



DISIS-2016-001-3
Definitive Interconnection System
Impact Study Report

Groups 3, 6, & 7 Restudy

Published on April 12, 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.
4/12/2019	SPP	DISIS-2016-001-3 Report Revision 1 issued. Updates to Contingent Upgrades table, correction of power factor requirements and inclusion of prior outage results in the stability analysis section, addition of previously allocated projects to Appendix E, format correction to Appendix G-T and G-V, and final stability reports.

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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 1,284.05 MW to the SPP Transmission System for Groups 3, 6, and 7. The interconnecting SPP Transmission Owners include:

- American Electric Power West (AEPW)
- Midwest Energy (MIDW)
- Southwestern Public Service (SPS)
- Sunflower Electric Power Corporation (SUNC)

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 date¹.

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.

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.

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.

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 (100 MVAR)	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 (60 MVAR)	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 (100 MVAR)	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) 3 (Spearville Area), 6 (South Texas Panhandle/New Mexico Area) and 7 (Southwest Oklahoma 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 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. Additional constraints identified by multi-element contingencies are listed in Appendix I.

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:

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

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

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

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

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

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 6 and 7 total an estimated **\$526.4 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 3 (SPEARVILLE 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 3.

Table 8-1 Group 3 Cluster Upgrade Scenarios

Scenario	Constraint Type	Incremental Mitigation
0	Non-Converged	Clark County – Beaver County 345 kV CKT 1
2	Thermal	NONE
3	Voltage	Greenburg 115 kV Capacitive Reactive Support

The following ERS Non-Convergence constraints were observed for single contingency (N-1), and multi-contingency (P1, P2, etc.) conditions for Group 3. The table below summarizes constraints and associated mitigations.

Table 8-2 Group 3 Cluster ERS Non-Convergence Constraints

Contingency	Mitigation
BUCKNER7 345.00 - HOLCOMB 345KV CKT 1	Clark County – Beaver County 345 kV CKT 1
FINNEY SWITCHING STATION - WALKEMEYER 7345.00 345KV CKT 1	
Hitchland Interchange - WALKEMEYER 7345.00 345KV CKT 1	

The following ERS thermal constraints were observed for single contingency (N-1), and multi-contingency (P1, P2, etc.) conditions for Group 3. The table below summarizes constraints and associated mitigations.

Table 8-3 Group 3 Cluster ERS Thermal Constraints

Monitored Element	Limiting Rate A/B (MVA)	TC %Loading (%MVA)	Contingency	Mitigation
CLEARWATER - MILAN TAP 138KV CKT 1	110	107.516	BASE CASE	NTC-200288 NTC-200296 NTC-20363 NTC-200362
HUNTSVILLE - ST_JOHN 115KV CKT 1	80	103.423	CIRCLE - MULLERGRENN 230KV CKT 1	Model Correction – Updated ratings from 2019 ITP

The following ERS voltage constraints were observed for single contingency (N-1), and multi-contingency (P1, P2, etc.) conditions for Group 3. The table below summarizes constraints and associated mitigations.

Table 8-4 Group 3 Cluster ERS Voltage Constraints

Monitored Element	TC Voltage (PU)	VMIN (PU)	VMAX (PU)	Contingency	Mitigation
Greenburg 115 kV	0.894081	0.9	1.05	Hitchland Interchange - WALKEMEYER 7345.00 345KV CKT 1	Greenburg 115 kV Capacitive Reactive Support

CLUSTER GROUP 6 (SOUTH TEXAS PANHANDLE/NEW MEXICO 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 6.

Table 8-5 Group 6 Cluster Upgrade Scenarios

Scenario	Constraint Type	Incremental Mitigation
0	Non-Converged	New Crawfish Draw 345 kV Substation
	Non-Converged	Crawfish Draw – Tolk 345 kV CKT 1
	Non-Converged	Tolk – Potter 345 kV CKT 1
	Non-Converged	Border – Chisholm 345 kV CKT 1
2	Thermal	Andrews 230/115 kV CKT 1 & 2 Uprate
3	Voltage	Oklaunion 345 kV Capacitive Reactive Support
	Voltage	Shamrock 69 kV Capacitive Reactive Support

The following ERS Non-Convergence constraints were observed for single contingency (N-1), and multi-contingency (P1, P2, etc.) conditions for Group 6. The table below summarizes constraints and associated mitigations.

Table 8-6 Group 6 Cluster ERS Non-Convergence Constraints

Contingency	Mitigation
OASIS INTERCHANGE - SAN JUAN MESA TAP 230KV CKT 1	Model Correction – Capacitor Switching
BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1	New Crawfish Draw 345 kV Substation Crawfish Draw – Tolk 345 kV CKT 1 Tolk – Potter 345 kV CKT 1 Border – Chisholm 345 kV CKT 1
BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1	
OKLAUNION - TUCO INTERCHANGE 345KV CKT 1	

The following ERS thermal constraints were observed for single contingency (N-1), and multi-contingency (P1, P2, etc.) conditions for Group 6. The table below summarizes constraints and associated mitigations.

Table 8-7 Group 6 Cluster ERS Thermal Constraints

Monitored Element	Limiting Rate A/B (MVA)	TC %Loading (%MVA)	Contingency	Mitigation
ANDREWS 6230.00 (FROM MIDLAND) 230/115/13.2KV TRANSFORMER CKT 1	168	104.5552	ANDREWS 6230.00 - HOBBS INTERCHANGE 230KV CKT 1	Andrews 230/115 kV CKT 1 & 2 Uprate
ANDREWS 6230.00 (FROM BORDEN) 230/115/13.2KV TRANSFORMER CKT 2	168	105.0698	ANDREWS 6230.00 - HOBBS INTERCHANGE 230KV CKT 1	Andrews 230/115 kV CKT 1 & 2 Uprate
CURRY COUNTY INTERCHANGE - DEAF SMITH REC-#20 115KV CKT 1	89.63	116.4911	BASE CASE	New Crawfish Draw 345 kV Substation Crawfish Draw – Tolk 345 kV CKT 1 Tolk – Potter 345 kV CKT 1
DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1	318.69	122.1928	BASE CASE	
DEAF SMITH REC-#20 - PARMER COUNTY SUB 115KV CKT 1	93.21	100.5845	BASE CASE	
DRINKARD SUB - DRINKARD TAP 115KV CKT 1	102.58	123.2769	ANDREWS 6230.00 - HOBBS INTERCHANGE 230KV CKT 1	Model Correction – Updated ratings from 2019 ITP

Monitored Element	Limiting Rate A/B (MVA)	TC %Loading (%MVA)	Contingency	Mitigation
GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1	318.69	101.9719	BASE CASE	Border – Chisholm 345 kV CKT 1
National Enrichment Plant Sub - TARGA 3115.00 115KV CKT 1	119.9	154.8428	ANDREWS 6230.00 - HOBBS INTERCHANGE 230KV CKT 1	Model Correction – Updated ratings from 2019 ITP
NEWHART 230 - PLANT X STATION 230KV CKT 1	318.69	113.0553	BASE CASE	New Crawfish Draw 345 kV Substation Crawfish Draw – Tolc 345 kV CKT 1 Tolk – Potter 345 kV CKT 1
TOLK STATION EAST - TUCO INTERCHANGE 230KV CKT 1	318.69	117.324	NEWHART 230 - PLANT X STATION 230KV CKT 1	

The following ERS voltage constraints were observed for single contingency (N-1), and multi-contingency (P1, P2, etc.) conditions for Group 6. The table below summarizes constraints and associated mitigations.

Table 8-8 Group 6 Cluster ERS Voltage Constraints

Monitored Element	TC Voltage (PU)	VMIN (PU)	VMAX (PU)	Contingency	Mitigation
Oklaunion 345 kV	0.867717	0.92	1.05	BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1	Oklaunion 345 kV Capacitive Reactive Support
Shamrock 69 kV	0.88782	0.92	1.05	OKLAUNION - TUCO INTERCHANGE 345KV CKT 1	Shamrock 69 kV Capacitive Reactive Support

CLUSTER GROUP 7 (SOUTHWEST OKLAHOMA AREA)

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

Steady-state results for this contingency observed thermal constraints on the Sweetwater to Wheeler 230 kV line, Chisolm to Elk City 230 kV line, and Elk City 230 kV to 138kV transformer. System instability was also observed for a three-phase fault events on the GEN-2016-037 Tap to Gracemont 345 kV line. In consideration of the multitude of observed constraints, the assigned mitigation is a transmission upgrade to connect the Chisholm 345kV substation to the TUCO to Woodward 345kV circuit.

The following table outlines the incremental mitigation scenarios for Group 7.

Table 8-9 Group 7 Cluster Upgrade Scenarios

Scenario	Constraint Type	Incremental Mitigation
0	Non-Converged	None
2	Thermal	Border – Chisholm 345 kV CKT 1

The following ERIS thermal constraints were observed for single contingency (N-1), and multi-contingency (P1, P2, etc.) conditions for Group 7. The table below summarizes constraints and associated mitigations.

Table 8-10 Group 7 Cluster ERIS Thermal Constraints

Monitored Element	Limiting Rate A/B (MVA)	TC %Loading (%MVA)	Contingency	Mitigation
CHISHOLM6 230.00 - ELK CITY 230KV 230KV CKT 1	353	124.9847	G16-037-TAP 345.00 - GRACEMONT 345KV CKT 1	Border – Chisholm 345 kV CKT 1
ELK CITY 230KV (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1	316	140.7299		
STATELINE INTERCHANGE - STLN-DEMAR6 230KV CKT 1	555	107.0608		
STLN-DEMAR6 - SWEETWATER 230KV CKT 1	555	107.0299		

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-2016-015	100.0	0
GEN-2016-016	78.2	0
GEN-2016-037	300.0	38.4
GEN-2016-046	299.0	0
GEN-2016-051	9.8	9.8
GEN-2016-056	200.0	0
GEN-2016-062	250.7	0
GEN-2016-069	31.4	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 3 (SPEARVILLE AREA)

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

The Group 3 stability, power factor, and short circuit analysis were not performed again for this restudy, the study results for the original study of DISIS-2016-001 performed by S&C Electric Company (S&C) remain valid.

That study determined that relay SLNOS #1 protecting the Finney to Holcomb 345 kV circuit was observed to trip following faults at the GEN-2016-046 345 kV interconnection substation along the Clark County to Ironwood 345kV circuit. With this relay disabled, the system response to these faults was found to be stable. The Transmission Owner(s) should review the relay settings on this line during the facility study to ensure that relay tripping will not occur for faults at the GEN-2016-046 345 kV interconnection substation.

CLUSTER GROUP 6 (SOUTH TEXAS PANHANDLE/NEW MEXICO AREA)

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

The Group 6 cases included the following system adjustments of dispatching, to maximum output, generation interconnected at the same or adjacent substations to a current study request:

- TUCO units: GEN-2015-041 & GEN-2016-056
- Hobbs units: GEN-2016-015 & GEN-2016-062

Additionally, to evaluate the planned conversion of the Tolk units to operate normally as synchronous condensers except during Summer Peaks, the 2017 Winter Peak case included a reduction to the Tolk unit 1 maximum output to 175 MW and switched off Tolk unit 2.

The Group 6 stability analysis for this area was performed by Aneden Consulting (Aneden). With the new requests modeled, the system was stable during the simulated fault conditions, however, there were generator tripping, transient voltage recovery and post-contingency voltage violations. Upgrades identified in the power flow analysis were also tested in the stability analysis.

For certain contingencies at and near the POI of the GEN-2016-015 request, the PV solar generators (inverters) tripped offline due to frequency relays. The frequency protection relays set points were adjusted to prevent the unit from tripping on a known issue with PSS/E frequency calculations during low voltages associated with a nearby fault. The GEN-2016-015 customer will have to coordinate with the inverter manufacturer to verify that the generators will not trip for faults on the system with normal clearing time and provide the results to SPP.

There were transient voltage recovery violations (high voltage) observed at the Oklaunion 345 kV substation following the three-phase fault on the Oklaunion to Lawton Eastside 345 kV line. This fault results in the Oklaunion DC tie being blocked and the Oklaunion 345 kV substation, with up to 100 MVar of DISIS-2015-002 assigned capacitor banks and the 90 MVar HVDC capacitor filters to be radially connected to the TUCO 345 kV substation. The Oklaunion relay configuration will need to be reviewed by the Transmission Owner(s) in the Facility Study so that the Oklaunion 100 MVar capacitor banks and the 90 MVar HVDC capacitor filters are tripped when the Oklaunion to Lawton Eastside 345 kV line is tripped offline and the Oklaunion DC tie is blocked.

There were also steady state undervoltage violations observed at the Oklaunion 345 kV, Palmer 115 kV, and Newhart 230 kV substations following some three-phase fault conditions. These undervoltage violations were resolved with a new Tolk to Potter County 345 kV line being placed in-service.

The following upgrades were included while conducting the prior outage analysis:

- Border to Chisholm circuit 1
- Crawfish Draw 345kV substation
 - Tap on Border to TUCO 345kV circuit 1
 - Tap on OKU to TUCO 345kV circuit 1

- Crawfish Draw to Tolk 345kV circuit 1

The results of the prior outage analysis showed that the total output from the DISIS-2016-001 Group 6 projects may have to be curtailed by approximately 350 MW in order to prevent system performance violations following prior outage conditions.

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

The Group 6 power factor and short circuit analysis were not performed again for this restudy, the previous study results remain valid.

Cluster Group 7 (SOUTHWESTERN OKLAHOMA AREA)

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

The Group 7 stability analysis for this area was performed by Aneden Consulting (Aneden). With the new requests modeled, violations of stability damping criteria and voltage recovery criteria were observed for fault events under system intact conditions.

System instability was observed for a three-phase fault events on the GEN-2016-037 Tap to Gracemont 345 kV line. Following the outage of this circuit the composite short circuit ratio (CSCR) that considers the contribution of requests interconnected at Sweetwater 230kV, Chisholm 345kV, and GEN-2016-037 was 1.3 indicating a very weak system condition. Steady-state results for this contingency also observed thermal constraints on the Sweetwater to Wheeler 230 kV line, Chisolm to Elk City 230 kV line, and Elk City 230 kV to 138kV transformer. In consideration of the multitude of observed constraints, the assigned mitigation is a transmission upgrade to connect the Chisholm 345kV substation to the TUCO to Woodward 345kV circuit.

The following upgrades were included while conducting the prior outage analysis:

- Border to Chisholm circuit 1

The results of the prior outage analysis showed that GEN-2016-037 may have to be curtailed to 140 MW and GEN-2003-022, GEN-2004-020, & GEN-2016-051 facility may have to be curtailed to 100 MW in order to prevent system performance violations following prior outage conditions.

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

The Group 7 power factor and short circuit analysis were not performed again for this restudy, the previous study results remain valid.

SECTION 10: CONCLUSION

The minimum cost of interconnecting all Group 3, Group 6, and Group 7 generation interconnection requests included in this Definitive Interconnection System Impact Restudy is estimated at **\$526.4 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	6	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	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:						7,081.45

*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	448.00	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	340.40	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-2008-1190	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/ON SCHEDULE
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/ON SCHEDULE
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
GEN-2014-031	35.80	NPPD	Meadow Grove 230kV	IA FULLY EXECUTED/COMMERCIAL OPERATION

Request	Amount	Area	Requested/Proposed Point of Interconnection	Status or In-Service Date
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 PENDING
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
GEN-2015-066	248.40	OKGE	Tap Cleveland - Sooner 345kV	IA FULLY EXECUTED/ON SUSPENSION

Request	Amount	Area	Requested/Proposed Point of Interconnection	Status or In-Service Date
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 Belfied - 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:	59,617.9			

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-2006-0245	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	170.2	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	4,220.45		
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	5,817.05		

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	224	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	2,146.55		
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	2,456.35		

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	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	1,331.20		
AREA TOTAL	4,777.55		

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	6	KCPL	Paola 161kV
CURRENT CLUSTER SUBTOTAL	6.00		
AREA TOTAL	1,108.70		

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		

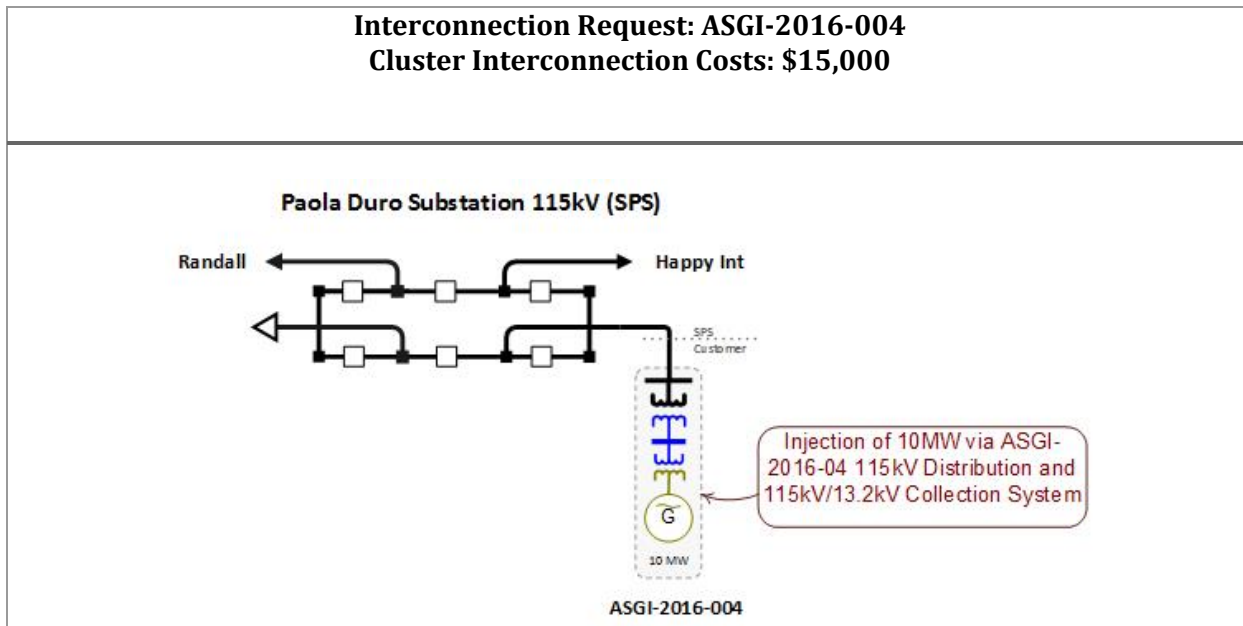
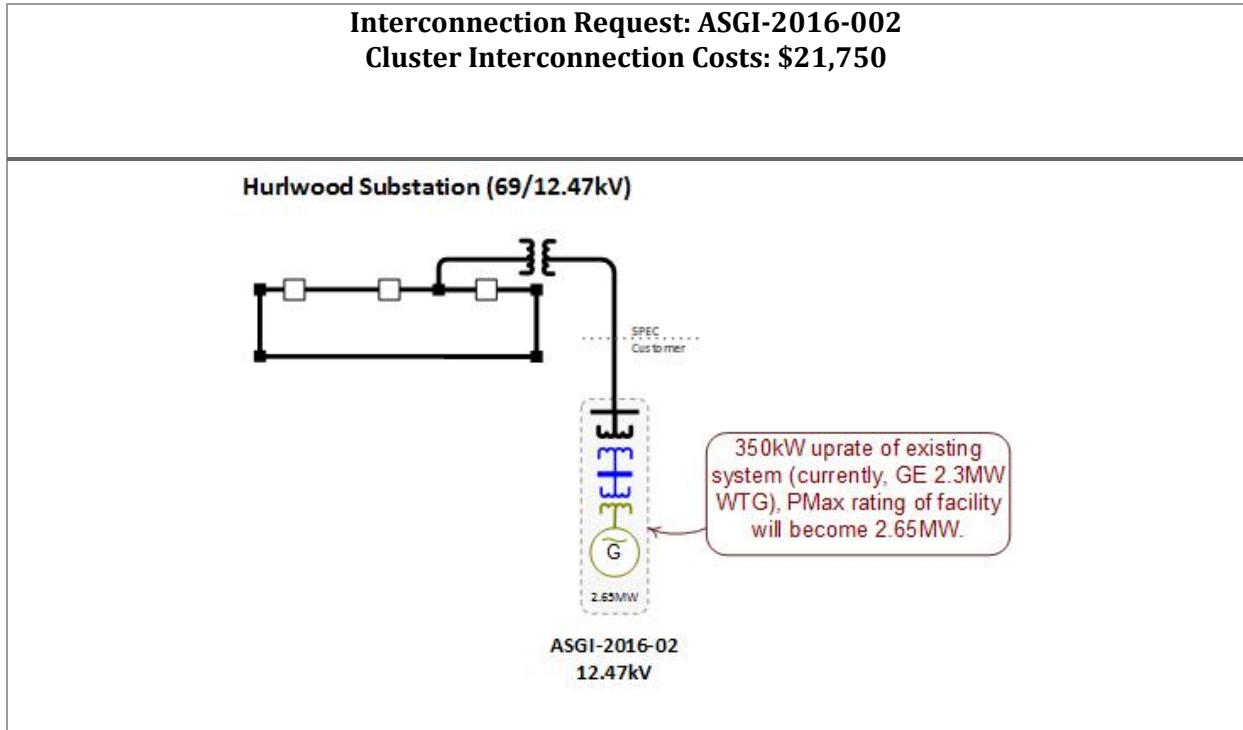
GROUP 16: W-NORTH DAKOTA AREA			
Request	Capacity	Area	Proposed Point of Interconnection
GEN-2005-008IS	50	WAPA	Hilken 230kV [Ecklund 230kV]
GEN-2006-015IS	50	WAPA	Hilken 230kV [Ecklund 230kV]
GEN-2007-015IS	100	WAPA	Hilken 230kV [Ecklund 230kV]
GEN-2009-026IS	110	WAPA	Dickenson-Heskett 230kV
GEN-2012-012IS	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 Belfied - 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	0.00		

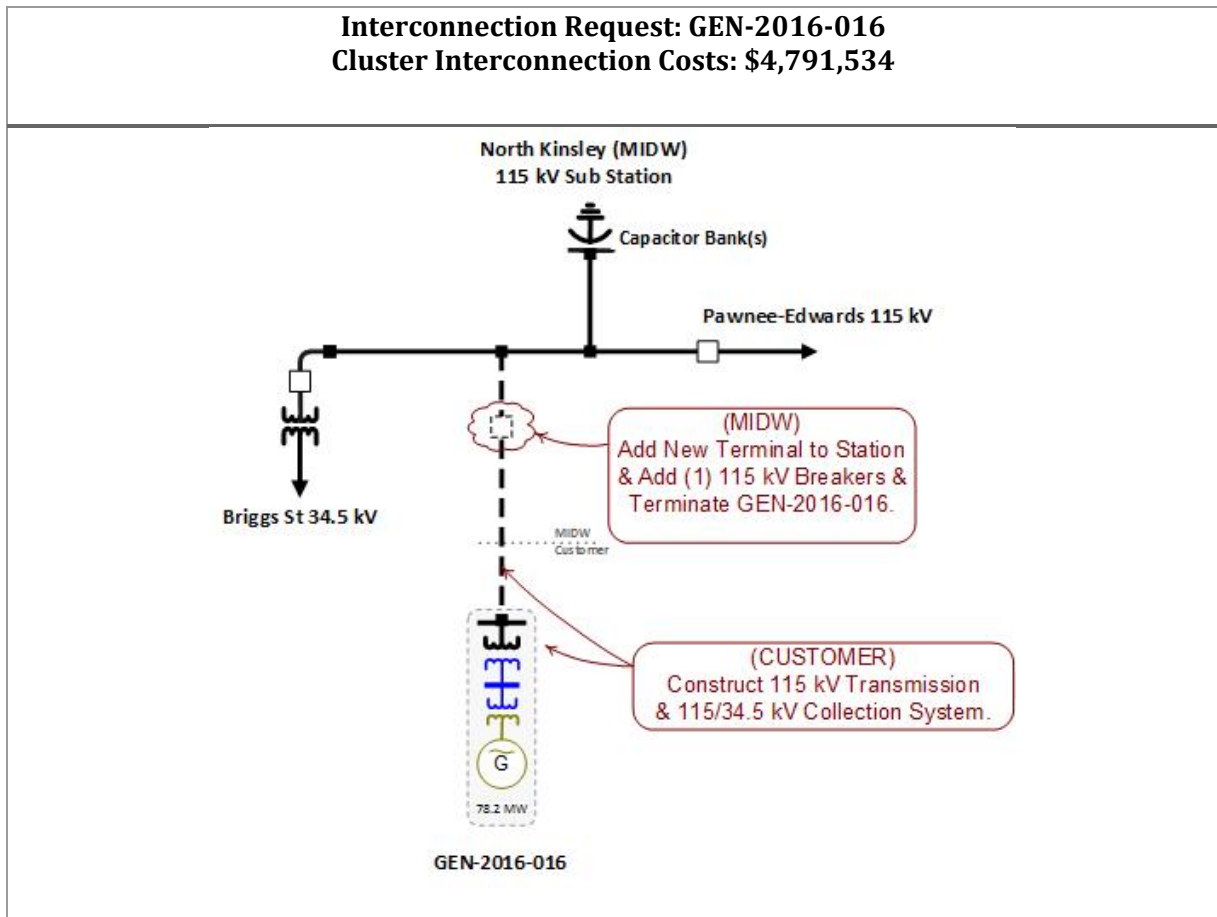
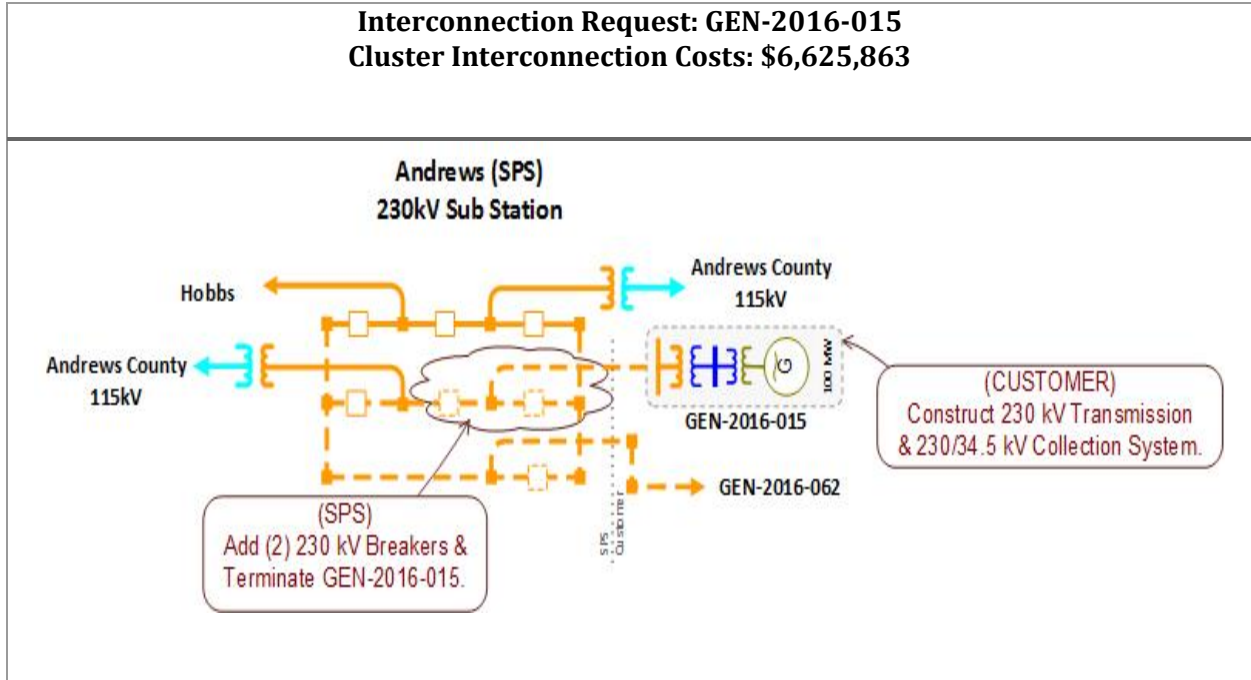
GROUP 17: W-SOUTH DAKOTA AREA			
Request	Capacity	Area	Proposed Point of Interconnection
GEN-2006-002IS	51	WAPA	Wessington Springs 230kV
GEN-2009-020AIS	130.5	WAPA	Tripp Junction 115kV
PRIOR QUEUED SUBTOTAL	181.50		
GEN-2016-054	3.4	WAPA	Wessington Springs 230kV
CURRENT CLUSTER SUBTOTAL	3.40		
AREA TOTAL	0.00		

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	0.00		

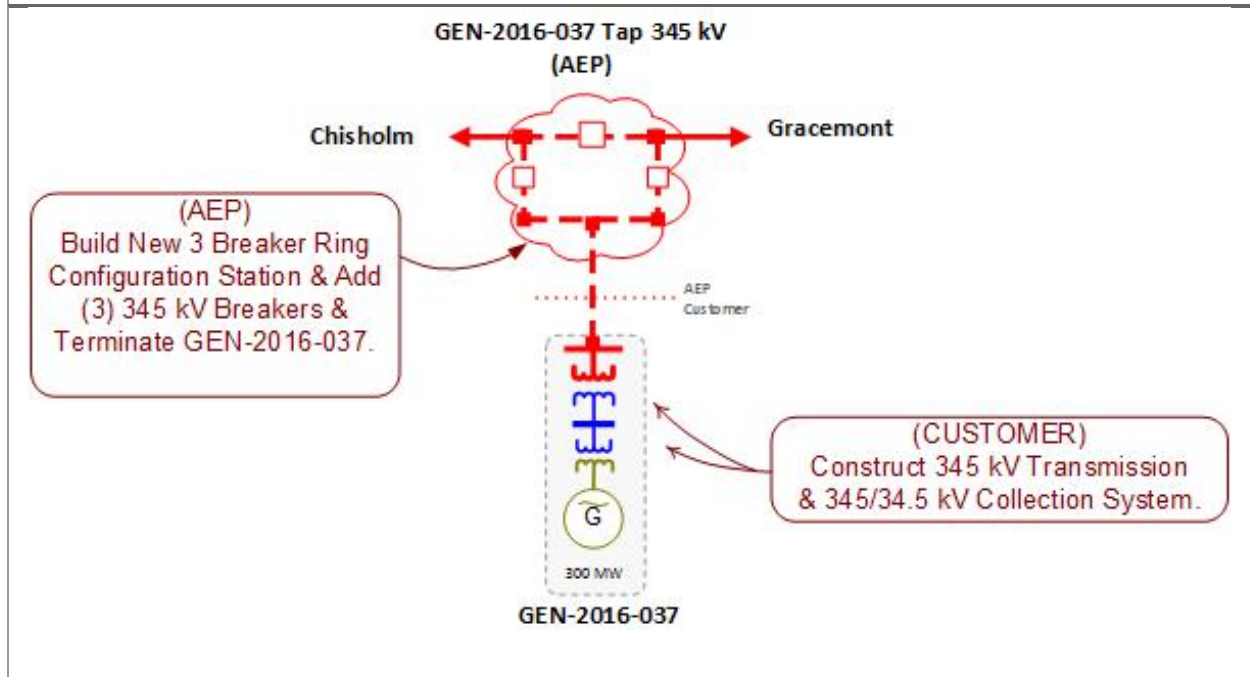
CLUSTER TOTAL (CURRENT STUDY)	6,986.1	MW
PQ TOTAL (PRIOR QUEUED)	35,469.7	MW
CLUSTER TOTAL (INCLUDING PRIOR QUEUED)	42,455.8	MW

D: PROPOSED POINT OF INTERCONNECTION ONE-LINE DIAGRAMS

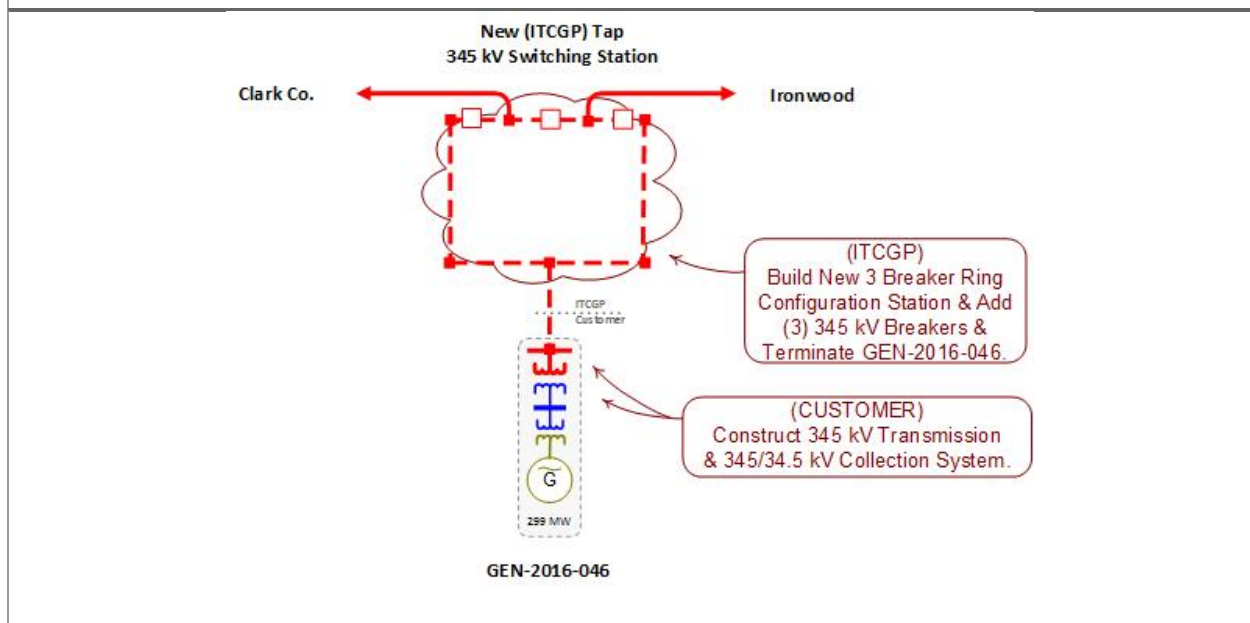




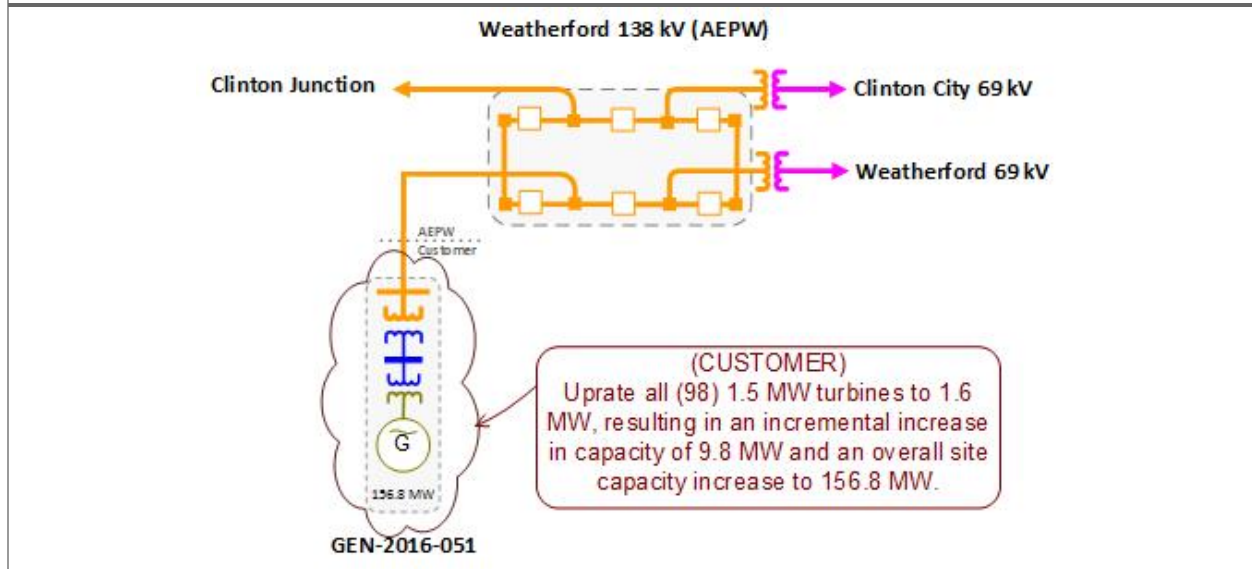
Interconnection Request: GEN-2016-037
Cluster Interconnection Costs: \$17,105,572



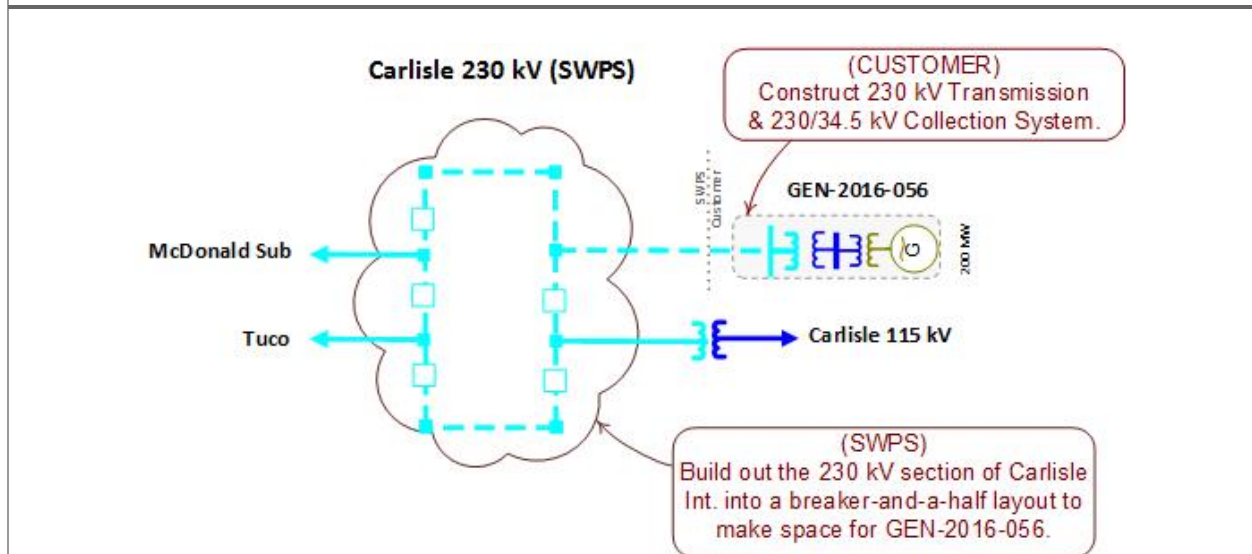
Interconnection Request: GEN-2016-046
Cluster Interconnection Costs: \$9,996,660



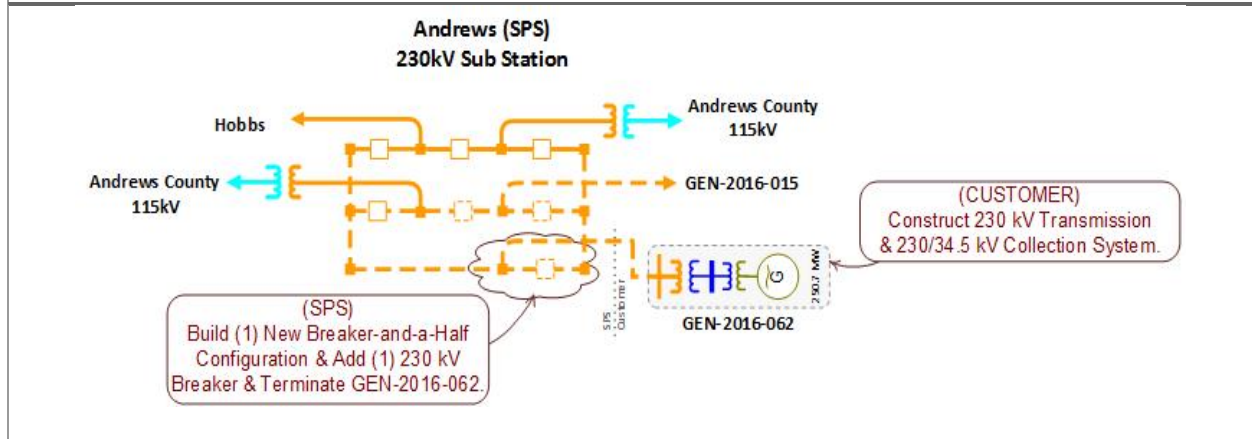
Interconnection Request: GEN-2016-051
Cluster Interconnection Costs: \$18,500



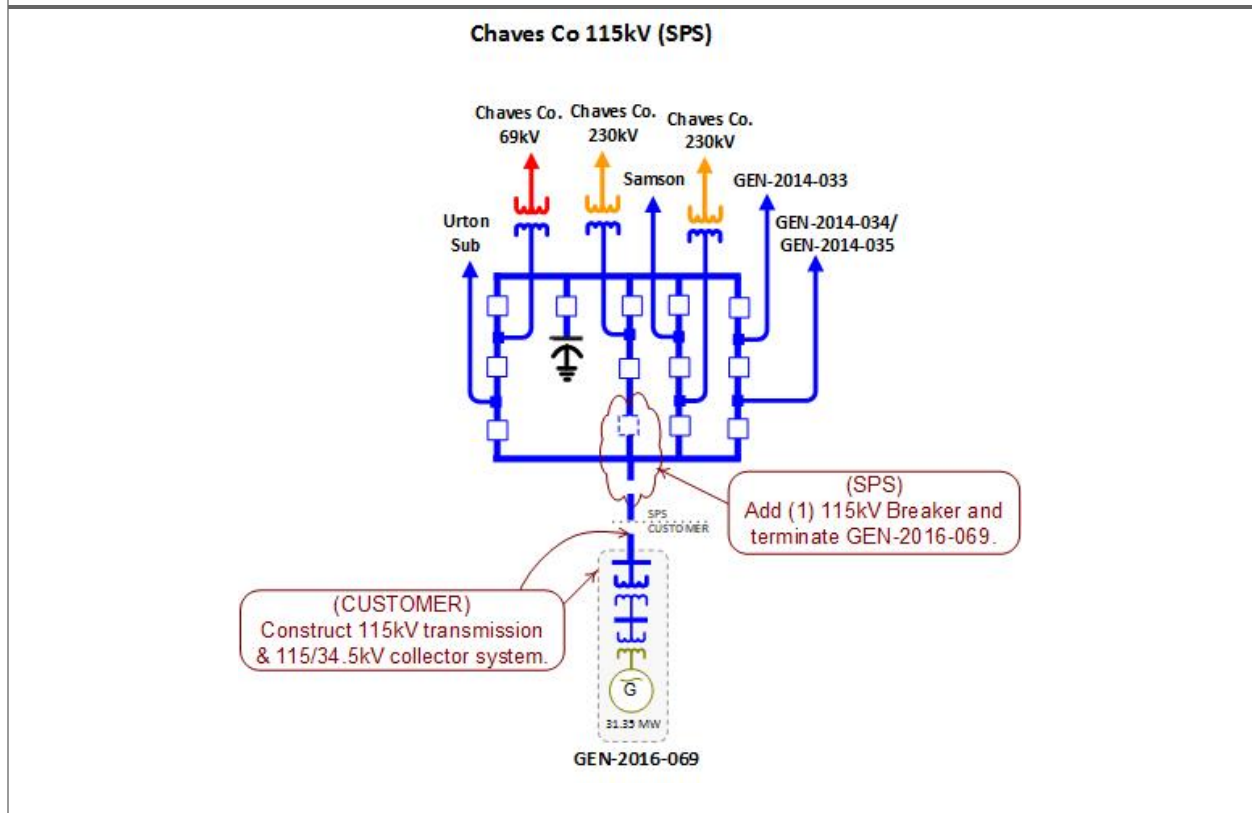
Interconnection Request: GEN-2016-056
Cluster Interconnection Costs: \$4,215,059



Interconnection Request: GEN-2016-062
Cluster Interconnection Costs: \$2,197,565



Interconnection Request: GEN-2016-069
Cluster Interconnection Costs: \$1,910,989



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
Border - Chisholm 345kV CKT 1 Build 25 miles of new 345 kV from Border (OKGE) - Chisholm (AEP) with a minimum normal/emergency rating of 1793 MVA	Current Study	\$9,975	\$41,000,000
New Crawfish Draw 345kV Substation & Crawfish Draw - Tolk 345kV CKT 1 Tap Border-TUCO 345kV and OKU-TUCO 345kV, build Crawfish Draw 345kV substation and build ~64 miles of 345kV from Crawfish Draw - Tolk 345kV with a minimum normal/emergency	Current Study	\$13,490	\$112,934,205
Oklaunion 345kV Capacitive Reactive Power Support (AEPW) Install a minimum of +20Mvar Capacitor Bank(s) at Oklaunion 345kV	Current Study	\$620	\$1,000,000
Shamrock 69kV Capacitive Reactive Power Support (AEPW) Install a minimum of +10Mvar of Capacitor Bank(s) at Shamrock 69kV	Current Study	\$287	\$500,000
Tolk - Potter County 345kV CKT 1 Build approximately 115 miles of 345kV from Tolk - Potter County with minimum normal/emergency rating of 1195 MVA	Current Study	\$80,715	\$156,000,000
Border Capacitive Reactive Power Support (OKGE) Install +100Mvar Capacitor Bank(s) at Border 345kV	Previously Allocated		\$2,369,160
Deaf Smith - Plant X 230kV CKT 1 (SPS) Fix ~70 structures and two wavetraps at Plant X and Deaf Smith to achieve 953 amps (380 MVA) minimum	Previously Allocated		\$4,500,000
Deaf Smith Capacitive Reactive Power Support (SPS) Install +60Mvar Capacitor Bank(s) at Deaf Smith 230kV	Previously Allocated		\$1,679,950
Newhart - Plant X 230kV CKT 1 (SPS) Fix ~14 structures to achieve 1035 amps (413 MVA) minimum	Previously Allocated		\$700,000
Oklaunion Capacitive Reactive Power Support (AEPW) Install +100Mvar Capacitor Bank(s) at Oklaunion 345kV	Previously Allocated		\$2,369,160
	Current Study Total	\$126,836	

ASGI-2016-004

ASGI-2016-004 Interconnection Costs See One-Line Diagram.	Current Study	\$15,000	\$15,000
Border - Chisholm 345kV CKT 1 Build 25 miles of new 345 kV from Border (OKGE) - Chisholm (AEP) with a minimum normal/emergency rating of 1793 MVA	Current Study	\$63,843	\$41,000,000

* 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
New Crawfish Draw 345kV Substation & Crawfish Draw - Tolk 345kV CKT 1 Tap Border-TUCO 345kV and OKU-TUCO 345kV, build Crawfish Draw 345kV substation and build ~64 miles of 345kV from Crawfish Draw - Tolk 345kV with a minimum normal/emergency	Current Study	\$552,101	\$112,934,205
Oklaunion 345kV Capacitive Reactive Power Support (AEPW) Install a minimum of +20Mvar Capacitor Bank(s) at Oklaunion 345kV	Current Study	\$6,024	\$1,000,000
Shamrock 69kV Capacitive Reactive Power Support (AEPW) Install a minimum of +10Mvar of Capacitor Bank(s) at Shamrock 69kV	Current Study	\$6,602	\$500,000
Tolk - Potter County 345kV CKT 1 Build approximately 115 miles of 345kV from Tolk - Potter County with minimum normal/emergency rating of 1195 MVA	Current Study	\$22,208	\$156,000,000
Border Capacitive Reactive Power Support (OKGE) Install +100Mvar Capacitor Bank(s) at Border 345kV	Previously Allocated		\$2,369,160
Deaf Smith - Plant X 230kV CKT 1 (SPS) Fix ~70 structures and two wavetraps at Plant X and Deaf Smith to achieve 953 amps (380 MVA) minimum	Previously Allocated		\$4,500,000
Deaf Smith Capacitive Reactive Power Support (SPS) Install +60Mvar Capacitor Bank(s) at Deaf Smith 230kV	Previously Allocated		\$1,679,950
Newhart - Plant X 230kV CKT 1 (SPS) Fix ~14 structures to achieve 1035 amps (413 MVA) minimum	Previously Allocated		\$700,000
Oklaunion Capacitive Reactive Power Support (AEPW) Install +100Mvar Capacitor Bank(s) at Oklaunion 345kV	Previously Allocated		\$2,369,160
	Current Study Total	\$665,777	

GEN-2016-015

Andrews 230/115/13kV Transformer CKT 1 Uprate existing Andrews 230/115/13kV Transformers CKT 1 and CKT 2 to achieve a minimum normal/emergency rating of 177 MVA	Current Study	\$2,281,152	\$8,000,000
Andrews 230/115/13kV Transformer CKT 2 Uprate existing Andrews 230/115/13kV Transformers CKT 1 and CKT 2 to achieve a minimum normal/emergency rating of 177 MVA	Current Study	\$2,281,152	\$8,000,000
Border - Chisholm 345kV CKT 1 Build 25 miles of new 345 kV from Border (OKGE) - Chisholm (AEP) with a minimum normal/emergency rating of 1793 MVA	Current Study	\$2,632,817	\$41,000,000
GEN-2016-015 Interconnection Costs See One-Line Diagram.	Current Study	\$6,625,863	\$6,625,863
GEN-2016-015 Interconnection Facilities Upgrade Mitigate frequency tripping (Refer to Stability Report for details)	Current Study	\$0	\$0
New Crawfish Draw 345kV Substation & Crawfish Draw - Tolk 345kV CKT 1 Tap Border-TUCO 345kV and OKU-TUCO 345kV, build Crawfish Draw 345kV substation and build ~64 miles of 345kV from Crawfish Draw - Tolk 345kV with a minimum normal/emergency	Current Study	\$24,815,074	\$112,934,205

