactive compensation was required, the size, type, and location were determined. The proposed reactive reinforcements would ensure the wind or solar farm meets FERC Order 661A low voltage requirements and return the wind or solar farm to its pre-disturbance operating voltage. If the results indicated the need for fast responding reactive support, dynamic support such as an SVC or STATCOM was investigated. If tripping of the prior queued projects was observed during the stability analysis (for under/over voltage or under/over frequency) the simulations were re-ran with the prior queued project's voltage and frequency tripping disabled.

3.2 Stability Analysis Results

The Stability Analysis determined there were multiple contingencies that resulted in system/voltage instability, generation tripping offline, and poor post-fault voltage recovery when all generation interconnection requests were at 100% output.

Refer to Table 3-2 for a summary of the Stability Analysis results for the contingencies listed in Table 2-3. Table 3-2 is a summary of the stability results for the 2017 Winter Peak, 2018 Summer Peak, and 2026 Summer Peak conditions and states whether the system remained stable or generation tripped offline, if acceptable voltage recovery was observed after the fault was cleared, and if the voltage recovered to above 0.9 p.u. and below 1.1 p.u. post fault steady-state conditions. Voltage recovery criteria includes ensuring that the transient voltage recovery is between 0.7 p.u. within 2.5 seconds after the fault is cleared and 1.2 p.u. at any point after the fault is cleared and ending in a steady-state voltage (for N-1 contingencies) at the pre-contingent level or at least above 0.9 p.u. and below 1.1. p.u.

Refer to Appendix B, Appendix C, and Appendix D for a complete set of plots for all contingencies for 2017 Winter Peak, 2018 Summer Peak, and 2026 Summer Peak conditions, respectively.

Table 3-2
Stability Analysis Summary of Results for 2017 Winter, 2018 Summer, and 2026 Summer Peak Conditions

Ref. No.	Cont. Name	2017 Winter Peak				2018 Summer Peak				2026 Summer Peak			
		Voltage Recovery		Post Fault Steady-State Voltage	System Stability	Voltage Recovery		Post Fault Steady-State Voltage	System Stability	Voltage Recovery		Post Fault Steady-State Voltage	System Stability
		Less than 0.70 p.u.	Greater than 1.2 p.u.			Less than 0.70 p.u.	Greater than 1.2 p.u.			Less than 0.70 p.u.	Greater than 1.2 p.u.		
1	FLT01-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
2	FLT02-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
3	FLT03-3PH	Yes	Yes	Non-compliant	Unstable	Yes	Yes	Non-compliant	Unstable	Yes	Yes	Non-compliant	Unstable
4	FLT04-3PH	Yes	Yes	Non-compliant	Unstable	Yes	Yes	Non-compliant	Unstable	Yes	Yes	Non-compliant	Unstable
5	FLT05-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
6	FLT06-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
7	FLT07-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
8	FLT08-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
9	FLT09-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
10	FLT10-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
11	FLT11-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
12	FLT12-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
13	FLT13-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
14	FLT14-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
15	FLT15-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
16	FLT16-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
17	FLT17-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
18	FLT18-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
19	FLT19-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
20	FLT20-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
21	FLT21-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
22	FLT22-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
23	FLT23-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
24	FLT24-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
25	FLT25-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
26	FLT25-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
27	FLT27-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
28	FLT28-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
29	FLT29-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
30	FLT30-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
31	FLT31-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
32	FLT32-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
33	FLT33-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
34	FLT34-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
35	FLT35-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
36	FLT36-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
37	FLT37-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
38	FLT38-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
39	FLT39-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
40	FLT40-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
41	FLT41-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
42	FLT43-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
43	FLT44-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
44	FLT45-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
45	FLT45-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
46	FLT46-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
47	FLT47-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
48	FLT48-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
49	FLT49-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
50	FLT50-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
51	FLT51-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
52	FLT52-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
53	FLT53-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
54	FLT54-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
55	FLT55-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
56	FLT56-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
57	FLT57-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
58	FLT58-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
59	FLT59-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
60	FLT60-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable

Table 3-2 (Continued)
Stability Analysis Summary of Results for 2017 Winter, 2018 Summer, and 2026 Summer Peak Conditions