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

Interconnection Request and Upgrades	Upgrade Type	Allocated Cost	Upgrade Cost
Oklaunion 345 kV High Voltages Update relay settings (Refer to Stability Report for details)	Current Study	\$0	\$0
Oklaunion 345kV Capacitive Reactive Power Support (AEPW) Install a minimum of +20Mvar Capacitor Bank(s) at Oklaunion 345kV	Current Study	\$166,168	\$1,000,000
Shamrock 69kV Capacitive Reactive Power Support (AEPW) Install a minimum of +10Mvar of Capacitor Bank(s) at Shamrock 69kV	Current Study	\$86,844	\$500,000
Tolk - Potter County 345kV CKT 1 Build approximately 115 miles of 345kV from Tolk - Potter County with minimum normal/emergency rating of 1195 MVA	Current Study	\$28,776,653	\$156,000,000
Border Capacitive Reactive Power Support (OKGE) Install +100Mvar Capacitor Bank(s) at Border 345kV	Previously Allocated		\$2,369,160
Deaf Smith - Plant X 230kV CKT 1 (SPS) Fix ~70 structures and two wavetraps at Plant X and Deaf Smith to achieve 953 amps (380 MVA) minimum	Previously Allocated		\$4,500,000
Deaf Smith Capacitive Reactive Power Support (SPS) Install +60Mvar Capacitor Bank(s) at Deaf Smith 230kV	Previously Allocated		\$1,679,950
Newhart - Plant X 230kV CKT 1 (SPS) Fix ~14 structures to achieve 1035 amps (413 MVA) minimum	Previously Allocated		\$700,000
Oklaunion Capacitive Reactive Power Support (AEPW) Install +100Mvar Capacitor Bank(s) at Oklaunion 345kV	Previously Allocated		\$2,369,160
	Current Study Total	\$67,665,723	

GEN-2016-016

Beaver County - Clark County 345kV CKT 1 Build approximately 125 miles of new 345kV from Beaver - Clark with a minimum normal/emergency rating of 1195 MVA	Current Study	\$13,822,362	\$150,000,000
Finney - Holcomb 345kV CKT 1 SNLOS1 Relay Update relay settings (Refer to Stability Report for details)	Current Study	\$0	\$0
GEN-2016-016 Interconnection Costs See One-Line Diagram.	Current Study	\$4,791,534	\$4,791,534
Greenburg 115kV Capacitive Reactive Power Support (SUNC) Install a minimum of +10Mvar Capacitor Bank(s) at Greenburg 115kV	Current Study	\$844,551	\$2,000,000
Clearwater - Viola 138kV CKT 1 SPP 2013 ITP NT assigneg upgrade per SPP-NTC-200228 for 12/31/2018 in-service.	Previously Allocated		\$31,492,903
Gill - Viola 138kV CKT 1 Per SPP 2013 ITP NT and SPP-NTC-200228 for 12/31/2018 in-service.	Previously Allocated		\$17,234,744

* 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
Viola - Sumner County 138kV CKT 1 SPP 2014 ITP NT assigned upgrade per SPP-NTC-200296 for 6/1/2019 in-service.	Previously Allocated		\$51,513,963
Viola 345/138 kV Transformer CKT 1 SPP 2013 ITP NT assigned upgrade per SPP-NTC-200288 for 6/1/2019 in-service.	Previously Allocated		\$18,339,327
Viola HPILS Upgrade Project 138kV CKT 1 HPILS assigned upgrades per SPP-NTC-20363 & 200362. Build Anthony - Bluff City - Caldwell - Mayfield - Milan - Viola 138 kV Ckt 1	Previously Allocated		\$49,070,637
	Current Study Total	\$19,458,447	
GEN-2016-037			
Border - Chisholm 345kV CKT 1 Build 25 miles of new 345 kV from Border (OKGE) - Chisholm (AEP) with a minimum normal/emergency rating of 1793 MVA	Current Study	\$25,072,689	\$41,000,000
GEN-2016-037 Interconnection Costs See One-Line Diagram.	Current Study	\$17,105,572	\$17,105,572
Grapevine - Wheeler (SPS) - Sweetwater (AEPW) 230kV CKT 1 Replace wavetrap at Grapevine to achieve 814 amps (324 MVA), rebuild ~5 miles of 230kV and replace terminal equipment to achieve 1150 amps (458 MVA) minimum	Previously Allocated		\$8,800,000
	Current Study Total	\$42,178,261	
GEN-2016-046			
Beaver County - Clark County 345kV CKT 1 Build approximately 125 miles of new 345kV from Beaver - Clark with a minimum normal/emergency rating of 1195 MVA	Current Study	\$136,177,638	\$150,000,000
Finney - Holcomb 345kV CKT 1 SNLOS1 Relay Update relay settings (Refer to Stability Report for details)	Current Study	\$0	\$0
GEN-2016-046 Interconnection Costs See One-Line Diagram.	Current Study	\$9,996,660	\$9,996,660
Greenburg 115kV Capacitive Reactive Power Support (SUNC) Install a minimum of +10MVar Capacitor Bank(s) at Greenburg 115kV	Current Study	\$1,155,449	\$2,000,000
	Current Study Total	\$147,329,747	
GEN-2016-051			
GEN-2016-051 Interconnection Costs See One-Line Diagram.	Current Study	\$18,500	\$18,500
Grapevine - Wheeler (SPS) - Sweetwater (AEPW) 230kV CKT 1 Replace wavetrap at Grapevine to achieve 814 amps (324 MVA), rebuild ~5 miles of 230kV and replace terminal equipment to achieve 1150 amps (458 MVA) minimum	Previously Allocated		\$8,800,000
	Current Study Total	\$18,500	

* 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			
Border - Chisholm 345kV CKT 1 Build 25 miles of new 345 kV from Border (OKGE) - Chisholm (AEP) with a minimum normal/emergency rating of 1793 MVA	Current Study	\$5,809,638	\$41,000,000
GEN-2016-056 Interconnection Costs See One-Line Diagram.	Current Study	\$4,215,059	\$4,215,059
New Crawfish Draw 345kV Substation & Crawfish Draw - Tolk 345kV CKT 1 Tap Border-TUCO 345kV and OKU-TUCO 345kV, build Crawfish Draw 345kV substation and build ~64 miles of 345kV from Crawfish Draw - Tolk 345kV with a minimum normal/emergency	Current Study	\$15,604,694	\$112,934,205
Oklaunion 345 kV High Voltages Update relay settings (Refer to Stability Report for details)	Current Study	\$0	\$0
Oklaunion 345kV Capacitive Reactive Power Support (AEPW) Install a minimum of +20Mvar Capacitor Bank(s) at Oklaunion 345kV	Current Study	\$359,230	\$1,000,000
Shamrock 69kV Capacitive Reactive Power Support (AEPW) Install a minimum of +10Mvar of Capacitor Bank(s) at Shamrock 69kV	Current Study	\$160,900	\$500,000
Tolk - Potter County 345kV CKT 1 Build approximately 115 miles of 345kV from Tolk - Potter County with minimum normal/emergency rating of 1195 MVA	Current Study	\$45,583,820	\$156,000,000
Border Capacitive Reactive Power Support (OKGE) Install +100Mvar Capacitor Bank(s) at Border 345kV	Previously Allocated		\$2,369,160
Deaf Smith - Plant X 230kV CKT 1 (SPS) Fix ~70 structures and two wavetraps at Plant X and Deaf Smith to achieve 953 amps (380 MVA) minimum	Previously Allocated		\$4,500,000
Deaf Smith Capacitive Reactive Power Support (SPS) Install +60Mvar Capacitor Bank(s) at Deaf Smith 230kV	Previously Allocated		\$1,679,950
Newhart - Plant X 230kV CKT 1 (SPS) Fix ~14 structures to achieve 1035 amps (413 MVA) minimum	Previously Allocated		\$700,000
Oklaunion Capacitive Reactive Power Support (AEPW) Install +100Mvar Capacitor Bank(s) at Oklaunion 345kV	Previously Allocated		\$2,369,160
	Current Study Total	\$71,733,340	

GEN-2016-062

Andrews 230/115/13kV Transformer CKT 1 Uprate existing Andrews 230/115/13kV Transformers CKT 1 and CKT 2 to achieve a minimum normal/emergency rating of 177 MVA	Current Study	\$5,718,848	\$8,000,000
Andrews 230/115/13kV Transformer CKT 2 Uprate existing Andrews 230/115/13kV Transformers CKT 1 and CKT 2 to achieve a minimum normal/emergency rating of 177 MVA	Current Study	\$5,718,848	\$8,000,000
Border - Chisholm 345kV CKT 1 Build 25 miles of new 345 kV from Border (OKGE) - Chisholm (AEP) with a minimum normal/emergency rating of 1793 MVA	Current Study	\$6,600,473	\$41,000,000

* 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
GEN-2016-062 Interconnection Costs See One-Line Diagram.	Current Study	\$2,197,565	\$2,197,565
New Crawfish Draw 345kV Substation & Crawfish Draw - Tolk 345kV CKT 1 Tap Border-TUCO 345kV and OKU-TUCO 345kV, build Crawfish Draw 345kV substation and build ~64 miles of 345kV from Crawfish Draw - Tolk 345kV with a minimum normal/emergency	Current Study	\$62,211,389	\$112,934,205
Oklaunion 345 kV High Voltages Update relay settings (Refer to Stability Report for details)	Current Study	\$0	\$0
Oklaunion 345kV Capacitive Reactive Power Support (AEPW) Install a minimum of +20Mvar Capacitor Bank(s) at Oklaunion 345kV	Current Study	\$416,582	\$1,000,000
Shamrock 69kV Capacitive Reactive Power Support (AEPW) Install a minimum of +10Mvar of Capacitor Bank(s) at Shamrock 69kV	Current Study	\$217,719	\$500,000
Tolk - Potter County 345kV CKT 1 Build approximately 115 miles of 345kV from Tolk - Potter County with minimum normal/emergency rating of 1195 MVA	Current Study	\$72,143,070	\$156,000,000
Border Capacitive Reactive Power Support (OKGE) Install +100Mvar Capacitor Bank(s) at Border 345kV	Previously Allocated		\$2,369,160
Deaf Smith - Plant X 230kV CKT 1 (SPS) Fix ~70 structures and two wavetraps at Plant X and Deaf Smith to achieve 953 amps (380 MVA) minimum	Previously Allocated		\$4,500,000
Deaf Smith Capacitive Reactive Power Support (SPS) Install +60Mvar Capacitor Bank(s) at Deaf Smith 230kV	Previously Allocated		\$1,679,950
Newhart - Plant X 230kV CKT 1 (SPS) Fix ~14 structures to achieve 1035 amps (413 MVA) minimum	Previously Allocated		\$700,000
Oklaunion Capacitive Reactive Power Support (AEPW) Install +100Mvar Capacitor Bank(s) at Oklaunion 345kV	Previously Allocated		\$2,369,160
	Current Study Total	\$155,224,494	

GEN-2016-069

Border - Chisholm 345kV CKT 1 Build 25 miles of new 345 kV from Border (OKGE) - Chisholm (AEP) with a minimum normal/emergency rating of 1793 MVA	Current Study	\$810,566	\$41,000,000
GEN-2016-069 Interconnection Costs See One-Line Diagram.	Current Study	\$1,910,989	\$1,910,989
New Crawfish Draw 345kV Substation & Crawfish Draw - Tolk 345kV CKT 1 Tap Border-TUCO 345kV and OKU-TUCO 345kV, build Crawfish Draw 345kV substation and build ~64 miles of 345kV from Crawfish Draw - Tolk 345kV with a minimum normal/emergency	Current Study	\$9,737,458	\$112,934,205
Oklaunion 345 kV High Voltages Update relay settings (Refer to Stability Report for details)	Current Study	\$0	\$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
Oklaunion 345kV Capacitive Reactive Power Support (AEPW) Install a minimum of +20Mvar Capacitor Bank(s) at Oklaunion 345kV	Current Study	\$51,376	\$1,000,000
Shamrock 69kV Capacitive Reactive Power Support (AEPW) Install a minimum of +10Mvar of Capacitor Bank(s) at Shamrock 69kV	Current Study	\$27,649	\$500,000
Tolk - Potter County 345kV CKT 1 Build approximately 115 miles of 345kV from Tolk - Potter County with minimum normal/emergency rating of 1195 MVA	Current Study	\$9,393,535	\$156,000,000
Border Capacitive Reactive Power Support (OKGE) Install +100Mvar Capacitor Bank(s) at Border 345kV	Previously Allocated		\$2,369,160
Deaf Smith - Plant X 230kV CKT 1 (SPS) Fix ~70 structures and two wavetraps at Plant X and Deaf Smith to achieve 953 amps (380 MVA) minimum	Previously Allocated		\$4,500,000
Deaf Smith Capacitive Reactive Power Support (SPS) Install +60Mvar Capacitor Bank(s) at Deaf Smith 230kV	Previously Allocated		\$1,679,950
Newhart - Plant X 230kV CKT 1 (SPS) Fix ~14 structures to achieve 1035 amps (413 MVA) minimum	Previously Allocated		\$700,000
Oklaunion Capacitive Reactive Power Support (AEPW) Install +100Mvar Capacitor Bank(s) at Oklaunion 345kV	Previously Allocated		\$2,369,160
	Current Study Total	\$21,931,572	
TOTAL CURRENT STUDY COSTS:		\$526,332,697	

* 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

Andrews 230/115/13kV Transformer CKT 1 **\$8,000,000**

Uprate existing Andrews 230/115/13kV Transformers CKT 1 and CKT 2 to achieve a minimum normal/emergency rating of 177 MVA

GEN-2016-015	\$2,281,152
GEN-2016-062	\$5,718,848

Total Allocated Costs **\$8,000,000**

Andrews 230/115/13kV Transformer CKT 2 **\$8,000,000**

Uprate existing Andrews 230/115/13kV Transformers CKT 1 and CKT 2 to achieve a minimum normal/emergency rating of 177 MVA

GEN-2016-015	\$2,281,152
GEN-2016-062	\$5,718,848

Total Allocated Costs **\$8,000,000**

ASGI-2016-002 Interconnection Costs **\$21,750**

See One-Line Diagram.

ASGI-2016-002	\$21,750
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Total Allocated Costs **\$21,750**

ASGI-2016-004 Interconnection Costs **\$15,000**

See One-Line Diagram.

ASGI-2016-004	\$15,000
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Total Allocated Costs **\$15,000**

Beaver County - Clark County 345kV CKT 1 **\$150,000,000**

Build approximately 125 miles of new 345kV from Beaver - Clark with a minimum normal/emergency rating of 1195 MVA

GEN-2016-016	\$13,822,362
GEN-2016-046	\$136,177,638

Total Allocated Costs **\$150,000,000**

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

Border - Chisholm 345kV CKT 1**\$41,000,000**

Build 25 miles of new 345 kV from Border (OKGE) - Chisholm (AEP) with a minimum normal/emergency rating of 1793 MVA

ASGI-2016-002	\$9,975
ASGI-2016-004	\$63,843
GEN-2016-015	\$2,632,817
GEN-2016-037	\$25,072,689
GEN-2016-056	\$5,809,638
GEN-2016-062	\$6,600,473
GEN-2016-069	\$810,566

Total Allocated Costs	\$41,000,000
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New Crawfish Draw 345kV Substation & Crawfish Draw - Tolk 345kV CKT 1**\$112,934,205**

Tap Border-TUCO 345kV and OKU-TUCO 345kV, build Crawfish Draw 345kV substation and build ~64 miles of 345kV from Crawfish Draw - Tolk 345kV

ASGI-2016-002	\$13,490
ASGI-2016-004	\$552,101
GEN-2016-015	\$24,815,074
GEN-2016-056	\$15,604,694
GEN-2016-062	\$62,211,389
GEN-2016-069	\$9,737,458

Total Allocated Costs	\$112,934,205
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Finney - Holcomb 345kV CKT 1 SNLOS1 Relay**\$0**

Update relay settings (Refer to Stability Report for details)

GEN-2016-016	\$0
GEN-2016-046	\$0

Total Allocated Costs	\$0
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GEN-2016-015 Interconnection Costs**\$6,625,863**

See One-Line Diagram.

GEN-2016-015	\$6,625,863
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Total Allocated Costs	\$6,625,863
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GEN-2016-015 Interconnection Facilities Upgrade**\$0**

Mitigate frequency tripping (Refer to Stability Report for details)

GEN-2016-015	\$0
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Total Allocated Costs	\$0
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* Withdrawal of higher queued projects will cause a restudy and may result in higher costs

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-2016-037 Interconnection Costs		\$17,105,572
See One-Line Diagram.		
	GEN-2016-037	\$17,105,572
	Total Allocated Costs	\$17,105,572
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-2016-051 Interconnection Costs		\$18,500
See One-Line Diagram.		
	GEN-2016-051	\$18,500
	Total Allocated Costs	\$18,500
GEN-2016-056 Interconnection Costs		\$4,215,059
See One-Line Diagram.		
	GEN-2016-056	\$4,215,059
	Total Allocated Costs	\$4,215,059
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-2016-069 Interconnection Costs		\$1,910,989
See One-Line Diagram.		
	GEN-2016-069	\$1,910,989
	Total Allocated Costs	\$1,910,989
Greenburg 115kV Capacitive Reactive Power Support (SUNC)		\$2,000,000
Install a minimum of +10MVar Capacitor Bank(s) at Greenburg 115kV		
	GEN-2016-016	\$844,551
	GEN-2016-046	\$1,155,449
	Total Allocated Costs	\$2,000,000

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

Oklaunion 345 kV High Voltages**\$0**

Update relay settings (Refer to Stability Report for details)

GEN-2016-015	\$0
GEN-2016-056	\$0
GEN-2016-062	\$0
GEN-2016-069	\$0

Total Allocated Costs	\$0
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Oklaunion 345kV Capacitive Reactive Power Support (AEPW)**\$1,000,000**

Install a minimum of +20Mvar Capacitor Bank(s) at Oklaunion 345kV

ASGI-2016-002	\$620
ASGI-2016-004	\$6,024
GEN-2016-015	\$166,168
GEN-2016-056	\$359,230
GEN-2016-062	\$416,582
GEN-2016-069	\$51,376

Total Allocated Costs	\$1,000,000
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Shamrock 69kV Capacitive Reactive Power Support (AEPW)**\$500,000**

Install a minimum of +10Mvar of Capacitor Bank(s) at Shamrock 69kV

ASGI-2016-002	\$287
ASGI-2016-004	\$6,602
GEN-2016-015	\$86,844
GEN-2016-056	\$160,900
GEN-2016-062	\$217,719
GEN-2016-069	\$27,649

Total Allocated Costs	\$500,000
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Tolk - Potter County 345kV CKT 1**\$156,000,000**

Build approximately 115 miles of 345kV from Tolk - Potter County with minimum normal/emergency rating of 1195 MVA

ASGI-2016-002	\$80,715
ASGI-2016-004	\$22,208
GEN-2016-015	\$28,776,653
GEN-2016-056	\$45,583,820
GEN-2016-062	\$72,143,070
GEN-2016-069	\$9,393,535

Total Allocated Costs	\$156,000,000
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* 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: <ul style="list-style-type: none"> • ##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

Table with columns: SOLUTION, GROUP, SCENARIO, SEASON, SOURCE, DIRECTION, MONITORED ELEMENT, RATEA (MVA), RATEB(MVA), TDF, TC%LOADING (% MVA), and CONTINGENCY. It contains numerous rows detailing power flow constraints and contingencies across various scenarios and seasons.

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

Available upon request

Legend:

Column	Definition
Solution	Solution Method
Group	Model Case Identification: <ul style="list-style-type: none"> • ##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	06ALL	0	21L	ASGI_16_02	'OKLAUNION 345KV'	0.964671	0.906828	0.0578428	0.97987	0.92	1.05	0.20625	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	0	21SP	ASGI_16_02	'OKLAUNION 345KV'	0.988052	0.937308	0.050744	0.93731	0.95	1.05	0.27432	System Intact
FDNS	06ALL	0	21SP	ASGI_16_02	'OKLAUNION 345KV'	0.988052	0.937308	0.050744	0.93731	0.95	1.05	0.27432	System Intact
FDNS	06ALL	0	21SP	ASGI_16_02	'OKLAUNION 345KV'	0.926263	0.872003	0.0542603	0.93731	0.9	1.05	0.27432	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	0	21SP	ASGI_16_02	'OKLAUNION 345KV'	0.926263	0.872003	0.0542603	0.93731	0.92	1.05	0.27432	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	0	21SP	ASGI_16_02	'OKLAUNION 345KV'	0.975767	0.905944	0.0698228	0.93731	0.92	1.05	0.15908	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21SP	ASGI_16_02	'OKLAUNION 345KV'	0.977318	0.913734	0.0635838	0.93731	0.92	1.05	0.15908	'POTTER COUNTY INTERCHANGE (WAUK 90343-A) 345/230/13.2KV TRANSFORMER CKT 1'
FDNS	06ALL	0	21SP	ASGI_16_02	'OKLAUNION 345KV'	0.975767	0.905944	0.0698228	0.93731	0.92	1.05	0.15908	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21SP	ASGI_16_02	'OKLAUNION 345KV'	0.977318	0.913734	0.0635838	0.93731	0.92	1.05	0.15908	'POTTER COUNTY INTERCHANGE (WAUK 90343-A) 345/230/13.2KV TRANSFORMER CKT 1'
FDNS	06ALL	0	21SP	ASGI_16_02	'OKLAUNION 345KV'	0.979853	0.919687	0.0601655	0.93731	0.92	1.05	0.1206	'NEWHART 230 - POTTER COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	21SP	ASGI_16_02	'OKLAUNION 345KV'	0.979853	0.919687	0.0601655	0.93731	0.92	1.05	0.1206	'NEWHART 230 - POTTER COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	21SP	ASGI_16_02	'OKLAUNION 345KV'	0.979224	0.917989	0.0612351	0.93731	0.92	1.05	0.1203	'BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	21SP	ASGI_16_02	'OKLAUNION 345KV'	0.979224	0.917989	0.0612351	0.93731	0.92	1.05	0.1203	'BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	21SP	ASGI_16_02	'OKLAUNION 345KV'	0.976723	0.908752	0.0679715	0.93731	0.92	1.05	0.10506	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
FDNS	06ALL	0	21SP	ASGI_16_02	'OKLAUNION 345KV'	0.976723	0.908752	0.0679715	0.93731	0.92	1.05	0.10506	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
FDNS	06ALL	0	21SP	ASGI_16_02	'OKLAUNION 345KV'	0.980964	0.917344	0.0636194	0.93731	0.92	1.05	0.10011	'GRACEMONT - LAWTON EASTSIDE 345KV CKT 1'
FDNS	06ALL	0	21SP	ASGI_16_02	'OKLAUNION 345KV'	0.980964	0.917344	0.0636194	0.93731	0.92	1.05	0.10011	'GRACEMONT - LAWTON EASTSIDE 345KV CKT 1'
FDNS	06ALL	0	21SP	ASGI_16_02	'OKLAUNION 345KV'	0.973888	0.908875	0.0650136	0.93731	0.92	1.05	0.09103	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	21SP	ASGI_16_02	'OKLAUNION 345KV'	0.976839	0.917446	0.0593928	0.93731	0.92	1.05	0.07406	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'
FDNS	06ALL	0	21SP	ASGI_16_02	'OKLAUNION 345KV'	0.976839	0.917446	0.0593928	0.93731	0.92	1.05	0.07406	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'
FDNS	06ALL	0	21WP	ASGI_16_02	'OKLAUNION 345KV'	0.940431	0.89655	0.0438808	0.95756	0.9	1.05	0.27218	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	0	21WP	ASGI_16_02	'OKLAUNION 345KV'	0.940431	0.89655	0.0438808	0.95756	0.92	1.05	0.27218	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	0	21WP	ASGI_16_02	'OKLAUNION 345KV'	0.961787	0.867717	0.0940703	0.95756	0.9	1.05	0.22202	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	0	21WP	ASGI_16_02	'OKLAUNION 345KV'	0.961787	0.867717	0.0940703	0.95756	0.92	1.05	0.22202	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNSLock	06ALL	0	18G	ASGI_16_02	'OKLAUNION 345KV'	0.946565	0.897633	0.048932	0.96178	0.9	1.05	0.27482	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL	0	18G	ASGI_16_02	'OKLAUNION 345KV'	0.946565	0.897633	0.048932	0.96178	0.92	1.05	0.27482	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL	0	21L	ASGI_16_02	'OKLAUNION 345KV'	0.955763	0.915469	0.0402938	0.97987	0.92	1.05	0.24922	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL	0	21SP	ASGI_16_02	'OKLAUNION 345KV'	0.926277	0.872003	0.0542739	0.93731	0.9	1.05	0.27432	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL	0	21SP	ASGI_16_02	'OKLAUNION 345KV'	0.926277	0.872003	0.0542739	0.93731	0.92	1.05	0.27432	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL	0	21WP	ASGI_16_02	'OKLAUNION 345KV'	0.940445	0.892481	0.0479638	0.95756	0.9	1.05	0.27218	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL	0	21WP	ASGI_16_02	'OKLAUNION 345KV'	0.940445	0.892481	0.0479638	0.95756	0.92	1.05	0.27218	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL	0	21WP	ASGI_16_02	'OKLAUNION 345KV'	0.968766	0.8781	0.0906662	0.95756	0.9	1.05	0.22202	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	0	21WP	ASGI_16_02	'OKLAUNION 345KV'	0.968766	0.8781	0.0906662	0.95756	0.92	1.05	0.22202	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	0	21WP	ASGI_16_02	'OKLAUNION 345KV'	0.968766	0.8781	0.0906662	0.95756	0.92	1.05	0.22202	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	ASGI_16_02	'SHAMROCK 115KV'	0.943645	0.902939	0.0407058	0.96617	0.92	1.05	0.27482	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	ASGI_16_02	'SHAMROCK 115KV'	0.943645	0.902939	0.0407058	0.96617	0.92	1.05	0.27482	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	ASGI_16_02	'SHAMROCK 115KV'	0.94719	0.915897	0.0312929	0.96617	0.92	1.05	0.09646	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	21WP	ASGI_16_02	'SHAMROCK 115KV'	0.956306	0.906569	0.0497372	0.97378	0.92	1.05	0.27218	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	ASGI_16_02	'SHAMROCK 115KV'	0.956306	0.906569	0.0497372	0.97378	0.92	1.05	0.27218	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	ASGI_16_02	'SHAMROCK 115KV'	0.94803	0.918341	0.0296886	0.97378	0.92	1.05	0.08894	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	17WP	ASGI_16_02	'SHAMROCK 69KV'	0.941749	0.911219	0.0305302	0.95406	0.92	1.05	0.10044	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	18G	ASGI_16_02	'SHAMROCK 69KV'	0.921752	0.88782	0.0339316	0.94237	0.9	1.05	0.27482	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	ASGI_16_02	'SHAMROCK 69KV'	0.921752	0.88782	0.0339316	0.94237	0.92	1.05	0.27482	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	ASGI_16_02	'SHAMROCK 69KV'	0.921752	0.88782	0.0339316	0.94237	0.92	1.05	0.27482	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	ASGI_16_02	'SHAMROCK 69KV'	0.921752	0.88782	0.0339316	0.94237	0.92	1.05	0.27482	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	ASGI_16_02	'SHAMROCK 69KV'	0.94251	0.915854	0.0266567	0.94237	0.92	1.05	0.15485	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	ASGI_16_02	'SHAMROCK 69KV'	0.94251	0.915854	0.0266567	0.94237	0.92	1.05	0.15485	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	ASGI_16_02	'SHAMROCK 69KV'	0.945055	0.919173	0.0258818	0.94237	0.92	1.05	0.11615	'MATHWSN7 345.00 - TATONGA7 345.00 345KV CKT 1'
FDNS	06ALL	0	18G	ASGI_16_02	'SHAMROCK 69KV'	0.922272	0.895083	0.0271891	0.94237	0.9	1.05	0.09646	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	18G	ASGI_16_02	'SHAMROCK 69KV'	0.922272	0.895083	0.0271891	0.94237	0.92	1.05	0.09646	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	18G	ASGI_16_02	'SHAMROCK 69KV'	0.937177	0.90447	0.032707	0.94237	0.92	1.05	0.09646	'STLN-DEMARC6 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	18G	ASGI_16_02	'SHAMROCK 69KV'	0.938841	0.906155	0.0326868	0.94237	0.92	1.05	0.09646	'STATELINE INTERCHANGE - STLN-DEMARC6 230KV CKT 1'
FDNS	06ALL	0	18G	ASGI_16_02	'SHAMROCK 69KV'	0.9368	0.913242	0.0235581	0.94237	0.92	1.05	0.08155	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	18G	ASGI_16_02	'SHAMROCK 69KV'	0.9368	0.913242	0.0235581	0.94237	0.92	1.05	0.08155	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	18SP	ASGI_16_02	'SHAMROCK 69KV'	0.935303	0.907264	0.0280384	0.94903	0.92	1.05	0.27299	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18SP	ASGI_16_02	'SHAMROCK 69KV'	0.935303	0.907264	0.0280384	0.94903	0.92	1.05	0.27299	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18SP	ASGI_16_02	'SHAMROCK 69KV'	0.937541	0.917034	0.0205072	0.94903	0.92	1.05	0.09509	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	21L	ASGI_16_02	'SHAMROCK 69KV'	0.937265	0.900091	0.0371735	0.96676	0.92	1.05	0.24922	'OKLAUNION - TUCO INTERCHANGE 345KV 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
FDNS	06ALL	0	21L	ASGI_16_02	'SHAMROCK 69KV'	0.937265	0.900091	0.0371735	0.96676	0.92	1.05	0.24922	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21L	ASGI_16_02	'SHAMROCK 69KV'	0.927705	0.902827	0.0248773	0.96676	0.92	1.05	0.07512	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	21L	ASGI_16_02	'SHAMROCK 69KV'	0.940921	0.917392	0.0235285	0.96676	0.92	1.05	0.07512	'STLN-DEMARC6 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	21L	ASGI_16_02	'SHAMROCK 69KV'	0.939614	0.915541	0.0240734	0.96676	0.92	1.05	0.07512	'STATELINE INTERCHANGE - STLN-DEMARC6 230KV CKT 1'
FDNS	06ALL	0	21SP	ASGI_16_02	'SHAMROCK 69KV'	0.943517	0.917985	0.0255317	0.94414	0.92	1.05	0.15908	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21SP	ASGI_16_02	'SHAMROCK 69KV'	0.943517	0.917985	0.0255317	0.94414	0.92	1.05	0.15908	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21SP	ASGI_16_02	'SHAMROCK 69KV'	0.930159	0.903584	0.0265749	0.94414	0.92	1.05	0.09103	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	21SP	ASGI_16_02	'SHAMROCK 69KV'	0.943987	0.919594	0.0243928	0.94414	0.92	1.05	0.09103	'STATELINE INTERCHANGE - STLN-DEMARC6 230KV CKT 1'
FDNS	06ALL	0	21SP	ASGI_16_02	'SHAMROCK 69KV'	0.939921	0.918407	0.0215131	0.94414	0.92	1.05	0.07699	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	21SP	ASGI_16_02	'SHAMROCK 69KV'	0.939921	0.918407	0.0215131	0.94414	0.92	1.05	0.07699	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	21WP	ASGI_16_02	'SHAMROCK 69KV'	0.933042	0.889221	0.0438206	0.94727	0.9	1.05	0.27218	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	ASGI_16_02	'SHAMROCK 69KV'	0.933042	0.889221	0.0438206	0.94727	0.92	1.05	0.27218	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	ASGI_16_02	'SHAMROCK 69KV'	0.933042	0.889221	0.0438206	0.94727	0.9	1.05	0.27218	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	ASGI_16_02	'SHAMROCK 69KV'	0.933042	0.889221	0.0438206	0.94727	0.92	1.05	0.27218	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	ASGI_16_02	'SHAMROCK 69KV'	0.92306	0.895123	0.0279369	0.94727	0.9	1.05	0.08894	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	21WP	ASGI_16_02	'SHAMROCK 69KV'	0.92306	0.895123	0.0279369	0.94727	0.92	1.05	0.08894	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	21WP	ASGI_16_02	'SHAMROCK 69KV'	0.940591	0.917227	0.0233641	0.94727	0.92	1.05	0.08894	'STLN-DEMARC6 - SWEETWATER 230KV CKT 1'
FDNSLock	06ALL	0	21WP	ASGI_16_02	'SHAMROCK 69KV'	0.946765	0.917519	0.0292466	0.94727	0.92	1.05	0.22202	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	0	21WP	ASGI_16_02	'SHAMROCK 69KV'	0.946765	0.917519	0.0292466	0.94727	0.92	1.05	0.22202	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	0	21WP	ASGI_16_02	'SHAMROCK 69KV'	0.937606	0.916765	0.0208413	0.94727	0.92	1.05	0.07521	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNSLock	06ALL	0	21WP	ASGI_16_02	'SHAMROCK 69KV'	0.937606	0.916765	0.0208413	0.94727	0.92	1.05	0.07521	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	21SP	ASGI_16_02	'SWISHER COUNTY INTERCHANGE 230KV'	0.973712	0.946518	0.027194	0.94652	0.95	1.05	0.12413	System Intact
FDNS	06ALL	0	21SP	ASGI_16_02	'SWISHER COUNTY INTERCHANGE 230KV'	0.973712	0.946518	0.027194	0.94652	0.95	1.05	0.12413	System Intact
FDNS	06ALL	0	18G	ASGI_16_02	'XIT_INTG 6230.00 230KV'	0.961921	0.898247	0.0636745	0.96282	0.9	1.05	0.27482	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	ASGI_16_02	'XIT_INTG 6230.00 230KV'	0.961921	0.898247	0.0636745	0.96282	0.9	1.05	0.27482	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	ASGI_16_02	'OKLAUN HVDC7345.00 345KV'	0.971746	0.876534	0.0952119	0.96195	0.9	1.05	0.2126	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	18G	ASGI_16_02	'OKLAUN HVDC7345.00 345KV'	0.971746	0.876534	0.0952119	0.96195	0.92	1.05	0.2126	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	18G	ASGI_16_02	'OKLAUN HVDC7345.00 345KV'	0.979037	0.894444	0.0845932	0.96195	0.9	1.05	0.2126	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	ASGI_16_02	'OKLAUN HVDC7345.00 345KV'	0.979037	0.894444	0.0845932	0.96195	0.92	1.05	0.2126	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	ASGI_16_02	'OKLAUN HVDC7345.00 345KV'	0.979037	0.894444	0.0845932	0.96195	0.9	1.05	0.2126	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	ASGI_16_02	'OKLAUN HVDC7345.00 345KV'	0.979037	0.894444	0.0845932	0.96195	0.92	1.05	0.2126	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18SP	ASGI_16_02	'OKLAUN HVDC7345.00 345KV'	0.982492	0.917047	0.0654445	0.98452	0.92	1.05	0.22116	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	21L	ASGI_16_02	'OKLAUN HVDC7345.00 345KV'	0.964794	0.906985	0.057809	0.98004	0.92	1.05	0.20625	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	21SP	ASGI_16_02	'OKLAUN HVDC7345.00 345KV'	0.975936	0.906101	0.0698349	0.93747	0.92	1.05	0.15908	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	21SP	ASGI_16_02	'OKLAUN HVDC7345.00 345KV'	0.977487	0.913892	0.0635948	0.93747	0.92	1.05	0.15908	'POTTER COUNTY INTERCHANGE (WAUK 90343-A) 345/230/13.2KV TRANSFORMER CKT 1'
FDNS	06ALL	2	21SP	ASGI_16_02	'OKLAUN HVDC7345.00 345KV'	0.975936	0.906101	0.0698349	0.93747	0.92	1.05	0.15908	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	21SP	ASGI_16_02	'OKLAUN HVDC7345.00 345KV'	0.977487	0.913892	0.0635948	0.93747	0.92	1.05	0.15908	'POTTER COUNTY INTERCHANGE (WAUK 90343-A) 345/230/13.2KV TRANSFORMER CKT 1'
FDNS	06ALL	2	21SP	ASGI_16_02	'OKLAUN HVDC7345.00 345KV'	0.980022	0.919846	0.0601759	0.93747	0.92	1.05	0.1206	'NEWHART 230 - POTTER COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	2	21SP	ASGI_16_02	'OKLAUN HVDC7345.00 345KV'	0.980022	0.919846	0.0601759	0.93747	0.92	1.05	0.1206	'NEWHART 230 - POTTER COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	2	21SP	ASGI_16_02	'OKLAUN HVDC7345.00 345KV'	0.979393	0.918147	0.0612457	0.93747	0.92	1.05	0.1203	'BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	2	21SP	ASGI_16_02	'OKLAUN HVDC7345.00 345KV'	0.979393	0.918147	0.0612457	0.93747	0.92	1.05	0.1203	'BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	2	21SP	ASGI_16_02	'OKLAUN HVDC7345.00 345KV'	0.976892	0.908909	0.0679833	0.93747	0.92	1.05	0.10506	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
FDNS	06ALL	2	21SP	ASGI_16_02	'OKLAUN HVDC7345.00 345KV'	0.976892	0.908909	0.0679833	0.93747	0.92	1.05	0.10506	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
FDNS	06ALL	2	21SP	ASGI_16_02	'OKLAUN HVDC7345.00 345KV'	0.981133	0.917503	0.0636305	0.93747	0.92	1.05	0.10011	'GRACEMONT - LAWTON EASTSIDE 345KV CKT 1'
FDNS	06ALL	2	21SP	ASGI_16_02	'OKLAUN HVDC7345.00 345KV'	0.981133	0.917503	0.0636305	0.93747	0.92	1.05	0.10011	'GRACEMONT - LAWTON EASTSIDE 345KV CKT 1'
FDNS	06ALL	2	21SP	ASGI_16_02	'OKLAUN HVDC7345.00 345KV'	0.974057	0.909032	0.0650249	0.93747	0.92	1.05	0.09103	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	2	21SP	ASGI_16_02	'OKLAUN HVDC7345.00 345KV'	0.977008	0.917605	0.059403	0.93747	0.92	1.05	0.07406	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'
FDNS	06ALL	2	21SP	ASGI_16_02	'OKLAUN HVDC7345.00 345KV'	0.977008	0.917605	0.059403	0.93747	0.92	1.05	0.07406	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'
FDNS	06ALL	2	21WP	ASGI_16_02	'OKLAUN HVDC7345.00 345KV'	0.961953	0.867867	0.0940866	0.95772	0.9	1.05	0.22202	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	21WP	ASGI_16_02	'OKLAUN HVDC7345.00 345KV'	0.961953	0.867867	0.0940866	0.95772	0.92	1.05	0.22202	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNSLock	06ALL	2	21WP	ASGI_16_02	'OKLAUN HVDC7345.00 345KV'	0.968933	0.878251	0.0906819	0.95772	0.9	1.05	0.22202	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	2	21WP	ASGI_16_02	'OKLAUN HVDC7345.00 345KV'	0.968933	0.878251	0.0906819	0.95772	0.92	1.05	0.22202	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	2	21WP	ASGI_16_02	'OKLAUN HVDC7345.00 345KV'	0.968933	0.878251	0.0906819	0.95772	0.9	1.05	0.22202	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	2	21WP	ASGI_16_02	'OKLAUN HVDC7345.00 345KV'	0.968933	0.878251	0.0906819	0.95772	0.92	1.05	0.22202	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	ASGI_16_02	'OKLAUNION 345KV'	0.946555	0.89765	0.0489053	0.96178	0.9	1.05	0.27482	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	2	18G	ASGI_16_02	'OKLAUNION 345KV'	0.946555	0.89765	0.0489053	0.96178	0.92	1.05	0.27482	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	2	18G	ASGI_16_02	'OKLAUNION 345KV'	0.971578	0.876382	0.0951954	0.96178	0.9	1.05	0.2126	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'

SOLUTION	GROUP	SCENARIO	SEASON	SOURCE	MONITORED ELEMENT	BC Voltage	TC Voltage	Voltage Differ	VINIT (PU)	VMIN (PU)	VMAX(PU)	TDF	CONTINGENCY
						(PU)	(PU)	(PU)					
FDNS	06ALL		2 18G	ASGI_16_02	'OKLAUNION 345KV'	0.971578	0.876382	0.0951954	0.96178	0.92	1.05	0.2126	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL		2 18G	ASGI_16_02	'OKLAUNION 345KV'	0.978868	0.894289	0.0845786	0.96178	0.9	1.05	0.2126	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL		2 18G	ASGI_16_02	'OKLAUNION 345KV'	0.978868	0.894289	0.0845786	0.96178	0.92	1.05	0.2126	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL		2 18G	ASGI_16_02	'OKLAUNION 345KV'	0.978868	0.894289	0.0845786	0.96178	0.9	1.05	0.2126	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL		2 18SP	ASGI_16_02	'OKLAUNION 345KV'	0.982322	0.916889	0.0654331	0.98435	0.92	1.05	0.22116	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL		2 21L	ASGI_16_02	'OKLAUNION 345KV'	0.955763	0.91547	0.0402927	0.97987	0.92	1.05	0.24922	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL		2 21L	ASGI_16_02	'OKLAUNION 345KV'	0.964671	0.906828	0.0578428	0.97987	0.92	1.05	0.20625	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL		2 21SP	ASGI_16_02	'OKLAUNION 345KV'	0.988052	0.937308	0.050744	0.93731	0.95	1.05	0.27432	System Intact
FDNS	06ALL		2 21SP	ASGI_16_02	'OKLAUNION 345KV'	0.988052	0.937308	0.050744	0.93731	0.95	1.05	0.27432	System Intact
FDNS	06ALL		2 21SP	ASGI_16_02	'OKLAUNION 345KV'	0.926263	0.872003	0.0542603	0.93731	0.9	1.05	0.27432	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL		2 21SP	ASGI_16_02	'OKLAUNION 345KV'	0.926263	0.872003	0.0542603	0.93731	0.92	1.05	0.27432	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL		2 21SP	ASGI_16_02	'OKLAUNION 345KV'	0.975767	0.905944	0.0698228	0.93731	0.92	1.05	0.15908	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL		2 21SP	ASGI_16_02	'OKLAUNION 345KV'	0.977318	0.913734	0.0635838	0.93731	0.92	1.05	0.15908	'POTTER COUNTY INTERCHANGE (WAUK 90343-A) 345/230/13.2KV TRANSFORMER CKT 1'
FDNS	06ALL		2 21SP	ASGI_16_02	'OKLAUNION 345KV'	0.975767	0.905944	0.0698228	0.93731	0.92	1.05	0.15908	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL		2 21SP	ASGI_16_02	'OKLAUNION 345KV'	0.977318	0.913734	0.0635838	0.93731	0.92	1.05	0.15908	'POTTER COUNTY INTERCHANGE (WAUK 90343-A) 345/230/13.2KV TRANSFORMER CKT 1'
FDNS	06ALL		2 21SP	ASGI_16_02	'OKLAUNION 345KV'	0.979853	0.919687	0.0601655	0.93731	0.92	1.05	0.1206	'NEWHART 230 - POTTER COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL		2 21SP	ASGI_16_02	'OKLAUNION 345KV'	0.979853	0.919687	0.0601655	0.93731	0.92	1.05	0.1206	'NEWHART 230 - POTTER COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL		2 21SP	ASGI_16_02	'OKLAUNION 345KV'	0.979224	0.917989	0.0612351	0.93731	0.92	1.05	0.1203	'BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL		2 21SP	ASGI_16_02	'OKLAUNION 345KV'	0.979224	0.917989	0.0612351	0.93731	0.92	1.05	0.1203	'BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL		2 21SP	ASGI_16_02	'OKLAUNION 345KV'	0.976723	0.908752	0.0679715	0.93731	0.92	1.05	0.10506	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
FDNS	06ALL		2 21SP	ASGI_16_02	'OKLAUNION 345KV'	0.976723	0.908752	0.0679715	0.93731	0.92	1.05	0.10506	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
FDNS	06ALL		2 21SP	ASGI_16_02	'OKLAUNION 345KV'	0.980964	0.917344	0.0636194	0.93731	0.92	1.05	0.10011	'GRACEMONT - LAWTON EASTSIDE 345KV CKT 1'
FDNS	06ALL		2 21SP	ASGI_16_02	'OKLAUNION 345KV'	0.980964	0.917344	0.0636194	0.93731	0.92	1.05	0.10011	'GRACEMONT - LAWTON EASTSIDE 345KV CKT 1'
FDNS	06ALL		2 21SP	ASGI_16_02	'OKLAUNION 345KV'	0.973888	0.908875	0.0650136	0.93731	0.92	1.05	0.09103	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL		2 21SP	ASGI_16_02	'OKLAUNION 345KV'	0.976839	0.917446	0.0593928	0.93731	0.92	1.05	0.07406	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'
FDNS	06ALL		2 21SP	ASGI_16_02	'OKLAUNION 345KV'	0.976839	0.917446	0.0593928	0.93731	0.92	1.05	0.07406	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'
FDNS	06ALL		2 21WP	ASGI_16_02	'OKLAUNION 345KV'	0.940431	0.89655	0.0438808	0.95756	0.9	1.05	0.27218	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL		2 21WP	ASGI_16_02	'OKLAUNION 345KV'	0.940431	0.89655	0.0438808	0.95756	0.92	1.05	0.27218	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL		2 21WP	ASGI_16_02	'OKLAUNION 345KV'	0.961787	0.867717	0.0940703	0.95756	0.9	1.05	0.22202	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL		2 21WP	ASGI_16_02	'OKLAUNION 345KV'	0.961787	0.867717	0.0940703	0.95756	0.92	1.05	0.22202	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNSLock	06ALL		2 18G	ASGI_16_02	'OKLAUNION 345KV'	0.946565	0.897633	0.048932	0.96178	0.9	1.05	0.27482	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL		2 18G	ASGI_16_02	'OKLAUNION 345KV'	0.946565	0.897633	0.048932	0.96178	0.92	1.05	0.27482	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL		2 21L	ASGI_16_02	'OKLAUNION 345KV'	0.955763	0.915469	0.0402938	0.97987	0.92	1.05	0.24922	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL		2 21SP	ASGI_16_02	'OKLAUNION 345KV'	0.926277	0.872003	0.0542739	0.93731	0.9	1.05	0.27432	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL		2 21SP	ASGI_16_02	'OKLAUNION 345KV'	0.926277	0.872003	0.0542739	0.93731	0.92	1.05	0.27432	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL		2 21WP	ASGI_16_02	'OKLAUNION 345KV'	0.940445	0.892481	0.0479638	0.95756	0.9	1.05	0.27218	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL		2 21WP	ASGI_16_02	'OKLAUNION 345KV'	0.940445	0.892481	0.0479638	0.95756	0.92	1.05	0.27218	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL		2 21WP	ASGI_16_02	'OKLAUNION 345KV'	0.968766	0.8781	0.0906662	0.95756	0.9	1.05	0.22202	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL		2 21WP	ASGI_16_02	'OKLAUNION 345KV'	0.968766	0.8781	0.0906662	0.95756	0.92	1.05	0.22202	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL		2 21WP	ASGI_16_02	'OKLAUNION 345KV'	0.968766	0.8781	0.0906662	0.95756	0.9	1.05	0.22202	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL		2 21WP	ASGI_16_02	'OKLAUNION 345KV'	0.968766	0.8781	0.0906662	0.95756	0.92	1.05	0.22202	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL		2 17WP	ASGI_16_02	'SHAMROCK 69KV'	0.941749	0.911219	0.0305302	0.95406	0.92	1.05	0.10044	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL		2 18G	ASGI_16_02	'SHAMROCK 69KV'	0.921752	0.88782	0.0339316	0.94237	0.9	1.05	0.27482	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL		2 18G	ASGI_16_02	'SHAMROCK 69KV'	0.921752	0.88782	0.0339316	0.94237	0.92	1.05	0.27482	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL		2 18G	ASGI_16_02	'SHAMROCK 69KV'	0.921752	0.88782	0.0339316	0.94237	0.92	1.05	0.27482	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL		2 18G	ASGI_16_02	'SHAMROCK 69KV'	0.94251	0.915854	0.0266567	0.94237	0.92	1.05	0.15485	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL		2 18G	ASGI_16_02	'SHAMROCK 69KV'	0.94251	0.915854	0.0266567	0.94237	0.92	1.05	0.15485	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL		2 18G	ASGI_16_02	'SHAMROCK 69KV'	0.945055	0.919173	0.0258818	0.94237	0.92	1.05	0.11615	'MATHWSN7 345.00 - TATONGA7 345.00 345KV CKT 1'
FDNS	06ALL		2 18G	ASGI_16_02	'SHAMROCK 69KV'	0.922272	0.895083	0.0271891	0.94237	0.9	1.05	0.09646	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL		2 18G	ASGI_16_02	'SHAMROCK 69KV'	0.922272	0.895083	0.0271891	0.94237	0.92	1.05	0.09646	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL		2 18G	ASGI_16_02	'SHAMROCK 69KV'	0.937177	0.90447	0.032707	0.94237	0.92	1.05	0.09646	'STLN-DEMARC6 - SWEETWATER 230KV CKT 1'
FDNS	06ALL		2 18G	ASGI_16_02	'SHAMROCK 69KV'	0.938841	0.906155	0.0326868	0.94237	0.92	1.05	0.09646	'STATELINE INTERCHANGE - STLN-DEMARC6 230KV CKT 1'
FDNS	06ALL		2 18G	ASGI_16_02	'SHAMROCK 69KV'	0.9368	0.913242	0.0235581	0.94237	0.92	1.05	0.08155	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNS	06ALL		2 18G	ASGI_16_02	'SHAMROCK 69KV'	0.9368	0.913242	0.0235581	0.94237	0.92	1.05	0.08155	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNS	06ALL		2 18SP	ASGI_16_02	'SHAMROCK 69KV'	0.935303	0.907264	0.0280384	0.94903	0.92	1.05	0.27299	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL		2 18SP	ASGI_16_02	'SHAMROCK 69KV'	0.935303	0.907264	0.0280384	0.94903	0.92	1.05	0.27299	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL		2 18SP	ASGI_16_02	'SHAMROCK 69KV'	0.937541	0.917034	0.0205072	0.94903	0.92	1.05	0.09509	'CHISHOLM6 230.00 - SWEETWATER 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
FDNS	06ALL	2	21L	ASGI_16_02	'SHAMROCK 69KV'	0.937265	0.900091	0.0371735	0.96676	0.92	1.05	0.24922	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	21L	ASGI_16_02	'SHAMROCK 69KV'	0.937265	0.900091	0.0371735	0.96676	0.92	1.05	0.24922	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	21L	ASGI_16_02	'SHAMROCK 69KV'	0.927705	0.902827	0.0248773	0.96676	0.92	1.05	0.07512	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	2	21L	ASGI_16_02	'SHAMROCK 69KV'	0.940921	0.917392	0.0235285	0.96676	0.92	1.05	0.07512	'STLN-DEMAR6 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	2	21L	ASGI_16_02	'SHAMROCK 69KV'	0.939614	0.915541	0.0240734	0.96676	0.92	1.05	0.07512	'STATELINE INTERCHANGE - STLN-DEMAR6 230KV CKT 1'
FDNS	06ALL	2	21SP	ASGI_16_02	'SHAMROCK 69KV'	0.943517	0.917985	0.0255317	0.94414	0.92	1.05	0.15908	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	21SP	ASGI_16_02	'SHAMROCK 69KV'	0.943517	0.917985	0.0255317	0.94414	0.92	1.05	0.15908	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	21SP	ASGI_16_02	'SHAMROCK 69KV'	0.930159	0.903584	0.0265749	0.94414	0.92	1.05	0.09103	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	2	21SP	ASGI_16_02	'SHAMROCK 69KV'	0.943987	0.919594	0.0243928	0.94414	0.92	1.05	0.09103	'STATELINE INTERCHANGE - STLN-DEMAR6 230KV CKT 1'
FDNS	06ALL	2	21SP	ASGI_16_02	'SHAMROCK 69KV'	0.939921	0.918407	0.0215131	0.94414	0.92	1.05	0.07699	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNS	06ALL	2	21SP	ASGI_16_02	'SHAMROCK 69KV'	0.939921	0.918407	0.0215131	0.94414	0.92	1.05	0.07699	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNS	06ALL	2	21WP	ASGI_16_02	'SHAMROCK 69KV'	0.933042	0.889221	0.0438206	0.94727	0.9	1.05	0.27218	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	21WP	ASGI_16_02	'SHAMROCK 69KV'	0.933042	0.889221	0.0438206	0.94727	0.92	1.05	0.27218	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	21WP	ASGI_16_02	'SHAMROCK 69KV'	0.933042	0.889221	0.0438206	0.94727	0.9	1.05	0.27218	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	21WP	ASGI_16_02	'SHAMROCK 69KV'	0.933042	0.889221	0.0438206	0.94727	0.92	1.05	0.27218	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	21WP	ASGI_16_02	'SHAMROCK 69KV'	0.92306	0.895123	0.0279369	0.94727	0.9	1.05	0.08894	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	2	21WP	ASGI_16_02	'SHAMROCK 69KV'	0.92306	0.895123	0.0279369	0.94727	0.92	1.05	0.08894	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	2	21WP	ASGI_16_02	'SHAMROCK 69KV'	0.940591	0.917227	0.0233641	0.94727	0.92	1.05	0.08894	'STLN-DEMAR6 - SWEETWATER 230KV CKT 1'
FDNSLock	06ALL	2	21WP	ASGI_16_02	'SHAMROCK 69KV'	0.946765	0.917519	0.0292466	0.94727	0.92	1.05	0.22202	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	2	21WP	ASGI_16_02	'SHAMROCK 69KV'	0.946765	0.917519	0.0292466	0.94727	0.92	1.05	0.22202	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	2	21WP	ASGI_16_02	'SHAMROCK 69KV'	0.937606	0.916765	0.0208413	0.94727	0.92	1.05	0.07521	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNSLock	06ALL	2	21WP	ASGI_16_02	'SHAMROCK 69KV'	0.937606	0.916765	0.0208413	0.94727	0.92	1.05	0.07521	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	18G	ASGI_16_04	'BORDER 7345.00 345KV'	0.960417	0.87447	0.0859476	0.96029	0.9	1.05	0.16428	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	ASGI_16_04	'BORDER 7345.00 345KV'	0.960417	0.87447	0.0859476	0.96029	0.9	1.05	0.16428	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	ASGI_16_04	'BORDER 7345.00 345KV'	0.952111	0.873373	0.0787379	0.96753	0.9	1.05	0.15822	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	ASGI_16_04	'BORDER 7345.00 345KV'	0.952111	0.873373	0.0787379	0.96753	0.9	1.05	0.15822	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	ASGI_16_04	'G1149G1504 345.00 345KV'	0.960417	0.87447	0.0859476	0.96029	0.9	1.05	0.16428	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	ASGI_16_04	'G1149G1504 345.00 345KV'	0.960417	0.87447	0.0859476	0.96029	0.9	1.05	0.16428	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	ASGI_16_04	'G1149G1504 345.00 345KV'	0.952111	0.873373	0.0787379	0.96753	0.9	1.05	0.15822	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	ASGI_16_04	'G1149G1504 345.00 345KV'	0.952111	0.873373	0.0787379	0.96753	0.9	1.05	0.15822	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	ASGI_16_04	'GRAPEVINE INTERCHANGE 230KV'	0.963349	0.8997	0.0636498	0.9775	0.9	1.05	0.16428	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	ASGI_16_04	'GRAPEVINE INTERCHANGE 230KV'	0.963349	0.8997	0.0636498	0.9775	0.9	1.05	0.16428	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	ASGI_16_04	'OKLAUN HVDC7345.00 345KV'	0.971746	0.876534	0.0952119	0.96195	0.9	1.05	0.10874	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	0	18G	ASGI_16_04	'OKLAUN HVDC7345.00 345KV'	0.971746	0.876534	0.0952119	0.96195	0.92	1.05	0.10874	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	0	18G	ASGI_16_04	'OKLAUN HVDC7345.00 345KV'	0.979037	0.894444	0.0845932	0.96195	0.9	1.05	0.10874	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	ASGI_16_04	'OKLAUN HVDC7345.00 345KV'	0.979037	0.894444	0.0845932	0.96195	0.92	1.05	0.10874	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	ASGI_16_04	'OKLAUN HVDC7345.00 345KV'	0.979037	0.894444	0.0845932	0.96195	0.92	1.05	0.10874	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18SP	ASGI_16_04	'OKLAUN HVDC7345.00 345KV'	0.982492	0.917047	0.0654445	0.98452	0.92	1.05	0.11768	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	0	21L	ASGI_16_04	'OKLAUN HVDC7345.00 345KV'	0.964794	0.906985	0.057809	0.98004	0.92	1.05	0.10032	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	0	21SP	ASGI_16_04	'OKLAUN HVDC7345.00 345KV'	0.975936	0.906101	0.0698349	0.93747	0.92	1.05	0.23237	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21SP	ASGI_16_04	'OKLAUN HVDC7345.00 345KV'	0.977487	0.913892	0.0635948	0.93747	0.92	1.05	0.23237	'POTTER COUNTY INTERCHANGE (WAUK 90343-A) 345/230/13.2KV TRANSFORMER CKT 1'
FDNS	06ALL	0	21SP	ASGI_16_04	'OKLAUN HVDC7345.00 345KV'	0.975936	0.906101	0.0698349	0.93747	0.92	1.05	0.23237	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21SP	ASGI_16_04	'OKLAUN HVDC7345.00 345KV'	0.977487	0.913892	0.0635948	0.93747	0.92	1.05	0.23237	'POTTER COUNTY INTERCHANGE (WAUK 90343-A) 345/230/13.2KV TRANSFORMER CKT 1'
FDNS	06ALL	0	21SP	ASGI_16_04	'OKLAUN HVDC7345.00 345KV'	0.974057	0.909032	0.0650249	0.93747	0.92	1.05	0.15218	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	21SP	ASGI_16_04	'OKLAUN HVDC7345.00 345KV'	0.977008	0.917605	0.059403	0.93747	0.92	1.05	0.12054	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'
FDNS	06ALL	0	21SP	ASGI_16_04	'OKLAUN HVDC7345.00 345KV'	0.977008	0.917605	0.059403	0.93747	0.92	1.05	0.12054	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'
FDNS	06ALL	0	21SP	ASGI_16_04	'OKLAUN HVDC7345.00 345KV'	0.981133	0.917503	0.0636305	0.93747	0.92	1.05	0.03637	'GRACEMONT - LAWTON EASTSIDE 345KV CKT 1'
FDNS	06ALL	0	21SP	ASGI_16_04	'OKLAUN HVDC7345.00 345KV'	0.981133	0.917503	0.0636305	0.93747	0.92	1.05	0.03637	'GRACEMONT - LAWTON EASTSIDE 345KV CKT 1'
FDNS	06ALL	0	21WP	ASGI_16_04	'OKLAUN HVDC7345.00 345KV'	0.961953	0.867867	0.0940866	0.95772	0.9	1.05	0.11606	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	0	21WP	ASGI_16_04	'OKLAUN HVDC7345.00 345KV'	0.961953	0.867867	0.0940866	0.95772	0.92	1.05	0.11606	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNSLock	06ALL	0	21WP	ASGI_16_04	'OKLAUN HVDC7345.00 345KV'	0.968933	0.878251	0.0906819	0.95772	0.9	1.05	0.11606	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	0	21WP	ASGI_16_04	'OKLAUN HVDC7345.00 345KV'	0.968933	0.878251	0.0906819	0.95772	0.92	1.05	0.11606	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	0	21WP	ASGI_16_04	'OKLAUN HVDC7345.00 345KV'	0.968933	0.878251	0.0906819	0.95772	0.9	1.05	0.11606	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	0	21WP	ASGI_16_04	'OKLAUN HVDC7345.00 345KV'	0.968933	0.878251	0.0906819	0.95772	0.92	1.05	0.11606	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	ASGI_16_04	'OKLAUNION 345KV'	0.946555	0.89765	0.0489053	0.96178	0.9	1.05	0.16428	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	0	18G	ASGI_16_04	'OKLAUNION 345KV'	0.946555	0.89765	0.0489053	0.96178	0.92	1.05	0.16428	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	0	18G	ASGI_16_04	'OKLAUNION 345KV'	0.971578	0.876382	0.0951954	0.96178	0.9	1.05	0.10874	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	0	18G	ASGI_16_04	'OKLAUNION 345KV'	0.971578	0.876382	0.0951954	0.96178	0.92	1.05	0.10874	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	0	18G	ASGI_16_04	'OKLAUNION 345KV'	0.978868	0.894289	0.0845786	0.96178	0.9	1.05	0.10874	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	ASGI_16_04	'OKLAUNION 345KV'	0.978868	0.894289	0.0845786	0.96178	0.92	1.05	0.10874	'BORDER 7345.00 - TUCO INTERCHANGE 345KV 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
FDNS	06ALL		0 18G	ASGI_16_04	'OKLAUNION 345KV'	0.978868	0.894289	0.0845786	0.96178	0.9	1.05	0.10874	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL		0 18G	ASGI_16_04	'OKLAUNION 345KV'	0.978868	0.894289	0.0845786	0.96178	0.92	1.05	0.10874	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL		0 18SP	ASGI_16_04	'OKLAUNION 345KV'	0.982322	0.916889	0.0654331	0.98435	0.92	1.05	0.11768	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL		0 21L	ASGI_16_04	'OKLAUNION 345KV'	0.955763	0.91547	0.0402927	0.97987	0.92	1.05	0.13529	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL		0 21L	ASGI_16_04	'OKLAUNION 345KV'	0.964671	0.906828	0.0578428	0.97987	0.92	1.05	0.10032	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL		0 21SP	ASGI_16_04	'OKLAUNION 345KV'	0.975767	0.905944	0.0698228	0.93731	0.92	1.05	0.23237	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL		0 21SP	ASGI_16_04	'OKLAUNION 345KV'	0.977318	0.913734	0.0635838	0.93731	0.92	1.05	0.23237	'POTTER COUNTY INTERCHANGE (WAUK 90343-A) 345/230/13.2KV TRANSFORMER CKT 1'
FDNS	06ALL		0 21SP	ASGI_16_04	'OKLAUNION 345KV'	0.975767	0.905944	0.0698228	0.93731	0.92	1.05	0.23237	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL		0 21SP	ASGI_16_04	'OKLAUNION 345KV'	0.977318	0.913734	0.0635838	0.93731	0.92	1.05	0.23237	'POTTER COUNTY INTERCHANGE (WAUK 90343-A) 345/230/13.2KV TRANSFORMER CKT 1'
FDNS	06ALL		0 21SP	ASGI_16_04	'OKLAUNION 345KV'	0.988052	0.937308	0.050744	0.93731	0.95	1.05	0.16036	System Intact
FDNS	06ALL		0 21SP	ASGI_16_04	'OKLAUNION 345KV'	0.988052	0.937308	0.050744	0.93731	0.95	1.05	0.16036	System Intact
FDNS	06ALL		0 21SP	ASGI_16_04	'OKLAUNION 345KV'	0.926263	0.872003	0.0542603	0.93731	0.9	1.05	0.16036	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL		0 21SP	ASGI_16_04	'OKLAUNION 345KV'	0.926263	0.872003	0.0542603	0.93731	0.92	1.05	0.16036	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL		0 21SP	ASGI_16_04	'OKLAUNION 345KV'	0.973888	0.908875	0.0650136	0.93731	0.92	1.05	0.15218	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL		0 21SP	ASGI_16_04	'OKLAUNION 345KV'	0.976839	0.917446	0.0593928	0.93731	0.92	1.05	0.12054	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'
FDNS	06ALL		0 21SP	ASGI_16_04	'OKLAUNION 345KV'	0.976839	0.917446	0.0593928	0.93731	0.92	1.05	0.12054	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'
FDNS	06ALL		0 21SP	ASGI_16_04	'OKLAUNION 345KV'	0.980964	0.917344	0.0636194	0.93731	0.92	1.05	0.03637	'GRACEMONT - LAWTON EASTSIDE 345KV CKT 1'
FDNS	06ALL		0 21SP	ASGI_16_04	'OKLAUNION 345KV'	0.980964	0.917344	0.0636194	0.93731	0.92	1.05	0.03637	'GRACEMONT - LAWTON EASTSIDE 345KV CKT 1'
FDNS	06ALL		0 21WP	ASGI_16_04	'OKLAUNION 345KV'	0.940431	0.89655	0.0438808	0.95756	0.9	1.05	0.15822	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL		0 21WP	ASGI_16_04	'OKLAUNION 345KV'	0.940431	0.89655	0.0438808	0.95756	0.92	1.05	0.15822	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL		0 21WP	ASGI_16_04	'OKLAUNION 345KV'	0.961787	0.867717	0.0940703	0.95756	0.9	1.05	0.11606	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL		0 21WP	ASGI_16_04	'OKLAUNION 345KV'	0.961787	0.867717	0.0940703	0.95756	0.92	1.05	0.11606	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNSLock	06ALL		0 18G	ASGI_16_04	'OKLAUNION 345KV'	0.946565	0.897633	0.048932	0.96178	0.9	1.05	0.16428	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL		0 18G	ASGI_16_04	'OKLAUNION 345KV'	0.946565	0.897633	0.048932	0.96178	0.92	1.05	0.16428	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL		0 21L	ASGI_16_04	'OKLAUNION 345KV'	0.955763	0.915469	0.0402938	0.97987	0.92	1.05	0.13529	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL		0 21SP	ASGI_16_04	'OKLAUNION 345KV'	0.926277	0.872003	0.0542739	0.93731	0.9	1.05	0.16036	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL		0 21SP	ASGI_16_04	'OKLAUNION 345KV'	0.926277	0.872003	0.0542739	0.93731	0.92	1.05	0.16036	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL		0 21WP	ASGI_16_04	'OKLAUNION 345KV'	0.940445	0.892481	0.0479638	0.95756	0.9	1.05	0.15822	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL		0 21WP	ASGI_16_04	'OKLAUNION 345KV'	0.940445	0.892481	0.0479638	0.95756	0.92	1.05	0.15822	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL		0 21WP	ASGI_16_04	'OKLAUNION 345KV'	0.968766	0.8781	0.0906662	0.95756	0.9	1.05	0.11606	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL		0 21WP	ASGI_16_04	'OKLAUNION 345KV'	0.968766	0.8781	0.0906662	0.95756	0.92	1.05	0.11606	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL		0 21WP	ASGI_16_04	'OKLAUNION 345KV'	0.968766	0.8781	0.0906662	0.95756	0.9	1.05	0.11606	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL		0 21WP	ASGI_16_04	'OKLAUNION 345KV'	0.968766	0.8781	0.0906662	0.95756	0.92	1.05	0.11606	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL		0 18G	ASGI_16_04	'SHAMROCK 115KV'	0.943645	0.902939	0.0407058	0.96617	0.92	1.05	0.16428	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL		0 18G	ASGI_16_04	'SHAMROCK 115KV'	0.943645	0.902939	0.0407058	0.96617	0.92	1.05	0.16428	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL		0 18G	ASGI_16_04	'SHAMROCK 115KV'	0.94719	0.915897	0.0312929	0.96617	0.92	1.05	0.15692	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL		0 21WP	ASGI_16_04	'SHAMROCK 115KV'	0.956306	0.906569	0.0497372	0.97378	0.92	1.05	0.15822	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL		0 21WP	ASGI_16_04	'SHAMROCK 115KV'	0.956306	0.906569	0.0497372	0.97378	0.92	1.05	0.15822	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL		0 21WP	ASGI_16_04	'SHAMROCK 115KV'	0.94803	0.918341	0.0296886	0.97378	0.92	1.05	0.15008	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL		0 17WP	ASGI_16_04	'SHAMROCK 69KV'	0.941749	0.911219	0.0305302	0.95406	0.92	1.05	0.1612	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL		0 18G	ASGI_16_04	'SHAMROCK 69KV'	0.94251	0.915854	0.0266567	0.94237	0.92	1.05	0.22561	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL		0 18G	ASGI_16_04	'SHAMROCK 69KV'	0.94251	0.915854	0.0266567	0.94237	0.92	1.05	0.22561	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL		0 18G	ASGI_16_04	'SHAMROCK 69KV'	0.921752	0.88782	0.0339316	0.94237	0.9	1.05	0.16428	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL		0 18G	ASGI_16_04	'SHAMROCK 69KV'	0.921752	0.88782	0.0339316	0.94237	0.92	1.05	0.16428	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL		0 18G	ASGI_16_04	'SHAMROCK 69KV'	0.921752	0.88782	0.0339316	0.94237	0.9	1.05	0.16428	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL		0 18G	ASGI_16_04	'SHAMROCK 69KV'	0.921752	0.88782	0.0339316	0.94237	0.92	1.05	0.16428	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL		0 18G	ASGI_16_04	'SHAMROCK 69KV'	0.922272	0.895083	0.0271891	0.94237	0.9	1.05	0.15692	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL		0 18G	ASGI_16_04	'SHAMROCK 69KV'	0.922272	0.895083	0.0271891	0.94237	0.92	1.05	0.15692	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL		0 18G	ASGI_16_04	'SHAMROCK 69KV'	0.937177	0.90447	0.032707	0.94237	0.92	1.05	0.15692	'STLN-DEMARC6 - SWEETWATER 230KV CKT 1'
FDNS	06ALL		0 18G	ASGI_16_04	'SHAMROCK 69KV'	0.938841	0.906155	0.0326868	0.94237	0.92	1.05	0.15692	'STATELINE INTERCHANGE - STLN-DEMARC6 230KV CKT 1'
FDNS	06ALL		0 18G	ASGI_16_04	'SHAMROCK 69KV'	0.9368	0.913242	0.0235581	0.94237	0.92	1.05	0.13221	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNS	06ALL		0 18G	ASGI_16_04	'SHAMROCK 69KV'	0.9368	0.913242	0.0235581	0.94237	0.92	1.05	0.13221	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNS	06ALL		0 18G	ASGI_16_04	'SHAMROCK 69KV'	0.945055	0.919173	0.0258818	0.94237	0.92	1.05	0.12651	'MATHWSN7 345.00 - TATONGA7 345.00 345KV CKT 1'
FDNS	06ALL		0 18SP	ASGI_16_04	'SHAMROCK 69KV'	0.935303	0.907264	0.0280384	0.94903	0.92	1.05	0.16175	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL		0 18SP	ASGI_16_04	'SHAMROCK 69KV'	0.935303	0.907264	0.0280384	0.94903	0.92	1.05	0.16175	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL		0 18SP	ASGI_16_04	'SHAMROCK 69KV'	0.937541	0.917034	0.0205072	0.94903	0.92	1.05	0.155	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL		0 21L	ASGI_16_04	'SHAMROCK 69KV'	0.927705	0.902827	0.0248773	0.96676	0.92	1.05	0.13625	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL		0 21L	ASGI_16_04	'SHAMROCK 69KV'	0.940921	0.917392	0.0235285	0.96676	0.92	1.05	0.13625	'STLN-DEMARC6 - SWEETWATER 230KV CKT 1'
FDNS	06ALL		0 21L	ASGI_16_04	'SHAMROCK 69KV'	0.939614	0.915541	0.0240734	0.96676	0.92	1.05	0.13625	'STATELINE INTERCHANGE - STLN-DEMARC6 230KV CKT 1'
FDNS	06ALL		0 21L	ASGI_16_04	'SHAMROCK 69KV'	0.937265	0.900091	0.0371735	0.96676	0.92	1.05	0.13529	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL		0 21L	ASGI_16_04	'SHAMROCK 69KV'	0.937265	0.900091	0.0371735	0.96676	0.92	1.05	0.13529	'OKLAUNION - TUCO INTERCHANGE 345KV 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
FDNS	06ALL	0	21SP	ASGI_16_04	'SHAMROCK 69KV'	0.943517	0.917985	0.0255317	0.94414	0.92	1.05	0.23237	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21SP	ASGI_16_04	'SHAMROCK 69KV'	0.943517	0.917985	0.0255317	0.94414	0.92	1.05	0.23237	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21SP	ASGI_16_04	'SHAMROCK 69KV'	0.930159	0.903584	0.0265749	0.94414	0.92	1.05	0.15218	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	21SP	ASGI_16_04	'SHAMROCK 69KV'	0.943987	0.919594	0.0243928	0.94414	0.92	1.05	0.15218	'STATELINE INTERCHANGE - STLN-DEMARC6 230KV CKT 1'
FDNS	06ALL	0	21SP	ASGI_16_04	'SHAMROCK 69KV'	0.939921	0.918407	0.0215131	0.94414	0.92	1.05	0.12823	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	21SP	ASGI_16_04	'SHAMROCK 69KV'	0.939921	0.918407	0.0215131	0.94414	0.92	1.05	0.12823	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	21WP	ASGI_16_04	'SHAMROCK 69KV'	0.933042	0.889221	0.0438206	0.94727	0.9	1.05	0.15822	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	ASGI_16_04	'SHAMROCK 69KV'	0.933042	0.889221	0.0438206	0.94727	0.92	1.05	0.15822	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	ASGI_16_04	'SHAMROCK 69KV'	0.933042	0.889221	0.0438206	0.94727	0.9	1.05	0.15822	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	ASGI_16_04	'SHAMROCK 69KV'	0.933042	0.889221	0.0438206	0.94727	0.92	1.05	0.15822	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	ASGI_16_04	'SHAMROCK 69KV'	0.933042	0.889221	0.0438206	0.94727	0.92	1.05	0.15822	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	ASGI_16_04	'SHAMROCK 69KV'	0.92306	0.895123	0.0279369	0.94727	0.9	1.05	0.15008	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	21WP	ASGI_16_04	'SHAMROCK 69KV'	0.92306	0.895123	0.0279369	0.94727	0.92	1.05	0.15008	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	21WP	ASGI_16_04	'SHAMROCK 69KV'	0.940591	0.917227	0.0233641	0.94727	0.92	1.05	0.15008	'STLN-DEMARC6 - SWEETWATER 230KV CKT 1'
FDNSLock	06ALL	0	21WP	ASGI_16_04	'SHAMROCK 69KV'	0.937606	0.916765	0.0208413	0.94727	0.92	1.05	0.12645	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNSLock	06ALL	0	21WP	ASGI_16_04	'SHAMROCK 69KV'	0.937606	0.916765	0.0208413	0.94727	0.92	1.05	0.12645	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNSLock	06ALL	0	21WP	ASGI_16_04	'SHAMROCK 69KV'	0.946765	0.917519	0.0292466	0.94727	0.92	1.05	0.11606	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	0	21WP	ASGI_16_04	'SHAMROCK 69KV'	0.946765	0.917519	0.0292466	0.94727	0.92	1.05	0.11606	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	ASGI_16_04	'XIT_INTG 6230.00 230KV'	0.961921	0.898247	0.0636745	0.96282	0.9	1.05	0.16428	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	ASGI_16_04	'XIT_INTG 6230.00 230KV'	0.961921	0.898247	0.0636745	0.96282	0.9	1.05	0.16428	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	ASGI_16_04	'OKLAUN HVDC7345.00 345KV'	0.971746	0.876534	0.0952119	0.96195	0.9	1.05	0.10874	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	18G	ASGI_16_04	'OKLAUN HVDC7345.00 345KV'	0.971746	0.876534	0.0952119	0.96195	0.92	1.05	0.10874	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	18G	ASGI_16_04	'OKLAUN HVDC7345.00 345KV'	0.979037	0.894444	0.0845932	0.96195	0.9	1.05	0.10874	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	ASGI_16_04	'OKLAUN HVDC7345.00 345KV'	0.979037	0.894444	0.0845932	0.96195	0.92	1.05	0.10874	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	ASGI_16_04	'OKLAUN HVDC7345.00 345KV'	0.979037	0.894444	0.0845932	0.96195	0.9	1.05	0.10874	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	ASGI_16_04	'OKLAUN HVDC7345.00 345KV'	0.979037	0.894444	0.0845932	0.96195	0.92	1.05	0.10874	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18SP	ASGI_16_04	'OKLAUN HVDC7345.00 345KV'	0.982492	0.917047	0.0654445	0.98452	0.92	1.05	0.11768	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	21L	ASGI_16_04	'OKLAUN HVDC7345.00 345KV'	0.964794	0.906985	0.057809	0.98004	0.92	1.05	0.10032	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	21SP	ASGI_16_04	'OKLAUN HVDC7345.00 345KV'	0.975936	0.906101	0.0698349	0.93747	0.92	1.05	0.23237	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	21SP	ASGI_16_04	'OKLAUN HVDC7345.00 345KV'	0.977487	0.913892	0.0635948	0.93747	0.92	1.05	0.23237	'POTTER COUNTY INTERCHANGE (WAUK 90343-A) 345/230/13.2KV TRANSFORMER CKT 1'
FDNS	06ALL	2	21SP	ASGI_16_04	'OKLAUN HVDC7345.00 345KV'	0.975936	0.906101	0.0698349	0.93747	0.92	1.05	0.23237	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	21SP	ASGI_16_04	'OKLAUN HVDC7345.00 345KV'	0.977487	0.913892	0.0635948	0.93747	0.92	1.05	0.23237	'POTTER COUNTY INTERCHANGE (WAUK 90343-A) 345/230/13.2KV TRANSFORMER CKT 1'
FDNS	06ALL	2	21SP	ASGI_16_04	'OKLAUN HVDC7345.00 345KV'	0.974057	0.909032	0.0650249	0.93747	0.92	1.05	0.15218	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	2	21SP	ASGI_16_04	'OKLAUN HVDC7345.00 345KV'	0.977008	0.917605	0.059403	0.93747	0.92	1.05	0.12054	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'
FDNS	06ALL	2	21SP	ASGI_16_04	'OKLAUN HVDC7345.00 345KV'	0.977008	0.917605	0.059403	0.93747	0.92	1.05	0.12054	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'
FDNS	06ALL	2	21SP	ASGI_16_04	'OKLAUN HVDC7345.00 345KV'	0.981133	0.917503	0.0636305	0.93747	0.92	1.05	0.03637	'GRACEMONT - LAWTON EASTSIDE 345KV CKT 1'
FDNS	06ALL	2	21SP	ASGI_16_04	'OKLAUN HVDC7345.00 345KV'	0.981133	0.917503	0.0636305	0.93747	0.92	1.05	0.03637	'GRACEMONT - LAWTON EASTSIDE 345KV CKT 1'
FDNS	06ALL	2	21WP	ASGI_16_04	'OKLAUN HVDC7345.00 345KV'	0.961953	0.867867	0.0940866	0.95772	0.9	1.05	0.11606	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	21WP	ASGI_16_04	'OKLAUN HVDC7345.00 345KV'	0.961953	0.867867	0.0940866	0.95772	0.92	1.05	0.11606	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNSLock	06ALL	2	21WP	ASGI_16_04	'OKLAUN HVDC7345.00 345KV'	0.968933	0.878251	0.0906819	0.95772	0.9	1.05	0.11606	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	2	21WP	ASGI_16_04	'OKLAUN HVDC7345.00 345KV'	0.968933	0.878251	0.0906819	0.95772	0.92	1.05	0.11606	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	2	21WP	ASGI_16_04	'OKLAUN HVDC7345.00 345KV'	0.968933	0.878251	0.0906819	0.95772	0.9	1.05	0.11606	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	2	21WP	ASGI_16_04	'OKLAUN HVDC7345.00 345KV'	0.968933	0.878251	0.0906819	0.95772	0.92	1.05	0.11606	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	ASGI_16_04	'OKLAUNION 345KV'	0.946555	0.89765	0.0489053	0.96178	0.9	1.05	0.16428	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	2	18G	ASGI_16_04	'OKLAUNION 345KV'	0.946555	0.89765	0.0489053	0.96178	0.92	1.05	0.16428	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	2	18G	ASGI_16_04	'OKLAUNION 345KV'	0.971578	0.876382	0.0951954	0.96178	0.9	1.05	0.10874	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	18G	ASGI_16_04	'OKLAUNION 345KV'	0.971578	0.876382	0.0951954	0.96178	0.92	1.05	0.10874	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	18G	ASGI_16_04	'OKLAUNION 345KV'	0.978868	0.894289	0.0845786	0.96178	0.9	1.05	0.10874	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	ASGI_16_04	'OKLAUNION 345KV'	0.978868	0.894289	0.0845786	0.96178	0.92	1.05	0.10874	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	ASGI_16_04	'OKLAUNION 345KV'	0.978868	0.894289	0.0845786	0.96178	0.9	1.05	0.10874	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	ASGI_16_04	'OKLAUNION 345KV'	0.978868	0.894289	0.0845786	0.96178	0.92	1.05	0.10874	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18SP	ASGI_16_04	'OKLAUNION 345KV'	0.982322	0.916889	0.0654331	0.98435	0.92	1.05	0.11768	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	21L	ASGI_16_04	'OKLAUNION 345KV'	0.955763	0.91547	0.0402927	0.97987	0.92	1.05	0.13529	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	2	21L	ASGI_16_04	'OKLAUNION 345KV'	0.964671	0.906828	0.0578428	0.97987	0.92	1.05	0.10032	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	21SP	ASGI_16_04	'OKLAUNION 345KV'	0.975767	0.905944	0.0698228	0.93731	0.92	1.05	0.23237	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	21SP	ASGI_16_04	'OKLAUNION 345KV'	0.977318	0.913734	0.0635838	0.93731	0.92	1.05	0.23237	'POTTER COUNTY INTERCHANGE (WAUK 90343-A) 345/230/13.2KV TRANSFORMER CKT 1'
FDNS	06ALL	2	21SP	ASGI_16_04	'OKLAUNION 345KV'	0.975767	0.905944	0.0698228	0.93731	0.92	1.05	0.23237	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	21SP	ASGI_16_04	'OKLAUNION 345KV'	0.977318	0.913734	0.0635838	0.93731	0.92	1.05	0.23237	'POTTER COUNTY INTERCHANGE (WAUK 90343-A) 345/230/13.2KV TRANSFORMER CKT 1'
FDNS	06ALL	2	21SP	ASGI_16_04	'OKLAUNION 345KV'	0.988052	0.937308	0.050744	0.93731	0.95	1.05	0.16036	System Intact
FDNS	06ALL	2	21SP	ASGI_16_04	'OKLAUNION 345KV'	0.988052	0.937308	0.050744	0.93731	0.95	1.05	0.16036	System Intact

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	06ALL		2 21SP	ASGI_16_04	'OKLAUNION 345KV'	0.926263	0.872003	0.0542603	0.93731	0.9	1.05	0.16036	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL		2 21SP	ASGI_16_04	'OKLAUNION 345KV'	0.926263	0.872003	0.0542603	0.93731	0.92	1.05	0.16036	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL		2 21SP	ASGI_16_04	'OKLAUNION 345KV'	0.973888	0.908875	0.0650136	0.93731	0.92	1.05	0.15218	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL		2 21SP	ASGI_16_04	'OKLAUNION 345KV'	0.976839	0.917446	0.0593928	0.93731	0.92	1.05	0.12054	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'
FDNS	06ALL		2 21SP	ASGI_16_04	'OKLAUNION 345KV'	0.976839	0.917446	0.0593928	0.93731	0.92	1.05	0.12054	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'
FDNS	06ALL		2 21SP	ASGI_16_04	'OKLAUNION 345KV'	0.980964	0.917344	0.0636194	0.93731	0.92	1.05	0.03637	'GRACEMONT - LAWTON EASTSIDE 345KV CKT 1'
FDNS	06ALL		2 21SP	ASGI_16_04	'OKLAUNION 345KV'	0.980964	0.917344	0.0636194	0.93731	0.92	1.05	0.03637	'GRACEMONT - LAWTON EASTSIDE 345KV CKT 1'
FDNS	06ALL		2 21WP	ASGI_16_04	'OKLAUNION 345KV'	0.940431	0.89655	0.0438808	0.95756	0.9	1.05	0.15822	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL		2 21WP	ASGI_16_04	'OKLAUNION 345KV'	0.940431	0.89655	0.0438808	0.95756	0.92	1.05	0.15822	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL		2 21WP	ASGI_16_04	'OKLAUNION 345KV'	0.961787	0.867717	0.0940703	0.95756	0.9	1.05	0.11606	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL		2 21WP	ASGI_16_04	'OKLAUNION 345KV'	0.961787	0.867717	0.0940703	0.95756	0.92	1.05	0.11606	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNSLock	06ALL		2 18G	ASGI_16_04	'OKLAUNION 345KV'	0.946565	0.897633	0.048932	0.96178	0.9	1.05	0.16428	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL		2 18G	ASGI_16_04	'OKLAUNION 345KV'	0.946565	0.897633	0.048932	0.96178	0.92	1.05	0.16428	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL		2 21L	ASGI_16_04	'OKLAUNION 345KV'	0.955763	0.915469	0.0402938	0.97987	0.92	1.05	0.13529	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL		2 21SP	ASGI_16_04	'OKLAUNION 345KV'	0.926277	0.872003	0.0542739	0.93731	0.9	1.05	0.16036	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL		2 21SP	ASGI_16_04	'OKLAUNION 345KV'	0.926277	0.872003	0.0542739	0.93731	0.92	1.05	0.16036	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL		2 21WP	ASGI_16_04	'OKLAUNION 345KV'	0.940445	0.892481	0.0479638	0.95756	0.9	1.05	0.15822	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL		2 21WP	ASGI_16_04	'OKLAUNION 345KV'	0.940445	0.892481	0.0479638	0.95756	0.92	1.05	0.15822	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL		2 21WP	ASGI_16_04	'OKLAUNION 345KV'	0.968766	0.8781	0.0906662	0.95756	0.9	1.05	0.11606	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL		2 21WP	ASGI_16_04	'OKLAUNION 345KV'	0.968766	0.8781	0.0906662	0.95756	0.92	1.05	0.11606	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL		2 21WP	ASGI_16_04	'OKLAUNION 345KV'	0.968766	0.8781	0.0906662	0.95756	0.9	1.05	0.11606	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL		2 21WP	ASGI_16_04	'OKLAUNION 345KV'	0.968766	0.8781	0.0906662	0.95756	0.92	1.05	0.11606	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL		2 17WP	ASGI_16_04	'SHAMROCK 69KV'	0.941749	0.911219	0.0305302	0.95406	0.92	1.05	0.1612	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL		2 18G	ASGI_16_04	'SHAMROCK 69KV'	0.94251	0.915854	0.0266567	0.94237	0.92	1.05	0.22561	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL		2 18G	ASGI_16_04	'SHAMROCK 69KV'	0.94251	0.915854	0.0266567	0.94237	0.92	1.05	0.22561	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL		2 18G	ASGI_16_04	'SHAMROCK 69KV'	0.921752	0.88782	0.0339316	0.94237	0.9	1.05	0.16428	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL		2 18G	ASGI_16_04	'SHAMROCK 69KV'	0.921752	0.88782	0.0339316	0.94237	0.92	1.05	0.16428	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL		2 18G	ASGI_16_04	'SHAMROCK 69KV'	0.921752	0.88782	0.0339316	0.94237	0.9	1.05	0.16428	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL		2 18G	ASGI_16_04	'SHAMROCK 69KV'	0.921752	0.88782	0.0339316	0.94237	0.92	1.05	0.16428	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL		2 18G	ASGI_16_04	'SHAMROCK 69KV'	0.922272	0.895083	0.0271891	0.94237	0.9	1.05	0.15692	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL		2 18G	ASGI_16_04	'SHAMROCK 69KV'	0.922272	0.895083	0.0271891	0.94237	0.92	1.05	0.15692	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL		2 18G	ASGI_16_04	'SHAMROCK 69KV'	0.937177	0.90447	0.032707	0.94237	0.92	1.05	0.15692	'STLN-DEMARC6 - SWEETWATER 230KV CKT 1'
FDNS	06ALL		2 18G	ASGI_16_04	'SHAMROCK 69KV'	0.938841	0.906155	0.0326868	0.94237	0.92	1.05	0.15692	'STATELINE INTERCHANGE - STLN-DEMARC6 230KV CKT 1'
FDNS	06ALL		2 18G	ASGI_16_04	'SHAMROCK 69KV'	0.9368	0.913242	0.0235581	0.94237	0.92	1.05	0.13221	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNS	06ALL		2 18G	ASGI_16_04	'SHAMROCK 69KV'	0.9368	0.913242	0.0235581	0.94237	0.92	1.05	0.13221	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNS	06ALL		2 18G	ASGI_16_04	'SHAMROCK 69KV'	0.945055	0.919173	0.0258818	0.94237	0.92	1.05	0.12651	'MATHWSN7 345.00 - TATONGA7 345.00 345KV CKT 1'
FDNS	06ALL		2 18SP	ASGI_16_04	'SHAMROCK 69KV'	0.935303	0.907264	0.0280384	0.94903	0.92	1.05	0.16175	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL		2 18SP	ASGI_16_04	'SHAMROCK 69KV'	0.935303	0.907264	0.0280384	0.94903	0.92	1.05	0.16175	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL		2 18SP	ASGI_16_04	'SHAMROCK 69KV'	0.937541	0.917034	0.0205072	0.94903	0.92	1.05	0.155	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL		2 21L	ASGI_16_04	'SHAMROCK 69KV'	0.927705	0.902827	0.0248773	0.96676	0.92	1.05	0.13625	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL		2 21L	ASGI_16_04	'SHAMROCK 69KV'	0.940921	0.917392	0.0235285	0.96676	0.92	1.05	0.13625	'STLN-DEMARC6 - SWEETWATER 230KV CKT 1'
FDNS	06ALL		2 21L	ASGI_16_04	'SHAMROCK 69KV'	0.939614	0.915541	0.0240734	0.96676	0.92	1.05	0.13625	'STATELINE INTERCHANGE - STLN-DEMARC6 230KV CKT 1'
FDNS	06ALL		2 21L	ASGI_16_04	'SHAMROCK 69KV'	0.937265	0.900091	0.0371735	0.96676	0.92	1.05	0.13529	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL		2 21L	ASGI_16_04	'SHAMROCK 69KV'	0.937265	0.900091	0.0371735	0.96676	0.92	1.05	0.13529	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL		2 21SP	ASGI_16_04	'SHAMROCK 69KV'	0.943517	0.917985	0.0255317	0.94414	0.92	1.05	0.23237	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL		2 21SP	ASGI_16_04	'SHAMROCK 69KV'	0.943517	0.917985	0.0255317	0.94414	0.92	1.05	0.23237	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL		2 21SP	ASGI_16_04	'SHAMROCK 69KV'	0.930159	0.903584	0.0265749	0.94414	0.92	1.05	0.15218	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL		2 21SP	ASGI_16_04	'SHAMROCK 69KV'	0.943987	0.919594	0.0243928	0.94414	0.92	1.05	0.15218	'STATELINE INTERCHANGE - STLN-DEMARC6 230KV CKT 1'
FDNS	06ALL		2 21SP	ASGI_16_04	'SHAMROCK 69KV'	0.939921	0.918407	0.0215131	0.94414	0.92	1.05	0.12823	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNS	06ALL		2 21SP	ASGI_16_04	'SHAMROCK 69KV'	0.939921	0.918407	0.0215131	0.94414	0.92	1.05	0.12823	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNS	06ALL		2 21WP	ASGI_16_04	'SHAMROCK 69KV'	0.933042	0.889221	0.0438206	0.94727	0.9	1.05	0.15822	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL		2 21WP	ASGI_16_04	'SHAMROCK 69KV'	0.933042	0.889221	0.0438206	0.94727	0.92	1.05	0.15822	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL		2 21WP	ASGI_16_04	'SHAMROCK 69KV'	0.933042	0.889221	0.0438206	0.94727	0.92	1.05	0.15822	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL		2 21WP	ASGI_16_04	'SHAMROCK 69KV'	0.92306	0.895123	0.0279369	0.94727	0.9	1.05	0.15008	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL		2 21WP	ASGI_16_04	'SHAMROCK 69KV'	0.92306	0.895123	0.0279369	0.94727	0.92	1.05	0.15008	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL		2 21WP	ASGI_16_04	'SHAMROCK 69KV'	0.940591	0.917227	0.0233641	0.94727	0.92	1.05	0.15008	'STLN-DEMARC6 - SWEETWATER 230KV CKT 1'
FDNSLock	06ALL		2 21WP	ASGI_16_04	'SHAMROCK 69KV'	0.937606	0.916765	0.0208413	0.94727	0.92	1.05	0.12645	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNSLock	06ALL		2 21WP	ASGI_16_04	'SHAMROCK 69KV'	0.937606	0.916765	0.0208413	0.94727	0.92	1.05	0.12645	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNSLock	06ALL		2 21WP	ASGI_16_04	'SHAMROCK 69KV'	0.946765	0.917519	0.0292466	0.94727	0.92	1.05	0.11606	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL		2 21WP	ASGI_16_04	'SHAMROCK 69KV'	0.946765	0.917519	0.0292466	0.94727	0.92	1.05	0.11606	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL		0 18G	G16_015	'BORDER 7345.00 345KV'	0.960417	0.87447	0.0859476	0.96029	0.9	1.05	0.24983	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL		0 18G	G16_015	'BORDER 7345.00 345KV'	0.960417	0.87447	0.0859476	0.96029	0.9	1.05	0.24983	'OKLAUNION - TUCO INTERCHANGE 345KV 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
FDNS	06ALL	0	21WP	G16_015	'BORDER 7345.00 345KV'	0.952111	0.873373	0.0787379	0.96753	0.9	1.05	0.26722	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	G16_015	'BORDER 7345.00 345KV'	0.952111	0.873373	0.0787379	0.96753	0.9	1.05	0.26722	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21SP	G16_015	'DEAF SMITH COUNTY INTERCHANGE 230KV'	0.955763	0.931943	0.0238197	0.93194	0.95	1.05	0.12433	System Intact
FDNS	06ALL	0	21SP	G16_015	'DEAF SMITH COUNTY INTERCHANGE 230KV'	0.917765	0.882885	0.0348799	0.93194	0.9	1.05	0.12433	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_015	'DEAF SMITH COUNTY INTERCHANGE 230KV'	0.955763	0.931943	0.0238197	0.93194	0.95	1.05	0.12433	System Intact
FDNS	06ALL	0	21SP	G16_015	'DEAF SMITH COUNTY INTERCHANGE 230KV'	0.917765	0.882885	0.0348799	0.93194	0.9	1.05	0.12433	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
FDNS	06ALL	0	18G	G16_015	'G1149G1504 345.00 345KV'	0.960417	0.87447	0.0859476	0.96029	0.9	1.05	0.24983	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_015	'G1149G1504 345.00 345KV'	0.960417	0.87447	0.0859476	0.96029	0.9	1.05	0.24983	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	G16_015	'G1149G1504 345.00 345KV'	0.952111	0.873373	0.0787379	0.96753	0.9	1.05	0.26722	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	G16_015	'G1149G1504 345.00 345KV'	0.952111	0.873373	0.0787379	0.96753	0.9	1.05	0.26722	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_015	'GRAPEVINE INTERCHANGE 230KV'	0.963349	0.8997	0.0636498	0.9775	0.9	1.05	0.24983	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_015	'GRAPEVINE INTERCHANGE 230KV'	0.963349	0.8997	0.0636498	0.9775	0.9	1.05	0.24983	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21SP	G16_015	'OKLAUN HVDC7345.00 345KV'	0.967552	0.941326	0.0262256	0.94133	0.95	1.05	0.12332	System Intact
FDNS	06ALL	0	21SP	G16_015	'NEWHART 230 230KV'	0.967552	0.941326	0.0262256	0.94133	0.95	1.05	0.12332	System Intact
FDNS	06ALL	0	18G	G16_015	'OKLAUN HVDC7345.00 345KV'	0.971746	0.876534	0.0952119	0.96195	0.9	1.05	0.18872	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	0	18G	G16_015	'OKLAUN HVDC7345.00 345KV'	0.971746	0.876534	0.0952119	0.96195	0.92	1.05	0.18872	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	0	18G	G16_015	'OKLAUN HVDC7345.00 345KV'	0.979037	0.894444	0.0845932	0.96195	0.9	1.05	0.18872	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_015	'OKLAUN HVDC7345.00 345KV'	0.979037	0.894444	0.0845932	0.96195	0.92	1.05	0.18872	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_015	'OKLAUN HVDC7345.00 345KV'	0.979037	0.894444	0.0845932	0.96195	0.9	1.05	0.18872	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18SP	G16_015	'OKLAUN HVDC7345.00 345KV'	0.982492	0.917047	0.0654445	0.98452	0.92	1.05	0.19734	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	0	21L	G16_015	'OKLAUN HVDC7345.00 345KV'	0.964794	0.906985	0.057809	0.98004	0.92	1.05	0.20155	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	0	21SP	G16_015	'OKLAUN HVDC7345.00 345KV'	0.975936	0.906101	0.0698349	0.93747	0.92	1.05	0.16322	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21SP	G16_015	'OKLAUN HVDC7345.00 345KV'	0.977487	0.913892	0.0635948	0.93747	0.92	1.05	0.16322	'POTTER COUNTY INTERCHANGE (WAUK 90343-A) 345/230/13.2KV TRANSFORMER CKT 1'
FDNS	06ALL	0	21SP	G16_015	'OKLAUN HVDC7345.00 345KV'	0.975936	0.906101	0.0698349	0.93747	0.92	1.05	0.16322	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21SP	G16_015	'OKLAUN HVDC7345.00 345KV'	0.977487	0.913892	0.0635948	0.93747	0.92	1.05	0.16322	'POTTER COUNTY INTERCHANGE (WAUK 90343-A) 345/230/13.2KV TRANSFORMER CKT 1'
FDNS	06ALL	0	21SP	G16_015	'OKLAUN HVDC7345.00 345KV'	0.979393	0.918147	0.0612457	0.93747	0.92	1.05	0.13983	'BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_015	'OKLAUN HVDC7345.00 345KV'	0.979393	0.918147	0.0612457	0.93747	0.92	1.05	0.13983	'BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_015	'OKLAUN HVDC7345.00 345KV'	0.976892	0.908909	0.0679833	0.93747	0.92	1.05	0.12433	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_015	'OKLAUN HVDC7345.00 345KV'	0.976892	0.908909	0.0679833	0.93747	0.92	1.05	0.12433	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_015	'OKLAUN HVDC7345.00 345KV'	0.980022	0.919846	0.0601759	0.93747	0.92	1.05	0.12117	'NEWHART 230 - POTTER COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_015	'OKLAUN HVDC7345.00 345KV'	0.980022	0.919846	0.0601759	0.93747	0.92	1.05	0.12117	'NEWHART 230 - POTTER COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_015	'OKLAUN HVDC7345.00 345KV'	0.981133	0.917503	0.0636305	0.93747	0.92	1.05	0.09738	'GRACEMONT - LAWTON EASTSIDE 345KV CKT 1'
FDNS	06ALL	0	21SP	G16_015	'OKLAUN HVDC7345.00 345KV'	0.981133	0.917503	0.0636305	0.93747	0.92	1.05	0.09738	'GRACEMONT - LAWTON EASTSIDE 345KV CKT 1'
FDNS	06ALL	0	21SP	G16_015	'OKLAUN HVDC7345.00 345KV'	0.974057	0.909032	0.0650249	0.93747	0.92	1.05	0.09319	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_015	'OKLAUN HVDC7345.00 345KV'	0.977008	0.917605	0.059403	0.93747	0.92	1.05	0.07582	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_015	'OKLAUN HVDC7345.00 345KV'	0.977008	0.917605	0.059403	0.93747	0.92	1.05	0.07582	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'
FDNS	06ALL	0	21WP	G16_015	'OKLAUN HVDC7345.00 345KV'	0.961953	0.867867	0.0940866	0.95772	0.9	1.05	0.21732	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	0	21WP	G16_015	'OKLAUN HVDC7345.00 345KV'	0.961953	0.867867	0.0940866	0.95772	0.92	1.05	0.21732	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNSLock	06ALL	0	21WP	G16_015	'OKLAUN HVDC7345.00 345KV'	0.968933	0.878251	0.0906819	0.95772	0.9	1.05	0.21732	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	0	21WP	G16_015	'OKLAUN HVDC7345.00 345KV'	0.968933	0.878251	0.0906819	0.95772	0.92	1.05	0.21732	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	0	21WP	G16_015	'OKLAUN HVDC7345.00 345KV'	0.968933	0.878251	0.0906819	0.95772	0.9	1.05	0.21732	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	0	21WP	G16_015	'OKLAUN HVDC7345.00 345KV'	0.968933	0.878251	0.0906819	0.95772	0.92	1.05	0.21732	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_015	'OKLAUNION 345KV'	0.946555	0.89765	0.0489053	0.96178	0.9	1.05	0.24983	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	0	18G	G16_015	'OKLAUNION 345KV'	0.946555	0.89765	0.0489053	0.96178	0.92	1.05	0.24983	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	0	18G	G16_015	'OKLAUNION 345KV'	0.971578	0.876382	0.0951954	0.96178	0.9	1.05	0.18872	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	0	18G	G16_015	'OKLAUNION 345KV'	0.971578	0.876382	0.0951954	0.96178	0.92	1.05	0.18872	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	0	18G	G16_015	'OKLAUNION 345KV'	0.978868	0.894289	0.0845786	0.96178	0.9	1.05	0.18872	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_015	'OKLAUNION 345KV'	0.978868	0.894289	0.0845786	0.96178	0.92	1.05	0.18872	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_015	'OKLAUNION 345KV'	0.978868	0.894289	0.0845786	0.96178	0.9	1.05	0.18872	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_015	'OKLAUNION 345KV'	0.978868	0.894289	0.0845786	0.96178	0.92	1.05	0.18872	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18SP	G16_015	'OKLAUNION 345KV'	0.982322	0.916889	0.0654331	0.98435	0.92	1.05	0.19734	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	0	21L	G16_015	'OKLAUNION 345KV'	0.955763	0.91547	0.0402927	0.97987	0.92	1.05	0.24426	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	0	21L	G16_015	'OKLAUNION 345KV'	0.964671	0.906828	0.0578428	0.97987	0.92	1.05	0.20155	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	0	21SP	G16_015	'OKLAUNION 345KV'	0.988052	0.937308	0.050744	0.93731	0.95	1.05	0.26936	System Intact