Ref. No.	Cont. Name	2017 Winter Peak				2018 Summer Peak				2026 Summer Peak			
		Voltage Recovery		Post Fault Steady-State Voltage	System Stability	Voltage Recovery		Post Fault Steady-State Voltage	System Stability	Voltage Recovery		Post Fault Steady-State Voltage	System Stability
		Less than 0.70 p.u.	Greater than 1.2 p.u.			Less than 0.70 p.u.	Greater than 1.2 p.u.			Less than 0.70 p.u.	Greater than 1.2 p.u.		
61	FLT61-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
62	FLT62-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
63	FLT63-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
64	FLT66a-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
65	FLT68-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
66	FLT69-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
67	FLT71-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
68	FLT72-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
69	FLT73-PO	Yes	Yes	Non-compliant	Unstable	Yes	Yes	Non-compliant	Unstable	Yes	Yes	Non-compliant	Unstable
70	FLT74-PO	Yes	Yes	Non-compliant	Unstable	Yes	Yes	Non-compliant	Unstable	Yes	Yes	Non-compliant	Unstable
71	FLT75-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
72	FLT76-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
73	FLT77-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
74	FLT78-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
75	FLT79-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
76	FLT80-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
77	FLT81-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
78	FLT82-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
79	FLT83-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
80	FLT84-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
81	FLT85-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
82	FLT86-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
83	FLT87-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
84	FLT88-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
85	FLT89-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
86	FLT90-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
87	FLT91-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
88	FLT92-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
89	FLT93-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
90	FLT94-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
91	FLT95-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
92	FLT96-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
93	FLT97-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
94	FLT98-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
95	FLT99-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
96	FLT100-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
97	FLT101-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
98	FLT102-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
99	FLT103-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
100	FLT104-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
101	FLT105-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
102	FLT106-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
103	FLT107-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
104	FLT108-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
105	FLT109-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
106	FLT110-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
107	FLT111-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
108	FLT112-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
109	FLT113-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
110	FLT114-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
111	FLT115-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
112	FLT116-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
113	FLT117-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
114	FLT118-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
115	FLT119-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
116	FLT120-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable

Table 3-2 (Continued)
Stability Analysis Summary of Results for 2017 Winter, 2018 Summer, and 2026 Summer Peak Conditions

Ref. No.	Cont. Name	2017 Winter Peak				2018 Summer Peak				2026 Summer Peak			
		Voltage Recovery		Post Fault Steady-State Voltage	System Stability	Voltage Recovery		Post Fault Steady-State Voltage	System Stability	Voltage Recovery		Post Fault Steady-State Voltage	System Stability
		Less than 0.70 p.u.	Greater than 1.2 p.u.			Less than 0.70 p.u.	Greater than 1.2 p.u.			Less than 0.70 p.u.	Greater than 1.2 p.u.		
116	FLT122-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
117	FLT123-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
118	FLT124-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
119	FLT125-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
120	FLT126-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
121	FLT127-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
122	FLT128-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
123	FLT129-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
124	FLT130-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
125	FLT131-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
126	FLT132-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
127	FLT133-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
128	FLT134-3PH	Yes	Yes	Non-compliant	Unstable	No	No	Compliant	Stable	No	No	Compliant	Stable
131	FLT140-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
133	FLT143-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable

With the above upgrades, it was observed that FLT04-3PH, which is a 3PH fault resulting in the loss of the Laramie to Stegall 345 kV line, resulted in system instability for all seasonal peak conditions. The following upgrades were each independently found to mitigate the instability observed:

- Reroute the Laramie River Station to Stegall 345 kV line through the GEN-2016-023 Substation and equipment necessary to achieve a fault clearing within 5 cycles.
- Replace Keystone to Sidney 345 kV circuit #2 with Keystone to Banner County 345 kV circuit
- +250MVAR SVC at Sidney 345kV

Refer to Table 3-3 for a summary of the identified upgrades and the key faults for those upgrades.

Table 3-3
Mitigation Analysis Summary of Results for 2017 Winter, 2018 Summer, and 2026 Summer Peak Conditions

Fault Number	Faulted Bus	Faulted Circuit	Fault Type	Fault Duration (cycles)	Season	Group 9 Results	Mitigation Solution Implemented in Study Case						
							GGS-Thedford-Holt 345kV Ckt 1	GGS-Keystone 345kV Ckt 2	Keystone-Sidney 345kV Ckt 1	Keystone-Banner 345kV Ckt 1	Reroute of LRS-Stegall 345kV through GEN-2016-023 substation	Sidney SVC	GGS Upgrade
FLT03	Stegall 345kV (659135)	Laramie (659131) to Stegall (659135) 345kV Ckt 1	3PH	6	All	Stable	Yes	Yes	Yes	No	No	No	No
FLT04	Laramie 345kV (659131)	Laramie (659131) to Stegall (659135) 345kV Ckt 1	3PH	6	All	Unstable	Yes	Yes	Yes	No	No	No	No
				6	All	Stable	Yes	Yes	Yes	No	Yes	No	No
				6	All	Stable	Yes	Yes	No	Yes	No	No	No
				6	All	Stable	Yes	Yes	Yes	No	No	250 MVAR	No
FLT134	Laramie 345kV (659131)	Laramie (659131) to GEN-2016-023 substation (560075) 345kV Ckt 1	3PH	6	All	Stable	Yes	Yes	Yes	No	Yes	No	No
FLT138	GEN-2016-023 substation 345kV (560075)	Laramie (659131) to GEN-2016-023 substation (560075) 345kV Ckt 1	3PH	6	All	Stable	Yes	Yes	Yes	No	Yes	No	No
FLT139	GEN-2016-023 substation 345kV (560075)	Stegall (659135) to GEN-2016-023 substation (560075) 345kV Ckt 1	3PH	6	17W GGS 18S GGS	Unstable	Yes	Yes	Yes	No	Yes	No	No
FLT139	GEN-2016-023 substation 345kV (560075)	Stegall (659135) to GEN-2016-023 substation (560075) 345kV Ckt 1	3PH	5	17W GGS 18S GGS	Stable	Yes	Yes	Yes	No	Yes	No	No
FLT141	Stegall 345kV (659135)	Stegall (659135) to GEN-2016-023 substation (560075) 345kV Ckt 1	3PH	6	All	Stable	Yes	Yes	Yes	No	Yes	No	No

Note 1: Base upgrade for this analysis is the R-Plan upgrade and GGS - Keystone - Sidney 345 kV CKT
Note 2: SPP recommended/selected upgrade is Base Upgrade + reroute of the LRS to Stegall 345 kV CKT through GEN-2016-023 substation
Note 3: FLT138 and FLT139 are faults associated with the reroute of LRS to Stegall 345kV CKT through GEN-2016-023 substation

SPP provided direction to proceed with the upgrade to reroute the Laramie River Station to Stegall 345 kV line through the GEN-2016-023 Substation. Refer to Figure 3-1 for a representative plot of the bus voltage at Laramie 345 kV for FLT04 for the 2017 Winter Peak case with and without the reroute mitigation.