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	06ALL	0	21SP	G16_015	'OKLAUNION 345KV'	0.988052	0.937308	0.050744	0.93731	0.95	1.05	0.26936	System Intact
FDNS	06ALL	0	21SP	G16_015	'OKLAUNION 345KV'	0.926263	0.872003	0.0542603	0.93731	0.9	1.05	0.26936	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	0	21SP	G16_015	'OKLAUNION 345KV'	0.926263	0.872003	0.0542603	0.93731	0.92	1.05	0.26936	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	0	21SP	G16_015	'OKLAUNION 345KV'	0.975767	0.905944	0.0698228	0.93731	0.92	1.05	0.16322	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21SP	G16_015	'OKLAUNION 345KV'	0.977318	0.913734	0.0635838	0.93731	0.92	1.05	0.16322	'POTTER COUNTY INTERCHANGE (WAUK 90343-A) 345/230/13.2KV TRANSFORMER CKT 1'
FDNS	06ALL	0	21SP	G16_015	'OKLAUNION 345KV'	0.975767	0.905944	0.0698228	0.93731	0.92	1.05	0.16322	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21SP	G16_015	'OKLAUNION 345KV'	0.977318	0.913734	0.0635838	0.93731	0.92	1.05	0.16322	'POTTER COUNTY INTERCHANGE (WAUK 90343-A) 345/230/13.2KV TRANSFORMER CKT 1'
FDNS	06ALL	0	21SP	G16_015	'OKLAUNION 345KV'	0.979224	0.917989	0.0612351	0.93731	0.92	1.05	0.13983	'BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_015	'OKLAUNION 345KV'	0.979224	0.917989	0.0612351	0.93731	0.92	1.05	0.13983	'BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_015	'OKLAUNION 345KV'	0.976723	0.908752	0.0679715	0.93731	0.92	1.05	0.12433	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_015	'OKLAUNION 345KV'	0.976723	0.908752	0.0679715	0.93731	0.92	1.05	0.12433	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_015	'OKLAUNION 345KV'	0.979853	0.919687	0.0601655	0.93731	0.92	1.05	0.12117	'NEWHART 230 - POTTER COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_015	'OKLAUNION 345KV'	0.979853	0.919687	0.0601655	0.93731	0.92	1.05	0.12117	'NEWHART 230 - POTTER COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_015	'OKLAUNION 345KV'	0.980964	0.917344	0.0636194	0.93731	0.92	1.05	0.09738	'GRACEMONT - LAWTON EASTSIDE 345KV CKT 1'
FDNS	06ALL	0	21SP	G16_015	'OKLAUNION 345KV'	0.980964	0.917344	0.0636194	0.93731	0.92	1.05	0.09738	'GRACEMONT - LAWTON EASTSIDE 345KV CKT 1'
FDNS	06ALL	0	21SP	G16_015	'OKLAUNION 345KV'	0.973888	0.908875	0.0650136	0.93731	0.92	1.05	0.09319	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_015	'OKLAUNION 345KV'	0.976839	0.917446	0.0593928	0.93731	0.92	1.05	0.07582	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_015	'OKLAUNION 345KV'	0.976839	0.917446	0.0593928	0.93731	0.92	1.05	0.07582	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'
FDNS	06ALL	0	21WP	G16_015	'OKLAUNION 345KV'	0.940431	0.89655	0.0438808	0.95756	0.9	1.05	0.26722	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	0	21WP	G16_015	'OKLAUNION 345KV'	0.940431	0.89655	0.0438808	0.95756	0.92	1.05	0.26722	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	0	21WP	G16_015	'OKLAUNION 345KV'	0.961787	0.867717	0.0940703	0.95756	0.9	1.05	0.21732	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	0	21WP	G16_015	'OKLAUNION 345KV'	0.961787	0.867717	0.0940703	0.95756	0.92	1.05	0.21732	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNSLock	06ALL	0	18G	G16_015	'OKLAUNION 345KV'	0.946565	0.897633	0.048932	0.96178	0.9	1.05	0.24983	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL	0	18G	G16_015	'OKLAUNION 345KV'	0.946565	0.897633	0.048932	0.96178	0.92	1.05	0.24983	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL	0	21L	G16_015	'OKLAUNION 345KV'	0.955763	0.915469	0.0402938	0.97987	0.92	1.05	0.24426	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL	0	21SP	G16_015	'OKLAUNION 345KV'	0.926277	0.872003	0.0542739	0.93731	0.9	1.05	0.26936	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL	0	21SP	G16_015	'OKLAUNION 345KV'	0.926277	0.872003	0.0542739	0.93731	0.92	1.05	0.26936	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL	0	21WP	G16_015	'OKLAUNION 345KV'	0.940445	0.892481	0.0479638	0.95756	0.9	1.05	0.26722	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL	0	21WP	G16_015	'OKLAUNION 345KV'	0.940445	0.892481	0.0479638	0.95756	0.92	1.05	0.26722	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL	0	21WP	G16_015	'OKLAUNION 345KV'	0.968766	0.8781	0.0906662	0.95756	0.9	1.05	0.21732	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	0	21WP	G16_015	'OKLAUNION 345KV'	0.968766	0.8781	0.0906662	0.95756	0.92	1.05	0.21732	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	0	21WP	G16_015	'OKLAUNION 345KV'	0.968766	0.8781	0.0906662	0.95756	0.92	1.05	0.21732	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_015	'SHAMROCK 115KV'	0.943645	0.902939	0.0407058	0.96617	0.92	1.05	0.24983	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_015	'SHAMROCK 115KV'	0.943645	0.902939	0.0407058	0.96617	0.92	1.05	0.24983	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_015	'SHAMROCK 115KV'	0.94719	0.915897	0.0312929	0.96617	0.92	1.05	0.10838	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	21WP	G16_015	'SHAMROCK 115KV'	0.956306	0.906569	0.0497372	0.97378	0.92	1.05	0.26722	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	G16_015	'SHAMROCK 115KV'	0.956306	0.906569	0.0497372	0.97378	0.92	1.05	0.26722	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	G16_015	'SHAMROCK 115KV'	0.94803	0.918341	0.0296886	0.97378	0.92	1.05	0.09109	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	17WP	G16_015	'SHAMROCK 69KV'	0.941749	0.911219	0.0305302	0.95406	0.92	1.05	0.11232	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	18G	G16_015	'SHAMROCK 69KV'	0.921752	0.88782	0.0339316	0.94237	0.9	1.05	0.24983	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_015	'SHAMROCK 69KV'	0.921752	0.88782	0.0339316	0.94237	0.92	1.05	0.24983	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_015	'SHAMROCK 69KV'	0.921752	0.88782	0.0339316	0.94237	0.9	1.05	0.24983	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_015	'SHAMROCK 69KV'	0.921752	0.88782	0.0339316	0.94237	0.92	1.05	0.24983	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_015	'SHAMROCK 69KV'	0.94251	0.915854	0.0266567	0.94237	0.92	1.05	0.17434	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_015	'SHAMROCK 69KV'	0.94251	0.915854	0.0266567	0.94237	0.92	1.05	0.17434	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_015	'SHAMROCK 69KV'	0.945055	0.919173	0.0258818	0.94237	0.92	1.05	0.11915	'MATHWSN7 345.00 - TATONGA7 345.00 345KV CKT 1'
FDNS	06ALL	0	18G	G16_015	'SHAMROCK 69KV'	0.922272	0.895083	0.0271891	0.94237	0.9	1.05	0.10838	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	18G	G16_015	'SHAMROCK 69KV'	0.922272	0.895083	0.0271891	0.94237	0.92	1.05	0.10838	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	18G	G16_015	'SHAMROCK 69KV'	0.937177	0.90447	0.032707	0.94237	0.92	1.05	0.10838	'STLN-DEMARC6 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	18G	G16_015	'SHAMROCK 69KV'	0.938841	0.906155	0.0326868	0.94237	0.92	1.05	0.10838	'STATELINE INTERCHANGE - STLN-DEMARC6 230KV CKT 1'
FDNS	06ALL	0	18G	G16_015	'SHAMROCK 69KV'	0.9368	0.913242	0.0235581	0.94237	0.92	1.05	0.09163	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	18G	G16_015	'SHAMROCK 69KV'	0.9368	0.913242	0.0235581	0.94237	0.92	1.05	0.09163	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	18SP	G16_015	'SHAMROCK 69KV'	0.935303	0.907264	0.0280384	0.94903	0.92	1.05	0.24774	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18SP	G16_015	'SHAMROCK 69KV'	0.935303	0.907264	0.0280384	0.94903	0.92	1.05	0.24774	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18SP	G16_015	'SHAMROCK 69KV'	0.937541	0.917034	0.0205072	0.94903	0.92	1.05	0.10689	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	21L	G16_015	'SHAMROCK 69KV'	0.937265	0.900091	0.0371735	0.96676	0.92	1.05	0.24426	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21L	G16_015	'SHAMROCK 69KV'	0.937265	0.900091	0.0371735	0.96676	0.92	1.05	0.24426	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21L	G16_015	'SHAMROCK 69KV'	0.927705	0.902827	0.0248773	0.96676	0.92	1.05	0.07728	'CHISHOLM6 230.00 - SWEETWATER 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
FDNS	06ALL	0	21L	G16_015	'SHAMROCK 69KV'	0.940921	0.917392	0.0235285	0.96676	0.92	1.05	0.07728	'STLN-DEMARC6 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	21L	G16_015	'SHAMROCK 69KV'	0.939614	0.915541	0.0240734	0.96676	0.92	1.05	0.07728	'STATELINE INTERCHANGE - STLN-DEMARC6 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_015	'SHAMROCK 69KV'	0.943517	0.917985	0.0255317	0.94414	0.92	1.05	0.16322	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21SP	G16_015	'SHAMROCK 69KV'	0.943517	0.917985	0.0255317	0.94414	0.92	1.05	0.16322	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21SP	G16_015	'SHAMROCK 69KV'	0.930159	0.903584	0.0265749	0.94414	0.92	1.05	0.09319	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_015	'SHAMROCK 69KV'	0.943987	0.919594	0.0243928	0.94414	0.92	1.05	0.09319	'STATELINE INTERCHANGE - STLN-DEMARC6 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_015	'SHAMROCK 69KV'	0.939921	0.918407	0.0215131	0.94414	0.92	1.05	0.07881	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_015	'SHAMROCK 69KV'	0.939921	0.918407	0.0215131	0.94414	0.92	1.05	0.07881	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	21WP	G16_015	'SHAMROCK 69KV'	0.933042	0.889221	0.0438206	0.94727	0.9	1.05	0.26722	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	G16_015	'SHAMROCK 69KV'	0.933042	0.889221	0.0438206	0.94727	0.92	1.05	0.26722	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	G16_015	'SHAMROCK 69KV'	0.933042	0.889221	0.0438206	0.94727	0.9	1.05	0.26722	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	G16_015	'SHAMROCK 69KV'	0.933042	0.889221	0.0438206	0.94727	0.92	1.05	0.26722	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	G16_015	'SHAMROCK 69KV'	0.92306	0.895123	0.0279369	0.94727	0.9	1.05	0.09109	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	21WP	G16_015	'SHAMROCK 69KV'	0.92306	0.895123	0.0279369	0.94727	0.92	1.05	0.09109	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	21WP	G16_015	'SHAMROCK 69KV'	0.940591	0.917227	0.0233641	0.94727	0.92	1.05	0.09109	'STLN-DEMARC6 - SWEETWATER 230KV CKT 1'
FDNSLock	06ALL	0	21WP	G16_015	'SHAMROCK 69KV'	0.946765	0.917519	0.0292466	0.94727	0.92	1.05	0.21732	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	0	21WP	G16_015	'SHAMROCK 69KV'	0.946765	0.917519	0.0292466	0.94727	0.92	1.05	0.21732	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	0	21WP	G16_015	'SHAMROCK 69KV'	0.937606	0.916765	0.0208413	0.94727	0.92	1.05	0.07704	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNSLock	06ALL	0	21WP	G16_015	'SHAMROCK 69KV'	0.937606	0.916765	0.0208413	0.94727	0.92	1.05	0.07704	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_015	'SWISHER COUNTY INTERCHANGE 230KV'	0.973712	0.946518	0.027194	0.94652	0.95	1.05	0.07682	System Intact
FDNS	06ALL	0	21SP	G16_015	'SWISHER COUNTY INTERCHANGE 230KV'	0.973712	0.946518	0.027194	0.94652	0.95	1.05	0.07682	System Intact
FDNS	06ALL	0	18G	G16_015	'XIT_INTG 6230.00 230KV'	0.961921	0.898247	0.0636745	0.96282	0.9	1.05	0.24983	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_015	'XIT_INTG 6230.00 230KV'	0.961921	0.898247	0.0636745	0.96282	0.9	1.05	0.24983	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	G16_015	'OKLAUN HVDC7345.00 345KV'	0.971746	0.876534	0.0952119	0.96195	0.9	1.05	0.18872	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	18G	G16_015	'OKLAUN HVDC7345.00 345KV'	0.971746	0.876534	0.0952119	0.96195	0.92	1.05	0.18872	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	18G	G16_015	'OKLAUN HVDC7345.00 345KV'	0.979037	0.894444	0.0845932	0.96195	0.9	1.05	0.18872	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	G16_015	'OKLAUN HVDC7345.00 345KV'	0.979037	0.894444	0.0845932	0.96195	0.92	1.05	0.18872	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	G16_015	'OKLAUN HVDC7345.00 345KV'	0.979037	0.894444	0.0845932	0.96195	0.9	1.05	0.18872	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18SP	G16_015	'OKLAUN HVDC7345.00 345KV'	0.982492	0.917047	0.0654445	0.98452	0.92	1.05	0.19734	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	21L	G16_015	'OKLAUN HVDC7345.00 345KV'	0.964794	0.906985	0.057809	0.98004	0.92	1.05	0.20155	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	21SP	G16_015	'OKLAUN HVDC7345.00 345KV'	0.975936	0.906101	0.0698349	0.93747	0.92	1.05	0.16322	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	21SP	G16_015	'OKLAUN HVDC7345.00 345KV'	0.977487	0.913892	0.0635948	0.93747	0.92	1.05	0.16322	'POTTER COUNTY INTERCHANGE (WAUK 90343-A) 345/230/13.2KV TRANSFORMER CKT 1'
FDNS	06ALL	2	21SP	G16_015	'OKLAUN HVDC7345.00 345KV'	0.975936	0.906101	0.0698349	0.93747	0.92	1.05	0.16322	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	21SP	G16_015	'OKLAUN HVDC7345.00 345KV'	0.977487	0.913892	0.0635948	0.93747	0.92	1.05	0.16322	'POTTER COUNTY INTERCHANGE (WAUK 90343-A) 345/230/13.2KV TRANSFORMER CKT 1'
FDNS	06ALL	2	21SP	G16_015	'OKLAUN HVDC7345.00 345KV'	0.979393	0.918147	0.0612457	0.93747	0.92	1.05	0.13983	'BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_015	'OKLAUN HVDC7345.00 345KV'	0.979393	0.918147	0.0612457	0.93747	0.92	1.05	0.13983	'BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_015	'OKLAUN HVDC7345.00 345KV'	0.976892	0.908909	0.0679833	0.93747	0.92	1.05	0.12433	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_015	'OKLAUN HVDC7345.00 345KV'	0.976892	0.908909	0.0679833	0.93747	0.92	1.05	0.12433	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_015	'OKLAUN HVDC7345.00 345KV'	0.980022	0.919846	0.0601759	0.93747	0.92	1.05	0.12117	'NEWHART 230 - POTTER COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_015	'OKLAUN HVDC7345.00 345KV'	0.980022	0.919846	0.0601759	0.93747	0.92	1.05	0.12117	'NEWHART 230 - POTTER COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_015	'OKLAUN HVDC7345.00 345KV'	0.981133	0.917503	0.0636305	0.93747	0.92	1.05	0.09738	'GRACEMONT - LAWTON EASTSIDE 345KV CKT 1'
FDNS	06ALL	2	21SP	G16_015	'OKLAUN HVDC7345.00 345KV'	0.981133	0.917503	0.0636305	0.93747	0.92	1.05	0.09738	'GRACEMONT - LAWTON EASTSIDE 345KV CKT 1'
FDNS	06ALL	2	21SP	G16_015	'OKLAUN HVDC7345.00 345KV'	0.974057	0.909032	0.0650249	0.93747	0.92	1.05	0.09319	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_015	'OKLAUN HVDC7345.00 345KV'	0.977008	0.917605	0.059403	0.93747	0.92	1.05	0.07582	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_015	'OKLAUN HVDC7345.00 345KV'	0.977008	0.917605	0.059403	0.93747	0.92	1.05	0.07582	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'
FDNS	06ALL	2	21WP	G16_015	'OKLAUN HVDC7345.00 345KV'	0.961953	0.867867	0.0940866	0.95772	0.9	1.05	0.21732	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	21WP	G16_015	'OKLAUN HVDC7345.00 345KV'	0.961953	0.867867	0.0940866	0.95772	0.92	1.05	0.21732	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNSLock	06ALL	2	21WP	G16_015	'OKLAUN HVDC7345.00 345KV'	0.968933	0.878251	0.0906819	0.95772	0.9	1.05	0.21732	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	2	21WP	G16_015	'OKLAUN HVDC7345.00 345KV'	0.968933	0.878251	0.0906819	0.95772	0.92	1.05	0.21732	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	2	21WP	G16_015	'OKLAUN HVDC7345.00 345KV'	0.968933	0.878251	0.0906819	0.95772	0.9	1.05	0.21732	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	2	21WP	G16_015	'OKLAUN HVDC7345.00 345KV'	0.968933	0.878251	0.0906819	0.95772	0.92	1.05	0.21732	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	G16_015	'OKLAUNION 345KV'	0.946555	0.89765	0.0489053	0.96178	0.9	1.05	0.24983	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	2	18G	G16_015	'OKLAUNION 345KV'	0.946555	0.89765	0.0489053	0.96178	0.92	1.05	0.24983	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	2	18G	G16_015	'OKLAUNION 345KV'	0.971578	0.876382	0.0951954	0.96178	0.9	1.05	0.18872	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	18G	G16_015	'OKLAUNION 345KV'	0.971578	0.876382	0.0951954	0.96178	0.92	1.05	0.18872	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	18G	G16_015	'OKLAUNION 345KV'	0.978868	0.894289	0.0845786	0.96178	0.9	1.05	0.18872	'BORDER 7345.00 - TUCO INTERCHANGE 345KV 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
FDNS	06ALL	2	18G	G16_015	'OKLAUNION 345KV'	0.978868	0.894289	0.0845786	0.96178	0.92	1.05	0.18872	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	G16_015	'OKLAUNION 345KV'	0.978868	0.894289	0.0845786	0.96178	0.9	1.05	0.18872	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	G16_015	'OKLAUNION 345KV'	0.978868	0.894289	0.0845786	0.96178	0.92	1.05	0.18872	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18SP	G16_015	'OKLAUNION 345KV'	0.982322	0.916889	0.0654331	0.98435	0.92	1.05	0.19734	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	21L	G16_015	'OKLAUNION 345KV'	0.955763	0.91547	0.0402927	0.97987	0.92	1.05	0.24426	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	2	21L	G16_015	'OKLAUNION 345KV'	0.964671	0.906828	0.0578428	0.97987	0.92	1.05	0.20155	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	21SP	G16_015	'OKLAUNION 345KV'	0.988052	0.937308	0.050744	0.93731	0.95	1.05	0.26936	System Intact
FDNS	06ALL	2	21SP	G16_015	'OKLAUNION 345KV'	0.988052	0.937308	0.050744	0.93731	0.95	1.05	0.26936	System Intact
FDNS	06ALL	2	21SP	G16_015	'OKLAUNION 345KV'	0.926263	0.872003	0.0542603	0.93731	0.9	1.05	0.26936	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	2	21SP	G16_015	'OKLAUNION 345KV'	0.926263	0.872003	0.0542603	0.93731	0.92	1.05	0.26936	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	2	21SP	G16_015	'OKLAUNION 345KV'	0.975767	0.905944	0.0698228	0.93731	0.92	1.05	0.16322	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	21SP	G16_015	'OKLAUNION 345KV'	0.977318	0.913734	0.0635838	0.93731	0.92	1.05	0.16322	'POTTER COUNTY INTERCHANGE (WAUK 90343-A) 345/230/13.2KV TRANSFORMER CKT 1'
FDNS	06ALL	2	21SP	G16_015	'OKLAUNION 345KV'	0.975767	0.905944	0.0698228	0.93731	0.92	1.05	0.16322	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	21SP	G16_015	'OKLAUNION 345KV'	0.977318	0.913734	0.0635838	0.93731	0.92	1.05	0.16322	'POTTER COUNTY INTERCHANGE (WAUK 90343-A) 345/230/13.2KV TRANSFORMER CKT 1'
FDNS	06ALL	2	21SP	G16_015	'OKLAUNION 345KV'	0.979224	0.917989	0.0612351	0.93731	0.92	1.05	0.13983	'BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_015	'OKLAUNION 345KV'	0.979224	0.917989	0.0612351	0.93731	0.92	1.05	0.13983	'BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_015	'OKLAUNION 345KV'	0.976723	0.908752	0.0679715	0.93731	0.92	1.05	0.12433	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_015	'OKLAUNION 345KV'	0.976723	0.908752	0.0679715	0.93731	0.92	1.05	0.12433	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_015	'OKLAUNION 345KV'	0.979853	0.919687	0.0601655	0.93731	0.92	1.05	0.12117	'NEWHART 230 - POTTER COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_015	'OKLAUNION 345KV'	0.979853	0.919687	0.0601655	0.93731	0.92	1.05	0.12117	'NEWHART 230 - POTTER COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_015	'OKLAUNION 345KV'	0.980964	0.917344	0.0636194	0.93731	0.92	1.05	0.09738	'GRACEMONT - LAWTON EASTSIDE 345KV CKT 1'
FDNS	06ALL	2	21SP	G16_015	'OKLAUNION 345KV'	0.980964	0.917344	0.0636194	0.93731	0.92	1.05	0.09738	'GRACEMONT - LAWTON EASTSIDE 345KV CKT 1'
FDNS	06ALL	2	21SP	G16_015	'OKLAUNION 345KV'	0.973888	0.908875	0.0650136	0.93731	0.92	1.05	0.09319	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_015	'OKLAUNION 345KV'	0.976839	0.917446	0.0593928	0.93731	0.92	1.05	0.07582	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_015	'OKLAUNION 345KV'	0.976839	0.917446	0.0593928	0.93731	0.92	1.05	0.07582	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'
FDNS	06ALL	2	21WP	G16_015	'OKLAUNION 345KV'	0.940431	0.89655	0.0438808	0.95756	0.9	1.05	0.26722	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	2	21WP	G16_015	'OKLAUNION 345KV'	0.940431	0.89655	0.0438808	0.95756	0.92	1.05	0.26722	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	2	21WP	G16_015	'OKLAUNION 345KV'	0.961787	0.867717	0.0940703	0.95756	0.9	1.05	0.21732	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	21WP	G16_015	'OKLAUNION 345KV'	0.961787	0.867717	0.0940703	0.95756	0.92	1.05	0.21732	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNSLock	06ALL	2	18G	G16_015	'OKLAUNION 345KV'	0.946565	0.897633	0.048932	0.96178	0.9	1.05	0.24983	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL	2	18G	G16_015	'OKLAUNION 345KV'	0.946565	0.897633	0.048932	0.96178	0.92	1.05	0.24983	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL	2	21L	G16_015	'OKLAUNION 345KV'	0.955763	0.915469	0.0402938	0.97987	0.92	1.05	0.24426	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL	2	21SP	G16_015	'OKLAUNION 345KV'	0.926277	0.872003	0.0542739	0.93731	0.9	1.05	0.26936	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL	2	21SP	G16_015	'OKLAUNION 345KV'	0.926277	0.872003	0.0542739	0.93731	0.92	1.05	0.26936	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL	2	21WP	G16_015	'OKLAUNION 345KV'	0.940445	0.892481	0.0479638	0.95756	0.9	1.05	0.26722	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL	2	21WP	G16_015	'OKLAUNION 345KV'	0.940445	0.892481	0.0479638	0.95756	0.92	1.05	0.26722	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL	2	21WP	G16_015	'OKLAUNION 345KV'	0.968766	0.8781	0.0906662	0.95756	0.9	1.05	0.21732	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	2	21WP	G16_015	'OKLAUNION 345KV'	0.968766	0.8781	0.0906662	0.95756	0.92	1.05	0.21732	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	2	21WP	G16_015	'OKLAUNION 345KV'	0.968766	0.8781	0.0906662	0.95756	0.92	1.05	0.21732	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	17WP	G16_015	'SHAMROCK 69KV'	0.941749	0.911219	0.0305302	0.95406	0.92	1.05	0.11232	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	2	18G	G16_015	'SHAMROCK 69KV'	0.921752	0.88782	0.0339316	0.94237	0.9	1.05	0.24983	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	G16_015	'SHAMROCK 69KV'	0.921752	0.88782	0.0339316	0.94237	0.92	1.05	0.24983	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	G16_015	'SHAMROCK 69KV'	0.921752	0.88782	0.0339316	0.94237	0.9	1.05	0.24983	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	G16_015	'SHAMROCK 69KV'	0.921752	0.88782	0.0339316	0.94237	0.92	1.05	0.24983	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	G16_015	'SHAMROCK 69KV'	0.94251	0.915854	0.0266567	0.94237	0.92	1.05	0.17434	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	G16_015	'SHAMROCK 69KV'	0.94251	0.915854	0.0266567	0.94237	0.92	1.05	0.17434	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	G16_015	'SHAMROCK 69KV'	0.945055	0.919173	0.0258818	0.94237	0.92	1.05	0.11915	'MATHWSN7 345.00 - TATONGA7 345.00 345KV CKT 1'
FDNS	06ALL	2	18G	G16_015	'SHAMROCK 69KV'	0.922272	0.895083	0.0271891	0.94237	0.9	1.05	0.10838	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	2	18G	G16_015	'SHAMROCK 69KV'	0.922272	0.895083	0.0271891	0.94237	0.92	1.05	0.10838	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	2	18G	G16_015	'SHAMROCK 69KV'	0.937177	0.90447	0.032707	0.94237	0.92	1.05	0.10838	'STLN-DEMARC6 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	2	18G	G16_015	'SHAMROCK 69KV'	0.938841	0.906155	0.0326868	0.94237	0.92	1.05	0.10838	'STATELINE INTERCHANGE - STLN-DEMARC6 230KV CKT 1'
FDNS	06ALL	2	18G	G16_015	'SHAMROCK 69KV'	0.9368	0.913242	0.0235581	0.94237	0.92	1.05	0.09163	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNS	06ALL	2	18G	G16_015	'SHAMROCK 69KV'	0.9368	0.913242	0.0235581	0.94237	0.92	1.05	0.09163	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNS	06ALL	2	18SP	G16_015	'SHAMROCK 69KV'	0.935303	0.907264	0.0280384	0.94903	0.92	1.05	0.24774	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18SP	G16_015	'SHAMROCK 69KV'	0.935303	0.907264	0.0280384	0.94903	0.92	1.05	0.24774	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18SP	G16_015	'SHAMROCK 69KV'	0.937541	0.917034	0.0205072	0.94903	0.92	1.05	0.10689	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	2	21L	G16_015	'SHAMROCK 69KV'	0.937265	0.900091	0.0371735	0.96676	0.92	1.05	0.24426	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	21L	G16_015	'SHAMROCK 69KV'	0.937265	0.900091	0.0371735	0.96676	0.92	1.05	0.24426	'OKLAUNION - TUCO INTERCHANGE 345KV 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
FDNS	06ALL	2	21L	G16_015	'SHAMROCK 69KV'	0.927705	0.902827	0.0248773	0.96676	0.92	1.05	0.07728	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	2	21L	G16_015	'SHAMROCK 69KV'	0.940921	0.917392	0.0235285	0.96676	0.92	1.05	0.07728	'STLN-DEMARC6 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	2	21L	G16_015	'SHAMROCK 69KV'	0.939614	0.915541	0.0240734	0.96676	0.92	1.05	0.07728	'STATELINE INTERCHANGE - STLN-DEMARC6 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_015	'SHAMROCK 69KV'	0.943517	0.917985	0.0255317	0.94414	0.92	1.05	0.16322	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	21SP	G16_015	'SHAMROCK 69KV'	0.943517	0.917985	0.0255317	0.94414	0.92	1.05	0.16322	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	21SP	G16_015	'SHAMROCK 69KV'	0.930159	0.903584	0.0265749	0.94414	0.92	1.05	0.09319	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_015	'SHAMROCK 69KV'	0.943987	0.919594	0.0243928	0.94414	0.92	1.05	0.09319	'STATELINE INTERCHANGE - STLN-DEMARC6 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_015	'SHAMROCK 69KV'	0.939921	0.918407	0.0215131	0.94414	0.92	1.05	0.07881	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_015	'SHAMROCK 69KV'	0.939921	0.918407	0.0215131	0.94414	0.92	1.05	0.07881	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNS	06ALL	2	21WP	G16_015	'SHAMROCK 69KV'	0.933042	0.889221	0.0438206	0.94727	0.9	1.05	0.26722	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	21WP	G16_015	'SHAMROCK 69KV'	0.933042	0.889221	0.0438206	0.94727	0.92	1.05	0.26722	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	21WP	G16_015	'SHAMROCK 69KV'	0.933042	0.889221	0.0438206	0.94727	0.92	1.05	0.26722	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	21WP	G16_015	'SHAMROCK 69KV'	0.92306	0.895123	0.0279369	0.94727	0.9	1.05	0.09109	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	2	21WP	G16_015	'SHAMROCK 69KV'	0.92306	0.895123	0.0279369	0.94727	0.92	1.05	0.09109	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	2	21WP	G16_015	'SHAMROCK 69KV'	0.940591	0.917227	0.0233641	0.94727	0.92	1.05	0.09109	'STLN-DEMARC6 - SWEETWATER 230KV CKT 1'
FDNSLock	06ALL	2	21WP	G16_015	'SHAMROCK 69KV'	0.946765	0.917519	0.0292466	0.94727	0.92	1.05	0.21732	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	2	21WP	G16_015	'SHAMROCK 69KV'	0.946765	0.917519	0.0292466	0.94727	0.92	1.05	0.21732	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	2	21WP	G16_015	'SHAMROCK 69KV'	0.937606	0.916765	0.0208413	0.94727	0.92	1.05	0.07704	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNSLock	06ALL	2	21WP	G16_015	'SHAMROCK 69KV'	0.937606	0.916765	0.0208413	0.94727	0.92	1.05	0.07704	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNS	03ALL	0	21WP	G16_016	'G16-005-TAP 345.00 345KV'	0.918759	0.896474	0.0222849	0.94795	0.9	1.05	0.07485	'Hitchland Interchange - WALKEMEYER 7345.00 345KV CKT 1'
FDNS	03ALL	0	21WP	G16_016	'G16-005-TAP 345.00 345KV'	0.918759	0.896474	0.0222849	0.94795	0.9	1.05	0.07485	'Hitchland Interchange - WALKEMEYER 7345.00 345KV CKT 1'
FDNS	03ALL	0	21WP	G16_016	'GEN-2016-005345.00 345KV'	0.918759	0.896474	0.0222849	0.94795	0.9	1.05	0.07485	'Hitchland Interchange - WALKEMEYER 7345.00 345KV CKT 1'
FDNS	03ALL	0	21WP	G16_016	'GEN-2016-005345.00 345KV'	0.918759	0.896474	0.0222849	0.94795	0.9	1.05	0.07485	'Hitchland Interchange - WALKEMEYER 7345.00 345KV CKT 1'
FDNS	03ALL	2	26SP	G16_016	'GREENSBURG 115KV'	0.914368	0.894081	0.0202873	0.95178	0.9	1.05	0.05282	'Hitchland Interchange - WALKEMEYER 7345.00 345KV CKT 1'
FDNS	03ALL	0	26SP	G16_046	'CLARKCOUNTY7345.00 345KV'	0.919082	0.889699	0.0293834	0.94788	0.9	1.05	0.18271	'POST ROCK - SPEARVILLE 345KV CKT 1'
FDNS	03ALL	0	26SP	G16_046	'CLARKCOUNTY7345.00 345KV'	0.919082	0.889699	0.0293834	0.94788	0.9	1.05	0.18271	'POST ROCK - SPEARVILLE 345KV CKT 1'
FDNS	03ALL	0	26SP	G16_046	'G12-024 345.00 345KV'	0.919082	0.889699	0.0293834	0.94788	0.9	1.05	0.18271	'POST ROCK - SPEARVILLE 345KV CKT 1'
FDNS	03ALL	0	26SP	G16_046	'G12-024 345.00 345KV'	0.919082	0.889699	0.0293834	0.94788	0.9	1.05	0.18271	'POST ROCK - SPEARVILLE 345KV CKT 1'
FDNS	03ALL	0	21WP	G16_046	'G16-005-TAP 345.00 345KV'	0.918759	0.896474	0.0222849	0.94795	0.9	1.05	0.12317	'Hitchland Interchange - WALKEMEYER 7345.00 345KV CKT 1'
FDNS	03ALL	0	21WP	G16_046	'G16-005-TAP 345.00 345KV'	0.918759	0.896474	0.0222849	0.94795	0.9	1.05	0.12317	'Hitchland Interchange - WALKEMEYER 7345.00 345KV CKT 1'
FDNS	03ALL	0	26SP	G16_046	'G16-005-TAP 345.00 345KV'	0.922694	0.891739	0.0309545	0.94982	0.9	1.05	0.18271	'POST ROCK - SPEARVILLE 345KV CKT 1'
FDNS	03ALL	0	26SP	G16_046	'G16-005-TAP 345.00 345KV'	0.922694	0.891739	0.0309545	0.94982	0.9	1.05	0.18271	'POST ROCK - SPEARVILLE 345KV CKT 1'
FDNS	03ALL	0	21WP	G16_046	'GEN-2016-005345.00 345KV'	0.918759	0.896474	0.0222849	0.94795	0.9	1.05	0.12317	'Hitchland Interchange - WALKEMEYER 7345.00 345KV CKT 1'
FDNS	03ALL	0	21WP	G16_046	'GEN-2016-005345.00 345KV'	0.918759	0.896474	0.0222849	0.94795	0.9	1.05	0.12317	'Hitchland Interchange - WALKEMEYER 7345.00 345KV CKT 1'
FDNS	03ALL	0	26SP	G16_046	'GEN-2016-005345.00 345KV'	0.922694	0.891739	0.0309545	0.94982	0.9	1.05	0.18271	'POST ROCK - SPEARVILLE 345KV CKT 1'
FDNS	03ALL	0	26SP	G16_046	'GEN-2016-005345.00 345KV'	0.922694	0.891739	0.0309545	0.94982	0.9	1.05	0.18271	'POST ROCK - SPEARVILLE 345KV CKT 1'
FDNS	03ALL	0	26SP	G16_046	'PSCO LAMAR DC TIE 345KV'	0.919522	0.897892	0.0216294	0.93223	0.9	1.05	0.18271	'POST ROCK - SPEARVILLE 345KV CKT 1'
FDNS	03ALL	0	26SP	G16_046	'PSCO LAMAR DC TIE 345KV'	0.919522	0.897892	0.0216294	0.93223	0.9	1.05	0.18271	'POST ROCK - SPEARVILLE 345KV CKT 1'
FDNS	03ALL	0	26SP	G16_046	'THISTLE7 345.00 345KV'	0.955896	0.933666	0.0222293	0.97164	0.95	1.05	0.18271	'POST ROCK - SPEARVILLE 345KV CKT 1'
FDNS	03ALL	0	26SP	G16_046	'THISTLE7 345.00 345KV'	0.955896	0.933666	0.0222293	0.97164	0.95	1.05	0.18271	'POST ROCK - SPEARVILLE 345KV CKT 1'
FDNS	03ALL	2	26SP	G16_046	'GREENSBURG 115KV'	0.914368	0.894081	0.0202873	0.95178	0.9	1.05	0.06989	'Hitchland Interchange - WALKEMEYER 7345.00 345KV CKT 1'
FDNS	06ALL	0	18G	G16_056	'BORDER 7345.00 345KV'	0.960417	0.87447	0.0859476	0.96029	0.9	1.05	0.28008	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_056	'BORDER 7345.00 345KV'	0.960417	0.87447	0.0859476	0.96029	0.9	1.05	0.28008	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	G16_056	'BORDER 7345.00 345KV'	0.952111	0.873373	0.0787379	0.96753	0.9	1.05	0.27516	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	G16_056	'BORDER 7345.00 345KV'	0.952111	0.873373	0.0787379	0.96753	0.9	1.05	0.27516	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21SP	G16_056	'DEAF SMITH COUNTY INTERCHANGE 230KV'	0.955763	0.931943	0.0238197	0.93194	0.95	1.05	0.10184	System Intact
FDNS	06ALL	0	21SP	G16_056	'DEAF SMITH COUNTY INTERCHANGE 230KV'	0.917765	0.882885	0.0348799	0.93194	0.9	1.05	0.10184	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_056	'DEAF SMITH COUNTY INTERCHANGE 230KV'	0.955763	0.931943	0.0238197	0.93194	0.95	1.05	0.10184	System Intact
FDNS	06ALL	0	21SP	G16_056	'DEAF SMITH COUNTY INTERCHANGE 230KV'	0.917765	0.882885	0.0348799	0.93194	0.9	1.05	0.10184	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
FDNS	06ALL	0	18G	G16_056	'G1149G1504 345.00 345KV'	0.960417	0.87447	0.0859476	0.96029	0.9	1.05	0.28008	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_056	'G1149G1504 345.00 345KV'	0.960417	0.87447	0.0859476	0.96029	0.9	1.05	0.28008	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	G16_056	'G1149G1504 345.00 345KV'	0.952111	0.873373	0.0787379	0.96753	0.9	1.05	0.27516	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	G16_056	'G1149G1504 345.00 345KV'	0.952111	0.873373	0.0787379	0.96753	0.9	1.05	0.27516	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_056	'GRAPEVINE INTERCHANGE 230KV'	0.963349	0.8997	0.0636498	0.9775	0.9	1.05	0.28008	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_056	'GRAPEVINE INTERCHANGE 230KV'	0.963349	0.8997	0.0636498	0.9775	0.9	1.05	0.28008	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21SP	G16_056	'NEWHART 230 230KV'	0.967552	0.941326	0.0262256	0.94133	0.95	1.05	0.07068	System Intact
FDNS	06ALL	0	21SP	G16_056	'NEWHART 230 230KV'	0.967552	0.941326	0.0262256	0.94133	0.95	1.05	0.07068	System Intact
FDNS	06ALL	0	18G	G16_056	'OKLAUN HVDC7345.00 345KV'	0.971746	0.876534	0.0952119	0.96195	0.9	1.05	0.21761	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV 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
FDNS	06ALL	0	18G	G16_056	'OKLAUN HVDC7345.00 345KV'	0.971746	0.876534	0.0952119	0.96195	0.92	1.05	0.21761	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	0	18G	G16_056	'OKLAUN HVDC7345.00 345KV'	0.979037	0.894444	0.0845932	0.96195	0.9	1.05	0.21761	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_056	'OKLAUN HVDC7345.00 345KV'	0.979037	0.894444	0.0845932	0.96195	0.92	1.05	0.21761	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_056	'OKLAUN HVDC7345.00 345KV'	0.979037	0.894444	0.0845932	0.96195	0.9	1.05	0.21761	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18SP	G16_056	'OKLAUN HVDC7345.00 345KV'	0.982492	0.917047	0.0654445	0.98452	0.92	1.05	0.22615	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	0	21L	G16_056	'OKLAUN HVDC7345.00 345KV'	0.964794	0.906985	0.057809	0.98004	0.92	1.05	0.20905	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	0	21SP	G16_056	'OKLAUN HVDC7345.00 345KV'	0.975936	0.906101	0.0698349	0.93747	0.92	1.05	0.15679	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21SP	G16_056	'OKLAUN HVDC7345.00 345KV'	0.977487	0.913892	0.0635948	0.93747	0.92	1.05	0.15679	'POTTER COUNTY INTERCHANGE (WAUK 90343-A) 345/230/13.2KV TRANSFORMER CKT 1'
FDNS	06ALL	0	21SP	G16_056	'OKLAUN HVDC7345.00 345KV'	0.975936	0.906101	0.0698349	0.93747	0.92	1.05	0.15679	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21SP	G16_056	'OKLAUN HVDC7345.00 345KV'	0.977487	0.913892	0.0635948	0.93747	0.92	1.05	0.15679	'POTTER COUNTY INTERCHANGE (WAUK 90343-A) 345/230/13.2KV TRANSFORMER CKT 1'
FDNS	06ALL	0	21SP	G16_056	'OKLAUN HVDC7345.00 345KV'	0.980022	0.919846	0.0601759	0.93747	0.92	1.05	0.11916	'NEWHART 230 - POTTER COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_056	'OKLAUN HVDC7345.00 345KV'	0.980022	0.919846	0.0601759	0.93747	0.92	1.05	0.11916	'NEWHART 230 - POTTER COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_056	'OKLAUN HVDC7345.00 345KV'	0.979393	0.918147	0.0612457	0.93747	0.92	1.05	0.11659	'BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_056	'OKLAUN HVDC7345.00 345KV'	0.979393	0.918147	0.0612457	0.93747	0.92	1.05	0.11659	'BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_056	'OKLAUN HVDC7345.00 345KV'	0.976892	0.908909	0.0679833	0.93747	0.92	1.05	0.10184	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_056	'OKLAUN HVDC7345.00 345KV'	0.976892	0.908909	0.0679833	0.93747	0.92	1.05	0.10184	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_056	'OKLAUN HVDC7345.00 345KV'	0.981133	0.917503	0.0636305	0.93747	0.92	1.05	0.10176	'GRACEMONT - LAWTON EASTSIDE 345KV CKT 1'
FDNS	06ALL	0	21SP	G16_056	'OKLAUN HVDC7345.00 345KV'	0.981133	0.917503	0.0636305	0.93747	0.92	1.05	0.10176	'GRACEMONT - LAWTON EASTSIDE 345KV CKT 1'
FDNS	06ALL	0	21SP	G16_056	'OKLAUN HVDC7345.00 345KV'	0.974057	0.909032	0.0650249	0.93747	0.92	1.05	0.08963	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_056	'OKLAUN HVDC7345.00 345KV'	0.977008	0.917605	0.059403	0.93747	0.92	1.05	0.07292	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_056	'OKLAUN HVDC7345.00 345KV'	0.977008	0.917605	0.059403	0.93747	0.92	1.05	0.07292	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'
FDNS	06ALL	0	21WP	G16_056	'OKLAUN HVDC7345.00 345KV'	0.961953	0.867867	0.0940866	0.95772	0.9	1.05	0.22482	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	0	21WP	G16_056	'OKLAUN HVDC7345.00 345KV'	0.961953	0.867867	0.0940866	0.95772	0.92	1.05	0.22482	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNSLock	06ALL	0	21WP	G16_056	'OKLAUN HVDC7345.00 345KV'	0.968933	0.878251	0.0906819	0.95772	0.9	1.05	0.22482	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	0	21WP	G16_056	'OKLAUN HVDC7345.00 345KV'	0.968933	0.878251	0.0906819	0.95772	0.92	1.05	0.22482	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	0	21WP	G16_056	'OKLAUN HVDC7345.00 345KV'	0.968933	0.878251	0.0906819	0.95772	0.9	1.05	0.22482	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	0	21WP	G16_056	'OKLAUN HVDC7345.00 345KV'	0.968933	0.878251	0.0906819	0.95772	0.92	1.05	0.22482	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_056	'OKLAUNION 345KV'	0.946555	0.89765	0.0489053	0.96178	0.9	1.05	0.28008	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	0	18G	G16_056	'OKLAUNION 345KV'	0.946555	0.89765	0.0489053	0.96178	0.92	1.05	0.28008	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	0	18G	G16_056	'OKLAUNION 345KV'	0.971578	0.876382	0.0951954	0.96178	0.9	1.05	0.21761	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	0	18G	G16_056	'OKLAUNION 345KV'	0.971578	0.876382	0.0951954	0.96178	0.92	1.05	0.21761	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	0	18G	G16_056	'OKLAUNION 345KV'	0.978868	0.894289	0.0845786	0.96178	0.9	1.05	0.21761	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_056	'OKLAUNION 345KV'	0.978868	0.894289	0.0845786	0.96178	0.92	1.05	0.21761	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_056	'OKLAUNION 345KV'	0.978868	0.894289	0.0845786	0.96178	0.9	1.05	0.21761	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_056	'OKLAUNION 345KV'	0.978868	0.894289	0.0845786	0.96178	0.92	1.05	0.21761	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18SP	G16_056	'OKLAUNION 345KV'	0.982322	0.916889	0.0654331	0.98435	0.92	1.05	0.22615	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	0	21L	G16_056	'OKLAUNION 345KV'	0.955763	0.91547	0.0402927	0.97987	0.92	1.05	0.2522	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	0	21L	G16_056	'OKLAUNION 345KV'	0.964671	0.906828	0.0578428	0.97987	0.92	1.05	0.20905	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	0	21SP	G16_056	'OKLAUNION 345KV'	0.988052	0.937308	0.050744	0.93731	0.95	1.05	0.27729	System Intact
FDNS	06ALL	0	21SP	G16_056	'OKLAUNION 345KV'	0.988052	0.937308	0.050744	0.93731	0.95	1.05	0.27729	System Intact
FDNS	06ALL	0	21SP	G16_056	'OKLAUNION 345KV'	0.926263	0.872003	0.0542603	0.93731	0.9	1.05	0.27729	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	0	21SP	G16_056	'OKLAUNION 345KV'	0.926263	0.872003	0.0542603	0.93731	0.92	1.05	0.27729	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	0	21SP	G16_056	'OKLAUNION 345KV'	0.975767	0.905944	0.0698228	0.93731	0.92	1.05	0.15679	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21SP	G16_056	'OKLAUNION 345KV'	0.977318	0.913734	0.0635838	0.93731	0.92	1.05	0.15679	'POTTER COUNTY INTERCHANGE (WAUK 90343-A) 345/230/13.2KV TRANSFORMER CKT 1'
FDNS	06ALL	0	21SP	G16_056	'OKLAUNION 345KV'	0.975767	0.905944	0.0698228	0.93731	0.92	1.05	0.15679	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21SP	G16_056	'OKLAUNION 345KV'	0.977318	0.913734	0.0635838	0.93731	0.92	1.05	0.15679	'POTTER COUNTY INTERCHANGE (WAUK 90343-A) 345/230/13.2KV TRANSFORMER CKT 1'
FDNS	06ALL	0	21SP	G16_056	'OKLAUNION 345KV'	0.979853	0.919687	0.0601655	0.93731	0.92	1.05	0.11916	'NEWHART 230 - POTTER COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_056	'OKLAUNION 345KV'	0.979853	0.919687	0.0601655	0.93731	0.92	1.05	0.11916	'NEWHART 230 - POTTER COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_056	'OKLAUNION 345KV'	0.979224	0.917989	0.0612351	0.93731	0.92	1.05	0.11659	'BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_056	'OKLAUNION 345KV'	0.979224	0.917989	0.0612351	0.93731	0.92	1.05	0.11659	'BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_056	'OKLAUNION 345KV'	0.976723	0.908752	0.0679715	0.93731	0.92	1.05	0.10184	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_056	'OKLAUNION 345KV'	0.976723	0.908752	0.0679715	0.93731	0.92	1.05	0.10184	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_056	'OKLAUNION 345KV'	0.980964	0.917344	0.0636194	0.93731	0.92	1.05	0.10176	'GRACEMONT - LAWTON EASTSIDE 345KV CKT 1'
FDNS	06ALL	0	21SP	G16_056	'OKLAUNION 345KV'	0.980964	0.917344	0.0636194	0.93731	0.92	1.05	0.10176	'GRACEMONT - LAWTON EASTSIDE 345KV 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
FDNS	06ALL	0	21SP	G16_056	'OKLAUNION 345KV'	0.973888	0.908875	0.0650136	0.93731	0.92	1.05	0.08963	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_056	'OKLAUNION 345KV'	0.976839	0.917446	0.0593928	0.93731	0.92	1.05	0.07292	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_056	'OKLAUNION 345KV'	0.976839	0.917446	0.0593928	0.93731	0.92	1.05	0.07292	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'
FDNS	06ALL	0	21WP	G16_056	'OKLAUNION 345KV'	0.940431	0.89655	0.0438808	0.95756	0.9	1.05	0.27516	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	0	21WP	G16_056	'OKLAUNION 345KV'	0.940431	0.89655	0.0438808	0.95756	0.92	1.05	0.27516	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	0	21WP	G16_056	'OKLAUNION 345KV'	0.961787	0.867717	0.0940703	0.95756	0.9	1.05	0.22482	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	0	21WP	G16_056	'OKLAUNION 345KV'	0.961787	0.867717	0.0940703	0.95756	0.92	1.05	0.22482	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNSLock	06ALL	0	18G	G16_056	'OKLAUNION 345KV'	0.946565	0.897633	0.048932	0.96178	0.9	1.05	0.28008	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL	0	18G	G16_056	'OKLAUNION 345KV'	0.946565	0.897633	0.048932	0.96178	0.92	1.05	0.28008	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL	0	21L	G16_056	'OKLAUNION 345KV'	0.955763	0.915469	0.0402938	0.97987	0.92	1.05	0.2522	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL	0	21SP	G16_056	'OKLAUNION 345KV'	0.926277	0.872003	0.0542739	0.93731	0.9	1.05	0.27729	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL	0	21SP	G16_056	'OKLAUNION 345KV'	0.926277	0.872003	0.0542739	0.93731	0.92	1.05	0.27729	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL	0	21WP	G16_056	'OKLAUNION 345KV'	0.940445	0.892481	0.0479638	0.95756	0.9	1.05	0.27516	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL	0	21WP	G16_056	'OKLAUNION 345KV'	0.940445	0.892481	0.0479638	0.95756	0.92	1.05	0.27516	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL	0	21WP	G16_056	'OKLAUNION 345KV'	0.968766	0.8781	0.0906662	0.95756	0.9	1.05	0.22482	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	0	21WP	G16_056	'OKLAUNION 345KV'	0.968766	0.8781	0.0906662	0.95756	0.92	1.05	0.22482	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	0	21WP	G16_056	'OKLAUNION 345KV'	0.968766	0.8781	0.0906662	0.95756	0.9	1.05	0.22482	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	0	21WP	G16_056	'OKLAUNION 345KV'	0.968766	0.8781	0.0906662	0.95756	0.92	1.05	0.22482	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_056	'SHAMROCK 115KV'	0.943645	0.902939	0.0407058	0.96617	0.92	1.05	0.28008	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_056	'SHAMROCK 115KV'	0.943645	0.902939	0.0407058	0.96617	0.92	1.05	0.28008	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_056	'SHAMROCK 115KV'	0.94719	0.915897	0.0312929	0.96617	0.92	1.05	0.09391	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	21WP	G16_056	'SHAMROCK 115KV'	0.956306	0.906569	0.0497372	0.97378	0.92	1.05	0.27516	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	G16_056	'SHAMROCK 115KV'	0.956306	0.906569	0.0497372	0.97378	0.92	1.05	0.27516	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	G16_056	'SHAMROCK 115KV'	0.94803	0.918341	0.0296886	0.97378	0.92	1.05	0.08753	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	17WP	G16_056	'SHAMROCK 69KV'	0.941749	0.911219	0.0305302	0.95406	0.92	1.05	0.0979	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	18G	G16_056	'SHAMROCK 69KV'	0.921752	0.88782	0.0339316	0.94237	0.9	1.05	0.28008	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_056	'SHAMROCK 69KV'	0.921752	0.88782	0.0339316	0.94237	0.92	1.05	0.28008	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_056	'SHAMROCK 69KV'	0.921752	0.88782	0.0339316	0.94237	0.9	1.05	0.28008	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_056	'SHAMROCK 69KV'	0.921752	0.88782	0.0339316	0.94237	0.92	1.05	0.28008	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_056	'SHAMROCK 69KV'	0.94251	0.915854	0.0266567	0.94237	0.92	1.05	0.15082	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_056	'SHAMROCK 69KV'	0.94251	0.915854	0.0266567	0.94237	0.92	1.05	0.15082	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_056	'SHAMROCK 69KV'	0.945055	0.919173	0.0258818	0.94237	0.92	1.05	0.11554	'MATHWSN7 345.00 - TATONGA7 345.00 345KV CKT 1'
FDNS	06ALL	0	18G	G16_056	'SHAMROCK 69KV'	0.922272	0.895083	0.0271891	0.94237	0.9	1.05	0.09391	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	18G	G16_056	'SHAMROCK 69KV'	0.922272	0.895083	0.0271891	0.94237	0.92	1.05	0.09391	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	18G	G16_056	'SHAMROCK 69KV'	0.937177	0.90447	0.032707	0.94237	0.92	1.05	0.09391	'STLN-DEMARC6 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	18G	G16_056	'SHAMROCK 69KV'	0.938841	0.906155	0.0326868	0.94237	0.92	1.05	0.09391	'STATELINE INTERCHANGE - STLN-DEMARC6 230KV CKT 1'
FDNS	06ALL	0	18G	G16_056	'SHAMROCK 69KV'	0.9368	0.913242	0.0235581	0.94237	0.92	1.05	0.0794	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	18G	G16_056	'SHAMROCK 69KV'	0.9368	0.913242	0.0235581	0.94237	0.92	1.05	0.0794	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	18SP	G16_056	'SHAMROCK 69KV'	0.935303	0.907264	0.0280384	0.94903	0.92	1.05	0.2783	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18SP	G16_056	'SHAMROCK 69KV'	0.935303	0.907264	0.0280384	0.94903	0.92	1.05	0.2783	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18SP	G16_056	'SHAMROCK 69KV'	0.937541	0.917034	0.0205072	0.94903	0.92	1.05	0.09257	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	21L	G16_056	'SHAMROCK 69KV'	0.937265	0.900091	0.0371735	0.96676	0.92	1.05	0.2522	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21L	G16_056	'SHAMROCK 69KV'	0.937265	0.900091	0.0371735	0.96676	0.92	1.05	0.2522	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21L	G16_056	'SHAMROCK 69KV'	0.927705	0.902827	0.0248773	0.96676	0.92	1.05	0.07372	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	21L	G16_056	'SHAMROCK 69KV'	0.940921	0.917392	0.0235285	0.96676	0.92	1.05	0.07372	'STLN-DEMARC6 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	21L	G16_056	'SHAMROCK 69KV'	0.939614	0.915541	0.0240734	0.96676	0.92	1.05	0.07372	'STATELINE INTERCHANGE - STLN-DEMARC6 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_056	'SHAMROCK 69KV'	0.943517	0.917985	0.0255317	0.94414	0.92	1.05	0.15679	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21SP	G16_056	'SHAMROCK 69KV'	0.943517	0.917985	0.0255317	0.94414	0.92	1.05	0.15679	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21SP	G16_056	'SHAMROCK 69KV'	0.930159	0.903584	0.0265749	0.94414	0.92	1.05	0.08963	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_056	'SHAMROCK 69KV'	0.943987	0.919594	0.0243928	0.94414	0.92	1.05	0.08963	'STATELINE INTERCHANGE - STLN-DEMARC6 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_056	'SHAMROCK 69KV'	0.939921	0.918407	0.0215131	0.94414	0.92	1.05	0.0758	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_056	'SHAMROCK 69KV'	0.939921	0.918407	0.0215131	0.94414	0.92	1.05	0.0758	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	21WP	G16_056	'SHAMROCK 69KV'	0.933042	0.889221	0.0438206	0.94727	0.9	1.05	0.27516	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	G16_056	'SHAMROCK 69KV'	0.933042	0.889221	0.0438206	0.94727	0.92	1.05	0.27516	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	G16_056	'SHAMROCK 69KV'	0.933042	0.889221	0.0438206	0.94727	0.9	1.05	0.27516	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	G16_056	'SHAMROCK 69KV'	0.933042	0.889221	0.0438206	0.94727	0.92	1.05	0.27516	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	G16_056	'SHAMROCK 69KV'	0.92306	0.895123	0.0279369	0.94727	0.9	1.05	0.08753	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	21WP	G16_056	'SHAMROCK 69KV'	0.92306	0.895123	0.0279369	0.94727	0.92	1.05	0.08753	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	21WP	G16_056	'SHAMROCK 69KV'	0.940591	0.917227	0.0233641	0.94727	0.92	1.05	0.08753	'STLN-DEMARC6 - SWEETWATER 230KV CKT 1'
FDNSLock	06ALL	0	21WP	G16_056	'SHAMROCK 69KV'	0.946765	0.917519	0.0292466	0.94727	0.92	1.05	0.22482	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	0	21WP	G16_056	'SHAMROCK 69KV'	0.946765	0.917519	0.0292466	0.94727	0.92	1.05	0.22482	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	0	21WP	G16_056	'SHAMROCK 69KV'	0.937606	0.916765	0.0208413	0.94727	0.92	1.05	0.07403	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNSLock	06ALL	0	21WP	G16_056	'SHAMROCK 69KV'	0.937606	0.916765	0.0208413	0.94727	0.92	1.05	0.07403	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 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
FDNS	06ALL	0	21SP	G16_056	'SWISHER COUNTY INTERCHANGE 230KV'	0.973712	0.946518	0.027194	0.94652	0.95	1.05	0.1399	System Intact
FDNS	06ALL	0	21SP	G16_056	'SWISHER COUNTY INTERCHANGE 230KV'	0.973712	0.946518	0.027194	0.94652	0.95	1.05	0.1399	System Intact
FDNS	06ALL	0	18G	G16_056	'XIT_INTG 6230.00 230KV'	0.961921	0.898247	0.0636745	0.96282	0.9	1.05	0.28008	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_056	'XIT_INTG 6230.00 230KV'	0.961921	0.898247	0.0636745	0.96282	0.9	1.05	0.28008	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	G16_056	'OKLAUN HVDC7345.00 345KV'	0.971746	0.876534	0.0952119	0.96195	0.9	1.05	0.21761	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	18G	G16_056	'OKLAUN HVDC7345.00 345KV'	0.971746	0.876534	0.0952119	0.96195	0.92	1.05	0.21761	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	18G	G16_056	'OKLAUN HVDC7345.00 345KV'	0.979037	0.894444	0.0845932	0.96195	0.9	1.05	0.21761	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	G16_056	'OKLAUN HVDC7345.00 345KV'	0.979037	0.894444	0.0845932	0.96195	0.92	1.05	0.21761	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	G16_056	'OKLAUN HVDC7345.00 345KV'	0.979037	0.894444	0.0845932	0.96195	0.9	1.05	0.21761	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	G16_056	'OKLAUN HVDC7345.00 345KV'	0.979037	0.894444	0.0845932	0.96195	0.92	1.05	0.21761	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18SP	G16_056	'OKLAUN HVDC7345.00 345KV'	0.982492	0.917047	0.0654445	0.98452	0.92	1.05	0.22615	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	21L	G16_056	'OKLAUN HVDC7345.00 345KV'	0.964794	0.906985	0.057809	0.98004	0.92	1.05	0.20905	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	21SP	G16_056	'OKLAUN HVDC7345.00 345KV'	0.975936	0.906101	0.0698349	0.93747	0.92	1.05	0.15679	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	21SP	G16_056	'OKLAUN HVDC7345.00 345KV'	0.977487	0.913892	0.0635948	0.93747	0.92	1.05	0.15679	'POTTER COUNTY INTERCHANGE (WAUK 90343-A) 345/230/13.2KV TRANSFORMER CKT 1'
FDNS	06ALL	2	21SP	G16_056	'OKLAUN HVDC7345.00 345KV'	0.975936	0.906101	0.0698349	0.93747	0.92	1.05	0.15679	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	21SP	G16_056	'OKLAUN HVDC7345.00 345KV'	0.977487	0.913892	0.0635948	0.93747	0.92	1.05	0.15679	'POTTER COUNTY INTERCHANGE (WAUK 90343-A) 345/230/13.2KV TRANSFORMER CKT 1'
FDNS	06ALL	2	21SP	G16_056	'OKLAUN HVDC7345.00 345KV'	0.980022	0.919846	0.0601759	0.93747	0.92	1.05	0.11916	'NEWHART 230 - POTTER COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_056	'OKLAUN HVDC7345.00 345KV'	0.980022	0.919846	0.0601759	0.93747	0.92	1.05	0.11916	'NEWHART 230 - POTTER COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_056	'OKLAUN HVDC7345.00 345KV'	0.979393	0.918147	0.0612457	0.93747	0.92	1.05	0.11659	'BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_056	'OKLAUN HVDC7345.00 345KV'	0.979393	0.918147	0.0612457	0.93747	0.92	1.05	0.11659	'BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_056	'OKLAUN HVDC7345.00 345KV'	0.976892	0.908909	0.0679833	0.93747	0.92	1.05	0.10184	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_056	'OKLAUN HVDC7345.00 345KV'	0.976892	0.908909	0.0679833	0.93747	0.92	1.05	0.10184	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_056	'OKLAUN HVDC7345.00 345KV'	0.981133	0.917503	0.0636305	0.93747	0.92	1.05	0.10176	'GRACEMONT - LAWTON EASTSIDE 345KV CKT 1'
FDNS	06ALL	2	21SP	G16_056	'OKLAUN HVDC7345.00 345KV'	0.981133	0.917503	0.0636305	0.93747	0.92	1.05	0.10176	'GRACEMONT - LAWTON EASTSIDE 345KV CKT 1'
FDNS	06ALL	2	21SP	G16_056	'OKLAUN HVDC7345.00 345KV'	0.974057	0.909032	0.0650249	0.93747	0.92	1.05	0.08963	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_056	'OKLAUN HVDC7345.00 345KV'	0.977008	0.917605	0.059403	0.93747	0.92	1.05	0.07292	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_056	'OKLAUN HVDC7345.00 345KV'	0.977008	0.917605	0.059403	0.93747	0.92	1.05	0.07292	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'
FDNS	06ALL	2	21WP	G16_056	'OKLAUN HVDC7345.00 345KV'	0.961953	0.867867	0.0940866	0.95772	0.9	1.05	0.22482	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	21WP	G16_056	'OKLAUN HVDC7345.00 345KV'	0.961953	0.867867	0.0940866	0.95772	0.92	1.05	0.22482	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNSLock	06ALL	2	21WP	G16_056	'OKLAUN HVDC7345.00 345KV'	0.968933	0.878251	0.0906819	0.95772	0.9	1.05	0.22482	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	2	21WP	G16_056	'OKLAUN HVDC7345.00 345KV'	0.968933	0.878251	0.0906819	0.95772	0.92	1.05	0.22482	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	2	21WP	G16_056	'OKLAUN HVDC7345.00 345KV'	0.968933	0.878251	0.0906819	0.95772	0.9	1.05	0.22482	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	2	21WP	G16_056	'OKLAUN HVDC7345.00 345KV'	0.968933	0.878251	0.0906819	0.95772	0.92	1.05	0.22482	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	G16_056	'OKLAUNION 345KV'	0.946555	0.89765	0.0489053	0.96178	0.9	1.05	0.28008	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	2	18G	G16_056	'OKLAUNION 345KV'	0.946555	0.89765	0.0489053	0.96178	0.92	1.05	0.28008	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	2	18G	G16_056	'OKLAUNION 345KV'	0.971578	0.876382	0.0951954	0.96178	0.9	1.05	0.21761	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	18G	G16_056	'OKLAUNION 345KV'	0.971578	0.876382	0.0951954	0.96178	0.92	1.05	0.21761	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	18G	G16_056	'OKLAUNION 345KV'	0.978868	0.894289	0.0845786	0.96178	0.9	1.05	0.21761	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	G16_056	'OKLAUNION 345KV'	0.978868	0.894289	0.0845786	0.96178	0.92	1.05	0.21761	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	G16_056	'OKLAUNION 345KV'	0.978868	0.894289	0.0845786	0.96178	0.9	1.05	0.21761	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	G16_056	'OKLAUNION 345KV'	0.978868	0.894289	0.0845786	0.96178	0.92	1.05	0.21761	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18SP	G16_056	'OKLAUNION 345KV'	0.982322	0.916889	0.0654331	0.98435	0.92	1.05	0.22615	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	21L	G16_056	'OKLAUNION 345KV'	0.955763	0.91547	0.0402927	0.97987	0.92	1.05	0.2522	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	2	21L	G16_056	'OKLAUNION 345KV'	0.964671	0.906828	0.0578428	0.97987	0.92	1.05	0.20905	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	21SP	G16_056	'OKLAUNION 345KV'	0.988052	0.937308	0.050744	0.93731	0.95	1.05	0.27729	System Intact
FDNS	06ALL	2	21SP	G16_056	'OKLAUNION 345KV'	0.988052	0.937308	0.050744	0.93731	0.95	1.05	0.27729	System Intact
FDNS	06ALL	2	21SP	G16_056	'OKLAUNION 345KV'	0.926263	0.872003	0.0542603	0.93731	0.9	1.05	0.27729	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	2	21SP	G16_056	'OKLAUNION 345KV'	0.926263	0.872003	0.0542603	0.93731	0.92	1.05	0.27729	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	2	21SP	G16_056	'OKLAUNION 345KV'	0.975767	0.905944	0.0698228	0.93731	0.92	1.05	0.15679	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	21SP	G16_056	'OKLAUNION 345KV'	0.977318	0.913734	0.0635838	0.93731	0.92	1.05	0.15679	'POTTER COUNTY INTERCHANGE (WAUK 90343-A) 345/230/13.2KV TRANSFORMER CKT 1'
FDNS	06ALL	2	21SP	G16_056	'OKLAUNION 345KV'	0.975767	0.905944	0.0698228	0.93731	0.92	1.05	0.15679	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	21SP	G16_056	'OKLAUNION 345KV'	0.977318	0.913734	0.0635838	0.93731	0.92	1.05	0.15679	'POTTER COUNTY INTERCHANGE (WAUK 90343-A) 345/230/13.2KV TRANSFORMER CKT 1'
FDNS	06ALL	2	21SP	G16_056	'OKLAUNION 345KV'	0.979853	0.919687	0.0601655	0.93731	0.92	1.05	0.11916	'NEWHART 230 - POTTER COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_056	'OKLAUNION 345KV'	0.979853	0.919687	0.0601655	0.93731	0.92	1.05	0.11916	'NEWHART 230 - POTTER COUNTY INTERCHANGE 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	06ALL	2	21WP	G16_056	'SHAMROCK 69KV'	0.937606	0.916765	0.0208413	0.94727	0.92	1.05	0.07403	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNSLock	06ALL	2	21WP	G16_056	'SHAMROCK 69KV'	0.937606	0.916765	0.0208413	0.94727	0.92	1.05	0.07403	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	18G	G16_062	'BORDER 7345.00 345KV'	0.960417	0.87447	0.0859476	0.96029	0.9	1.05	0.24983	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_062	'BORDER 7345.00 345KV'	0.960417	0.87447	0.0859476	0.96029	0.9	1.05	0.24983	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	G16_062	'BORDER 7345.00 345KV'	0.952111	0.873373	0.0787379	0.96753	0.9	1.05	0.26722	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	G16_062	'BORDER 7345.00 345KV'	0.952111	0.873373	0.0787379	0.96753	0.9	1.05	0.26722	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21SP	G16_062	'DEAF SMITH COUNTY INTERCHANGE 230KV'	0.955763	0.931943	0.0238197	0.93194	0.95	1.05	0.12433	System Intact
FDNS	06ALL	0	21SP	G16_062	'DEAF SMITH COUNTY INTERCHANGE 230KV'	0.917765	0.882885	0.0348799	0.93194	0.9	1.05	0.12433	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_062	'DEAF SMITH COUNTY INTERCHANGE 230KV'	0.955763	0.931943	0.0238197	0.93194	0.95	1.05	0.12433	System Intact
FDNS	06ALL	0	21SP	G16_062	'DEAF SMITH COUNTY INTERCHANGE 230KV'	0.917765	0.882885	0.0348799	0.93194	0.9	1.05	0.12433	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
FDNS	06ALL	0	18G	G16_062	'G1149G1504 345.00 345KV'	0.960417	0.87447	0.0859476	0.96029	0.9	1.05	0.24983	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_062	'G1149G1504 345.00 345KV'	0.960417	0.87447	0.0859476	0.96029	0.9	1.05	0.24983	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	G16_062	'G1149G1504 345.00 345KV'	0.952111	0.873373	0.0787379	0.96753	0.9	1.05	0.26722	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	G16_062	'G1149G1504 345.00 345KV'	0.952111	0.873373	0.0787379	0.96753	0.9	1.05	0.26722	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_062	'GRAPEVINE INTERCHANGE 230KV'	0.963349	0.8997	0.0636498	0.9775	0.9	1.05	0.24983	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_062	'GRAPEVINE INTERCHANGE 230KV'	0.963349	0.8997	0.0636498	0.9775	0.9	1.05	0.24983	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21SP	G16_062	'NEWHART 230 230KV'	0.967552	0.941326	0.0262256	0.94133	0.95	1.05	0.12332	System Intact
FDNS	06ALL	0	21SP	G16_062	'NEWHART 230 230KV'	0.967552	0.941326	0.0262256	0.94133	0.95	1.05	0.12332	System Intact
FDNS	06ALL	0	18G	G16_062	'OKLAUN HVDC7345.00 345KV'	0.971746	0.876534	0.0952119	0.96195	0.9	1.05	0.18872	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	0	18G	G16_062	'OKLAUN HVDC7345.00 345KV'	0.971746	0.876534	0.0952119	0.96195	0.92	1.05	0.18872	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	0	18G	G16_062	'OKLAUN HVDC7345.00 345KV'	0.979037	0.894444	0.0845932	0.96195	0.9	1.05	0.18872	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_062	'OKLAUN HVDC7345.00 345KV'	0.979037	0.894444	0.0845932	0.96195	0.92	1.05	0.18872	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_062	'OKLAUN HVDC7345.00 345KV'	0.979037	0.894444	0.0845932	0.96195	0.9	1.05	0.18872	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_062	'OKLAUN HVDC7345.00 345KV'	0.979037	0.894444	0.0845932	0.96195	0.92	1.05	0.18872	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18SP	G16_062	'OKLAUN HVDC7345.00 345KV'	0.982492	0.917047	0.0654445	0.98452	0.92	1.05	0.19734	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	0	21L	G16_062	'OKLAUN HVDC7345.00 345KV'	0.964794	0.906985	0.057809	0.98004	0.92	1.05	0.20155	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	0	21SP	G16_062	'OKLAUN HVDC7345.00 345KV'	0.975936	0.906101	0.0698349	0.93747	0.92	1.05	0.16322	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21SP	G16_062	'OKLAUN HVDC7345.00 345KV'	0.977487	0.913892	0.0635948	0.93747	0.92	1.05	0.16322	'POTTER COUNTY INTERCHANGE (WAUK 90343-A) 345/230/13.2KV TRANSFORMER CKT 1'
FDNS	06ALL	0	21SP	G16_062	'OKLAUN HVDC7345.00 345KV'	0.975936	0.906101	0.0698349	0.93747	0.92	1.05	0.16322	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21SP	G16_062	'OKLAUN HVDC7345.00 345KV'	0.977487	0.913892	0.0635948	0.93747	0.92	1.05	0.16322	'POTTER COUNTY INTERCHANGE (WAUK 90343-A) 345/230/13.2KV TRANSFORMER CKT 1'
FDNS	06ALL	0	21SP	G16_062	'OKLAUN HVDC7345.00 345KV'	0.979393	0.918147	0.0612457	0.93747	0.92	1.05	0.13983	'BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_062	'OKLAUN HVDC7345.00 345KV'	0.979393	0.918147	0.0612457	0.93747	0.92	1.05	0.13983	'BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_062	'OKLAUN HVDC7345.00 345KV'	0.976892	0.908909	0.0679833	0.93747	0.92	1.05	0.12433	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_062	'OKLAUN HVDC7345.00 345KV'	0.976892	0.908909	0.0679833	0.93747	0.92	1.05	0.12433	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_062	'OKLAUN HVDC7345.00 345KV'	0.980022	0.919846	0.0601759	0.93747	0.92	1.05	0.12117	'NEWHART 230 - POTTER COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_062	'OKLAUN HVDC7345.00 345KV'	0.980022	0.919846	0.0601759	0.93747	0.92	1.05	0.12117	'NEWHART 230 - POTTER COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_062	'OKLAUN HVDC7345.00 345KV'	0.981133	0.917503	0.0636305	0.93747	0.92	1.05	0.09738	'GRACEMONT - LAWTON EASTSIDE 345KV CKT 1'
FDNS	06ALL	0	21SP	G16_062	'OKLAUN HVDC7345.00 345KV'	0.981133	0.917503	0.0636305	0.93747	0.92	1.05	0.09738	'GRACEMONT - LAWTON EASTSIDE 345KV CKT 1'
FDNS	06ALL	0	21SP	G16_062	'OKLAUN HVDC7345.00 345KV'	0.974057	0.909032	0.0650249	0.93747	0.92	1.05	0.09319	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_062	'OKLAUN HVDC7345.00 345KV'	0.977008	0.917605	0.059403	0.93747	0.92	1.05	0.07582	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_062	'OKLAUN HVDC7345.00 345KV'	0.977008	0.917605	0.059403	0.93747	0.92	1.05	0.07582	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'
FDNS	06ALL	0	21WP	G16_062	'OKLAUN HVDC7345.00 345KV'	0.961953	0.867867	0.0940866	0.95772	0.9	1.05	0.21732	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	0	21WP	G16_062	'OKLAUN HVDC7345.00 345KV'	0.961953	0.867867	0.0940866	0.95772	0.92	1.05	0.21732	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNSLock	06ALL	0	21WP	G16_062	'OKLAUN HVDC7345.00 345KV'	0.968933	0.878251	0.0906819	0.95772	0.9	1.05	0.21732	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	0	21WP	G16_062	'OKLAUN HVDC7345.00 345KV'	0.968933	0.878251	0.0906819	0.95772	0.92	1.05	0.21732	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	0	21WP	G16_062	'OKLAUN HVDC7345.00 345KV'	0.968933	0.878251	0.0906819	0.95772	0.9	1.05	0.21732	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	0	21WP	G16_062	'OKLAUN HVDC7345.00 345KV'	0.968933	0.878251	0.0906819	0.95772	0.92	1.05	0.21732	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_062	'OKLAUNION 345KV'	0.946555	0.89765	0.0489053	0.96178	0.9	1.05	0.24983	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	0	18G	G16_062	'OKLAUNION 345KV'	0.946555	0.89765	0.0489053	0.96178	0.92	1.05	0.24983	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	0	18G	G16_062	'OKLAUNION 345KV'	0.971578	0.876382	0.0951954	0.96178	0.9	1.05	0.18872	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	0	18G	G16_062	'OKLAUNION 345KV'	0.971578	0.876382	0.0951954	0.96178	0.92	1.05	0.18872	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	0	18G	G16_062	'OKLAUNION 345KV'	0.978868	0.894289	0.0845786	0.96178	0.9	1.05	0.18872	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_062	'OKLAUNION 345KV'	0.978868	0.894289	0.0845786	0.96178	0.92	1.05	0.18872	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_062	'OKLAUNION 345KV'	0.978868	0.894289	0.0845786	0.96178	0.9	1.05	0.18872	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_062	'OKLAUNION 345KV'	0.978868	0.894289	0.0845786	0.96178	0.92	1.05	0.18872	'BORDER 7345.00 - TUCO INTERCHANGE 345KV 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
FDNS	06ALL	0	18SP	G16_062	'OKLAUNION 345KV'	0.982322	0.916889	0.0654331	0.98435	0.92	1.05	0.19734	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	0	21L	G16_062	'OKLAUNION 345KV'	0.955763	0.91547	0.0402927	0.97987	0.92	1.05	0.24426	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	0	21L	G16_062	'OKLAUNION 345KV'	0.964671	0.906828	0.0578428	0.97987	0.92	1.05	0.20155	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	0	21SP	G16_062	'OKLAUNION 345KV'	0.988052	0.937308	0.050744	0.93731	0.95	1.05	0.26936	System Intact
FDNS	06ALL	0	21SP	G16_062	'OKLAUNION 345KV'	0.988052	0.937308	0.050744	0.93731	0.95	1.05	0.26936	System Intact
FDNS	06ALL	0	21SP	G16_062	'OKLAUNION 345KV'	0.926263	0.872003	0.0542603	0.93731	0.9	1.05	0.26936	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	0	21SP	G16_062	'OKLAUNION 345KV'	0.926263	0.872003	0.0542603	0.93731	0.92	1.05	0.26936	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	0	21SP	G16_062	'OKLAUNION 345KV'	0.975767	0.905944	0.0698228	0.93731	0.92	1.05	0.16322	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21SP	G16_062	'OKLAUNION 345KV'	0.977318	0.913734	0.0635838	0.93731	0.92	1.05	0.16322	'POTTER COUNTY INTERCHANGE (WAUK 90343-A) 345/230/13.2KV TRANSFORMER CKT 1'
FDNS	06ALL	0	21SP	G16_062	'OKLAUNION 345KV'	0.975767	0.905944	0.0698228	0.93731	0.92	1.05	0.16322	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21SP	G16_062	'OKLAUNION 345KV'	0.977318	0.913734	0.0635838	0.93731	0.92	1.05	0.16322	'POTTER COUNTY INTERCHANGE (WAUK 90343-A) 345/230/13.2KV TRANSFORMER CKT 1'
FDNS	06ALL	0	21SP	G16_062	'OKLAUNION 345KV'	0.979224	0.917989	0.0612351	0.93731	0.92	1.05	0.13983	'BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_062	'OKLAUNION 345KV'	0.979224	0.917989	0.0612351	0.93731	0.92	1.05	0.13983	'BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_062	'OKLAUNION 345KV'	0.976723	0.908752	0.0679715	0.93731	0.92	1.05	0.12433	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_062	'OKLAUNION 345KV'	0.976723	0.908752	0.0679715	0.93731	0.92	1.05	0.12433	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_062	'OKLAUNION 345KV'	0.979853	0.919687	0.0601655	0.93731	0.92	1.05	0.12117	'NEWHART 230 - POTTER COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_062	'OKLAUNION 345KV'	0.979853	0.919687	0.0601655	0.93731	0.92	1.05	0.12117	'NEWHART 230 - POTTER COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_062	'OKLAUNION 345KV'	0.980964	0.917344	0.0636194	0.93731	0.92	1.05	0.09738	'GRACEMONT - LAWTON EASTSIDE 345KV CKT 1'
FDNS	06ALL	0	21SP	G16_062	'OKLAUNION 345KV'	0.980964	0.917344	0.0636194	0.93731	0.92	1.05	0.09738	'GRACEMONT - LAWTON EASTSIDE 345KV CKT 1'
FDNS	06ALL	0	21SP	G16_062	'OKLAUNION 345KV'	0.973888	0.908875	0.0650136	0.93731	0.92	1.05	0.09319	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_062	'OKLAUNION 345KV'	0.976839	0.917446	0.0593928	0.93731	0.92	1.05	0.07582	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_062	'OKLAUNION 345KV'	0.976839	0.917446	0.0593928	0.93731	0.92	1.05	0.07582	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'
FDNS	06ALL	0	21WP	G16_062	'OKLAUNION 345KV'	0.940431	0.89655	0.0438808	0.95756	0.9	1.05	0.26722	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	0	21WP	G16_062	'OKLAUNION 345KV'	0.940431	0.89655	0.0438808	0.95756	0.92	1.05	0.26722	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	0	21WP	G16_062	'OKLAUNION 345KV'	0.961787	0.867717	0.0940703	0.95756	0.9	1.05	0.21732	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	0	21WP	G16_062	'OKLAUNION 345KV'	0.961787	0.867717	0.0940703	0.95756	0.92	1.05	0.21732	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNSLock	06ALL	0	18G	G16_062	'OKLAUNION 345KV'	0.946565	0.897633	0.048932	0.96178	0.9	1.05	0.24983	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL	0	18G	G16_062	'OKLAUNION 345KV'	0.946565	0.897633	0.048932	0.96178	0.92	1.05	0.24983	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL	0	21L	G16_062	'OKLAUNION 345KV'	0.955763	0.915469	0.0402938	0.97987	0.92	1.05	0.24426	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL	0	21SP	G16_062	'OKLAUNION 345KV'	0.926277	0.872003	0.0542739	0.93731	0.9	1.05	0.26936	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL	0	21SP	G16_062	'OKLAUNION 345KV'	0.926277	0.872003	0.0542739	0.93731	0.92	1.05	0.26936	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL	0	21WP	G16_062	'OKLAUNION 345KV'	0.940445	0.892481	0.0479638	0.95756	0.9	1.05	0.26722	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL	0	21WP	G16_062	'OKLAUNION 345KV'	0.940445	0.892481	0.0479638	0.95756	0.92	1.05	0.26722	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL	0	21WP	G16_062	'OKLAUNION 345KV'	0.968766	0.8781	0.0906662	0.95756	0.9	1.05	0.21732	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	0	21WP	G16_062	'OKLAUNION 345KV'	0.968766	0.8781	0.0906662	0.95756	0.92	1.05	0.21732	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	0	21WP	G16_062	'OKLAUNION 345KV'	0.968766	0.8781	0.0906662	0.95756	0.92	1.05	0.21732	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_062	'SHAMROCK 115KV'	0.943645	0.902939	0.0407058	0.96617	0.92	1.05	0.24983	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_062	'SHAMROCK 115KV'	0.943645	0.902939	0.0407058	0.96617	0.92	1.05	0.24983	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_062	'SHAMROCK 115KV'	0.94719	0.915897	0.0312929	0.96617	0.92	1.05	0.10838	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	21WP	G16_062	'SHAMROCK 115KV'	0.956306	0.906569	0.0497372	0.97378	0.92	1.05	0.26722	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	G16_062	'SHAMROCK 115KV'	0.956306	0.906569	0.0497372	0.97378	0.92	1.05	0.26722	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	G16_062	'SHAMROCK 115KV'	0.94803	0.918341	0.0296886	0.97378	0.92	1.05	0.09109	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	17WP	G16_062	'SHAMROCK 69KV'	0.941749	0.911219	0.0305302	0.95406	0.92	1.05	0.11232	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	18G	G16_062	'SHAMROCK 69KV'	0.921752	0.88782	0.0339316	0.94237	0.9	1.05	0.24983	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_062	'SHAMROCK 69KV'	0.921752	0.88782	0.0339316	0.94237	0.92	1.05	0.24983	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_062	'SHAMROCK 69KV'	0.921752	0.88782	0.0339316	0.94237	0.9	1.05	0.24983	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_062	'SHAMROCK 69KV'	0.94251	0.915854	0.0266567	0.94237	0.92	1.05	0.17434	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_062	'SHAMROCK 69KV'	0.94251	0.915854	0.0266567	0.94237	0.92	1.05	0.17434	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_062	'SHAMROCK 69KV'	0.945055	0.919173	0.0258818	0.94237	0.92	1.05	0.11915	'MATHWSN7 345.00 - TATONGA7 345.00 345KV CKT 1'
FDNS	06ALL	0	18G	G16_062	'SHAMROCK 69KV'	0.922272	0.895083	0.0271891	0.94237	0.9	1.05	0.10838	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	18G	G16_062	'SHAMROCK 69KV'	0.922272	0.895083	0.0271891	0.94237	0.92	1.05	0.10838	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	18G	G16_062	'SHAMROCK 69KV'	0.937177	0.90447	0.032707	0.94237	0.92	1.05	0.10838	'STLN-DEMAR6 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	18G	G16_062	'SHAMROCK 69KV'	0.938841	0.906155	0.0326868	0.94237	0.92	1.05	0.10838	'STATELINE INTERCHANGE - STLN-DEMAR6 230KV CKT 1'
FDNS	06ALL	0	18G	G16_062	'SHAMROCK 69KV'	0.9368	0.913242	0.0235581	0.94237	0.92	1.05	0.09163	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	18G	G16_062	'SHAMROCK 69KV'	0.9368	0.913242	0.0235581	0.94237	0.92	1.05	0.09163	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	18SP	G16_062	'SHAMROCK 69KV'	0.935303	0.907264	0.0280384	0.94903	0.92	1.05	0.24774	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18SP	G16_062	'SHAMROCK 69KV'	0.935303	0.907264	0.0280384	0.94903	0.92	1.05	0.24774	'OKLAUNION - TUCO INTERCHANGE 345KV 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
FDNS	06ALL	0	18SP	G16_062	'SHAMROCK 69KV'	0.937541	0.917034	0.0205072	0.94903	0.92	1.05	0.10689	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	21L	G16_062	'SHAMROCK 69KV'	0.937265	0.900091	0.0371735	0.96676	0.92	1.05	0.24426	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21L	G16_062	'SHAMROCK 69KV'	0.937265	0.900091	0.0371735	0.96676	0.92	1.05	0.24426	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21L	G16_062	'SHAMROCK 69KV'	0.927705	0.902827	0.0248773	0.96676	0.92	1.05	0.07728	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	21L	G16_062	'SHAMROCK 69KV'	0.940921	0.917392	0.0235285	0.96676	0.92	1.05	0.07728	'STLN-DEMARC6 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	21L	G16_062	'SHAMROCK 69KV'	0.939614	0.915541	0.0240734	0.96676	0.92	1.05	0.07728	'STATELINE INTERCHANGE - STLN-DEMARC6 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_062	'SHAMROCK 69KV'	0.943517	0.917985	0.0255317	0.94414	0.92	1.05	0.16322	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21SP	G16_062	'SHAMROCK 69KV'	0.943517	0.917985	0.0255317	0.94414	0.92	1.05	0.16322	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21SP	G16_062	'SHAMROCK 69KV'	0.930159	0.903584	0.0265749	0.94414	0.92	1.05	0.09319	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_062	'SHAMROCK 69KV'	0.943987	0.919594	0.0243928	0.94414	0.92	1.05	0.09319	'STATELINE INTERCHANGE - STLN-DEMARC6 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_062	'SHAMROCK 69KV'	0.939921	0.918407	0.0215131	0.94414	0.92	1.05	0.07881	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_062	'SHAMROCK 69KV'	0.939921	0.918407	0.0215131	0.94414	0.92	1.05	0.07881	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	21WP	G16_062	'SHAMROCK 69KV'	0.933042	0.889221	0.0438206	0.94727	0.9	1.05	0.26722	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	G16_062	'SHAMROCK 69KV'	0.933042	0.889221	0.0438206	0.94727	0.92	1.05	0.26722	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	G16_062	'SHAMROCK 69KV'	0.933042	0.889221	0.0438206	0.94727	0.9	1.05	0.26722	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	G16_062	'SHAMROCK 69KV'	0.933042	0.889221	0.0438206	0.94727	0.92	1.05	0.26722	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	G16_062	'SHAMROCK 69KV'	0.92306	0.895123	0.0279369	0.94727	0.9	1.05	0.09109	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	21WP	G16_062	'SHAMROCK 69KV'	0.92306	0.895123	0.0279369	0.94727	0.92	1.05	0.09109	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	21WP	G16_062	'SHAMROCK 69KV'	0.940591	0.917227	0.0233641	0.94727	0.92	1.05	0.09109	'STLN-DEMARC6 - SWEETWATER 230KV CKT 1'
FDNSLock	06ALL	0	21WP	G16_062	'SHAMROCK 69KV'	0.946765	0.917519	0.0292466	0.94727	0.92	1.05	0.21732	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	0	21WP	G16_062	'SHAMROCK 69KV'	0.946765	0.917519	0.0292466	0.94727	0.92	1.05	0.21732	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	0	21WP	G16_062	'SHAMROCK 69KV'	0.937606	0.916765	0.0208413	0.94727	0.92	1.05	0.07704	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNSLock	06ALL	0	21WP	G16_062	'SHAMROCK 69KV'	0.937606	0.916765	0.0208413	0.94727	0.92	1.05	0.07704	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_062	'SWISHER COUNTY INTERCHANGE 230KV'	0.973712	0.946518	0.027194	0.94652	0.95	1.05	0.07682	System Intact
FDNS	06ALL	0	21SP	G16_062	'SWISHER COUNTY INTERCHANGE 230KV'	0.973712	0.946518	0.027194	0.94652	0.95	1.05	0.07682	System Intact
FDNS	06ALL	0	18G	G16_062	'XIT_INTG 6230.00 230KV'	0.961921	0.898247	0.0636745	0.96282	0.9	1.05	0.24983	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_062	'XIT_INTG 6230.00 230KV'	0.961921	0.898247	0.0636745	0.96282	0.9	1.05	0.24983	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	G16_062	'OKLAUN HVDC7345.00 345KV'	0.971746	0.876534	0.0952119	0.96195	0.9	1.05	0.18872	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	18G	G16_062	'OKLAUN HVDC7345.00 345KV'	0.971746	0.876534	0.0952119	0.96195	0.92	1.05	0.18872	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	18G	G16_062	'OKLAUN HVDC7345.00 345KV'	0.979037	0.894444	0.0845932	0.96195	0.9	1.05	0.18872	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	G16_062	'OKLAUN HVDC7345.00 345KV'	0.979037	0.894444	0.0845932	0.96195	0.92	1.05	0.18872	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	G16_062	'OKLAUN HVDC7345.00 345KV'	0.979037	0.894444	0.0845932	0.96195	0.9	1.05	0.18872	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	G16_062	'OKLAUN HVDC7345.00 345KV'	0.979037	0.894444	0.0845932	0.96195	0.92	1.05	0.18872	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18SP	G16_062	'OKLAUN HVDC7345.00 345KV'	0.982492	0.917047	0.0654445	0.98452	0.92	1.05	0.19734	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	21L	G16_062	'OKLAUN HVDC7345.00 345KV'	0.964794	0.906985	0.057809	0.98004	0.92	1.05	0.20155	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	21SP	G16_062	'OKLAUN HVDC7345.00 345KV'	0.975936	0.906101	0.0698349	0.93747	0.92	1.05	0.16322	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	21SP	G16_062	'OKLAUN HVDC7345.00 345KV'	0.977487	0.913892	0.0635948	0.93747	0.92	1.05	0.16322	'POTTER COUNTY INTERCHANGE (WAUK 90343-A) 345/230/13.2KV TRANSFORMER CKT 1'
FDNS	06ALL	2	21SP	G16_062	'OKLAUN HVDC7345.00 345KV'	0.975936	0.906101	0.0698349	0.93747	0.92	1.05	0.16322	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	21SP	G16_062	'OKLAUN HVDC7345.00 345KV'	0.977487	0.913892	0.0635948	0.93747	0.92	1.05	0.16322	'POTTER COUNTY INTERCHANGE (WAUK 90343-A) 345/230/13.2KV TRANSFORMER CKT 1'
FDNS	06ALL	2	21SP	G16_062	'OKLAUN HVDC7345.00 345KV'	0.979393	0.918147	0.0612457	0.93747	0.92	1.05	0.13983	'BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_062	'OKLAUN HVDC7345.00 345KV'	0.979393	0.918147	0.0612457	0.93747	0.92	1.05	0.13983	'BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_062	'OKLAUN HVDC7345.00 345KV'	0.976892	0.908909	0.0679833	0.93747	0.92	1.05	0.12433	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_062	'OKLAUN HVDC7345.00 345KV'	0.976892	0.908909	0.0679833	0.93747	0.92	1.05	0.12433	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_062	'OKLAUN HVDC7345.00 345KV'	0.980022	0.919846	0.0601759	0.93747	0.92	1.05	0.12117	'NEWHART 230 - POTTER COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_062	'OKLAUN HVDC7345.00 345KV'	0.980022	0.919846	0.0601759	0.93747	0.92	1.05	0.12117	'NEWHART 230 - POTTER COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_062	'OKLAUN HVDC7345.00 345KV'	0.981133	0.917503	0.0636305	0.93747	0.92	1.05	0.09738	'GRACEMONT - LAWTON EASTSIDE 345KV CKT 1'
FDNS	06ALL	2	21SP	G16_062	'OKLAUN HVDC7345.00 345KV'	0.981133	0.917503	0.0636305	0.93747	0.92	1.05	0.09738	'GRACEMONT - LAWTON EASTSIDE 345KV CKT 1'
FDNS	06ALL	2	21SP	G16_062	'OKLAUN HVDC7345.00 345KV'	0.974057	0.909032	0.0650249	0.93747	0.92	1.05	0.09319	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_062	'OKLAUN HVDC7345.00 345KV'	0.977008	0.917605	0.059403	0.93747	0.92	1.05	0.07582	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_062	'OKLAUN HVDC7345.00 345KV'	0.977008	0.917605	0.059403	0.93747	0.92	1.05	0.07582	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'
FDNS	06ALL	2	21WP	G16_062	'OKLAUN HVDC7345.00 345KV'	0.961953	0.867867	0.0940866	0.95772	0.9	1.05	0.21732	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	21WP	G16_062	'OKLAUN HVDC7345.00 345KV'	0.961953	0.867867	0.0940866	0.95772	0.92	1.05	0.21732	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNSLock	06ALL	2	21WP	G16_062	'OKLAUN HVDC7345.00 345KV'	0.968933	0.878251	0.0906819	0.95772	0.9	1.05	0.21732	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	2	21WP	G16_062	'OKLAUN HVDC7345.00 345KV'	0.968933	0.878251	0.0906819	0.95772	0.92	1.05	0.21732	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	2	21WP	G16_062	'OKLAUN HVDC7345.00 345KV'	0.968933	0.878251	0.0906819	0.95772	0.9	1.05	0.21732	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	2	21WP	G16_062	'OKLAUN HVDC7345.00 345KV'	0.968933	0.878251	0.0906819	0.95772	0.92	1.05	0.21732	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	G16_062	'OKLAUNION 345KV'	0.946555	0.89765	0.0489053	0.96178	0.9	1.05	0.24983	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'