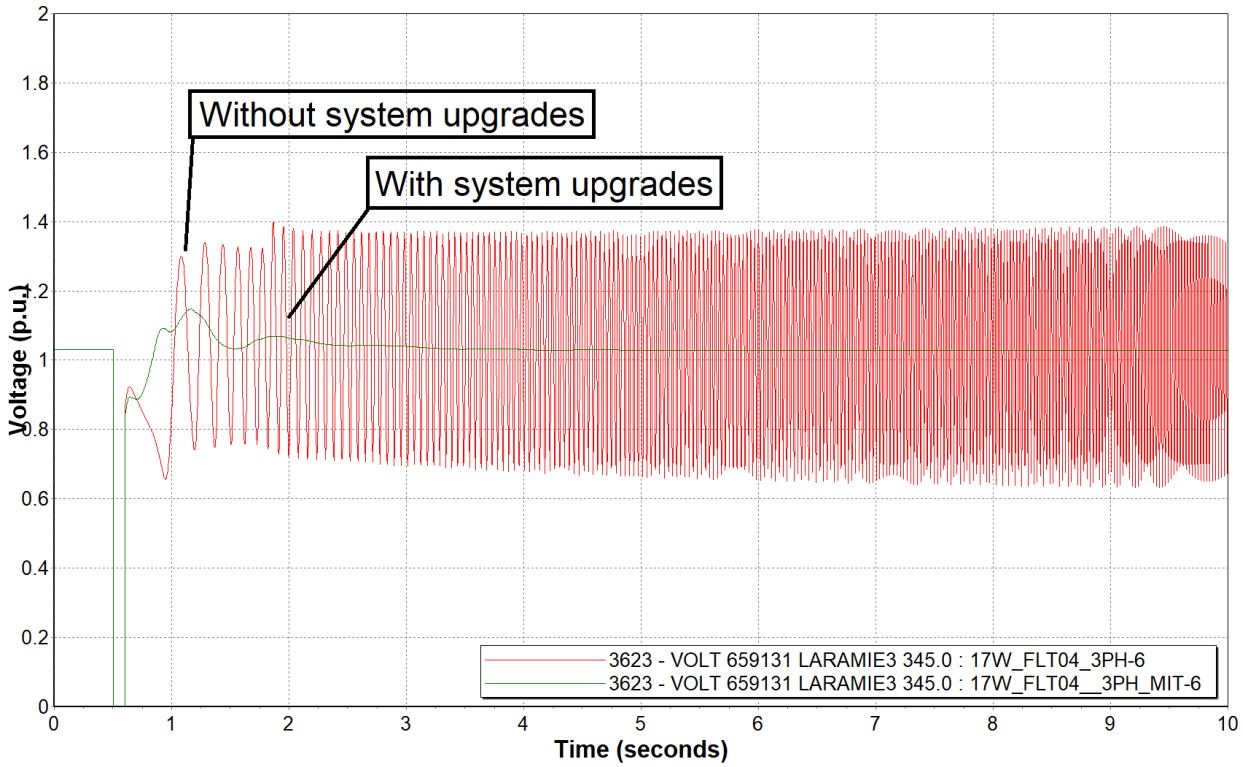

Figure 3-1. Plot of the voltage at Laramie 345 kV for FLT04 for 2017 Winter Peak case with and without mitigation.

It was observed that FLT134-3PH, which is a 3PH fault resulting in the loss of the G16-023-Tap to LRS 345 kV line, resulted in system instability for 17W conditions. After implementing the upgrades provided by SPP, the observed instability violation was mitigated. Refer to Figure 3-2 for a representative plot of the bus voltage at G16-023-Tap 345 kV for FLT134 for the 2017 Winter Peak case with and without mitigation.

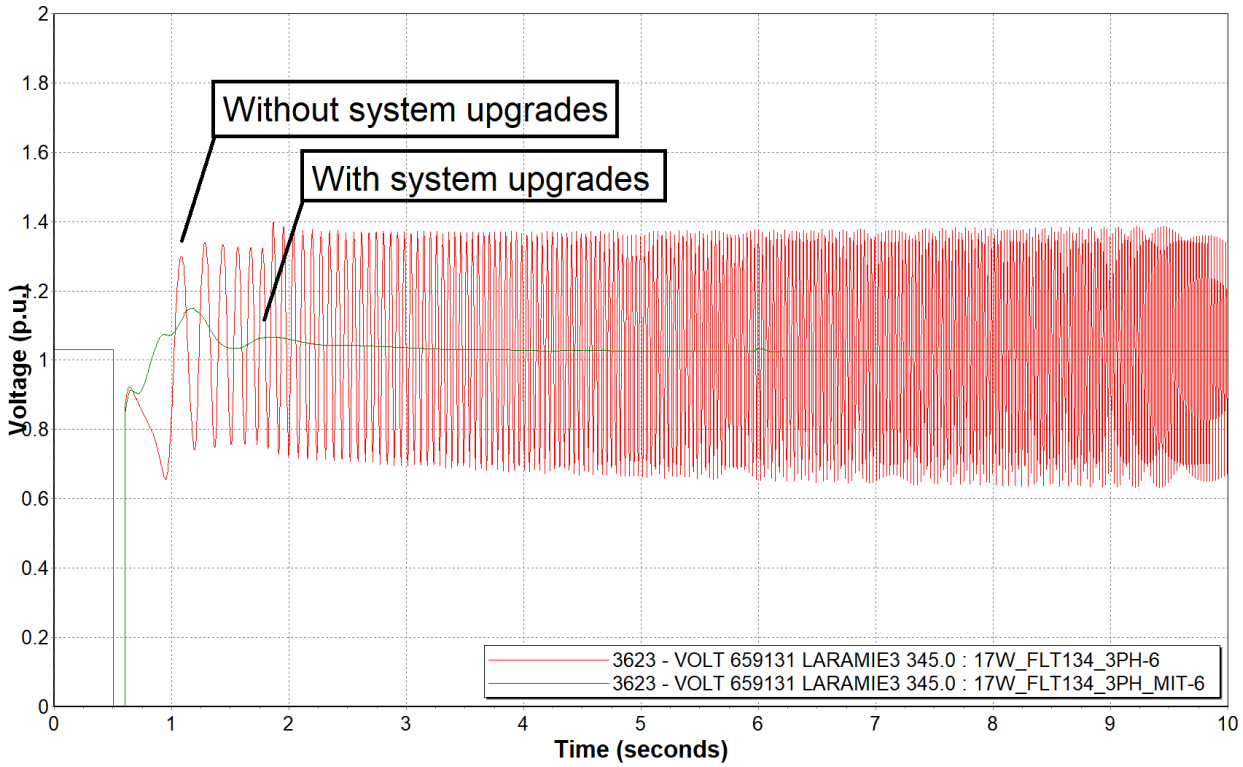

Figure 3-2. Plot of the voltage at G16-023-Tap 345 kV for FLT134 for 2017 Winter Peak case with and without mitigation.

After implementing the above upgrades, the contingency analysis was re-simulated for all contingencies. With the upgrades, the Stability Analysis determined that there was no generation tripping or system instability observed as a result of interconnecting all study projects at 100% output.

3.3 High GGS Sensitivity Stability Analysis Results

The High GGS Scenario Stability Analysis determined there were multiple contingencies that resulted in system/voltage instability, generation tripping offline, and poor post-fault voltage recovery when all generation interconnection requests were at 100% output.

Refer to Table 3-4 for a summary of the Stability Analysis results for the contingencies listed in Table 2-3. Table 3-4 is a summary of the stability results for the 2017 Winter Peak, 2018 Summer Peak, and 2026 Summer Peak High GGS conditions and states whether the system remained stable or generation tripped offline, if acceptable voltage recovery was observed after the fault was cleared, and if the voltage recovered to above 0.9 p.u. and below 1.1 p.u. post fault steady-state conditions. Voltage recovery criteria includes ensuring that the transient voltage recovery is between 0.7 p.u. within 2.5 seconds after the fault is cleared and 1.2 p.u. at any point

after the fault is cleared and ending in a steady-state voltage (for N-1 contingencies) at the pre-contingent level or at least above 0.9 p.u. and below 1.1. p.u.

Refer to Appendix E, Appendix F, and Appendix G for a complete set of plots for all contingencies for 2017 Winter Peak, 2018 Summer Peak, and 2026 Summer Peak High GGS conditions, respectively.

Table 3-4
High GGS: Stability Analysis Summary of Results for 2017 Winter, 2018 Summer, and 2026 Summer Peak Conditions

Ref. No.	Cont. Name	2017 Winter Peak				2018 Summer Peak				2026 Summer Peak			
		Voltage Recovery		Post Fault Steady-State Voltage	System Stability	Voltage Recovery		Post Fault Steady-State Voltage	System Stability	Voltage Recovery		Post Fault Steady-State Voltage	System Stability
		Less than 0.70 p.u.	Greater than 1.2 p.u.			Less than 0.70 p.u.	Greater than 1.2 p.u.			Less than 0.70 p.u.	Greater than 1.2 p.u.		
1	FLT01-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
2	FLT02-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
3	FLT03-3PH	Yes	Yes	Non-compliant	Unstable	Yes	Yes	Non-compliant	Unstable	Yes	Yes	Non-compliant	Unstable
4	FLT04-3PH	Yes	Yes	Non-compliant	Unstable	Yes	Yes	Non-compliant	Unstable	Yes	Yes	Non-compliant	Unstable
5	FLT05-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
6	FLT06-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
7	FLT07-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
8	FLT08-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
9	FLT09-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
10	FLT10-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
11	FLT11-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
12	FLT12-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
13	FLT13-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
14	FLT14-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
15	FLT15-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
16	FLT16-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
17	FLT17-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
18	FLT18-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
19	FLT19-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
20	FLT20-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
21	FLT21-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
22	FLT22-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
23	FLT23-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
24	FLT24-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
25	FLT25-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
26	FLT25-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
27	FLT27-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
28	FLT28-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
29	FLT29-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
30	FLT30-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
31	FLT31-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
32	FLT32-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
33	FLT33-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
34	FLT34-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
35	FLT35-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
36	FLT36-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
37	FLT37-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
38	FLT38-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
39	FLT39-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
40	FLT40-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
41	FLT41-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
42	FLT43-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
43	FLT44-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
44	FLT45-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
45	FLT45-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
46	FLT46-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
47	FLT47-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
48	FLT48-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
49	FLT49-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
50	FLT50-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
51	FLT51-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
52	FLT52-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
53	FLT53-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
54	FLT54-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
55	FLT55-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
56	FLT56-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
57	FLT57-SB	Yes	Yes	Non-compliant	Unstable	Yes	Yes	Non-compliant	Unstable	No	No	Compliant	Stable
58	FLT58-SB	Yes	Yes	Non-compliant	Unstable	Yes	Yes	Non-compliant	Unstable	No	No	Compliant	Stable
59	FLT59-SB	Yes	Yes	Non-compliant	Unstable	Yes	Yes	Non-compliant	Unstable	No	No	Compliant	Stable
60	FLT60-SB	Yes	Yes	Non-compliant	Unstable	Yes	Yes	Non-compliant	Unstable	No	No	Compliant	Stable