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	06ALL	2	18G	G16_062	'OKLAUNION 345KV'	0.946555	0.89765	0.0489053	0.96178	0.92	1.05	0.24983	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	2	18G	G16_062	'OKLAUNION 345KV'	0.971578	0.876382	0.0951954	0.96178	0.9	1.05	0.18872	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	18G	G16_062	'OKLAUNION 345KV'	0.971578	0.876382	0.0951954	0.96178	0.92	1.05	0.18872	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	18G	G16_062	'OKLAUNION 345KV'	0.978868	0.894289	0.0845786	0.96178	0.9	1.05	0.18872	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	G16_062	'OKLAUNION 345KV'	0.978868	0.894289	0.0845786	0.96178	0.92	1.05	0.18872	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	G16_062	'OKLAUNION 345KV'	0.978868	0.894289	0.0845786	0.96178	0.9	1.05	0.18872	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	G16_062	'OKLAUNION 345KV'	0.978868	0.894289	0.0845786	0.96178	0.92	1.05	0.18872	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18SP	G16_062	'OKLAUNION 345KV'	0.982322	0.916889	0.0654331	0.98435	0.92	1.05	0.19734	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	21L	G16_062	'OKLAUNION 345KV'	0.955763	0.91547	0.0402927	0.97987	0.92	1.05	0.24426	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	2	21L	G16_062	'OKLAUNION 345KV'	0.964671	0.906828	0.0578428	0.97987	0.92	1.05	0.20155	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	21SP	G16_062	'OKLAUNION 345KV'	0.988052	0.937308	0.050744	0.93731	0.95	1.05	0.26936	System Intact
FDNS	06ALL	2	21SP	G16_062	'OKLAUNION 345KV'	0.988052	0.937308	0.050744	0.93731	0.95	1.05	0.26936	System Intact
FDNS	06ALL	2	21SP	G16_062	'OKLAUNION 345KV'	0.926263	0.872003	0.0542603	0.93731	0.9	1.05	0.26936	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	2	21SP	G16_062	'OKLAUNION 345KV'	0.926263	0.872003	0.0542603	0.93731	0.92	1.05	0.26936	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	2	21SP	G16_062	'OKLAUNION 345KV'	0.975767	0.905944	0.0698228	0.93731	0.92	1.05	0.16322	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	21SP	G16_062	'OKLAUNION 345KV'	0.977318	0.913734	0.0635838	0.93731	0.92	1.05	0.16322	'POTTER COUNTY INTERCHANGE (WAUK 90343-A) 345/230/13.2KV TRANSFORMER CKT 1'
FDNS	06ALL	2	21SP	G16_062	'OKLAUNION 345KV'	0.975767	0.905944	0.0698228	0.93731	0.92	1.05	0.16322	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	21SP	G16_062	'OKLAUNION 345KV'	0.977318	0.913734	0.0635838	0.93731	0.92	1.05	0.16322	'POTTER COUNTY INTERCHANGE (WAUK 90343-A) 345/230/13.2KV TRANSFORMER CKT 1'
FDNS	06ALL	2	21SP	G16_062	'OKLAUNION 345KV'	0.979224	0.917989	0.0612351	0.93731	0.92	1.05	0.13983	'BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_062	'OKLAUNION 345KV'	0.979224	0.917989	0.0612351	0.93731	0.92	1.05	0.13983	'BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_062	'OKLAUNION 345KV'	0.976723	0.908752	0.0679715	0.93731	0.92	1.05	0.12433	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_062	'OKLAUNION 345KV'	0.976723	0.908752	0.0679715	0.93731	0.92	1.05	0.12433	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_062	'OKLAUNION 345KV'	0.979853	0.919687	0.0601655	0.93731	0.92	1.05	0.12117	'NEWHART 230 - POTTER COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_062	'OKLAUNION 345KV'	0.979853	0.919687	0.0601655	0.93731	0.92	1.05	0.12117	'NEWHART 230 - POTTER COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_062	'OKLAUNION 345KV'	0.980964	0.917344	0.0636194	0.93731	0.92	1.05	0.09738	'GRACEMONT - LAWTON EASTSIDE 345KV CKT 1'
FDNS	06ALL	2	21SP	G16_062	'OKLAUNION 345KV'	0.980964	0.917344	0.0636194	0.93731	0.92	1.05	0.09738	'GRACEMONT - LAWTON EASTSIDE 345KV CKT 1'
FDNS	06ALL	2	21SP	G16_062	'OKLAUNION 345KV'	0.973888	0.908875	0.0650136	0.93731	0.92	1.05	0.09319	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_062	'OKLAUNION 345KV'	0.976839	0.917446	0.0593928	0.93731	0.92	1.05	0.07582	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_062	'OKLAUNION 345KV'	0.976839	0.917446	0.0593928	0.93731	0.92	1.05	0.07582	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'
FDNS	06ALL	2	21WP	G16_062	'OKLAUNION 345KV'	0.940431	0.89655	0.0438808	0.95756	0.9	1.05	0.26722	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	2	21WP	G16_062	'OKLAUNION 345KV'	0.940431	0.89655	0.0438808	0.95756	0.92	1.05	0.26722	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	2	21WP	G16_062	'OKLAUNION 345KV'	0.961787	0.867717	0.0940703	0.95756	0.9	1.05	0.21732	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	21WP	G16_062	'OKLAUNION 345KV'	0.961787	0.867717	0.0940703	0.95756	0.92	1.05	0.21732	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNSLock	06ALL	2	18G	G16_062	'OKLAUNION 345KV'	0.946565	0.897633	0.048932	0.96178	0.9	1.05	0.24983	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL	2	18G	G16_062	'OKLAUNION 345KV'	0.946565	0.897633	0.048932	0.96178	0.92	1.05	0.24983	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL	2	21L	G16_062	'OKLAUNION 345KV'	0.955763	0.915469	0.0402938	0.97987	0.92	1.05	0.24426	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL	2	21SP	G16_062	'OKLAUNION 345KV'	0.926277	0.872003	0.0542739	0.93731	0.9	1.05	0.26936	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL	2	21SP	G16_062	'OKLAUNION 345KV'	0.926277	0.872003	0.0542739	0.93731	0.92	1.05	0.26936	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL	2	21WP	G16_062	'OKLAUNION 345KV'	0.940445	0.892481	0.0479638	0.95756	0.9	1.05	0.26722	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL	2	21WP	G16_062	'OKLAUNION 345KV'	0.940445	0.892481	0.0479638	0.95756	0.92	1.05	0.26722	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL	2	21WP	G16_062	'OKLAUNION 345KV'	0.968766	0.8781	0.0906662	0.95756	0.9	1.05	0.21732	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	2	21WP	G16_062	'OKLAUNION 345KV'	0.968766	0.8781	0.0906662	0.95756	0.92	1.05	0.21732	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	2	21WP	G16_062	'OKLAUNION 345KV'	0.968766	0.8781	0.0906662	0.95756	0.9	1.05	0.21732	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	2	21WP	G16_062	'OKLAUNION 345KV'	0.968766	0.8781	0.0906662	0.95756	0.92	1.05	0.21732	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	17WP	G16_062	'SHAMROCK 69KV'	0.941749	0.911219	0.0305302	0.95406	0.92	1.05	0.11232	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	2	18G	G16_062	'SHAMROCK 69KV'	0.921752	0.88782	0.0339316	0.94237	0.9	1.05	0.24983	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	G16_062	'SHAMROCK 69KV'	0.921752	0.88782	0.0339316	0.94237	0.92	1.05	0.24983	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	G16_062	'SHAMROCK 69KV'	0.921752	0.88782	0.0339316	0.94237	0.9	1.05	0.24983	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	G16_062	'SHAMROCK 69KV'	0.921752	0.88782	0.0339316	0.94237	0.92	1.05	0.24983	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	G16_062	'SHAMROCK 69KV'	0.94251	0.915854	0.0266567	0.94237	0.92	1.05	0.17434	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	G16_062	'SHAMROCK 69KV'	0.94251	0.915854	0.0266567	0.94237	0.92	1.05	0.17434	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	G16_062	'SHAMROCK 69KV'	0.945055	0.919173	0.0258818	0.94237	0.92	1.05	0.11915	'MATHWSN7 345.00 - TATONGA7 345.00 345KV CKT 1'
FDNS	06ALL	2	18G	G16_062	'SHAMROCK 69KV'	0.922272	0.895083	0.0271891	0.94237	0.9	1.05	0.10838	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	2	18G	G16_062	'SHAMROCK 69KV'	0.922272	0.895083	0.0271891	0.94237	0.92	1.05	0.10838	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	2	18G	G16_062	'SHAMROCK 69KV'	0.937177	0.90447	0.032707	0.94237	0.92	1.05	0.10838	'STLN-DEMARC6 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	2	18G	G16_062	'SHAMROCK 69KV'	0.938841	0.906155	0.0326868	0.94237	0.92	1.05	0.10838	'STATELINE INTERCHANGE - STLN-DEMARC6 230KV CKT 1'
FDNS	06ALL	2	18G	G16_062	'SHAMROCK 69KV'	0.9368	0.913242	0.0235581	0.94237	0.92	1.05	0.09163	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNS	06ALL	2	18G	G16_062	'SHAMROCK 69KV'	0.9368	0.913242	0.0235581	0.94237	0.92	1.05	0.09163	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNS	06ALL	2	18SP	G16_062	'SHAMROCK 69KV'	0.935303	0.907264	0.0280384	0.94903	0.92	1.05	0.24774	'OKLAUNION - TUCO INTERCHANGE 345KV 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
FDNS	06ALL	2	18SP	G16_062	'SHAMROCK 69KV'	0.935303	0.907264	0.0280384	0.94903	0.92	1.05	0.24774	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18SP	G16_062	'SHAMROCK 69KV'	0.937541	0.917034	0.0205072	0.94903	0.92	1.05	0.10689	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	2	21L	G16_062	'SHAMROCK 69KV'	0.937265	0.900091	0.0371735	0.96676	0.92	1.05	0.24426	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	21L	G16_062	'SHAMROCK 69KV'	0.937265	0.900091	0.0371735	0.96676	0.92	1.05	0.24426	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	21L	G16_062	'SHAMROCK 69KV'	0.927705	0.902827	0.0248773	0.96676	0.92	1.05	0.07728	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	2	21L	G16_062	'SHAMROCK 69KV'	0.940921	0.917392	0.0235285	0.96676	0.92	1.05	0.07728	'STLN-DEMARC6 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	2	21L	G16_062	'SHAMROCK 69KV'	0.939614	0.915541	0.0240734	0.96676	0.92	1.05	0.07728	'STATELINE INTERCHANGE - STLN-DEMARC6 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_062	'SHAMROCK 69KV'	0.943517	0.917985	0.0255317	0.94414	0.92	1.05	0.16322	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	21SP	G16_062	'SHAMROCK 69KV'	0.943517	0.917985	0.0255317	0.94414	0.92	1.05	0.16322	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	21SP	G16_062	'SHAMROCK 69KV'	0.930159	0.903584	0.0265749	0.94414	0.92	1.05	0.09319	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_062	'SHAMROCK 69KV'	0.943987	0.919594	0.0243928	0.94414	0.92	1.05	0.09319	'STATELINE INTERCHANGE - STLN-DEMARC6 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_062	'SHAMROCK 69KV'	0.939921	0.918407	0.0215131	0.94414	0.92	1.05	0.07881	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_062	'SHAMROCK 69KV'	0.939921	0.918407	0.0215131	0.94414	0.92	1.05	0.07881	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNS	06ALL	2	21WP	G16_062	'SHAMROCK 69KV'	0.933042	0.889221	0.0438206	0.94727	0.9	1.05	0.26722	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	21WP	G16_062	'SHAMROCK 69KV'	0.933042	0.889221	0.0438206	0.94727	0.92	1.05	0.26722	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	21WP	G16_062	'SHAMROCK 69KV'	0.933042	0.889221	0.0438206	0.94727	0.9	1.05	0.26722	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	21WP	G16_062	'SHAMROCK 69KV'	0.933042	0.889221	0.0438206	0.94727	0.92	1.05	0.26722	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	21WP	G16_062	'SHAMROCK 69KV'	0.92306	0.895123	0.0279369	0.94727	0.9	1.05	0.09109	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	2	21WP	G16_062	'SHAMROCK 69KV'	0.92306	0.895123	0.0279369	0.94727	0.92	1.05	0.09109	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	2	21WP	G16_062	'SHAMROCK 69KV'	0.940591	0.917227	0.0233641	0.94727	0.92	1.05	0.09109	'STLN-DEMARC6 - SWEETWATER 230KV CKT 1'
FDNSLock	06ALL	2	21WP	G16_062	'SHAMROCK 69KV'	0.946765	0.917519	0.0292466	0.94727	0.92	1.05	0.21732	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	2	21WP	G16_062	'SHAMROCK 69KV'	0.946765	0.917519	0.0292466	0.94727	0.92	1.05	0.21732	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	2	21WP	G16_062	'SHAMROCK 69KV'	0.937606	0.916765	0.0208413	0.94727	0.92	1.05	0.07704	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNSLock	06ALL	2	21WP	G16_062	'SHAMROCK 69KV'	0.937606	0.916765	0.0208413	0.94727	0.92	1.05	0.07704	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	18G	G16_069	'BORDER 7345.00 345KV'	0.960417	0.87447	0.0859476	0.96029	0.9	1.05	0.24409	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_069	'BORDER 7345.00 345KV'	0.960417	0.87447	0.0859476	0.96029	0.9	1.05	0.24409	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	G16_069	'BORDER 7345.00 345KV'	0.952111	0.873373	0.0787379	0.96753	0.9	1.05	0.25366	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	G16_069	'BORDER 7345.00 345KV'	0.952111	0.873373	0.0787379	0.96753	0.9	1.05	0.25366	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21SP	G16_069	'DEAF SMITH COUNTY INTERCHANGE 230KV'	0.955763	0.931943	0.0238197	0.93194	0.95	1.05	0.13267	System Intact
FDNS	06ALL	0	21SP	G16_069	'DEAF SMITH COUNTY INTERCHANGE 230KV'	0.917765	0.882885	0.0348799	0.93194	0.9	1.05	0.13267	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_069	'DEAF SMITH COUNTY INTERCHANGE 230KV'	0.955763	0.931943	0.0238197	0.93194	0.95	1.05	0.13267	System Intact
FDNS	06ALL	0	21SP	G16_069	'DEAF SMITH COUNTY INTERCHANGE 230KV'	0.917765	0.882885	0.0348799	0.93194	0.9	1.05	0.13267	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
FDNS	06ALL	0	18G	G16_069	'G1149G1504 345.00 345KV'	0.960417	0.87447	0.0859476	0.96029	0.9	1.05	0.24409	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_069	'G1149G1504 345.00 345KV'	0.960417	0.87447	0.0859476	0.96029	0.9	1.05	0.24409	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	G16_069	'G1149G1504 345.00 345KV'	0.952111	0.873373	0.0787379	0.96753	0.9	1.05	0.25366	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	G16_069	'G1149G1504 345.00 345KV'	0.952111	0.873373	0.0787379	0.96753	0.9	1.05	0.25366	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_069	'GRAPEVINE INTERCHANGE 230KV'	0.963349	0.8997	0.0636498	0.9775	0.9	1.05	0.24409	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_069	'GRAPEVINE INTERCHANGE 230KV'	0.963349	0.8997	0.0636498	0.9775	0.9	1.05	0.24409	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21SP	G16_069	'NEWHART 230 230KV'	0.967552	0.941326	0.0262256	0.94133	0.95	1.05	0.15071	System Intact
FDNS	06ALL	0	21SP	G16_069	'NEWHART 230 230KV'	0.967552	0.941326	0.0262256	0.94133	0.95	1.05	0.15071	System Intact
FDNS	06ALL	0	18G	G16_069	'OKLAUN HVDC7345.00 345KV'	0.971746	0.876534	0.0952119	0.96195	0.9	1.05	0.18324	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	0	18G	G16_069	'OKLAUN HVDC7345.00 345KV'	0.971746	0.876534	0.0952119	0.96195	0.92	1.05	0.18324	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	0	18G	G16_069	'OKLAUN HVDC7345.00 345KV'	0.979037	0.894444	0.0845932	0.96195	0.9	1.05	0.18324	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_069	'OKLAUN HVDC7345.00 345KV'	0.979037	0.894444	0.0845932	0.96195	0.92	1.05	0.18324	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_069	'OKLAUN HVDC7345.00 345KV'	0.979037	0.894444	0.0845932	0.96195	0.9	1.05	0.18324	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_069	'OKLAUN HVDC7345.00 345KV'	0.979037	0.894444	0.0845932	0.96195	0.92	1.05	0.18324	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18SP	G16_069	'OKLAUN HVDC7345.00 345KV'	0.982492	0.917047	0.0654445	0.98452	0.92	1.05	0.19203	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	0	21L	G16_069	'OKLAUN HVDC7345.00 345KV'	0.964794	0.906985	0.057809	0.98004	0.92	1.05	0.18878	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	0	21SP	G16_069	'OKLAUN HVDC7345.00 345KV'	0.975936	0.906101	0.0698349	0.93747	0.92	1.05	0.17366	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21SP	G16_069	'OKLAUN HVDC7345.00 345KV'	0.977487	0.913892	0.0635948	0.93747	0.92	1.05	0.17366	'POTTER COUNTY INTERCHANGE (WAUK 90343-A) 345/230/13.2KV TRANSFORMER CKT 1'
FDNS	06ALL	0	21SP	G16_069	'OKLAUN HVDC7345.00 345KV'	0.975936	0.906101	0.0698349	0.93747	0.92	1.05	0.17366	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21SP	G16_069	'OKLAUN HVDC7345.00 345KV'	0.977487	0.913892	0.0635948	0.93747	0.92	1.05	0.17366	'POTTER COUNTY INTERCHANGE (WAUK 90343-A) 345/230/13.2KV TRANSFORMER CKT 1'
FDNS	06ALL	0	21SP	G16_069	'OKLAUN HVDC7345.00 345KV'	0.979393	0.918147	0.0612457	0.93747	0.92	1.05	0.15965	'BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_069	'OKLAUN HVDC7345.00 345KV'	0.979393	0.918147	0.0612457	0.93747	0.92	1.05	0.15965	'BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_069	'OKLAUN HVDC7345.00 345KV'	0.976892	0.908909	0.0679833	0.93747	0.92	1.05	0.13267	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 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
FDNS	06ALL	0	18G	G16_069	'SHAMROCK 115KV'	0.943645	0.902939	0.0407058	0.96617	0.92	1.05	0.24409	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_069	'SHAMROCK 115KV'	0.943645	0.902939	0.0407058	0.96617	0.92	1.05	0.24409	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_069	'SHAMROCK 115KV'	0.94719	0.915897	0.0312929	0.96617	0.92	1.05	0.11113	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	21WP	G16_069	'SHAMROCK 115KV'	0.956306	0.906569	0.0497372	0.97378	0.92	1.05	0.25366	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	G16_069	'SHAMROCK 115KV'	0.956306	0.906569	0.0497372	0.97378	0.92	1.05	0.25366	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	G16_069	'SHAMROCK 115KV'	0.94803	0.918341	0.0296886	0.97378	0.92	1.05	0.09749	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	17WP	G16_069	'SHAMROCK 69KV'	0.941749	0.911219	0.0305302	0.95406	0.92	1.05	0.11505	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	18G	G16_069	'SHAMROCK 69KV'	0.921752	0.88782	0.0339316	0.94237	0.9	1.05	0.24409	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_069	'SHAMROCK 69KV'	0.921752	0.88782	0.0339316	0.94237	0.92	1.05	0.24409	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_069	'SHAMROCK 69KV'	0.921752	0.88782	0.0339316	0.94237	0.9	1.05	0.24409	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_069	'SHAMROCK 69KV'	0.921752	0.88782	0.0339316	0.94237	0.92	1.05	0.24409	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_069	'SHAMROCK 69KV'	0.94251	0.915854	0.0266567	0.94237	0.92	1.05	0.1788	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_069	'SHAMROCK 69KV'	0.94251	0.915854	0.0266567	0.94237	0.92	1.05	0.1788	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_069	'SHAMROCK 69KV'	0.945055	0.919173	0.0258818	0.94237	0.92	1.05	0.11983	'MATHWSN7 345.00 - TATONGA7 345.00 345KV CKT 1'
FDNS	06ALL	0	18G	G16_069	'SHAMROCK 69KV'	0.922272	0.895083	0.0271891	0.94237	0.9	1.05	0.11113	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	18G	G16_069	'SHAMROCK 69KV'	0.922272	0.895083	0.0271891	0.94237	0.92	1.05	0.11113	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	18G	G16_069	'SHAMROCK 69KV'	0.937177	0.90447	0.032707	0.94237	0.92	1.05	0.11113	'STLN-DEMARC6 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	18G	G16_069	'SHAMROCK 69KV'	0.938841	0.906155	0.0326868	0.94237	0.92	1.05	0.11113	'STATELINE INTERCHANGE - STLN-DEMARC6 230KV CKT 1'
FDNS	06ALL	0	18G	G16_069	'SHAMROCK 69KV'	0.9368	0.913242	0.0235581	0.94237	0.92	1.05	0.09395	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	18G	G16_069	'SHAMROCK 69KV'	0.9368	0.913242	0.0235581	0.94237	0.92	1.05	0.09395	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	18SP	G16_069	'SHAMROCK 69KV'	0.935303	0.907264	0.0280384	0.94903	0.92	1.05	0.24211	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18SP	G16_069	'SHAMROCK 69KV'	0.935303	0.907264	0.0280384	0.94903	0.92	1.05	0.24211	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18SP	G16_069	'SHAMROCK 69KV'	0.937541	0.917034	0.0205072	0.94903	0.92	1.05	0.10953	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	21L	G16_069	'SHAMROCK 69KV'	0.937265	0.900091	0.0371735	0.96676	0.92	1.05	0.2307	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21L	G16_069	'SHAMROCK 69KV'	0.937265	0.900091	0.0371735	0.96676	0.92	1.05	0.2307	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21L	G16_069	'SHAMROCK 69KV'	0.927705	0.902827	0.0248773	0.96676	0.92	1.05	0.08368	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	21L	G16_069	'SHAMROCK 69KV'	0.940921	0.917392	0.0235285	0.96676	0.92	1.05	0.08368	'STLN-DEMARC6 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	21L	G16_069	'SHAMROCK 69KV'	0.939614	0.915541	0.0240734	0.96676	0.92	1.05	0.08368	'STATELINE INTERCHANGE - STLN-DEMARC6 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_069	'SHAMROCK 69KV'	0.943517	0.917985	0.0255317	0.94414	0.92	1.05	0.17366	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21SP	G16_069	'SHAMROCK 69KV'	0.943517	0.917985	0.0255317	0.94414	0.92	1.05	0.17366	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21SP	G16_069	'SHAMROCK 69KV'	0.930159	0.903584	0.0265749	0.94414	0.92	1.05	0.09959	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_069	'SHAMROCK 69KV'	0.943987	0.919594	0.0243928	0.94414	0.92	1.05	0.09959	'STATELINE INTERCHANGE - STLN-DEMARC6 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_069	'SHAMROCK 69KV'	0.939921	0.918407	0.0215131	0.94414	0.92	1.05	0.08422	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_069	'SHAMROCK 69KV'	0.939921	0.918407	0.0215131	0.94414	0.92	1.05	0.08422	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	21WP	G16_069	'SHAMROCK 69KV'	0.933042	0.889221	0.0438206	0.94727	0.9	1.05	0.25366	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	G16_069	'SHAMROCK 69KV'	0.933042	0.889221	0.0438206	0.94727	0.92	1.05	0.25366	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	G16_069	'SHAMROCK 69KV'	0.933042	0.889221	0.0438206	0.94727	0.9	1.05	0.25366	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	G16_069	'SHAMROCK 69KV'	0.933042	0.889221	0.0438206	0.94727	0.92	1.05	0.25366	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	21WP	G16_069	'SHAMROCK 69KV'	0.92306	0.895123	0.0279369	0.94727	0.9	1.05	0.09749	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	21WP	G16_069	'SHAMROCK 69KV'	0.92306	0.895123	0.0279369	0.94727	0.92	1.05	0.09749	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	0	21WP	G16_069	'SHAMROCK 69KV'	0.940591	0.917227	0.0233641	0.94727	0.92	1.05	0.09749	'STLN-DEMARC6 - SWEETWATER 230KV CKT 1'
FDNSLock	06ALL	0	21WP	G16_069	'SHAMROCK 69KV'	0.946765	0.917519	0.0292466	0.94727	0.92	1.05	0.20455	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	0	21WP	G16_069	'SHAMROCK 69KV'	0.946765	0.917519	0.0292466	0.94727	0.92	1.05	0.20455	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	0	21WP	G16_069	'SHAMROCK 69KV'	0.937606	0.916765	0.0208413	0.94727	0.92	1.05	0.08245	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNSLock	06ALL	0	21WP	G16_069	'SHAMROCK 69KV'	0.937606	0.916765	0.0208413	0.94727	0.92	1.05	0.08245	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNS	06ALL	0	21SP	G16_069	'SWISHER COUNTY INTERCHANGE 230KV'	0.973712	0.946518	0.027194	0.94652	0.95	1.05	0.04555	System Intact
FDNS	06ALL	0	21SP	G16_069	'SWISHER COUNTY INTERCHANGE 230KV'	0.973712	0.946518	0.027194	0.94652	0.95	1.05	0.04555	System Intact
FDNS	06ALL	0	18G	G16_069	'XIT_INTG 6230.00 230KV'	0.961921	0.898247	0.0636745	0.96282	0.9	1.05	0.24409	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	0	18G	G16_069	'XIT_INTG 6230.00 230KV'	0.961921	0.898247	0.0636745	0.96282	0.9	1.05	0.24409	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	G16_069	'OKLAUN HVDC7345.00 345KV'	0.971746	0.876534	0.0952119	0.96195	0.9	1.05	0.18324	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	18G	G16_069	'OKLAUN HVDC7345.00 345KV'	0.971746	0.876534	0.0952119	0.96195	0.92	1.05	0.18324	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	18G	G16_069	'OKLAUN HVDC7345.00 345KV'	0.979037	0.894444	0.0845932	0.96195	0.9	1.05	0.18324	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	G16_069	'OKLAUN HVDC7345.00 345KV'	0.979037	0.894444	0.0845932	0.96195	0.92	1.05	0.18324	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	G16_069	'OKLAUN HVDC7345.00 345KV'	0.979037	0.894444	0.0845932	0.96195	0.9	1.05	0.18324	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	G16_069	'OKLAUN HVDC7345.00 345KV'	0.979037	0.894444	0.0845932	0.96195	0.92	1.05	0.18324	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18SP	G16_069	'OKLAUN HVDC7345.00 345KV'	0.982492	0.917047	0.0654445	0.98452	0.92	1.05	0.19203	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	21L	G16_069	'OKLAUN HVDC7345.00 345KV'	0.964794	0.906985	0.057809	0.98004	0.92	1.05	0.18878	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	21SP	G16_069	'OKLAUN HVDC7345.00 345KV'	0.975936	0.906101	0.0698349	0.93747	0.92	1.05	0.17366	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	21SP	G16_069	'OKLAUN HVDC7345.00 345KV'	0.977487	0.913892	0.0635948	0.93747	0.92	1.05	0.17366	'POTTER COUNTY INTERCHANGE (WAUK 90343-A) 345/230/13.2KV TRANSFORMER CKT 1'
FDNS	06ALL	2	21SP	G16_069	'OKLAUN HVDC7345.00 345KV'	0.975936	0.906101	0.0698349	0.93747	0.92	1.05	0.17366	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV 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
FDNS	06ALL	2	21SP	G16_069	'OKLAUN HVDC7345.00 345KV'	0.977487	0.913892	0.0635948	0.93747	0.92	1.05	0.17366	'POTTER COUNTY INTERCHANGE (WAUK 90343-A) 345/230/13.2KV TRANSFORMER CKT 1'
FDNS	06ALL	2	21SP	G16_069	'OKLAUN HVDC7345.00 345KV'	0.979393	0.918147	0.0612457	0.93747	0.92	1.05	0.15965	'BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_069	'OKLAUN HVDC7345.00 345KV'	0.979393	0.918147	0.0612457	0.93747	0.92	1.05	0.15965	'BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_069	'OKLAUN HVDC7345.00 345KV'	0.976892	0.908909	0.0679833	0.93747	0.92	1.05	0.13267	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_069	'OKLAUN HVDC7345.00 345KV'	0.976892	0.908909	0.0679833	0.93747	0.92	1.05	0.13267	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_069	'OKLAUN HVDC7345.00 345KV'	0.980022	0.919846	0.0601759	0.93747	0.92	1.05	0.12567	'NEWHART 230 - POTTER COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_069	'OKLAUN HVDC7345.00 345KV'	0.980022	0.919846	0.0601759	0.93747	0.92	1.05	0.12567	'NEWHART 230 - POTTER COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_069	'OKLAUN HVDC7345.00 345KV'	0.974057	0.909032	0.0650249	0.93747	0.92	1.05	0.09959	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_069	'OKLAUN HVDC7345.00 345KV'	0.981133	0.917503	0.0636305	0.93747	0.92	1.05	0.08987	'GRACEMONT - LAWTON EASTSIDE 345KV CKT 1'
FDNS	06ALL	2	21SP	G16_069	'OKLAUN HVDC7345.00 345KV'	0.981133	0.917503	0.0636305	0.93747	0.92	1.05	0.08987	'GRACEMONT - LAWTON EASTSIDE 345KV CKT 1'
FDNS	06ALL	2	21SP	G16_069	'OKLAUN HVDC7345.00 345KV'	0.977008	0.917605	0.059403	0.93747	0.92	1.05	0.08102	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_069	'OKLAUN HVDC7345.00 345KV'	0.977008	0.917605	0.059403	0.93747	0.92	1.05	0.08102	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'
FDNS	06ALL	2	21WP	G16_069	'OKLAUN HVDC7345.00 345KV'	0.961953	0.867867	0.0940866	0.95772	0.9	1.05	0.20455	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	21WP	G16_069	'OKLAUN HVDC7345.00 345KV'	0.961953	0.867867	0.0940866	0.95772	0.92	1.05	0.20455	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNSLock	06ALL	2	21WP	G16_069	'OKLAUN HVDC7345.00 345KV'	0.968933	0.878251	0.0906819	0.95772	0.9	1.05	0.20455	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	2	21WP	G16_069	'OKLAUN HVDC7345.00 345KV'	0.968933	0.878251	0.0906819	0.95772	0.92	1.05	0.20455	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	2	21WP	G16_069	'OKLAUN HVDC7345.00 345KV'	0.968933	0.878251	0.0906819	0.95772	0.9	1.05	0.20455	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	2	21WP	G16_069	'OKLAUN HVDC7345.00 345KV'	0.968933	0.878251	0.0906819	0.95772	0.92	1.05	0.20455	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	G16_069	'OKLAUNION 345KV'	0.946555	0.89765	0.0489053	0.96178	0.9	1.05	0.24409	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	2	18G	G16_069	'OKLAUNION 345KV'	0.946555	0.89765	0.0489053	0.96178	0.92	1.05	0.24409	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	2	18G	G16_069	'OKLAUNION 345KV'	0.971578	0.876382	0.0951954	0.96178	0.9	1.05	0.18324	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	18G	G16_069	'OKLAUNION 345KV'	0.971578	0.876382	0.0951954	0.96178	0.92	1.05	0.18324	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	18G	G16_069	'OKLAUNION 345KV'	0.978868	0.894289	0.0845786	0.96178	0.9	1.05	0.18324	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	G16_069	'OKLAUNION 345KV'	0.978868	0.894289	0.0845786	0.96178	0.92	1.05	0.18324	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	G16_069	'OKLAUNION 345KV'	0.978868	0.894289	0.0845786	0.96178	0.9	1.05	0.18324	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	G16_069	'OKLAUNION 345KV'	0.978868	0.894289	0.0845786	0.96178	0.92	1.05	0.18324	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18SP	G16_069	'OKLAUNION 345KV'	0.982322	0.916889	0.0654331	0.98435	0.92	1.05	0.19203	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	21L	G16_069	'OKLAUNION 345KV'	0.955763	0.91547	0.0402927	0.97987	0.92	1.05	0.2307	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	2	21L	G16_069	'OKLAUNION 345KV'	0.964671	0.906828	0.0578428	0.97987	0.92	1.05	0.18878	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	21SP	G16_069	'OKLAUNION 345KV'	0.988052	0.937308	0.050744	0.93731	0.95	1.05	0.25579	System Intact
FDNS	06ALL	2	21SP	G16_069	'OKLAUNION 345KV'	0.988052	0.937308	0.050744	0.93731	0.95	1.05	0.25579	System Intact
FDNS	06ALL	2	21SP	G16_069	'OKLAUNION 345KV'	0.926263	0.872003	0.0542603	0.93731	0.9	1.05	0.25579	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	2	21SP	G16_069	'OKLAUNION 345KV'	0.926263	0.872003	0.0542603	0.93731	0.92	1.05	0.25579	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	2	21SP	G16_069	'OKLAUNION 345KV'	0.975767	0.905944	0.0698228	0.93731	0.92	1.05	0.17366	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	21SP	G16_069	'OKLAUNION 345KV'	0.977318	0.913734	0.0635838	0.93731	0.92	1.05	0.17366	'POTTER COUNTY INTERCHANGE (WAUK 90343-A) 345/230/13.2KV TRANSFORMER CKT 1'
FDNS	06ALL	2	21SP	G16_069	'OKLAUNION 345KV'	0.975767	0.905944	0.0698228	0.93731	0.92	1.05	0.17366	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	21SP	G16_069	'OKLAUNION 345KV'	0.977318	0.913734	0.0635838	0.93731	0.92	1.05	0.17366	'POTTER COUNTY INTERCHANGE (WAUK 90343-A) 345/230/13.2KV TRANSFORMER CKT 1'
FDNS	06ALL	2	21SP	G16_069	'OKLAUNION 345KV'	0.979224	0.917989	0.0612351	0.93731	0.92	1.05	0.15965	'BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_069	'OKLAUNION 345KV'	0.979224	0.917989	0.0612351	0.93731	0.92	1.05	0.15965	'BUSHLAND INTERCHANGE - DEAF SMITH COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_069	'OKLAUNION 345KV'	0.976723	0.908752	0.0679715	0.93731	0.92	1.05	0.13267	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_069	'OKLAUNION 345KV'	0.976723	0.908752	0.0679715	0.93731	0.92	1.05	0.13267	'DEAF SMITH COUNTY INTERCHANGE - PLANT X STATION 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_069	'OKLAUNION 345KV'	0.979853	0.919687	0.0601655	0.93731	0.92	1.05	0.12567	'NEWHART 230 - POTTER COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_069	'OKLAUNION 345KV'	0.979853	0.919687	0.0601655	0.93731	0.92	1.05	0.12567	'NEWHART 230 - POTTER COUNTY INTERCHANGE 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_069	'OKLAUNION 345KV'	0.973888	0.908875	0.0650136	0.93731	0.92	1.05	0.09959	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_069	'OKLAUNION 345KV'	0.980964	0.917344	0.0636194	0.93731	0.92	1.05	0.08987	'GRACEMONT - LAWTON EASTSIDE 345KV CKT 1'
FDNS	06ALL	2	21SP	G16_069	'OKLAUNION 345KV'	0.980964	0.917344	0.0636194	0.93731	0.92	1.05	0.08987	'GRACEMONT - LAWTON EASTSIDE 345KV CKT 1'
FDNS	06ALL	2	21SP	G16_069	'OKLAUNION 345KV'	0.976839	0.917446	0.0593928	0.93731	0.92	1.05	0.08102	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_069	'OKLAUNION 345KV'	0.976839	0.917446	0.0593928	0.93731	0.92	1.05	0.08102	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'
FDNS	06ALL	2	21WP	G16_069	'OKLAUNION 345KV'	0.940431	0.89655	0.0438808	0.95756	0.9	1.05	0.25366	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	2	21WP	G16_069	'OKLAUNION 345KV'	0.940431	0.89655	0.0438808	0.95756	0.92	1.05	0.25366	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNS	06ALL	2	21WP	G16_069	'OKLAUNION 345KV'	0.961787	0.867717	0.0940703	0.95756	0.9	1.05	0.20455	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNS	06ALL	2	21WP	G16_069	'OKLAUNION 345KV'	0.961787	0.867717	0.0940703	0.95756	0.92	1.05	0.20455	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
FDNSLock	06ALL	2	18G	G16_069	'OKLAUNION 345KV'	0.946565	0.897633	0.048932	0.96178	0.9	1.05	0.24409	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL	2	18G	G16_069	'OKLAUNION 345KV'	0.946565	0.897633	0.048932	0.96178	0.92	1.05	0.24409	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL	2	21L	G16_069	'OKLAUNION 345KV'	0.955763	0.915469	0.0402938	0.97987	0.92	1.05	0.2307	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL	2	21SP	G16_069	'OKLAUNION 345KV'	0.926277	0.872003	0.0542739	0.93731	0.9	1.05	0.25579	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'

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	06ALL	2	21SP	G16_069	'OKLAUNION 345KV'	0.926277	0.872003	0.0542739	0.93731	0.92	1.05	0.25579	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL	2	21WP	G16_069	'OKLAUNION 345KV'	0.940445	0.892481	0.0479638	0.95756	0.9	1.05	0.25366	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL	2	21WP	G16_069	'OKLAUNION 345KV'	0.940445	0.892481	0.0479638	0.95756	0.92	1.05	0.25366	'OKLAUN HVDC7345.00 345KV SWITCHED SHUNT'
FDNSLock	06ALL	2	21WP	G16_069	'OKLAUNION 345KV'	0.968766	0.8781	0.0906662	0.95756	0.9	1.05	0.20455	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	2	21WP	G16_069	'OKLAUNION 345KV'	0.968766	0.8781	0.0906662	0.95756	0.92	1.05	0.20455	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	2	21WP	G16_069	'OKLAUNION 345KV'	0.968766	0.8781	0.0906662	0.95756	0.9	1.05	0.20455	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	2	21WP	G16_069	'OKLAUNION 345KV'	0.968766	0.8781	0.0906662	0.95756	0.92	1.05	0.20455	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	17WP	G16_069	'SHAMROCK 69KV'	0.941749	0.911219	0.0305302	0.95406	0.92	1.05	0.11505	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	2	18G	G16_069	'SHAMROCK 69KV'	0.921752	0.88782	0.0339316	0.94237	0.9	1.05	0.24409	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	G16_069	'SHAMROCK 69KV'	0.921752	0.88782	0.0339316	0.94237	0.92	1.05	0.24409	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	G16_069	'SHAMROCK 69KV'	0.921752	0.88782	0.0339316	0.94237	0.9	1.05	0.24409	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	G16_069	'SHAMROCK 69KV'	0.921752	0.88782	0.0339316	0.94237	0.92	1.05	0.24409	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	G16_069	'SHAMROCK 69KV'	0.94251	0.915854	0.0266567	0.94237	0.92	1.05	0.1788	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	G16_069	'SHAMROCK 69KV'	0.94251	0.915854	0.0266567	0.94237	0.92	1.05	0.1788	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18G	G16_069	'SHAMROCK 69KV'	0.945055	0.919173	0.0258818	0.94237	0.92	1.05	0.11983	'MATHWSN7 345.00 - TATONGA7 345.00 345KV CKT 1'
FDNS	06ALL	2	18G	G16_069	'SHAMROCK 69KV'	0.922272	0.895083	0.0271891	0.94237	0.9	1.05	0.11113	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	2	18G	G16_069	'SHAMROCK 69KV'	0.922272	0.895083	0.0271891	0.94237	0.92	1.05	0.11113	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	2	18G	G16_069	'SHAMROCK 69KV'	0.937177	0.90447	0.032707	0.94237	0.92	1.05	0.11113	'STLN-DEMARC6 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	2	18G	G16_069	'SHAMROCK 69KV'	0.938841	0.906155	0.0326868	0.94237	0.92	1.05	0.11113	'STATELINE INTERCHANGE - STLN-DEMARC6 230KV CKT 1'
FDNS	06ALL	2	18G	G16_069	'SHAMROCK 69KV'	0.9368	0.913242	0.0235581	0.94237	0.92	1.05	0.09395	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNS	06ALL	2	18G	G16_069	'SHAMROCK 69KV'	0.9368	0.913242	0.0235581	0.94237	0.92	1.05	0.09395	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNS	06ALL	2	18SP	G16_069	'SHAMROCK 69KV'	0.935303	0.907264	0.0280384	0.94903	0.92	1.05	0.24211	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18SP	G16_069	'SHAMROCK 69KV'	0.935303	0.907264	0.0280384	0.94903	0.92	1.05	0.24211	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	18SP	G16_069	'SHAMROCK 69KV'	0.937541	0.917034	0.0205072	0.94903	0.92	1.05	0.10953	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	2	21L	G16_069	'SHAMROCK 69KV'	0.937265	0.900091	0.0371735	0.96676	0.92	1.05	0.2307	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	21L	G16_069	'SHAMROCK 69KV'	0.937265	0.900091	0.0371735	0.96676	0.92	1.05	0.2307	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	21L	G16_069	'SHAMROCK 69KV'	0.927705	0.902827	0.0248773	0.96676	0.92	1.05	0.08368	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	2	21L	G16_069	'SHAMROCK 69KV'	0.940921	0.917392	0.0235285	0.96676	0.92	1.05	0.08368	'STLN-DEMARC6 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	2	21L	G16_069	'SHAMROCK 69KV'	0.939614	0.915541	0.0240734	0.96676	0.92	1.05	0.08368	'STATELINE INTERCHANGE - STLN-DEMARC6 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_069	'SHAMROCK 69KV'	0.943517	0.917985	0.0255317	0.94414	0.92	1.05	0.17366	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	21SP	G16_069	'SHAMROCK 69KV'	0.943517	0.917985	0.0255317	0.94414	0.92	1.05	0.17366	'Hitchland Interchange - POTTER COUNTY INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	21SP	G16_069	'SHAMROCK 69KV'	0.930159	0.903584	0.0265749	0.94414	0.92	1.05	0.09959	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_069	'SHAMROCK 69KV'	0.943987	0.919594	0.0243928	0.94414	0.92	1.05	0.09959	'STATELINE INTERCHANGE - STLN-DEMARC6 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_069	'SHAMROCK 69KV'	0.939921	0.918407	0.0215131	0.94414	0.92	1.05	0.08422	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNS	06ALL	2	21SP	G16_069	'SHAMROCK 69KV'	0.939921	0.918407	0.0215131	0.94414	0.92	1.05	0.08422	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNS	06ALL	2	21WP	G16_069	'SHAMROCK 69KV'	0.933042	0.889221	0.0438206	0.94727	0.9	1.05	0.25366	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	21WP	G16_069	'SHAMROCK 69KV'	0.933042	0.889221	0.0438206	0.94727	0.92	1.05	0.25366	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	21WP	G16_069	'SHAMROCK 69KV'	0.933042	0.889221	0.0438206	0.94727	0.9	1.05	0.25366	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	21WP	G16_069	'SHAMROCK 69KV'	0.933042	0.889221	0.0438206	0.94727	0.92	1.05	0.25366	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
FDNS	06ALL	2	21WP	G16_069	'SHAMROCK 69KV'	0.92306	0.895123	0.0279369	0.94727	0.9	1.05	0.09749	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	2	21WP	G16_069	'SHAMROCK 69KV'	0.92306	0.895123	0.0279369	0.94727	0.92	1.05	0.09749	'CHISHOLM6 230.00 - SWEETWATER 230KV CKT 1'
FDNS	06ALL	2	21WP	G16_069	'SHAMROCK 69KV'	0.940591	0.917227	0.0233641	0.94727	0.92	1.05	0.09749	'STLN-DEMARC6 - SWEETWATER 230KV CKT 1'
FDNSLock	06ALL	2	21WP	G16_069	'SHAMROCK 69KV'	0.946765	0.917519	0.0292466	0.94727	0.92	1.05	0.20455	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	2	21WP	G16_069	'SHAMROCK 69KV'	0.946765	0.917519	0.0292466	0.94727	0.92	1.05	0.20455	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
FDNSLock	06ALL	2	21WP	G16_069	'SHAMROCK 69KV'	0.937606	0.916765	0.0208413	0.94727	0.92	1.05	0.08245	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
FDNSLock	06ALL	2	21WP	G16_069	'SHAMROCK 69KV'	0.937606	0.916765	0.0208413	0.94727	0.92	1.05	0.08245	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'

Southwest Power Pool, Inc.

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

Available upon request

Southwest Power Pool, Inc.

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

Available upon request

Southwest Power Pool, Inc.

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

Available upon request

I: DYNAMIC STABILITY ANALYSIS REPORTS



Aeneden
Consulting

Submitted to
Southwest Power Pool



Report On

Definitive Interconnection System Impact Study
DISIS-2016-001-3 Study Group 6
ReStudy#3

Revision R2

Date of Submittal
April 11, 2019

anedenconsulting.com

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APPENDICES

- APPENDIX A: SPP Disturbance Performance Requirements
- APPENDIX B: DISIS-2016-001-3 Group 6 Generator Dynamic Models
- APPENDIX C: Dynamic Stability Simulation Plots

Executive Summary

Aneden Consulting (Aneden) was retained by the Southwest Power Pool (SPP) to complete the reactive power and dynamic stability analyses as part of the Definitive Interconnection System Impact Study DISIS-2016-001-3 ReStudy #3 (ReStudy#3) for South Texas Panhandle/New Mexico Area, defined as Group 6. The purpose of the analyses was to identify impacts to the transmission system caused by the active interconnection requests in Group 6 and develop mitigation upgrades or measures to resolve any detrimental impacts.

The DISIS-2016-001-3 Group 6 currently includes seven (7) generation interconnection requests shown in Table ES-1 below.

Table ES-1: DISIS-2016-001-3 Group 6 Interconnection Requests Evaluated

Request	Capacity (MW)	Generator Model	Point of Interconnection
GEN-2015-041	5 MW uprate to GEN-2013-016 (total power = 196 MW summer/208 MW winter)	GENROU (525845) (combustion turbine)	TUCO 345kV (525832)
GEN-2016-015	100	TMEIC 1.667MW PV inverters (solar)	Andrews 230kV (528604)
GEN-2016-056	200	GE 2.0MW (wind)	Carlisle 230 kV (526161)
GEN-2016-062	250.7	GE 2.3MW (wind)	Andrews 230kV (528604)
GEN-2016-069	31.4	Hanwha 3.8MW & Hanwha 0.95MW (solar)	Chaves County 115kV (527482)
ASGI-2016-002	0.35 MW uprate to ASGI-2015-002 (total power = 2.65MW)	GE 2.65MW (previously GE 2.3MW)	SP-Yuma 115kV (526475)
ASGI-2016-004	10	3 x Alstom 3.2MW & 4 x Renewtech 100kW	Palo Duro 115kV (524530)

Aneden performed reactive power and dynamic stability analyses using DISIS-2016-001-3 study models developed to reflect the system conditions for the current study generation interconnection requests - 2017 winter peak (2017WP), 2018 summer peak (2018SP) and 2026 summer peak (2026SP). All analyses were performed using the Siemens PTI PSS/E software version 33.7 and the results are summarized below.

The results of the reactive power analysis, also known as the low-wind/no-wind condition analysis or low-irradiance analysis, performed using all three models showed the following shunt reactor sizes may be needed at each project collector substation high voltage bus:

1. GEN-2016-015 – 0.8 MVAR
2. GEN-2016-056 – 7.6 MVAR
3. GEN-2016-062 – 12.7 MVAR
4. GEN-2016-069 – 0.4 MVAR

The dynamic stability analysis was performed using the three loading scenarios 2017WP, 2018SP and 2026SP simulating up to 243 fault conditions that included three-phase, single-line-to-ground faults with stuck and three phase faults on prior outage cases.

The dynamic stability analysis was performed without any of the steady state analysis mitigation upgrades in order to identify the potential system criteria violations prior to developing mitigation solutions. The stability analysis was also performed with one of the network upgrades identified by SPP in the steady state analysis and the complete set of network upgrades identified in the steady state analysis:

1. Select Steady State Network Upgrades (M1):
 - a. Tolk to Potter County 345 kV circuit 1.
2. Complete Steady State Network Upgrades (M2)
 - a. Tolk to Potter County 345 kV circuit 1.
 - b. Border to Chisholm 345 kV circuit 1
 - c. Crawfish Draw 345kV Switching Substation
 - i. Tap on Border to TUCO 345kV circuit 1
 - ii. Tap on OKU to TUCO 345kV circuit 1
 - d. Crawfish Draw to Tolk 345kV circuit 1

The M1 post-mitigation cases were simulated with the three phase and stuck breaker fault conditions to determine if that subset of network upgrades was sufficient. The subsequent three phase faults with prior outages were simulated with the M2 network upgrades in place.

For the pre-mitigation conditions, the system was stable during the simulated fault conditions, however, there were generator tripping, transient voltage recovery and post-contingency voltage violations. GEN-2016-015 tripped offline due to over frequency protection for faults close to its point of interconnection substation, Andrews 230 kV substation. Disabling the frequency protection relays prevents the unit tripping without adverse system impacts. The GEN-2016-015 customer will have to coordinate with the inverter manufacturer to verify that the generators will not trip for faults on the system with normal clearing time and provide the results to SPP.

There were transient voltage recovery violations (high voltage) observed at the Oklaunion 345 kV substation following the three-phase fault on the Oklaunion to Lawton Eastside 345 kV line. This fault results in the Oklaunion DC tie being blocked and the Oklaunion 345 kV substation, with up to 100 MVAR of DISIS-2015-002 assigned capacitor banks and the 90 MVAR HVDC capacitor filters to be radially connected to the TUCO 345 kV substation. This violation was also observed for the post-mitigation scenario with Tolk to Potter 345 kV circuit 1 applied. The recommended mitigation for this violation is to adjust the Oklaunion relays so that the Oklaunion 100 MVAR capacitor banks and the 90 MVAR HVDC capacitor filters are tripped when the Oklaunion to Lawton Eastside 345 kV line is tripped offline and the Oklaunion DC tie is blocked.

There were also steady state undervoltage violations observed at the Oklaunion 345 kV substation in the 17WP model in the pre-mitigation conditions and the Palmer 115 kV and Newhart 230 kV buses following some three-phase fault conditions. These undervoltage violations were resolved with the new Tolk to Potter County 345 kV line in-service.

Three phase faults were simulated with prior-outage conditions for both pre-mitigation and the M2 post-mitigation study models. The results showed that there were several system criteria violations with the pre-mitigation conditions. With the complete set of steady state network upgrades in place (M2), there were some faults that were not stable, the DISIS-2016-001 Group G6 generators may have to be curtailed by up to approximately 350 MW based on the most severe fault event simulated.