Table 3-4 (Continued)
High GGS: Stability Analysis Summary of Results for 2017 Winter, 2018 Summer, and 2026 Summer Peak Conditions

Ref. No.	Cont. Name	2017 Winter Peak				2018 Summer Peak				2026 Summer Peak			
		Voltage Recovery		Post Fault Steady-State Voltage	System Stability	Voltage Recovery		Post Fault Steady-State Voltage	System Stability	Voltage Recovery		Post Fault Steady-State Voltage	System Stability
		Less than 0.70 p.u.	Greater than 1.2 p.u.			Less than 0.70 p.u.	Greater than 1.2 p.u.			Less than 0.70 p.u.	Greater than 1.2 p.u.		
61	FLT61-SB	Yes	Yes	Non-compliant	Unstable	Yes	Yes	Non-compliant	Unstable	No	No	Compliant	Stable
62	FLT62-SB	Yes	Yes	Non-compliant	Unstable	Yes	Yes	Non-compliant	Unstable	No	No	Compliant	Stable
63	FLT63-SB	Yes	Yes	Non-compliant	Unstable	Yes	Yes	Non-compliant	Unstable	No	No	Compliant	Stable
64	FLT66a-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
65	FLT68-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
66	FLT69-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
67	FLT71-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
68	FLT72-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
69	FLT73-PO	Yes	Yes	Non-compliant	Unstable	Yes	Yes	Non-compliant	Unstable	Yes	Yes	Non-compliant	Unstable
70	FLT74-PO	Yes	Yes	Non-compliant	Unstable	Yes	Yes	Non-compliant	Unstable	Yes	Yes	Non-compliant	Unstable
71	FLT75-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
72	FLT76-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
73	FLT77-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
74	FLT78-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
75	FLT79-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
76	FLT80-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
77	FLT81-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
78	FLT82-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
79	FLT83-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
80	FLT84-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
81	FLT85-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
82	FLT86-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
83	FLT87-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
84	FLT88-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
85	FLT89-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
86	FLT90-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
87	FLT91-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
88	FLT92-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
89	FLT93-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
90	FLT94-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
91	FLT95-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
92	FLT96-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
93	FLT97-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
94	FLT98-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
95	FLT99-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
96	FLT100-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
97	FLT101-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
98	FLT102-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
99	FLT103-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
100	FLT104-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
101	FLT105-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
102	FLT106-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
103	FLT107-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
104	FLT108-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
105	FLT109-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
106	FLT110-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
107	FLT111-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
108	FLT112-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
109	FLT113-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
110	FLT114-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
111	FLT115-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
112	FLT116-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
113	FLT117-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
114	FLT118-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
115	FLT119-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
116	FLT120-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable

Table 3-4 (Continued)
High GGS: Stability Analysis Summary of Results for 2017 Winter, 2018 Summer, and 2026 Summer Peak Conditions

Ref. No.	Cont. Name	2017 Winter Peak				2018 Summer Peak				2026 Summer Peak			
		Voltage Recovery		Post Fault Steady-State Voltage	System Stability	Voltage Recovery		Post Fault Steady-State Voltage	System Stability	Voltage Recovery		Post Fault Steady-State Voltage	System Stability
		Less than 0.70 p.u.	Greater than 1.2 p.u.			Less than 0.70 p.u.	Greater than 1.2 p.u.			Less than 0.70 p.u.	Greater than 1.2 p.u.		
117	FLT122-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
118	FLT123-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
119	FLT124-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
120	FLT125-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
121	FLT126-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
122	FLT127-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
123	FLT128-SB	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
124	FLT129-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
125	FLT130-PO	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
126	FLT131-SB	Yes	Yes	Non-compliant	Unstable	Yes	Yes	Non-compliant	Unstable	No	No	Compliant	Stable
127	FLT132-SB	Yes	Yes	Non-compliant	Unstable	Yes	Yes	Non-compliant	Unstable	No	No	Compliant	Stable
128	FLT133-SB	Yes	Yes	Non-compliant	Unstable	Yes	Yes	Non-compliant	Unstable	No	No	Compliant	Stable
129	FLT134-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
130	FLT138-3PH	Yes	Yes	Non-compliant	Unstable	Yes	Yes	Non-compliant	Unstable	Yes	Yes	Non-compliant	Unstable
131	FLT139-3PH	Yes	Yes	Non-compliant	Unstable	Yes	Yes	Non-compliant	Unstable	No	No	Compliant	Stable
132	FLT140-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
133	FLT141-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable
134	FLT143-3PH	No	No	Compliant	Stable	No	No	Compliant	Stable	No	No	Compliant	Stable