1.0 Introduction

Aneden Consulting (Aneden) was retained by the Southwest Power Pool (SPP) to complete the reactive power analysis and dynamic stability analysis as part of the Definitive Interconnection System Impact Study DISIS-2016-001-3 ReStudy #3 (ReStudy#3) for South Texas Panhandle/New Mexico Area, defined as Group 6. The purpose of the analyses was to identify impacts to the transmission system caused by the active interconnection requests in Group 6 and develop mitigation upgrades or measures to resolve any detrimental impacts.

The active DISIS-2016-001-3 Group 6 projects studied in this ReStudy#3 are listed below in Table 1-1 below.

Table 1-1: Active DISIS-2016-001-3 Group 6 Interconnection Requests

Request	Capacity (MW)	Generator Model	Point of Interconnection
GEN-2015-041	5 MW uprate to GEN-2013-016 (total power = 196 MW summer/208 MW winter)	GENROU (525845) (combustion turbine)	TUCO 345kV (525832)
GEN-2016-015	100	TMEIC 1.667MW PV inverters (solar)	Andrews 230kV (528604)
GEN-2016-056	200	GE 2.0MW (wind)	Carlisle 230 kV (526161)
GEN-2016-062	250.7	GE 2.3MW (wind)	Andrews 230kV (528604)
GEN-2016-069	31.4	Hanwha 3.8MW & Hanwha 0.95MW (solar)	Chaves County 115kV (527482)
ASGI-2016-002	0.35 MW uprate to ASGI-2015-002 (total power = 2.65MW)	GE 2.65MW (previously GE 2.3MW)	SP-Yuma 115kV (526475)
ASGI-2016-004	10	3 x Alstom 3.2MW & 4 x Renewtech 100kW	Palo Duro 115kV (524530)

The active Higher Queued Group 6 projects studied in this ReStudy#3 are listed below in Table 1-2 below.

Table 1-2: Active Higher Queued Group 6 Interconnection Requests

Request	Size (MW)	Generator Model	Point of Interconnection
GEN-2001-033	180	Mitsubishi 1000 (524890 & 524896)	San Juan Mesa 230kV (524885)
GEN-2001-036	80	Mitsubishi 1000 (599138)	Norton 115kV (524502)
GEN-2006-018	170	GENSAL (525841, 525842, 525843)	TUCO 230kV (525830)
GEN-2006-026	502	GENROU (527901, 527902, 527903)	Hobbs 115kV (527891) Hobbs 230kV (527894)
GEN-2008-022	300	Vestas 2.0MW (599157, 599159, 577120)	Tap on Eddy County – Tolk 345kV line (G08-022-POI, 560007)
GEN-2010-006	180 Summer 205 Winter	GENROU (526333)	Jones_bus2 230kV (526337)
ASGI-2010-010	42	GENSAL (528331)	Lovington 115kV (528334)

Table 1-2 continued

Request	Size (MW)	Generator Model	Point of Interconnection
ASGI-2010-020	29.9	GE 2.3MW (580088)	Tap LE-Tatum to LE-Crsroads 69kV (AS10-020-POI, 560360)
ASGI-2010-021	15	Vestas 1.65MW (580083) & Vestas 2.0MW 580086	Tap LE-Saundrtp to LE-Anderson 69kV (ASGI-021-POI, 560364)
GEN-2010-046	56	GENSAL (580043)	TUCO 230kV (525830)
ASGI-2011-001	27.3	Suzlon 2.1MW (579423)	Lovington 115kV (528334)
ASGI-2011-003	10	Sany 2.0MW (579433)	Hendricks 69kV (525943)
ASGI-2011-004	19.8	Sany 1.8MW (583193 & 583196)	Crosby 69kV (525915)
GEN-2011-025	79.96	GE 1.715MW (581140), GE 2.0MW (581141), GE 2.1MW (581142), GE 2.3MW (581143)	Tap on Floyd County - Crosby County 115kV line (G11-025-POI, 562004)
GEN-2011-045	180 Summer 205 Winter	GENROU (526334)	Jones_bus2 230kV (526337)
GEN-2011-046	23 Summer 27 Winter	GENROU (524471)	Quay County 115kV (524472)
GEN-2011-048	165 Summer 175 Winter	GENROU (unit 6; 527166)	Mustang 230kV (527151)
GEN-2012-001	61.2	CCWE 3.6MW (599126)	Tap Grassland to Borden 230kV (526679)
ASGI-2012-002	18.15	Vestas 1.65MW V82 (583283)	Clovis 115kV (524808)
GEN-2012-020	477.12	GE 1.68MW (599152 & 599155)	TUCO 230kV (525830)
GEN-2012-034	7 increase; total power = 157MW	GENROU (unit 4; 527164)	Mustang 230kV (527151)
GEN-2012-035	7 increase; total power = 157MW	GENROU (unit 5; 527165)	Mustang 230kV (527151)
GEN-2012-036	7 increase; total power = 172MW Summer/182M W Winter	GENROU (unit 6; 527166)	Mustang 230kV (527151)
GEN-2012-037	196 Summer 203 Winter	GENROU (525844)	TUCO 345kV (525832)
GEN-2013-016	191 Summer 203 Winter	GENROU (525845)	TUCO 345kV (525832)
ASGI-2013-002	18.4	Siemens 2.3MW VS (583613)	Tucumcari 115kV (524509)
ASGI-2013-003	18.4	Siemens 2.3MW VS (583623)	Clovis 115kV (524808)
ASGI-2013-005	1.65 increase; total power = 19.8 MW	Vestas V82 1.65MW (583283)	FE-Clovis 115kV (524808)
GEN-2013-022	24.2	Solaron 500kW (583313)	Caprock 115kV (524486)
GEN-2014-033	70	17 X GE Prolec 4MVA, 2 X GE Prolec 1 MVA (527451), & 5 X Schneider XC680 0.680 MVA PV inverter (583956)	Chaves County 115kV
GEN-2014-034	70	17 X GE Prolec 4MVA PV inverter (527461)	Chaves County 115kV
GEN-2014-035	30	8 X GE Prolec 4MVA PV inverter (583973)	Chaves County 115kV
ASGI-2015-002	2.3	GE 2.3MW (584723)	Yuma Interchange 115/69kV (526469)
GEN-2015-014	149.99	GE 1.715MW (584563), GE 2.0MW (584564), GE 2.3MW (584565)	Tap on Cochran – LG Plains 115kV (560030)
GEN-2015-020	99.96	Eaton Power Xpert Solar 1.67MW (584623)	Oasis 115kV (524874)
GEN-2015-056	101.2	GE 2.3 MW (584943)	Crossroads 345kV (527656) (Tap Eddy (527802) to ToIk (525549))

1.1 Scope

The Study included reactive power and dynamic stability analyses. The methodology, assumptions and results of the analyses are presented in the following four main sections:

1. Study Assumptions and Criteria
2. Reactive Power Analysis
3. Dynamic Stability Analysis
4. Conclusions

1.2 Study Limitations

The assessments and conclusions provided in this report are based on assumptions and information provided to Aneden by others. While the assumptions and information provided may be appropriate for the purposes of this report, Aneden does not guarantee that those conditions assumed will occur. In addition, Aneden did not independently verify the accuracy or completeness of the information provided. As such, the conclusions and results presented in this report may vary depending on the extent to which actual future conditions differ from the assumptions made or information used herein.

2.0 Study Assumptions and Criteria

The reactive power and dynamic stability analyses were performed using the PTI PSS/E software version 33.7. The main assumptions and criteria applied in the study are summarized in the sections below.

2.1 Study System

The study system for the dynamic stability analysis consisted of generators and transmission buses at or above 115 kV within five (5) buses of the DISIS-2016-001-3 Group 6 projects in the monitored areas listed in Table 2-1 below.

Table 2-1: Monitored Areas

Area Number	Name
520	AEPW
524	OKGE
525	WFEC
526	SPS
531	MIDW
534	SUNC
536	WERE

2.2 Study Models

The reactive power and dynamic stability analyses were completed using the models developed from the 2016 SPP Model Development Working Group (MDWG) PSS/E models. Table 2-2 summarizes the study models used for each analysis.

Table 2-2: Study Models

Case Name	Reactive Power	Dynamic Stability
17W_DIS15027_G06	X	X
18S_DIS15027_G06	X	X
26S_DIS15027_G06	X	X

2.3 Group 6 Interconnection Request Configurations

The model configurations for the Group 6 projects in the study models are shown in Figure 2-1 through Figure 2-7 below.

Figure 2-1: GEN-2015-041 Single Line Diagram

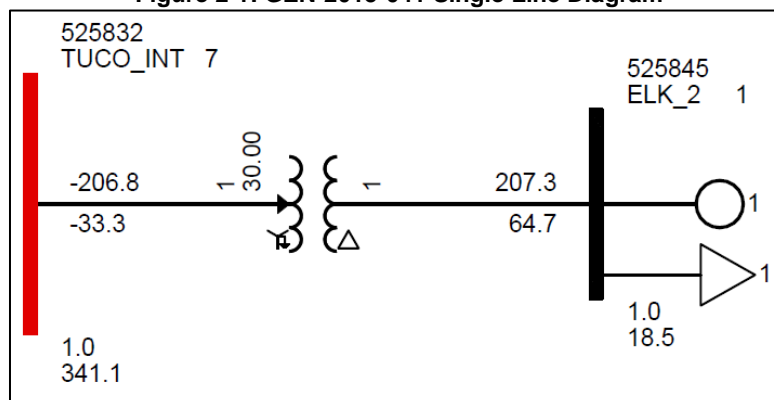


Figure 2-2: GEN-2016-015 Single Line Diagram

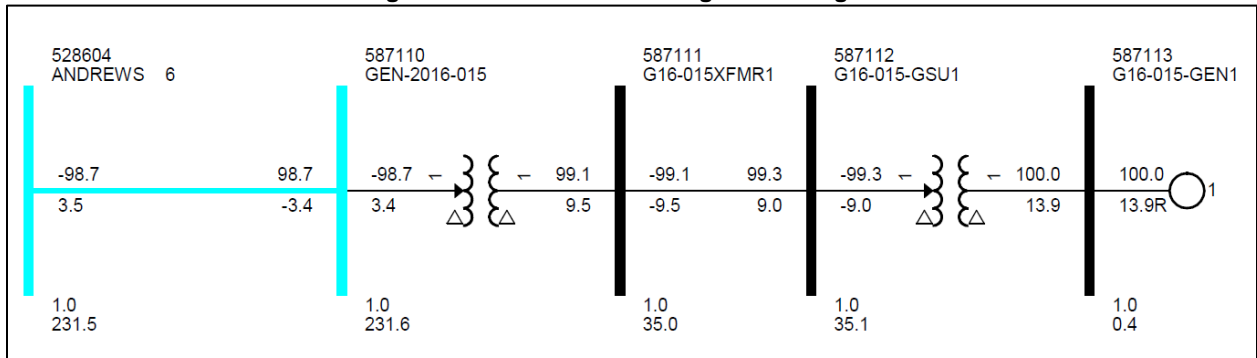


Figure 2-3: GEN-2016-056 Single Line Diagram

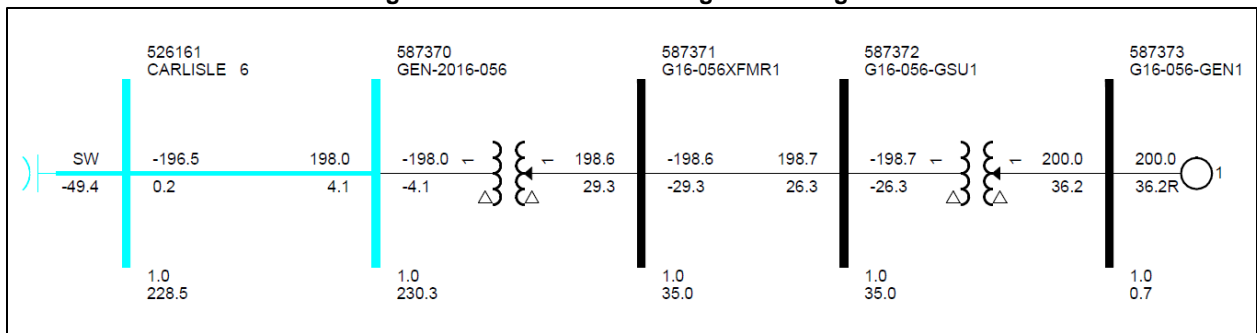


Figure 2-4: GEN-2016-062 Single Line Diagram

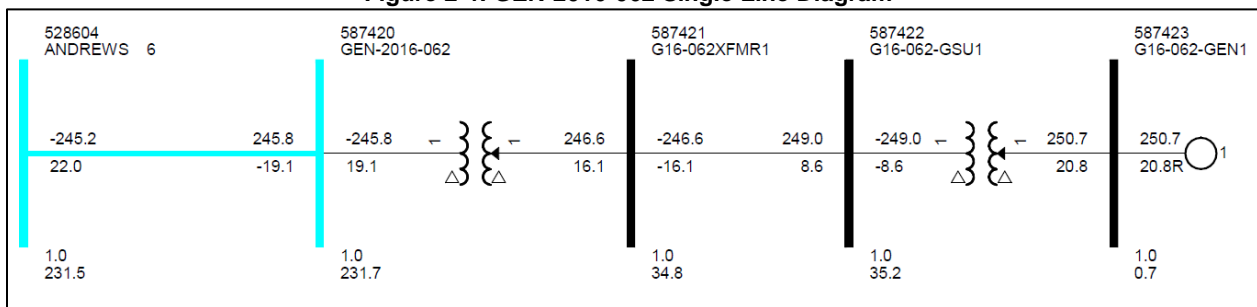


Figure 2-5: GEN-2016-069 Single Line Diagram

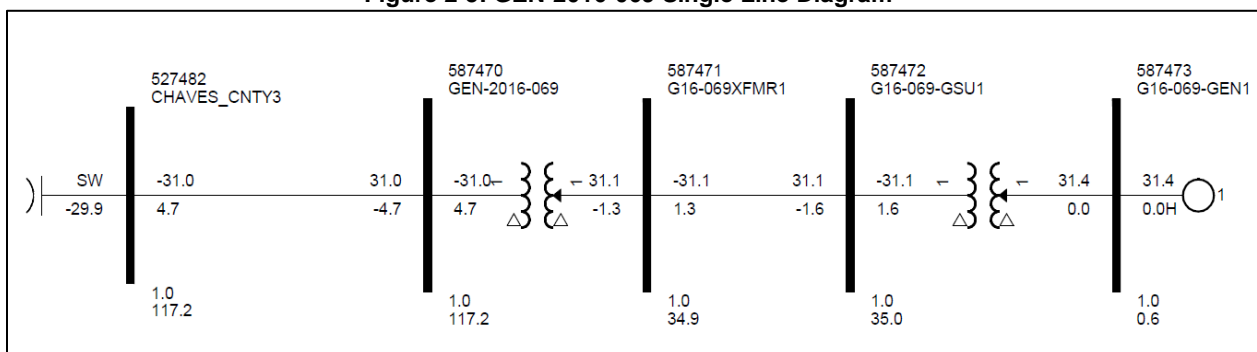


Figure 2-6: ASGI-2016-002 Single Line Diagram

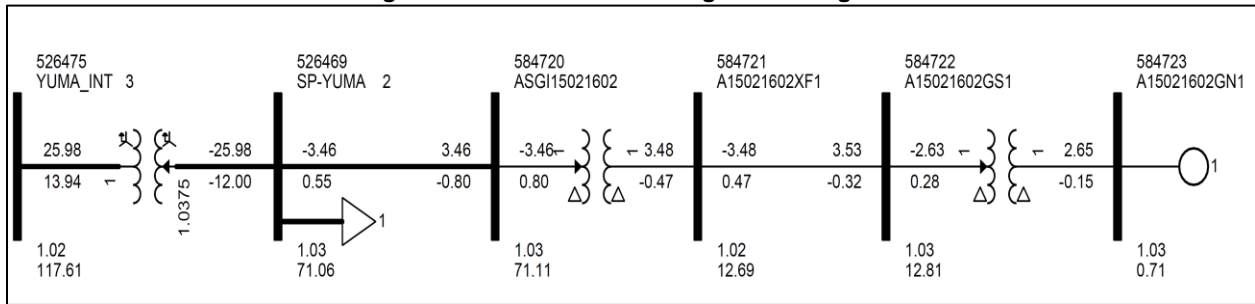
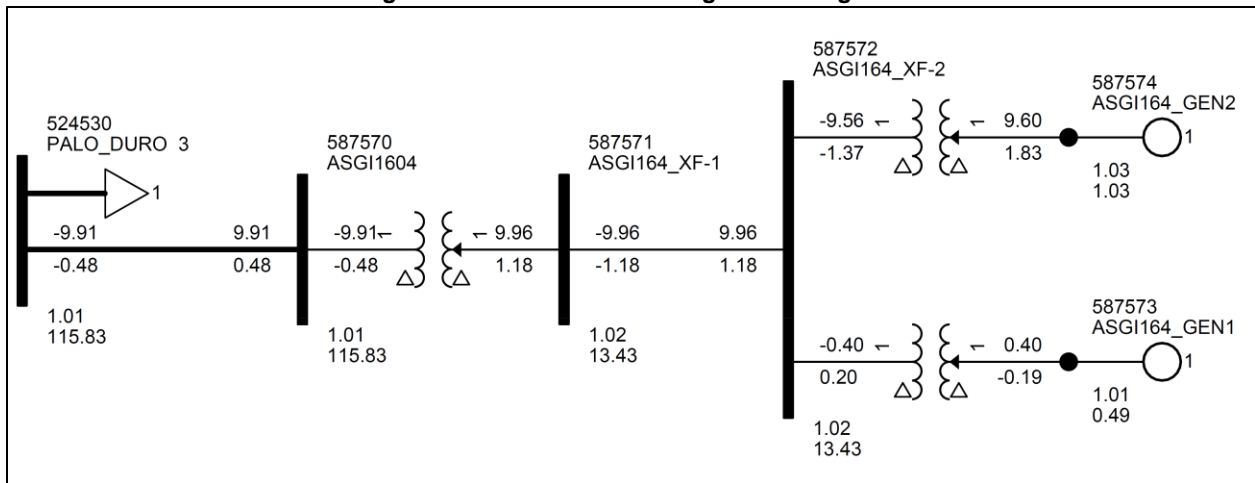


Figure 2-7: ASGI-2016-004 Single Line Diagram



2.4 Dynamic Performance Requirements

The dynamic stability analysis results were assessed according to the following excerpt from SPP’s Disturbance Performance Requirements. The complete document is provided in Appendix A.

“Machine Rotor Angles shall exhibit well damped angular oscillations following a disturbance on the Bulk Electric System for all NERC TPL-001-4 P1 through P7 events. Machines with rotor angle deviations greater than or equal to 16 degrees (measured as absolute maximum peak to absolute minimum peak) shall be evaluated against SPPR1 or SPPR5 requirements below. Machines with rotor angle deviations less than 16 degrees which do not exhibit convergence shall be evaluated on an individual basis. Rotor angle deviations will be calculated relative to the system swing machine.

Well damped angular oscillations shall meet one of the following two requirements when calculated directly from the rotor angle:

1. Successive Positive Peak Ratio One (SPPR1) must be less than or equal to 0.95 where

SPPR1 is calculated as follows:

$$\text{SPPR1} = \frac{\text{Peak Rotor Angle of 2nd Positive Peak minus Minimum Value}}{\text{Peak Rotor Angle of 1st Positive Peak minus Minimum Value}} \leq 0.95$$

-or- $\text{Damping Factor \%} = (1 - \text{SPPR1}) \times 100\% \geq 5\%$

The machine rotor angle damping ratio may be determined by appropriate modal analysis (i.e. Prony Analysis) where the following equivalent requirement must be met:

$$\text{Damping Ratio} \geq 0.0081633$$

2. Successive Positive Peak Ratio Five (SPPR5) must be less than or equal to 0.774 where

SPPR5 is calculated as follows:

$$\text{SPPR5} = \frac{\text{Peak Rotor Angle of 6th Positive Peak minus Minimum Value}}{\text{Peak Rotor Angle of 1st Positive Peak minus Minimum Value}} \leq 0.774$$

-or- $\text{Damping Factor \%} = (1 - \text{SPPR5}) \times 100\% \geq 22.6\%$

The machine rotor angle damping ratio may be determined by appropriate modal analysis (i.e. Prony Analysis) where the following equivalent requirement must be met:

$$\text{Damping Ratio} \geq 0.0081633$$

Bus voltages on the Bulk Electric System shall recover above 0.70 per unit, 2.5 seconds after the fault is cleared. Bus voltages shall not swing above 1.20 per unit after the fault is cleared, unless affected transmission system elements are designed to handle the rise above 1.2 per unit.”

3.0 Reactive Power Analysis

The reactive power analysis, also known as the low-wind/no-wind condition analysis or low-irradiance analysis, was performed for the Group 6 wind/solar projects to determine the reactive power contribution from each project’s interconnection line and collector transformer and cables during low/no generator output conditions while each project is still connected to the grid and to size shunt reactors that would reduce the project reactive power contribution to the POI to approximately zero. The reactive power analysis was performed using the three DISIS-2016-001-3 Group 6 study models, 2017WP, 2018SP and 2026SP.

3.1 Methodology and Criteria

Each Group 6 project wind/solar generator was switched out of service while other collector system elements remained in-service. A shunt reactor was tested at the study project substation high side bus to bring the MVar flow into the POI down to approximately zero.

3.2 Results

The results from the reactive power analysis showed that the Group 6 projects each required varying shunt reactance at the high side of the project substation, to reduce the POI MVar to zero. This represents the contributions from each project’s collector systems. Figure 3-1, Figure 3-2, Figure 3-3, and Figure 3-4 illustrate the shunt reactor size required to reduce the MVar flow into the POI to approximately zero. Reactive compensation can be provided either by discrete reactive devices or by the generator itself if it possesses that capability.

Table 3-1: Shunt Reactors for Low Wind Study

Machine	POI Bus Number	POI Bus Name	Reactor Size (MVar)		
			17WP	18SP	26SP
GEN-2016-015	528604	ANDREWS 6	0.8	0.8	0.8
GEN-2016-056	526161	CARLISLE 6	7.6	7.6	7.6
GEN-2016-062	528604	ANDREWS 6	12.7	12.7	12.7
GEN-2016-069	527482	CHAVES COUNTY 3	0.4	0.4	0.4

Figure 3-1: GEN-2016-015 Shunt Reactor

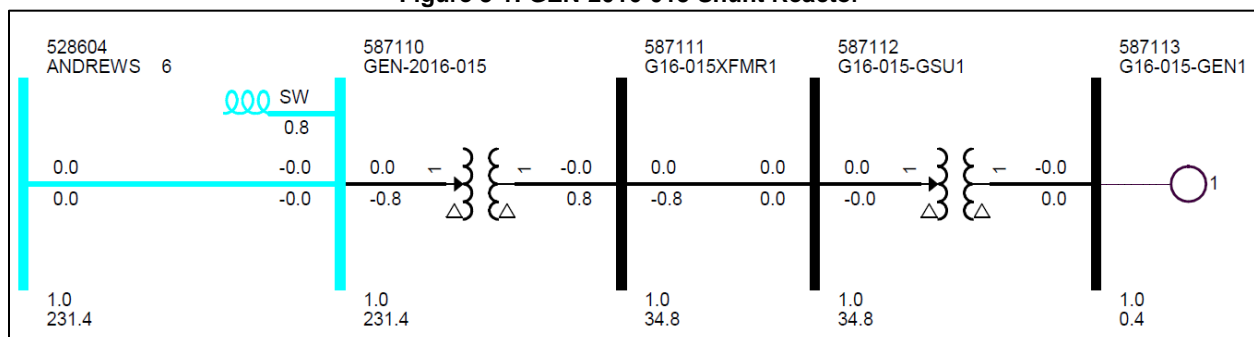


Figure 3-2: GEN-2016-056 Shunt Reactor

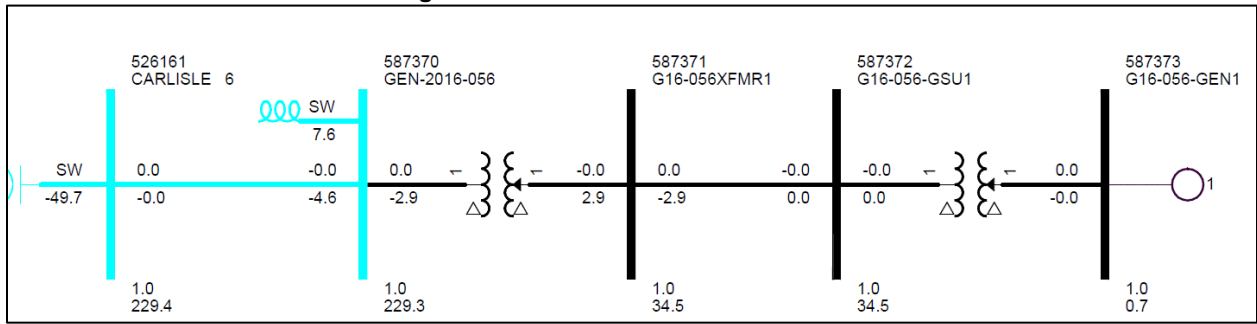


Figure 3-3: GEN-2016-062 Shunt Reactor

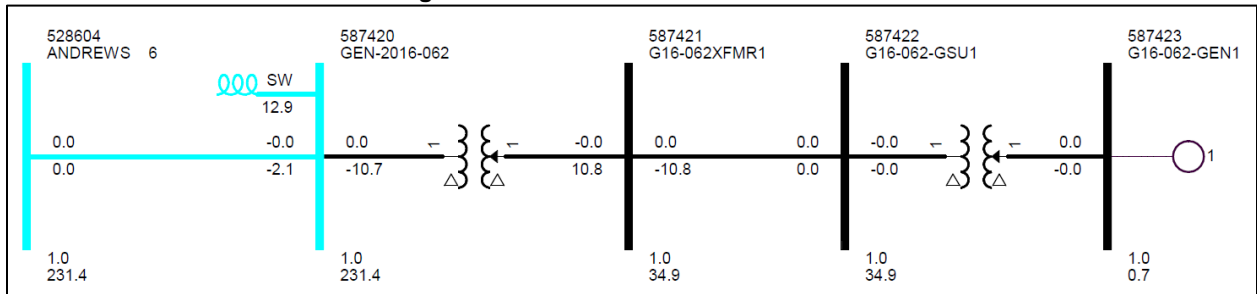
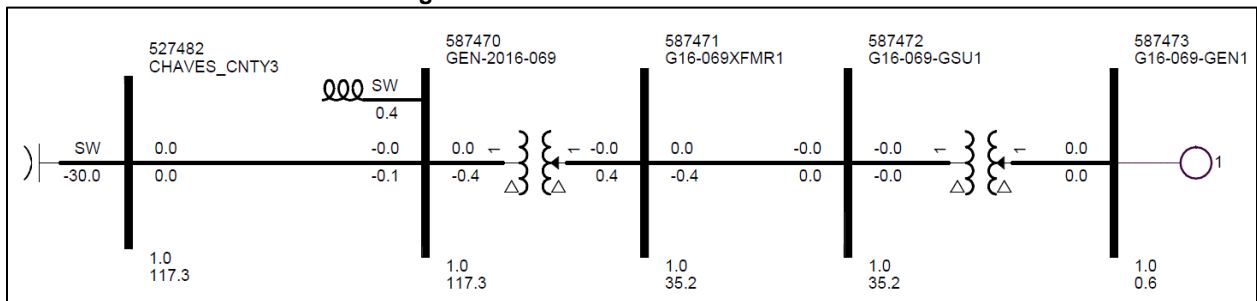


Figure 3-4: GEN-2016-069 Shunt Reactor



4.0 Dynamic Stability Analysis

Aneden performed a dynamic stability analysis to assess the system performance and identify any system stability issues associated with DISIS-2016-001-3 ReStudy#3 Group 6 interconnection requests. The analysis was performed according to SPP's Disturbance Performance Requirements. The Group 6 project dynamic modeling data is provided in Appendix B. The simulation plots can be found in Appendix C.

4.1 Methodology and Criteria

The dynamic stability analysis was performed using the DISIS-2016-001-3 (Group 6) study models described in Section 2.2 above. The power flow models and associated dynamics database were initialized (no-fault test) to confirm that there were no errors in the initial conditions of the immediate system and the dynamic data. The dynamics model data for the DISIS-2016-001-3 (Group 6) requests is provided in Appendix B. The stability analysis was performed using PSS/E version 33.7.

During the fault simulations, the active power (PELEC), reactive power (QELEC), terminal voltage (ETERM), and frequency (FREQ) were monitored for the Group 6 generation interconnection requests. The machine rotor angle for synchronous machines and speed for asynchronous machines within five (5) buses away from the POI of each of the Group 6 projects and within the study area including 520 (AEPW), 524 (OKGE), 525 (WFEC), 526 (SPS), 531 (MIDW), 534 (SUNC) and 536 (WERE) were monitored. In addition, the voltages of all 115 kV and above buses within the study area were monitored.

4.2 Fault Definitions

Aneden developed two hundred and forty-three (243) faults including three-phase line faults with reclosing (P1), three-phase transformer faults with normal clearing (P1) and single-line-to-ground (SLG) fault with stuck breaker (P4) and three phase faults on prior outage cases (P6). The SLG fault impedance values were determined by applying a fault on the base case large enough to produce a 0.6 pu voltage value on the faulted bus. The fault events are described in Table 4-1 below. These contingencies were applied to the 2017 winter peak, 2018 summer peak, and the 2026 summer peak models.

Table 4-1: Fault Definitions (P1, P4)

Fault ID	Fault Description
FLT01-3PH	3 phase fault on Chaves County 115 kV (527482) to Samson 115 kV (527546) CKT 1, near Chaves County. a. Apply fault at the Chaves County 115 kV bus. b. Clear fault after 5 cycles and trip the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT02-3PH	3 phase fault on Chaves County 115 kV (527482) to Urton 115 kV (527501) CKT 1, near Chaves County. a. Apply fault at the Chaves County 115 kV bus. b. Clear fault after 5 cycles and trip the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT03-3PH	3 phase fault on the Chaves County 115 kV (527482) to Chaves County 230 kV (527483) to Chaves County 13.2 kV (527478) XFMR CKT 1, near Chaves County 115 kV. a. Apply fault at the Chaves County 115 kV bus. b. Clear fault after 5 cycles and trip the faulted transformer.

Table 4-1 continued

Fault ID	Fault Description
FLT04-3PH	3 phase fault on Chaves County 230 kV (527483) to San Juan Tap 230 kV (524885) CKT 1, near Chaves County. a. Apply fault at the Chaves County 230 kV bus. b. Clear fault after 5 cycles and trip the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT05-3PH	3 phase fault on Chaves County 230 kV (527483) to Eddy North 230 kV (527799) CKT 1, near Chaves County. a. Apply fault at the Chaves County 230 kV bus. b. Clear fault after 5 cycles and trip the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT06-3PH	3 phase fault on Samson 115 kV (527546) to Roswell_Int 115 kV (527564) CKT 1, near Samson. a. Apply fault at the Samson 115 kV bus. b. Clear fault after 5 cycles and trip the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT07-3PH	3 phase fault on Urton 115 kV (527501) to Roswell City 115 kV (527522) CKT 1, near Urton. a. Apply fault at the Urton 115 kV bus. b. Clear fault after 5 cycles and trip the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT10-SB	Single phase fault with stuck breaker at Chaves County (527482) a. Apply fault at the Chaves 115 kV bus. b. Clear fault after 16 cycles and trip the following elements c. Chaves County 115 kV (527482)/ 230 kV (527483)/13.2 kV (527479) transformer d. Chaves County (527482) - Samson (527546) 115 kV
FLT11-3PH	3 phase fault on the FE-Bailey County (525028) to FE-Curry (524822) 115 kV line circuit 1, near FE-Bailey County. a. Apply fault at the FE-Bailey County 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT13-3PH	3 phase fault on the FE-Bailey County 115 kV (525028) to Bailey County 2 69 kV (525027) to Bailey transformer 1 13.2 kV (525025) XFMR CKT 1, near FE-Bailey County 115 kV. a. Apply fault at the FE-Bailey County 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.
FLT14-3PH	3 phase fault on the FE-Bailey County (525028) to EMU&VLY Tap (525019) 115 kV line circuit 1, near FE-Bailey County. a. Apply fault at the FE-Bailey County 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT15-3PH	3 phase fault on the FE-Curry (524822) to DS#20 (524669) 115 kV line circuit 1, near FE-Curry. a. Apply fault at the FE-Curry 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT16-3PH	3 phase fault on the FE-Curry (524822) to Norris Tap (524764) 115 kV line circuit 1, near FE-Curry. a. Apply fault at the FE-Curry 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.

Table 4-1 continued

Fault ID	Fault Description
FLT17-3PH	3 phase fault on the FE-Curry (524822) to E_Clovis (524773) 115 kV line circuit 1, near FE-Curry. a. Apply fault at the FE-Curry 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT18-3PH	3 phase fault on the FE-Curry (524822) to FE_Clovis2 (524838) 115 kV line circuit 1, near FE-Curry. a. Apply fault at the FE-Curry 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT19-3PH	3 phase fault on the FE-Curry (524822) to Roosevelt (524908) 115 kV line circuit 2, near FE-Curry. a. Apply fault at the FE-Curry 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT20-3PH	3 phase fault on the FE-Curry 115 kV (524822) to Curry 69 kV (524821) to Curry 13.2 kV (524819) XFMR CKT 1, near FE-Curry 115 kV. a. Apply fault at the FE-Curry 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.
FLT21-3PH	3 phase fault on the Oasis (524874) to Perimeter (524797) 115 kV line circuit 1, near Oasis. a. Apply fault at the Oasis 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT22-3PH	3 phase fault on the Oasis (524874) to FE-Chzplt (524863) 115 kV line circuit 1, near Oasis. a. Apply fault at the Oasis 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT23-3PH	3 phase fault on the FE-Chzplt (524863) to Norris Tap (524764) 115 kV line circuit 1, near FE-Chzplt. a. Apply fault at the FE-Chzplt 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT24-3PH	3 phase fault on the Perimeter (524797) to Cannon Top (524790) 115 kV line circuit 1, near Perimeter. a. Apply fault at the Perimeter 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT25-3PH	3 phase fault on the Oasis (524874) to Portales (524924) 115 kV line circuit 1, near Oasis. a. Apply fault at the Oasis 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT26-3PH	3 phase fault on the Portales (524924) to Roosevelt (524908) 115 kV line circuit 1, near Oasis. a. Apply fault at the Portales 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT27-3PH	3 phase fault on the Portales 115 kV (524924) to Portales 69 kV (524923) to Portales 13.2 kV (524921) XFMR CKT 1, near Portales 115 kV. a. Apply fault at the Portales 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.

Table 4-1 continued

Fault ID	Fault Description
FLT28-3PH	3 phase fault on the Oasis 115 kV (524874) to Oasis 230 kV (524875) to Oasis 13.2 kV (524872) XFMR CKT 1, near Oasis 115 kV. a. Apply fault at the Oasis 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.
FLT29-3PH	3 phase fault on the Oasis (524875) to San Juan Tap (524885) 230 kV line circuit 1, near Oasis. a. Apply fault at the Oasis 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT30-3PH	3 phase fault on the Oasis (524875) to SW_4k33 (524915) 230 kV line circuit 1, near Oasis. a. Apply fault at the Oasis 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT31-3PH	3 phase fault on the Oasis (524875) to Pleasant Hill (524770) 230 kV line circuit 1, near Oasis. a. Apply fault at the Oasis 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT34-3PH	3 phase fault on the Swisher (525213) to Amarillo South (524415) 230 kV line circuit 1, near Swisher. a. Apply fault at the Swisher 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT35-3PH	3 phase fault on the Amarillo South (524415) to Swisher (525213) 230 kV line circuit 1, near Amarillo South. a. Apply fault at the Amarillo South 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT36-3PH	3 phase fault on the Swisher 230 kV (525213) to Swisher 115 kV (525212) to Swisher 13.2 kV (525211) XFMR CKT 1, near Swisher 230 kV. a. Apply fault at the Swisher 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.
FLT37-3PH	3 phase fault on the Swisher (525213) to TUCO Int (525830) 230 kV line circuit 1, near Swisher. a. Apply fault at the Swisher 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT38-3PH	3 phase fault on the Swisher (525213) to Newhart (525461) 230 kV line circuit 1, near Swisher. a. Apply fault at the Swisher 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT39-3PH	3 phase fault on the Amarillo South 230 kV (524415) to Amarillo South 115 kV (524414) to Amarillo South 13.2 kV (524410) XFMR CKT 1, near Amarillo South 230 kV. a. Apply fault at the Amarillo 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.
FLT40-3PH	3 phase fault on the Amarillo South (524415) to Nichols (524044) 230 kV line circuit 1, near Amarillo South. a. Apply fault at the Amarillo South 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.

Table 4-1 continued

Fault ID	Fault Description
FLT41-3PH	3 phase fault on the Amarillo South (524415) to Randal (524365) 230 kV line circuit 1, near Amarillo South. a. Apply fault at the Amarillo South 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT42-SB	Single phase fault with stuck breaker at Swisher (525213) a. Apply fault at the Swisher 230 kV bus. b. Clear fault after 16 cycles and trip the following elements c. Swisher 230 kV (525213)/ 115 kV (525212)/13.2 kV (525211) transformer d. Swisher (525213) – TUCO (525830) 230 kV
FLT43-3PH	3 phase fault on the TUCO Int (525832) to OKU (511456) 345 kV line circuit 1, near TUCO Int. a. Apply fault at the TUCO Int 345 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 30 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT45-3PH	3 phase fault on the TUCO Int (525832) to Border (515458) 345 kV line circuit 1, near TUCO. a. Apply fault at the TUCO 345 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT46-3PH	3 phase fault on the TUCO 345 kV (525832) to TUCO 230 kV (525830) to TUCO 13.2 kV (525824) XFMR CKT 1, near TUCO 345 kV bus. a. Apply fault at the TUCO 345 kV bus. b. Clear fault after 5 cycles by tripping the transformer
FLT48-3PH	3 phase fault on the OKU (511456) to Oklaun (599891) 345 kV line circuit 1, near OKU. a. Apply fault at the OKU 345 kV bus. b. Clear fault after 5 cycles by tripping the faulted line and remove the fault. c. Block the DC tie at OKU.
FLT49-3PH*	3 phase fault on the OKU (511456) to Lawton Eastside (511468) 345 kV line circuit 1, near OKU. a. Apply fault at the OKU 345 kV bus. b. Clear fault after 5 cycles by tripping the faulted line, block the HVDC. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault. e. Block the DC tie.
FLT52-3PH	3 phase fault on the Plant X (525481) to Deaf Smith (524623) 230 kV line circuit 1, near Plant X. a. Apply fault at the Plant X 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT54-3PH	3 phase fault on the Deaf Smith (524623) to Bushland (524267) 230 kV line circuit 1, near Deaf Smith. a. Apply fault at the Deaf Smith 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT55-3PH	3 phase fault on the Deaf Smith 230 kV (524623) to Deaf Smith 115 kV (524622) to Deaf Smith 13.2 kV (524620) XFMR CKT 1, near Deaf Smith 230 kV. a. Apply fault at the Deaf Smith 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.

*Operational Measure Included as Sensitivity to trip OKU Capacitors when DC Tie is Blocked to Mitigate Violations

Table 4-1 continued

Fault ID	Fault Description
FLT56-3PH	3 phase fault on the Plant X (525481) to Tolk East (525524) 230 kV line circuit 2, near Plant X. a. Apply fault at the Plant X 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT57-3PH	3 phase fault on the Plant X (525481) to Newhart (525461) 230 kV line circuit 1, near Plant X. a. Apply fault at the Plant X 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT58-3PH	3 phase fault on the Plant X (525481) to Tolk West (525531) 230 kV line circuit 1, near Plant X. a. Apply fault at the Plant X 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault..
FLT59-3PH	3 phase fault on the Plant X (525481) to Sundown (526435) 230 kV line circuit 1, near Plant X. a. Apply fault at the Plant X 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT60-3PH	3 phase fault on the Plant X 230 kV (525481) to Plant X 115 kV (525480) to Plant X 13.2 kV (525479) XFMR CKT 1, near Plant X 230 kV. a. Apply fault at the Plant X 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.
FLT61-SB	Single phase fault with stuck breaker on the Tolk West (525531) to Plant X (525481) 230 kV circuit #1 line, near Tolk West. a. Apply fault at the Tolk West 230 kV bus. b. Run 5 cycles, and then open Plant X end of the faulted line. c. Run 10 cycles, and then clear the fault and disconnect Tolk West 230 kV bus (525531).
FLT62-SB	Single phase fault with stuck breaker on the Tolk East (525524) to Plant X (525481) 230 kV line circuit #2, near Tolk East. a. Apply fault at the Tolk East 230 kV bus. b. Run 5 cycles, and then open Plant X end of the faulted line. c. Run 10 cycles, and then clear the fault and disconnect Tolk East 230 kV bus (525524).
FLT63-3PH	3 phase fault on the Mustang (527149) to Amocowasson (526784) 230 kV line circuit 1, near Mustang. a. Apply fault at the Mustang 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT64-3PH	3 phase fault on the Mustang 230 kV (527149) to Mustang 115 kV (527146) to Mustang 13.2 kV (527143) XFMR CKT 1, near Mustang 230 kV. a. Apply fault at the Mustang 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.
FLT65-3PH	3 phase fault on the Mustang (527149) to Yoakum (526935) 230 kV line circuit 1, near Mustang. a. Apply fault at the Mustang 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT66-3PH	3 phase fault on the Mustang (527149) to Seminole (527276) 230 kV line circuit 1, near Mustang. a. Apply fault at the Mustang 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.

Table 4-1 continued

Fault ID	Fault Description
FLT67-3PH	3 phase fault on the Seminole 230 kV (527276) to Seminole 115 kV (527275) to Seminole 13.2 kV (527273) XFMR CKT 1, near Seminole 230 kV. a. Apply fault at the Seminole 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.
FLT68-3PH	3 phase fault on the Amocowasson (526784) to BRU_SUB 6 (527009) 230 kV line circuit 1, near Amocowasson. a. Apply fault at the Amocowasson 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT69-3PH	3 phase fault on the Yoakum (526935) to G13-027-TAP (562480) 230 kV line, near Yoakum. a. Apply fault at the Yoakum 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT70-3PH	3 phase fault on the Yoakum 230 kV (526935) to Yoakum 115 kV (526934) to Yoakum 13.2 kV (526932) XFMR CKT 2, near Yoakum 230 kV. a. Apply fault at the Yoakum 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.
FLT71-3PH	3 phase fault on the Mustang (527146) to Denver North (527130) 115 kV line circuit 1, near Mustang. a. Apply fault at the Mustang 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT72-3PH	3 phase fault on the Mustang (527146) to Seagraves (527202) 115 kV line circuit 1, near Mustang. a. Apply fault at the Mustang 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT73-3PH	3 phase fault on the Mustang (527146) to Denver South (527136) 115 kV line circuit 2, near Mustang. a. Apply fault at the Mustang 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT74-3PH	3 phase fault on the Mustang (527146) to Shell Co (527062) 115 kV line circuit 1, near Mustang. a. Apply fault at the Mustang 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT75-3PH	3 phase fault on the Yoakum (526935) to Amoco-SS (526460) 230 kV line, near Yoakum. a. Apply fault at the Yoakum 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT76-3PH	3 phase fault on the Yoakum (526935) to BRU_SUB 6 (527009) 230 kV line, near Yoakum. a. Apply fault at the Yoakum 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT77-3PH	3 phase fault on the Yoakum (526935) to GEN-2015-079 Tap (560059) 230 kV line, near Yoakum. a. Apply fault at the Yoakum 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.

Table 4-1 continued

Fault ID	Fault Description
FLT78-SB	Single phase fault with stuck breaker at Mustang (527149) a. Apply fault at the Mustang 230 kV bus. b. Clear fault after 16 cycles and trip the following elements c. Mustang 230 kV (527149) /115 kV (527146)/13.2 kV (527143) transformer d. Mustang (527149) - Amocowasson (526784) 230 kV
FLT79-SB	Single phase fault with stuck breaker on the Tolk West (525531) to GEN-2013-027 (562480) 230 kV line, near Tolk West. a. Apply fault at the Tolk West 230 kV bus. b. Run 5 cycles, and then open GEN-2013-027 end of the faulted line. c. Run 10 cycles, and then clear the fault and disconnect Tolk West 230 kV bus (525531).
FLT80-SB	Single phase fault with stuck breaker on the Yoakum (526935) to GEN-2013-027 (562480) 230 kV line, near Yoakum. a. Apply fault at the Yoakum 230 kV bus. b. Run 5 cycles, and then open GEN-2013-027 end of the faulted line. c. Run 10 cycles, and then clear the fault and open Yoakum end of the line in (b) and trip Yoakum (526935) to Yoakum 115 (526934)/13.2 kV (526931) transformer circuit #1.
FLT81-SB	Single phase fault with stuck breaker on the Yoakum (526935) to Amoco-SS (526460) 230 kV line, near Yoakum. a. Apply fault at the Yoakum 230 kV bus. b. Run 5 cycles, and then open Amoco-SS end of the faulted line. c. Run 10 cycles, and then clear the fault and trip Yoakum 230 kV (526935) bus.
FLT84-3PH	3 phase fault on the Woodward (515375) to Border (515458) 345 kV line circuit 1, near Woodward. a. Apply fault at the Woodward 345 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT85-3PH	3 phase fault on the TUCO (525830) to Carlisle (526161) 230 kV line circuit 1, near TUCO. a. Apply fault at the TUCO 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT86-3PH	3 phase fault on the TUCO (525830) to Tolk East (525524) 230 kV line circuit 1, near TUCO. a. Apply fault at the TUCO 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT87-3PH	3 phase fault on the TUCO (525830) to Jones (526337) 230 kV line circuit 1, near TUCO. a. Apply fault at the TUCO 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT88-3PH	3 phase fault on the TUCO 230 kV (525830) to TUCO 115 kV (525828) to TUCO 13.2 kV (525819) XFMR CKT 2, near TUCO 230 kV. a. Apply fault at the TUCO 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.
FLT91-SB	Single phase fault with stuck breaker at TUCO (525832) a. Apply fault at the TUCO 345 kV bus. b. Clear fault after 16 cycles and trip the following elements c. TUCO 345 kV (525832) /230 kV (525830) /13.2 kV (525824) transformer d. TUCO (525832) -- OKU (511456) 345 kV
FLT92-3PH	3 phase fault on the Crossroads (527656) to Tolk (525549) 345 kV line circuit 1, near Crossroads. a. Apply fault at the Crossroads 345 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.

Table 4-1 continued

Fault ID	Fault Description
FLT93-3PH	3 phase fault on the Crossroads (527656) to Eddy County (527802) 345 kV line circuit 1, near Crossroads. a. Apply fault at the Crossroads 345 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT94-3PH	3 phase fault on the Tolk 345 kV (525549) to Tolk Tap 230 kV (525543) to Tolk 13.2 kV (525537) XFMR CKT 1, near Tolk 345 kV. a. Apply fault at the Tolk 345 kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer
FLT95-3PH	3 phase fault on the Eddy County 345 kV (527802) to Eddy North 230 kV (527799) to Eddy 13.2 kV (527796) XFMR CKT 1, near Eddy County 345 kV. a. Apply fault at the Eddy County 345 kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer
FLT96-3PH	3 phase fault on the Atoka (527786) to CV-Dayton (527821) 115 kV line circuit 1, near Atoka. a. Apply fault at the Atoka 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT97-3PH	3 phase fault on the Atoka (527786) to CV-Irishhill (528116) 115 kV line circuit 1, near Atoka. a. Apply fault at the Atoka 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT98-3PH	3 phase fault on the Atoka (527786) to Eagle Creek (527711) 115 kV line circuit 1, near Atoka. a. Apply fault at the Atoka 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT99-3PH	3 phase fault on the CV-Dayton (527821) to Eddy South (527793) 115 kV line circuit 1, near CV-Dayton. a. Apply fault at the CV-Dayton 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT100-3PH	3 phase fault on the CV-Irishhill (528116) to CV-Lakewood (528109) 115 kV line circuit 1, near CV-Irishhill. a. Apply fault at the CV-Irishhill 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT101-3PH	3 phase fault on the Eagle Creek (527711) to Seven Rivers (528094) 115 kV line circuit 1, near Eagle Creek. a. Apply fault at the Eagle Creek 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT102-3PH	3 phase fault on the Eagle Creek (527711) to Eddy North (527798) 115 kV line circuit 1, near Eagle Creek. a. Apply fault at the Eagle Creek 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT105-3PH	3 phase fault on the Carlisle (526160) to LP-Doud Tap (526162) 115 kV line circuit 1, near Carlisle. a. Apply fault at the Carlisle 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.