In addition to the upgrades identified in Section 3.2, to mitigate the voltage instability and low post-fault steady-state voltages, the following upgrades were provided by SPP and implemented in all seasons:

- Reconfigure Gerald Gentleman Station to include additional breakers between the Sweetwater and Red Willow terminals

Note the stuck breaker faults at Gerald Gentleman Station were observed to cause voltage instability. All stuck breaker faults at Gentleman 345 kV and Gentleman 230 kV, except FLT60, were mitigated with a reduced delayed clearing time of 13.5 cycles.

Refer to Table 3-5 for a summary of the identified upgrades for the High GGS sensitivity cases and the key faults for those upgrades.

Table 3-5
Mitigation Analysis Summary of Results for the High GGS Sensitivity 2017 Winter, 2018 Summer, and 2026 Summer Peak Conditions

Fault Number	Faulted bus	Faulted circuit	Fault MVA	Fault Duration	Group 9 Results	Season	GGS-Thedford-Holt 345kV ckt 1	GGS-Keystone 345kV ckt 2	Keystone-Sidney 345kV ckt 2	Keystone-Banner 345kV ckt 1	Reroute of LRS-Stegall 345kV through GEN-2016-023 substation	Sidney SVC	GGS Upgrade
FLT60	Gentleman (640183) 345kV	Sweetwater-Gentleman 345kV ckt 1 Red Willow-Gentleman 345kV ckt 1	-5000	13.5 cycles	Unstable	All	Yes	Yes	Yes	No	No	No	No
	Gentleman (640183) 345kV	Sweetwater-Gentleman 345kV ckt 1 Red Willow-Gentleman 345kV ckt 1	-5000	13.5 cycles	Stable	All	Yes	Yes	Yes	No	No	No	Additional breaker(s) between Sweetwater and Red Willow terminals

Note 1: Base upgrade for this analysis is the R-Plan upgrade and GGS - Keystone - Sidney 345 kV CKT
Note 2: SPP recommended/selected upgrade is Base Upgrade + reroute of the LRS to Stegall 345 kV CKT through GEN-2016-023 substation

It was observed that FLT60-SB, which is a stuck breaker fault resulting in the loss of the Sweetwater to Gentleman 345 kV line as well as the Red Willow to Gentleman 345 kV line, resulted in system instability for all seasonal peak conditions. After implementing the upgrade above (reconfiguring the Gerald Gentleman Station) provided by SPP, the observed voltage violation was mitigated. Refer to Figure 3-3 for a representative plot of the bus voltage at Gentleman 345 kV for 2017 Winter Peak case with and without mitigation.

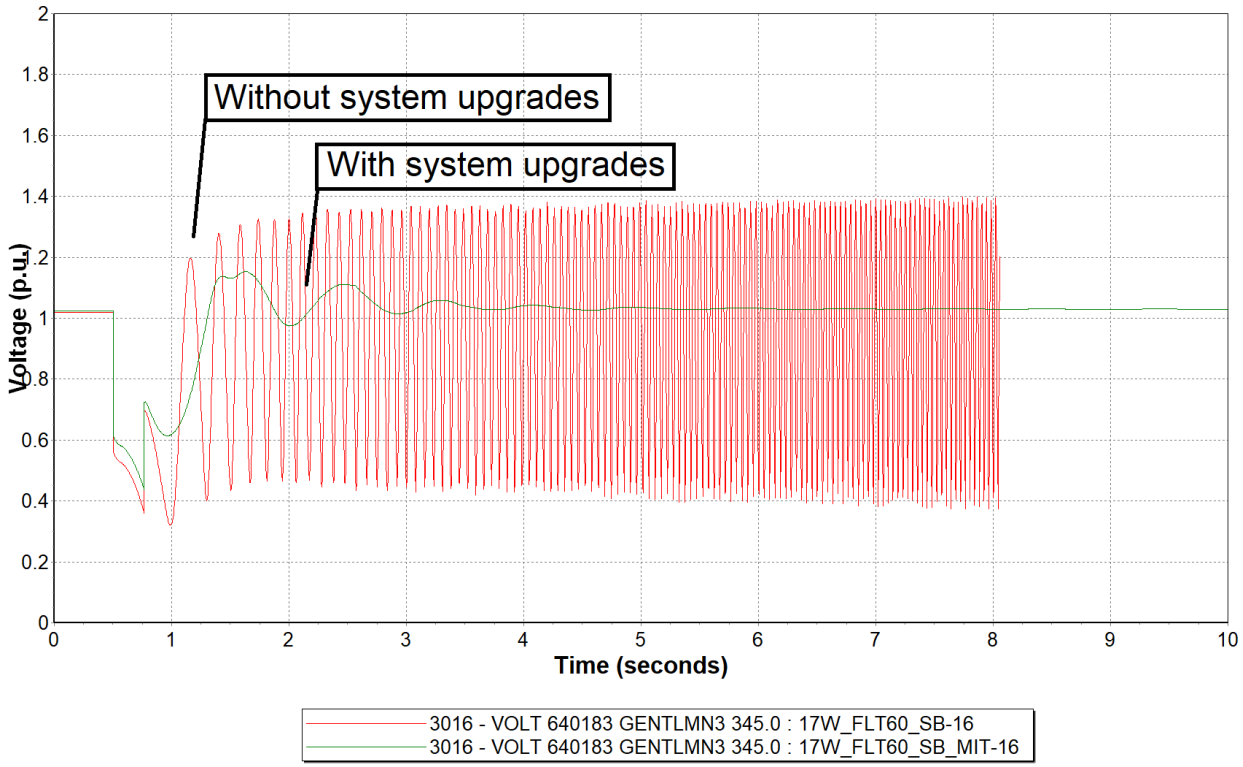

Figure 3-3. Plot of the voltage at Gentleman 345 kV for FLT60-SB for 2017 Summer Peak case with and without mitigation.

After implementing the above upgrades, the GGS contingency analysis was re-simulated for all contingencies. With the upgrades, the Stability Analysis determined that there was no generation tripping or system instability observed as a result of interconnecting all study projects at 100% output.

SECTION 4: CONCLUSIONS

Summary of the Stability Analysis

The Stability Analysis determined there were multiple contingencies that resulted in system/voltage instability, generation tripping offline, and poor post-fault voltage recovery when all generation interconnection requests were at 100% output.

To mitigate the system/voltage instability and low post-fault steady-state voltages, the following upgrades were provided by SPP and implemented in all seasons:

- SPP R Plan (16WP and 17SP only)
  - Cherry County/Thedford 345/115/13.8 kV transformer
  - Gentleman to Cherry County 345 kV circuit #1
  - Holt County to Cherry County 345 kV circuit #1
- Gerald Gentleman Station to Keystone 345 kV circuit #2
- Keystone to Sidney 345 kV circuit #2
- Reroute the Laramie River Station to Stegall 345 kV line through the GEN-2016-023 Substation and equipment necessary to achieve a fault clearing within 5 cycles.

After implementing the above upgrades, the contingency analysis was re-simulated for all contingencies. With the upgrades, the Stability Analysis determined that there was no generation tripping or system instability observed as a result of interconnecting all study projects at 100% output.

High GGS Sensitivity Scenario

The High GGS Scenario Stability Analysis determined there were multiple contingencies that resulted in system/voltage instability, generation tripping offline, and poor post-fault voltage recovery when all generation interconnection requests were at 100% output.

In addition to the upgrades identified above, to mitigate the voltage instability and low post-fault steady-state voltages, the following upgrades were provided by SPP and implemented in all seasons:

- Reconfigure Gerald Gentleman Station to include additional breakers between the Sweetwater and Red Willow terminals

After implementing the above upgrades, the contingency analysis was re-simulated for all contingencies. With the upgrades, the Stability Analysis determined that there was no generation tripping or system instability observed as a result of interconnecting all study projects at 100% output.