Table 4-1 continued

Fault ID	Fault Description
FLT106-3PH	3 phase fault on the Carlisle 115 kV (526160) to Carlisle 230 kV (526161) to Carlisle 13.2 kV (526157) XFMR CKT 1, near Carlisle 115 kV bus. a. Apply fault at the Carlisle 115 kV bus. b. Clear fault after 5 cycles by tripping the transformer
FLT107-3PH	3 phase fault on the Carlisle (526160) to SP-Erskine (526109) 115 kV line circuit 1, near Carlisle. a. Apply fault at the Carlisle 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT108-3PH	3 phase fault on the Carlisle (526160) to Murphy (526192) 115 kV line circuit 1, near Carlisle. a. Apply fault at the Carlisle 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT109-3PH	3 phase fault on the LG-Clauene (526491) to Terry County (526736) 115 kV line circuit 1, near LG-Clauene. a. Apply fault at the LG-Clauene 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT111-3PH	3 phase fault on the Terry County (526736) to Prentice (526792) 115 kV line circuit 1, near Terry County. a. Apply fault at the Terry County 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT112-3PH	3 phase fault on the Terry County (526736) to Denver North (527130) 115 kV line circuit 1, near Terry County. a. Apply fault at the Terry County 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT113-3PH	3 phase fault on the Terry County (526736) to Sulphur (527262) 115 kV line circuit 1, near Terry County. a. Apply fault at the Terry County 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT114-3PH	3 phase fault on the Terry County 115 kV (526736) to Terry County 69 kV (526735) to Terry County 13.2 kV (526733) XFMR CKT 1, near Terry County 115 kV. a. Apply fault at the Terry County 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.
FLT115-3PH	3 phase fault on the Terry County (526736) to Wolf Forth (526524) 115 kV line circuit 1, near Terry County. a. Apply fault at the Terry County 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT116-3PH	3 phase fault on the LG-Clauene (526491) to LG-Leveland (526484) 115 kV line circuit 1, near LG-Clauene. a. Apply fault at the LG-Clauene 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT117-3PH	3 phase fault on the Seagraves (527202) to Sulphur (527262) 115 kV line circuit 1, near Seagraves. a. Apply fault at the Seagraves 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.

Table 4-1 continued

Fault ID	Fault Description
FLT118-3PH	3 phase fault on the Seagraves (527202) to LG-Plshill (527194) 115 kV line circuit 1, near Seagraves. a. Apply fault at the Seagraves 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT119-3PH	3 phase fault on the Denver South (527136) to San Andreas (527105) 115 kV line circuit 1, near Denver South. a. Apply fault at the Denver South 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT120-3PH	3 phase fault on the Denver South (527136) to Shell C2 (527036) 115 kV line circuit 1, near Denver South. a. Apply fault at the Denver South 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT121-3PH	3 phase fault on the Denver South 115 kV (527136) to Denver City 69 kV (527125) to Denver South 13.2 kV (527123) XFMR CKT 2, near Denver South 115 kV. a. Apply fault at the Denver South 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.
FLT126-3PH	3 phase fault on the GEN-2015-079 Tap (560059) to Hobbs (527894) 230 kV line circuit 1, near GEN-2015-079 Tap. a. Apply fault at the GEN-2015-079 Tap 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT127-3PH	3 phase fault on the Hobbs (527894) to Andrews (528604) 230 kV line circuit 1, near Hobbs. a. Apply fault at the Hobbs 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT128-3PH	3 phase fault on the Hobbs (527894) to Cunningham (527867) 230 kV line circuit 1, near Hobbs. a. Apply fault at the Hobbs 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT129-3PH	3 phase fault on the Hobbs 230 kV (527894) to Hobbs 115 kV (527891) to Hobbs 13.2 kV (527889) XFMR CKT 2, near Hobbs 230 kV. a. Apply fault at the Hobbs 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.
FLT131-SB	Single phase fault with stuck breaker at Chaves County (527482) a. Apply fault at the Chaves 115 kV bus. b. Clear fault after 16 cycles and trip the following elements c. Chaves County 230 kV (527483)/ 115 kV (527482)/13.2 kV (527478) transformer d. Chaves County (527482) - Urton (527501) 115 kV
FLT133-SB	Single phase fault with stuck breaker at Oasis (524874) a. Apply fault at the Oasis 115 kV bus. b. Clear fault after 16 cycles and trip the following elements c. Oasis (524874) - FE-CHZPLT (524863) 115 kV d. Oasis (524874) - Portales (524924) 115 kV
FLT134-SB	Single phase fault with stuck breaker at Amarillo South (524415) a. Apply fault at the Amarillo South 230 kV bus. b. Clear fault after 16 cycles and trip the following elements c. Amarillo South (524415) - Nichols (524044) 230 kV d. Amarillo South (524415) - Randall (524365) 230 kV

Table 4-1 continued

Fault ID	Fault Description
FLT135-SB	Single phase fault with stuck breaker at TUCO Int (525832) a. Apply fault at the TUCO Int 345 kV bus. b. Clear fault after 16 cycles and trip the following elements c. TUCO Int (525832) - Border (515458) 345 kV d. TUCO Int (525832) - Yoakum (526936) 345 kV
FLT136-SB	Single phase fault with stuck breaker at Deafsmith (524623) a. Apply fault at the Deafsmith 230 kV bus. b. Clear fault after 16 cycles and trip the following elements c. Deafsmith 230 kV (524623)/115 kV (524622)/13.8 kV (524620) transformer d. Deafsmith (524623) - Bushland (524267) 230 kV
FLT137-SB	Single phase fault with stuck breaker at Mustang (527149) a. Apply fault at the Mustang 230 kV bus. b. Clear fault after 16 cycles and trip the following elements c. Mustang (527149) - Seminole (527276) 230 kV d. Mustang (527149) - Yoakum (526935) 230 kV
FLT138a-SB	Single phase fault with stuck breaker at EDDY_CNTY (527802) a. Apply fault at the Eddy County 345 kV bus. b. Clear fault after 16 cycles and trip the following elements c. Eddy County 345 kV (527802)/230 kV (527799)/13.2 kV (527796) transformer d. Eddy County (527802) - Crossroads (527656) 345 kV
FLT138b-SB	Single phase fault with stuck breaker at Tolk (525549) a. Apply fault at the Tolk 345 kV bus. b. Clear fault after 16 cycles and trip the following elements c. Tolk 345 kV (525549)/230 kV (525543)/13.2 kV (525537) transformer d. Tolk (525549) - Crossroads (527656) 345 kV
FLT139-SB	Single phase fault with stuck breaker at Atoka (527786) a. Apply fault at the Atoka 115 kV bus. b. Clear fault after 16 cycles and trip the following elements c. Atoka (527786) - Eagle Creek (527711) 115 kV d. Atoka (527786) - Irish Hill (528116) 115 kV
FLT140-SB	Single phase fault with stuck breaker at Carlisle (526160) a. Apply fault at the Carlisle 115 kV bus. b. Clear fault after 16 cycles and trip the following elements c. Carlisle (526160) - Murphy (526192) 115 kV d. Carlisle (526160) - Erskine (526109) 115 kV
FLT141-SB	Single phase fault with stuck breaker at Terry County (526736) a. Apply fault at the Terry County 115 kV bus. b. Clear fault after 16 cycles and trip the following elements c. Terry County (526736) - Wolfforth (526524) 115 kV d. Terry County (526736) - Denver (527130) 115 kV
FLT142-SB	Single phase fault with stuck breaker at Mustang (527146) a. Apply fault at the Mustang 115 kV bus. b. Clear fault after 16 cycles and trip the following elements c. Mustang (527146) - Seagraves (527202) 115 kV d. Mustang (527146) - Denver S (527136) 115 kV
FLT143-SB	Single phase fault with stuck breaker at Hobbs (527894) a. Apply fault at the Hobbs 230 kV bus. b. Clear fault after 16 cycles and trip the following elements c. Hobbs (527894) - Andrews (528604) 230 kV d. Hobbs (527894) - Cunningham (527867) 230 kV
FLT146-3PH	3 phase fault on the TUCO (525832) to Border (515458) 345 kV line circuit 1, near TUCO. a. Apply fault at the TUCO 345 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.

Table 4-1 continued

Fault ID	Fault Description
FLT150-SB	Single phase fault with stuck breaker at TUCO Int (525832) <ol style="list-style-type: none"> Apply fault at the TUCO Int 345 kV bus. Clear fault after 16 cycles and trip the following elements TUCO Int (525832) – Border 345 kV TUCO Int (525832) – Yoakum (526936) 345 kV
FLT156-SB	Single phase fault with stuck breaker on the Tolk West (525531) to Plant X (525481) 230 kV circuit #1 line, near Tolk West. <ol style="list-style-type: none"> Apply fault at the Tolk West 230 kV bus. Run 5 cycles, and then open Plant X end of the faulted line. Run 10 cycles, and then clear the fault and disconnect Tolk West 230 kV bus (525531).
FLT159-SB	Single phase fault with stuck breaker at Plant X (525481) 230 kV <ol style="list-style-type: none"> Apply fault at the Plant X 230 kV bus. Clear fault after 16 cycles and trip the following elements Plant X (525481) – Tolk West (525531) 230 kV Plant X (525481) – Sundown (526435) 230 kV
FLT160-SB	Single phase fault with stuck breaker at Plant X (525481) 230 kV <ol style="list-style-type: none"> Apply fault at the Plant X 230 kV bus. Clear fault after 16 cycles and trip the following elements Plant X (525481) 230 kV/ (525480) 115 kV/ (525479) 13.2 kV Xfmr Plant X (525481) – Newhart (525461) 230 kV
FLT165-3PH	3 phase fault on the Mustang (527146) to Shell Co (527062) 115 kV line circuit 1, near Mustang. <ol style="list-style-type: none"> Apply fault at the Mustang 115 kV bus. Clear fault after 5 cycles by tripping the faulted line. Wait 20 cycles, and then re-close the line in (b) back into the fault. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT166-3PH	3 phase fault on the Yoakum (526935) to Bru Sub (527009) 230 kV line, near Yoakum. <ol style="list-style-type: none"> Apply fault at the Yoakum 230 kV bus. Clear fault after 5 cycles by tripping the faulted line. Wait 20 cycles, and then re-close the line in (b) back into the fault. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT167-SB	Single phase fault with stuck breaker on the Yoakum (526935) to Amoco-SS (526460) 230 kV line, near Yoakum. <ol style="list-style-type: none"> Apply fault at the Yoakum 230 kV bus. Run 5 cycles, and then open Amoco-SS end of the faulted line. Run 10 cycles, and then clear the fault and trip Yoakum 230 kV (526935) bus.
FLT170-3PH	3 phase fault on the Border (515458) to Chisholm (511553) 345 kV line, near Border. <ol style="list-style-type: none"> Apply fault at the Border 345 kV bus. Clear fault after 5 cycles by tripping the faulted line. Wait 20 cycles, and then re-close the line in (b) back into the fault. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT171-3PH	3 phase fault on the Border (515458) to TUCO (525832) 345 kV line, near Border. <ol style="list-style-type: none"> Apply fault at the Border 345 kV bus. Clear fault after 5 cycles by tripping the faulted line. Wait 20 cycles, and then re-close the line in (b) back into the fault. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT172-3PH	3 phase fault on the TUCO Int (525830) to Antelope (525840) 230 kV line, near TUCO Int. <ol style="list-style-type: none"> Apply fault at the TUCO Int 230 kV bus. Clear fault after 5 cycles by tripping the faulted line. Wait 20 cycles, and then re-close the line in (b) back into the fault. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT174-SB	Single phase fault with stuck breaker at Mustang (527146) <ol style="list-style-type: none"> Apply fault at the Mustang 115 kV bus. Clear fault after 16 cycles and trip the following elements Mustang (527146) – Seagraves (527202) 115 kV Mustang (527146) – Denver North (527130) 115 kV

Table 4-1 continued

Fault ID	Fault Description
FLT176-SB	Single phase fault with stuck breaker at Mustang (527146) a. Apply fault at the Mustang 115 kV bus. b. Clear fault after 16 cycles and trip the following elements c. Mustang (527146) – Shell County (527062) 115 kV d. Mustang (527146) – Seagraves (527202) 115 kV
FLT180-3PH	3 phase fault on the Wolfforth (526524) to Yuma (526475) 115 kV line, near Wolfforth a. Apply fault at the Wolfforth 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT181-3PH	3 phase fault on the Wolfforth (526524) to Terry County (526736) 115 kV line, near Wolfforth a. Apply fault at the Wolfforth 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT182-3PH	3 phase fault on the Wolfforth 115 kV (526524) to Wolfforth 230 kV (526525) to Wolfforth 13.2 kV (526522) XFMR CKT 1, near Wolfforth 115 kV. a. Apply fault at the Wolfforth 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.
FLT183-3PH	3 phase fault on the Terry County (526736) to LG-Clauene (526491) 115 kV line, near Terry County a. Apply fault at the Terry County 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT185-3PH	3 phase fault on the Yuma (526475) to SP-Wolfforth Tap (526481) 115 kV line, near Yuma a. Apply fault at the Yuma 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT186-3PH	3 phase fault on the Wolfforth (526525) to Sundown (526435) 230 kV line, near Wolfforth a. Apply fault at the Wolfforth 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT187-3PH	3 phase fault on the Wolfforth (526525) to Lubbock South (526269) 230 kV line, near Wolfforth a. Apply fault at the Wolfforth 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT188-3PH	3 phase fault on the Wolfforth (526525) to Carlisle (526161) 230 kV line, near Wolfforth a. Apply fault at the Wolfforth 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT189-SB	Single phase fault with stuck breaker at Wolfforth (526524) a. Apply fault at the Wolfforth 115 kV bus. b. Clear fault after 16 cycles and trip the following elements c. Wolfforth (526524) – Yuma (526475) 115 kV d. Wolfforth (526524) – Terry County (526736) 115 kV
FLT190-SB	Single phase fault with stuck breaker at Wolfforth (526524) a. Apply fault at the Wolfforth 115 kV bus. b. Clear fault after 16 cycles and trip the following elements c. Wolfforth 115 kV (526524)/230 kV (526525)/13.2 kV (526522) xfmr d. Wolfforth (526524) – Terry County (526736) 115 kV

Table 4-1 continued

Fault ID	Fault Description
FLT193-3PH	3 phase fault on the SP-Wolfforth Tap (526481) to LP-Doud Tap (526162) 115 kV line, near SP-Wolfforth Tap a. Apply fault at the SP-Wolfforth Tap 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT194-3PH	3 phase fault on the SP-Wolfforth Tap (526481) to SP-Wolfforth (526483) 115 kV line, near SP-Wolfforth Tap a. Apply fault at the SP-Wolfforth Tap 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT195-SB	Single phase fault with stuck breaker at SP-Wolfforth Tap (526481) a. Apply fault at the SP-Wolfforth Tap 115 kV bus. b. Clear fault after 16 cycles and trip the following elements c. SP-Wolfforth Tap (526481) – LP-Doud Tap (526162) 115 kV d. SP-Wolfforth Tap (526481) – SP-Wolfforth (526483) 115 kV
FLT197-3PH	3 phase fault on the Happy (525154) to Tulia Tap (525179) 115 kV line, near Happy. a. Apply fault at the Happy 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT198-3PH	3 phase fault on the Happy (525154) to Palo Duro (524530) 115 kV line, near Happy. a. Apply fault at the Happy 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT199-3PH	3 phase fault on the Happy 115 kV (525154) to Happy 69 kV (525153) to Happy 13.2 kV (525151) XFMR CKT 1, near Happy 115 kV. a. Apply fault at the Happy 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.
FLT200-3PH	3 phase fault on the Tulia Tap (525179) to Kress (525192) 115 kV line, near Tulia Tap. a. Apply fault at the Tulia Tap 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT201-3PH	3 phase fault on the Tulia Tap (525179) to MU-Tulia (522800) 115 kV line, near Tulia Tap. a. Apply fault at the Tulia Tap 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT202-3PH	3 phase fault on the Palo Duro (524530) to Randall (524364) 115 kV line, near Palo Duro. a. Apply fault at the Paulo Duro 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT203-3PH	3 phase fault on the Palo Duro (524530) to Happy (525154) 115 kV line, near Palo Duro. a. Apply fault at the Paulo Duro 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT204-3PH	3 phase fault on the Happy (525153) to Happy City Tap (525143) 69 kV line, near Happy City Tap. a. Apply fault at the Happy City Tap 69 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.

Table 4-1 continued

Fault ID	Fault Description
FLT205-SB	Single phase fault with stuck breaker at Happy (525154) 115 kV a. Apply fault at the Happy 115 kV bus. b. Clear fault after 16 cycles and trip the following elements c. Happy (525154) – Tulia Tap (525179) 115 kV d. Happy (525154) – Palo Duro (524530) 115 kV
FLT206-SB	Single phase fault with stuck breaker at Happy (525154) 115 kV a. Apply fault at the Happy 115 kV bus. b. Clear fault after 16 cycles and trip the following elements c. Happy (525154) – Tulia Tap (525179) 115 kV d. Happy 115 kV (525154)/69 kV (525153)/13.2 kV (525151) Xfmr
FLT210-3PH	3 phase fault on the Randall (524364) to Manhattan (524224) 115 kV line, near Randall. a. Apply fault at the Randall 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT211-3PH	3 phase fault on the Randall (524364) to Southeast (524338) 115 kV line, near Randall. a. Apply fault at the Randall 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT212-3PH	3 phase fault on the Randall (524364) to Georgia (524322) 115 kV line, near Randall. a. Apply fault at the Randall 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT213-3PH	3 phase fault on the Randall (524364) to Canyon East (524522) 115 kV line, near Randall. a. Apply fault at the Randall 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT214-3PH	3 phase fault on the Randall 230 kV (524365) to Randall 115 kV (524364) to Randall 13.2 kV (524361) XFMR CKT 1, near Randall 115 kV. a. Apply fault at the Randall 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.
FLT215-SB	Single phase fault with stuck breaker at Randall (524364) 115 kV a. Apply fault at the Randall 115 kV bus. b. Clear fault after 16 cycles and trip the following elements c. Randall (524364) – Georgia (524322) 115 kV d. Randall (524364) – Palo Duro (524530) 115 kV
FLT216-SB	Single phase fault with stuck breaker at Randall (524364) 115 kV a. Apply fault at the Randall 115 kV bus. b. Clear fault after 16 cycles and trip the following elements c. Randall (524364) – Georgia (524322) 115 kV d. Randall (524364) – Canyon E (524522) 115 kV
FLT219-3PH	3 phase fault on Andrews (528604) to Hobbs (527894) 230 kV line circuit 1, near Andrews. a. Apply fault at the Andrews 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT220-3PH	3 phase fault on the Andrews 230 kV (528604) to Andrews 115 kV (528602) to Andrews 13.2 kV (528601) XFMR CKT 1, near Andrews 230 kV. a. Apply fault at the Andrews 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.

Table 4-1 continued

Fault ID	Fault Description
FLT222-3PH	3 phase fault on the Andrews (528602) to NA Enrich (528603) 115 kV line circuit 1, near Andrews. a. Apply fault at the Andrews 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT223-3PH	3 phase fault on the G1579&G1580T (560059) to Yoakum (526935) 230 kV line circuit 1, near G1579&G1580T. a. Apply fault at the G1579&G1580T 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT224-3PH	3 phase fault on the Cunningham (527865) to Potash Junction (527963) 230 kV line circuit 1, near Cunningham. a. Apply fault at the Cunningham 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT230-3PH	3 phase fault on the Swisher (525212) to Kress (525192) 115 kV line circuit 1, near Swisher. a. Apply fault at the Swisher 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT231-3PH	3 phase fault on the Kress (525192) to Kress Rural (525225) 115 kV line circuit 1, near Kress. a. Apply fault at the Kress 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT232-3PH	3 phase fault on the Kress (525192) to Newhart (525460) 115 kV line circuit 1, near Kress. a. Apply fault at the Kress 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT233-3PH	3 phase fault on the Kress (525192) to Tulia Tap (525179) 115 kV line circuit 1, near Kress. a. Apply fault at the Kress 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT234-3PH	3 phase fault on the Kress (525192) to Hale County (525454) 115 kV line circuit 1, near Kress. a. Apply fault at the Kress 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT235-3PH	3 phase fault on the Kress 115 kV (525192) to Kress 69 kV (525191) to Kress 13.2 kV (525190) XFMR CKT 1, near Kress 115 kV. a. Apply fault at the Kress 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.
FLT236-3PH	3 phase fault on the Swisher (525213) to TUCO (525832) 230 kV line circuit 1, near Swisher. a. Apply fault at the Swisher 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT237-SB	Single phase fault with stuck breaker at Swisher (525213) 230 kV a. Apply fault at the Swisher 230 kV bus. b. Clear fault after 16 cycles and trip the following elements c. Swisher (525213) – TUCO (525830) 230 kV d. Swisher 230 kV (525213)/115 kV (525212)/13.2 kV (525211) Xfmr

Table 4-1 continued

Fault ID	Fault Description
FLT238-SB	Single phase fault with stuck breaker at Kress (525192) 115 kV a. Apply fault at the Kress 115 kV bus. b. Clear fault after 16 cycles and trip the following elements c. Kress (525192) – Swisher (525212) 115 kV
FLT239-SB	Single phase fault with stuck breaker at Kress (525192) 115 kV a. Apply fault at the Kress 115 kV bus. b. Clear fault after 16 cycles and trip the following elements c. Kress (525192) – Newhart (525460) 115 kV d. Kress (525192) – Hale County (525454) 115 kV
FLT245-3PH	3 phase fault on the Carlisle (526161) to TUCO (525830) 230 kV line circuit 1, near Carlisle. a. Apply fault at the Carlisle 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT246-3PH	3 phase fault on the Carlisle (526161) to LP-Milwaukee (522823) 230 kV line circuit 1, near Carlisle. a. Apply fault at the Carlisle 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT247-SB	Single phase fault with stuck breaker at Carlisle (526161) 230 kV a. Apply fault at the Carlisle 230 kV bus. b. Clear fault after 16 cycles and trip the following elements c. Carlisle (526161) – Wolfforth (526525) 230 kV d. Carlisle 230 kV (526161)/115 kV (526160)/13.2 kV (526157) Xfmr
FLT248-SB	Single phase fault with stuck breaker at Carlisle (526161) 230 kV a. Apply fault at the Carlisle 230 kV bus. b. Clear fault after 16 cycles and trip the following elements c. Carlisle (526161) – Wolfforth (526525) 230 kV d. Carlisle (526161) – TUCO (525830) 230 kV
FLT249-SB	Single phase fault with stuck breaker at Carlisle (526161) 230 kV a. Apply fault at the Carlisle 230 kV bus. b. Clear fault after 16 cycles and trip the following elements c. Carlisle (526161) – LP-Milwaukee (522823) 230 kV d. Carlisle (526161) – TUCO (525830) 230 kV
FLT250-SB	Single phase fault with stuck breaker at TUCO (525830) 230 kV a. Apply fault at the TUCO 230 kV bus. b. Clear fault after 16 cycles and trip the following elements c. TUCO 230 kV (525830)/115 kV (525828)/13.2 kV (525819) Xfmr #2 d. TUCO 230 kV (525830)/115 kV (525828)/13.2 kV (525821) Xfmr #1
FLT254-3PH	3 phase fault on the Yoakum (526936) to TUCO (525832) 345 kV line circuit 1, near Yoakum. a. Apply fault at the Yoakum 345 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT255-3PH	3 phase fault on the Yoakum (526936) to Hobbs (527896) 345 kV line circuit 1, near Yoakum. a. Apply fault at the Yoakum 345 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT257-3PH	3 phase fault on the Yoakum (526935) to G1579&G1580T (560059) 230 kV line circuit 1, near Yoakum. a. Apply fault at the Yoakum 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.

Table 4-1 continued

Fault ID	Fault Description
FLT258-3PH	3 phase fault on the Yoakum (526935) to G13-027-Tap (562480) 230 kV line circuit 1, near Yoakum. a. Apply fault at the Yoakum 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT259-3PH	3 phase fault on the Yoakum (526935) to BruSub (527009) 230 kV line circuit 1, near Yoakum. a. Apply fault at the Yoakum 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT260-3PH	3 phase fault on the Yoakum (526935) to Amoco (526460) 230 kV line circuit 1, near Yoakum. a. Apply fault at the Yoakum 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT262-3PH*	3 phase fault on the Hobbs (527896) to Kiowa (527965) 345 kV line circuit 1, near Hobbs. 18S and 26S only a. Apply fault at the Hobbs 345 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT264-SB	Single phase fault with stuck breaker at Yoakum (526935) 230 kV a. Apply fault at the Yoakum 230 kV bus. b. Clear fault after 16 cycles and trip the following elements c. Yoakum (526935) – G13-027-Tap (562480) 230 kV d. Yoakum (526935) – Mustang (527149) 230 kV
FLT265-SB	Single phase fault with stuck breaker at Yoakum (526935) 230 kV a. Apply fault at the Yoakum 230 kV bus. b. Clear fault after 16 cycles and trip the following elements c. Yoakum 230/115/13.2kV (526935/526934/526931) transformer d. Yoakum 230/115/13.2kV (526935/526934/526932) transformer
FLT270-3PH	3 phase fault on Chaves County 115 kV (527482) to Price 115 kV (527508) CKT 1 to Capitan (527541) via Price Tap (527509), near Chaves County. a. Apply fault at the Chaves County 115 kV bus. b. Clear fault after 5 cycles and trip the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT271-3PH	3 phase fault on Price 115 kV (527508) CKT 1 to Capitan (527541) to Chaves County 115 kV (527482) via Price Tap (527509), near Chaves County. a. Apply fault at the Price 115 kV bus. b. Clear fault after 5 cycles and trip the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT272-SB	Single phase fault with stuck breaker at Chaves County (527482) a. Apply fault at the Chaves 115 kV bus. b. Clear fault after 16 cycles and trip the following elements c. Chaves County (527482) - Urton (527501) 115 kV d. Chaves County (527482) - Samson (527546) 115 kV
FLT157-SB	Single phase fault with stuck breaker on the Tolk East (525524) to Plant X (525481) 230 kV line circuit #2, near Tolk East. a. Apply fault at the Tolk East 230 kV bus. b. Run 5 cycles, and then open Plant X end of the faulted line. c. Run 10 cycles, and then clear the fault and disconnect Tolk East 230 kV bus (525524).

*Not run in the 17W Case

Table 4-1 continued

Fault ID	Fault Description
FLT158-SB	Single phase fault with stuck breaker at Plant X (525481) 230 kV a. Apply fault at the Plant X 230 kV bus. b. Clear fault after 16 cycles and trip the following elements c. Plant X (525481) – Deafsmith (524623) 230 kV d. Plant X (525481) – Newhart (525461) 230 kV
FLT173-SB	Single phase fault with stuck breaker at Mustang (527146) a. Apply fault at the Mustang 115 kV bus. b. Clear fault after 16 cycles and trip the following elements c. Mustang 230 kV (527149) /115 kV (527146)/13.2 kV (527143) transformer d. Mustang (527146) – Denver South (527136) 115 kV
FLT175-SB	Single phase fault with stuck breaker at Mustang (527146) a. Apply fault at the Mustang 115 kV bus. b. Clear fault after 16 cycles and trip the following elements c. Mustang (527146) – Denver South (527136) 115 kV d. Mustang (527146) – Denver North (527130) 115 kV
FLT221-3PH	3 phase fault on the Hobbs (527894) to Cunningham (527865) 230 kV line circuit 1, near Hobbs. a. Apply fault at the Hobbs 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT225-SB	Single phase fault with stuck breaker at Hobbs (527894) 230 kV a. Apply fault at the Hobbs 230 kV bus. b. Clear fault after 16 cycles and trip the following elements d. Hobbs (527894) – Cunningham (527865) 230 kV
FLT226-SB	Single phase fault with stuck breaker at Hobbs (527894) 230 kV a. Apply fault at the Hobbs 230 kV bus. b. Clear fault after 16 cycles and trip the following elements c. Hobbs (527894) – G1579&G1580T (560059) 230 kV d. Hobbs (527894) – Cunningham (527865) 230 kV
FLT244-3PH	3 phase fault on the Carlisle 230 kV (526161) to Carlisle 115 kV (525160) to Carlisle 13.2 kV (526157) XFMR CKT 1, near Carlisle 230 kV. a. Apply fault at the Carlisle 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.

Table 4-2 shows the prior outage events simulated in the study.

Table 4-2: Fault Definitions (P6)

Fault ID	Fault Description
FLT49T-PO1	Prior Outage of the Tuco 345 kV (525832) to Tuco 230 kV (525830) to Tuco 13.2 kV (525824) XFMR CKT 1; 3 phase fault on the OKU (511456) to L.E.S (511468) 345 kV line circuit 1, near OKU. a. Apply fault at the OKU 345 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. Trip OKU HVDC and cap banks
FLT146-PO1	Prior Outage of the Tuco 345 kV (525832) to Tuco 230 kV (525830) to Tuco 13.2 kV (525824) XFMR CKT 1; 3 phase fault on the Tuco 2 (525832) to Border (515458) 345 kV line circuit 1, near Tuco. a. Apply fault at the Tuco 345 kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
FLT45-PO2	Prior Outage of the OKU (511456) to L.E.S (511468) 345 kV line circuit 1, Trip OKU HVDC and cap banks; 3 phase fault on the Tuco Int (525832) to Border (515458) 345 kV line circuit 1, near Tuco. a. Apply fault at the Tuco Int 345 kV bus. b. Clear fault after 5 cycles by tripping the faulted line.

Table 4-2 continued

Fault ID	Fault Description
FLT59-PO3	Prior Outage of the Plant X 230 kV (525481) to Plant X 115 kV (525480) to Plant X 13.2 kV (525479) XFMR CKT 1; 3 phase fault on the Plant X 230 kV (525481) to Sundown (526435) 230 kV line circuit 1, near Plant X. a. Apply fault at the Plant X 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
FLT56-PO4	Prior Outage of the Plant X (525481) to Sundown (526435) 230 kV Line; 3 phase fault on the Plant X 230 kV (525481) to Tolk East (525524) 230 kV line circuit 2, near Plant X. a. Apply fault at the Plant X 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
FLT52-PO5	Prior Outage of the Deaf Smith (524623) to Bushland (524267) 230 kV Line; 3 phase fault on the Plant X (525481) to Deaf Smith (524623) 230 kV line circuit 1, near Plant X.. a. Apply fault at the Plant X 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
FLT65-PO6	Prior Outage of the Mustang (527149) to Seminole (527276) 230 kV line circuit 1; 3 phase fault on the Mustang (527149) to Yoakum (526935) 230 kV line circuit 1, near Mustang. a. Apply fault at the Mustang 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
FLT66-PO7	Prior Outage of the Mustang (527149) to Yoakum (526935) 230 kV line circuit 1; 3 phase fault on the Mustang (527149) to Seminole (527276) 230 kV line circuit 1, near Mustang. a. Apply fault at the Mustang 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
FLT73-PO8	Prior Outage of the Mustang (527146) to Denver North (527130) 115 kV line circuit 1; 3 phase fault on the Mustang (527146) to Denver South (527136) 115 kV line circuit 2, near Mustang. a. Apply fault at the Mustang 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
FLT71-PO9	Prior Outage of the Mustang (527149) 230 kV to Mustang (527146) 115 kV transformer, circuit 1; 3 phase fault on the Mustang (527146) to Denver North (527130) 115 kV line circuit 1, near Mustang. a. Apply fault at the Mustang 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
FLT73-PO10	Prior Outage of the Mustang (527146) to Shell County (527062) 115 kV line circuit 1; 3 phase fault on the Mustang (527146) to Denver South (527136) 115 kV line circuit 2, near Mustang. a. Apply fault at the Mustang 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
FLT191-PO11	Prior Outage of the Wolfforth (526524) to Terry County (526736) 115 kV line circuit 1; 3 phase fault on the Wolfforth 115 kV (526524)/230 kV (526525)/13.2 kV (526522) xfmr, near Wolfforth. a. Apply fault at the Wolfforth 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
FLT181-PO12	Prior Outage of the Wolfforth (526524) to Yuma (526475) 115 kV line circuit 1; 3 phase fault on the Wolfforth (526524) to Terry County (526736) 115 kV line circuit 1, near Wolfforth. a. Apply fault at the Wolfforth 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
FLT196-PO13	Prior Outage of the SP-Wolfforth Tap (526481) to SP-Wolfforth (526483) 115 kV line circuit 1; 3 phase fault on the SP-Wolfforth Tap (526481) to Yuma (526475) 115 kV line circuit 1, near SP-Wolfforth Tap. a. Apply fault at the SP-Wolfforth Tap 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
FLT198-PO14	Prior Outage of the Happy (525154) to Tulia Tap (525179) 115 kV line circuit 1; 3 phase fault on the Happy (525154) to Palo Duro (524530) 115 kV line circuit 1, near Happy. a. Apply fault at the Happy 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
FLT198-PO15	Prior Outage of the Happy 115 kV (525154)/69 kV (525153)/13.2 kV (525152) Xfmr, circuit 2; 3 phase fault on the Happy (525154) to Palo Duro (524530) 115 kV line circuit 1, near Happy. a. Apply fault at the Happy 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line.

Table 4-2 continued

Fault ID	Fault Description
FLT197-PO15	Prior Outage of the Happy 115 kV (525154)/69 kV (525153)/13.2 kV (525152) Xfmr, circuit 2; 3 phase fault on the Happy (525154) to Tulia Tap (525179) 115 kV line circuit 1, near Happy. a. Apply fault at the Happy 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
FLT198-PO16	Prior Outage of the Randall (524364) to Georgia (524322) 115 kV line circuit 1; 3 phase fault on the Happy (525154) to Palo Duro (524530) 115 kV line circuit 1, near Palo Duro. a. Apply fault at the Palo Duro 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
FLT210-PO17	Prior Outage of the Happy (525154) to Palo Duro (524530) 115 kV line circuit 1; 3 phase fault on the Randall (524364) to Manhattan (524224) 115 kV line circuit 1, near Randall. a. Apply fault at the Randall 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
FLT221-PO18	Prior Outage of the G1579&G1580T Tap (560059) to Hobbs (527894) 230 kV line circuit 1; 3 phase fault on the Hobbs (527894) to Cunningham (527865) 230 kV line circuit 1, near Hobbs. a. Apply fault at the Hobbs 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
FLT129-PO19	Prior Outage of the Hobbs (527894) to Cunningham (527865) 230 kV line circuit 1; 3 phase faults on the Hobbs 230 kV (527894) to Hobbs 115 kV (527891) to Hobbs 13.2 kV (527889) XFMR CKT 2, near Hobbs 230 kV. a. Apply fault at the Hobbs 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
FLT220-PO20	Prior Outage of the Andrews (528602) to NA Enrich (528603) 115 kV line circuit 1; 3 phase fault on the Andrews 230 kV (528604)/115 kV (528602)/13.2 kV (528601) Xfmr, ckt 1, near Andrews 230 kV. a. Apply fault at the Andrews 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
FLT230-PO21	Prior Outage of the Swisher (525213) to Tuco (525830) 230 kV line circuit 1; 3 phase fault on the Swisher (525212) to Kress (525192) 115 kV line circuit 1, near Swisher. a. Apply fault at the Swisher 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line
FLT36-PO21	Prior Outage of the Swisher (525213) to Tuco (525830) 230 kV line circuit 1; 3 phase fault on the Swisher 230 (525213)/115 kV (525212)/13.2 kV (525211) Xfmr, near Swisher 115 kV. a. Apply fault at the Swisher 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line
FLT230-PO22	Prior Outage of the Kress (525192) to Hale County (525454) 115 kV line circuit 1; 3 phase fault on the Swisher (525212) to Kress (525192) 115 kV line circuit 1, near Swisher. a. Apply fault at the Swisher 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line
FLT36-PO22	Prior Outage of the Kress (525192) to Newhart (525454) 115 kV line circuit 1; 3 phase fault on the Swisher 230 (525213)/115 kV (525212)/13.2 kV (525211) Xfmr, near Swisher 115 kV. a. Apply fault at the Swisher 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line
FLT251-PO23	Prior Outage of the Carlisle (526161) to Tuco (525830) 230 kV line circuit 1; 3 phase fault on the Carlisle (526161) to Wolfforth (526525) 230 kV line circuit 1, near Carlisle. a. Apply fault at the Carlisle 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line
FLT245-PO24	Prior Outage of the Carlisle (526161) to Wolfforth (526525) 230 kV line circuit 1; 3 phase fault on the Carlisle (526161) to Tuco (525830) 230 kV line circuit 1, near Carlisle. a. Apply fault at the Carlisle 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line
FLT244-PO24	Prior Outage of the Carlisle (526161) to Wolfforth (526525) 230 kV line circuit 1; 3 phase fault on the Carlisle 230 kV (526161)/115 kV (526160)/13.2 kV (526157) Xfmr circuit 1, near Carlisle. a. Apply fault at the Carlisle 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line

Table 4-2 continued

Fault ID	Fault Description
FLT257-PO25	Prior Outage of the Yoakum (526935) to G13-027-Tap (562480) 230 kV line circuit 1; 3 phase fault on the Yoakum (526935) to G1579&G1580T (560059) 230 kV line circuit 1, near Yoakum. a. Apply fault at the Yoakum 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line
FLT267-PO25	Prior Outage of the Yoakum (526935) to G13-027-Tap (562480) 230 kV line circuit 1; 3 phase fault on the Yoakum (526935) to Mustang (527149) 230 kV line circuit 1, near Yoakum. a. Apply fault at the Yoakum 230 kV bus. b. Clear fault after 5 cycles by tripping the faulted line
FLT01-PO27	Prior Outage of Chaves County 115 kV (527482) to Samson 115 kV (527546) CKT 1; 3 phase fault on Chaves County 115 kV (527482) to Urton 115 kV (527501) CKT 1, near Chaves County. a. Apply fault at the Chaves 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
FLT02-PO28	Prior Outage of Chaves County 115 kV (527482) to Urton 115 kV (527501) CKT 1; 3 phase fault on Chaves County 115 kV (527482) to Samson 115 kV (527546) CKT 1, near Chaves County. a. Apply fault at the Chaves 115 kV bus. b. Clear fault after 5 cycles by tripping the faulted line.

4.3 Pre-Mitigation Results

Table 4-3 shows the set of faults that did not meet SPP's performance requirements for transient voltage recovery and stability in each of the study models prior to including additional upgrades.

GEN-2016-015 tripped offline due to over frequency protection relays for faults close to its point of interconnection substation, Andrews 230 kV substation.

For the three phase faults on lines and transformers and the single-line-ground faults with stuck breaker, there were transient voltage recovery violations (high voltage) observed at the Oklaunion 345 kV buse in the 17WP and 18SP models with FLT49, the three-phase fault on the Oklaunion to Lawton Eastside 345 kV line which caused the Oklaunion 345 kV substation to be radially connected to the TUCO 345 kV substation. There were also undervoltage steady state violations observed at the Oklaunion 345 kV, Parmer 115 kV, and Newhart 230 kV substation during several fault conditions in the 17WP and 18SP models as shown below. The results are captured in Table 4-3 below.

Table 4-3: Pre-Mitigation Dynamic Stability Results (P1, P4)

Fault ID	17W			18S			26S		
	Volt. Recov.	Post Cont. Volt	Stability	Volt. Recov.	Post Cont. Volt	Stability	Volt. Recov.	Post Cont. Volt	Stability
FLT01-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT02-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT03-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT04-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT05-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT06-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT07-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT10-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT11-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT13-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT14-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT15-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT16-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable

Table 4-3 Continued

Fault ID	17W			18S			26S		
	Volt. Recov.	Post Cont. Volt	Stability	Volt. Recov.	Post Cont. Volt	Stability	Volt. Recov.	Post Cont. Volt	Stability
FLT17-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT18-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT19-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT20-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT21-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT22-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT23-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT24-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT25-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT26-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT27-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT28-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT29-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT30-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT31-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT34-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT35-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT36-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT37-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT38-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT39-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT40-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT41-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT42-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT43-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT45-3PH	Pass	Fail*	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT46-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT48-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT49-3PH	Fail**	Fail**	Stable	Fail**	Fail**	Stable	Pass	Pass	Stable
FLT52-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT54-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT55-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT56-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT57-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT58-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT59-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT60-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT61-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT62-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT63-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT64-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT65-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT66-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT67-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT68-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT69-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable

Table 4-3 Continued

Fault ID	17W			18S			26S		
	Volt. Recov.	Post Cont. Volt	Stability	Volt. Recov.	Post Cont. Volt	Stability	Volt. Recov.	Post Cont. Volt	Stability
FLT70-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT71-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT72-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT73-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT74-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT75-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT76-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT77-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT78-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT79-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT80-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT81-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT84-3PH	Pass	Fail*	Stable*	Pass	Pass	Stable	Pass	Pass	Stable
FLT85-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT86-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT87-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT88-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT91-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT92-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT93-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT94-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT95-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT96-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT97-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT98-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT99-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT100-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT101-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT102-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT105-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT106-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT107-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT108-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT109-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT111-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT112-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT113-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT114-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT115-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT116-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT117-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT118-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT119-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT120-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT121-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT126-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable

Table 4-3 Continued

Fault ID	17W			18S			26S		
	Volt. Recov.	Post Cont. Volt	Stability	Volt. Recov.	Post Cont. Volt	Stability	Volt. Recov.	Post Cont. Volt	Stability
FLT127-3PH	Pass	Pass	G16-015 trip	Pass	Pass	G16-015 trip	Pass	Pass	G16-015 trip
FLT128-3PH	Pass	Pass	G16-015 trip	Pass	Pass	G16-015 trip	Pass	Pass	G16-015 trip
FLT129-3PH	Pass	Pass	G16-015 trip	Pass	Pass	G16-015 trip	Pass	Pass	G16-015 trip
FLT131-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT133-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT134-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT135-SB	Pass	Fail*	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT136-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT137-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT138a-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT138b-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT139-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT140-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT141-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT142-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT143-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT146-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT150-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT156-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT157-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT158-SB	Pass	Pass	Stable	Pass	Fail***	Stable	Pass	Pass	Stable
FLT159-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT160-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT165-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT166-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT167-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT170-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT171-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT172-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT173-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT174-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT175-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT176-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT180-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT181-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT182-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT183-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT185-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT186-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT187-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT188-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT189-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT190-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT193-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT194-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable

Table 4-3 Continued

Fault ID	17W			18S			26S		
	Volt. Recov.	Post Cont. Volt	Stability	Volt. Recov.	Post Cont. Volt	Stability	Volt. Recov.	Post Cont. Volt	Stability
FLT195-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT197-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT198-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT199-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT200-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT201-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT202-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT203-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT204-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT205-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT206-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT210-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT211-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT212-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT213-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT214-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT215-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT216-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT219-3PH	Pass	Pass	G16-015 trip	Pass	Pass	G16-015 trip	Pass	Pass	G16-015 trip
FLT220-3PH	Pass	Pass	G16-015 trip	Pass	Pass	G16-015 trip	Pass	Pass	G16-015 trip
FLT221-3PH	Pass	Pass	G16-015 trip	Pass	Pass	G16-015 trip	Pass	Pass	G16-015 trip
FLT222-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT223-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT224-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT225-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT226-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT230-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT231-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT232-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT233-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT234-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT235-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT236-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT237-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT238-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT239-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT244-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT245-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT246-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT247-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT248-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT249-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT250-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT254-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT255-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT257-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable

Table 4-3 Continued

Fault ID	17W			18S			26S		
	Volt. Recov.	Post Cont. Volt	Stability	Volt. Recov.	Post Cont. Volt	Stability	Volt. Recov.	Post Cont. Volt	Stability
FLT258-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT259-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT260-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT262-3PH	N/A	N/A	N/A	Pass	Pass	Stable	Pass	Pass	Stable
FLT264-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT265-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT270-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT271-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT272-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable

*Oklaunion and Oklaunion HVDC buses 511456 & 511565 Post Fault Steady State Undervoltage

**Oklaunion and Oklaunion HVDC buses 511456 & 511565 Overvoltage During and Post Fault

***Palmer 524662 and Newhart 525461 Post Fault Steady State Undervoltage

The results of the prior-outage analyses are presented in Table 4-4 below. There were system performance criteria violations with the prior outages on the Tuco 34/230 kV transformer, The OKU to L.E.S 345 kV line, PlantX 230/115 kV transformer, the PlantX to Sundown 230 kV line and the Deaf Smith to Bushland 230 kV line followed by specific three phase faults.

Table 4-4: Pre-Mitigation Dynamic Stability Results (P6)

Fault ID	17W			18S			26S		
	Volt. Recov.	Post Cont. Volt	Stability	Volt. Recov.	Post Cont. Volt	Stability	Volt. Recov.	Post Cont. Volt	Stability
FLT49T-PO1	Pass	Pass	Poorly Damped	Pass	Pass	Poorly Damped	Pass	Pass	Stable
FLT146-PO1	Pass	Fail	Poorly Damped	Pass	Pass	Poorly Damped	Pass	Pass	Stable
FLT45-PO2	Fail	Fail	Negative Damped	Pass	Fail	Poorly Damped	Pass	Pass	Stable
FLT59-PO3	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT56-PO4	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT52-PO5	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT65-PO6	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT66-PO7	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT73-PO8	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT71-PO9	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT73-PO10	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT191-PO11	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT181-PO12	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT196-PO13	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT198-PO14	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT198-PO15	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT197-PO15	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT198-PO16	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT210-PO17	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT221-PO18	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT129-PO19	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT220-PO20	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT230-PO21	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT36-PO21	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT230-PO22	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT36-PO22	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT251-PO23	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT245-PO24	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT244-PO24	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT257-PO25	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT267-PO25	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT01-PO27	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT02-PO28	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable

4.4 Post-Mitigation Results

Table 4-5 shows the results of the P1 and P4 fault events with one of the network upgrades identified in the steady state analysis performed by SPP, the Tolk to Potter County 345kV circuit 1. The associated stability plots are provided in Appendix C.

Table 4-5: Post-Mitigation Dynamic Stability Results (P1, P4)

Fault ID	17W			18S			26S		
	Volt. Recov.	Post Cont. Volt	Stability	Volt. Recov.	Post Cont. Volt	Stability	Volt. Recov.	Post Cont. Volt	Stability
FLT01-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT02-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT03-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT04-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT05-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT06-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT07-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT10-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT11-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT13-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT14-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT15-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT16-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT17-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT18-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT19-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT20-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT21-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT22-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT23-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT24-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT25-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT26-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT27-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT28-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT29-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT30-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT31-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT34-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT35-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT36-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT37-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT38-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT39-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT40-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable

Table 4-5 continued

Fault ID	17W			18S			26S		
	Volt. Recov.	Post Cont. Volt	Stability	Volt. Recov.	Post Cont. Volt	Stability	Volt. Recov.	Post Cont. Volt	Stability
FLT41-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT42-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT43-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT45-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT46-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT48-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT49T-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT52-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT54-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT55-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT56-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT57-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT58-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT59-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT60-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT61-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT62-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT63-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT64-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT65-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT66-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT67-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT68-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT69-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT70-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT71-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT72-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT73-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT74-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT75-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT76-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT77-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT78-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT79-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT80-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT81-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT84-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT85-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT86-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT87-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT88-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable

Table 4-5 continued

Fault ID	17W			18S			26S		
	Volt. Recov.	Post Cont. Volt	Stability	Volt. Recov.	Post Cont. Volt	Stability	Volt. Recov.	Post Cont. Volt	Stability
FLT91-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT92-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT93-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT94-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT95-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT96-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT97-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT98-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT99-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT100-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT101-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT102-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT105-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT106-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT107-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT108-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT109-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT111-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT112-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT113-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT114-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT115-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT116-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT117-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT118-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT119-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT120-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT121-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT126-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT127-3PH	Pass	Pass	G16-015 trip	Pass	Pass	G16-015 trip	Pass	Pass	G16-015 trip
FLT128-3PH	Pass	Pass	G16-015 trip	Pass	Pass	G16-015 trip	Pass	Pass	G16-015 trip
FLT129-3PH	Pass	Pass	G16-015 trip	Pass	Pass	G16-015 trip	Pass	Pass	G16-015 trip
FLT131-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT133-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT134-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT135-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT136-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT137-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT138a-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT138b-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT139-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable

Table 4-5 continued

Fault ID	17W			18S			26S		
	Volt. Recov.	Post Cont. Volt	Stability	Volt. Recov.	Post Cont. Volt	Stability	Volt. Recov.	Post Cont. Volt	Stability
FLT140-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT141-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT142-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT143-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT146-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT150-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT156-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT157-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT158-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT159-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT160-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT165-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT166-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT167-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT170-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT171-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT172-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT173-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT174-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT175-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT176-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT180-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT181-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT182-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT183-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT185-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT186-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT187-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT188-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT189-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT190-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT193-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT194-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT195-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT197-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT198-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT199-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT200-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT201-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT202-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT203-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable

Table 4-5 continued

Fault ID	17W			18S			26S		
	Volt. Recov.	Post Cont. Volt	Stability	Volt. Recov.	Post Cont. Volt	Stability	Volt. Recov.	Post Cont. Volt	Stability
FLT204-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT205-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT206-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT210-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT211-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT212-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT213-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT214-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT215-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT216-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT219-3PH	Pass	Pass	G16-015 trip	Pass	Pass	G16-015 trip	Pass	Pass	G16-015 trip
FLT220-3PH	Pass	Pass	G16-015 trip	Pass	Pass	G16-015 trip	Pass	Pass	G16-015 trip
FLT221-3PH	Pass	Pass	G16-015 trip	Pass	Pass	G16-015 trip	Pass	Pass	G16-015 trip
FLT222-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT223-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT224-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT225-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT226-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT230-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT231-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT232-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT233-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT234-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT235-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT236-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT237-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT238-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT239-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT244-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT245-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT246-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT247-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT248-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT249-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT250-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT254-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT255-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT257-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT258-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT259-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT260-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT262-3PH	N/A	N/A	N/A	Pass	Pass	Stable	Pass	Pass	Stable

Table 4-5 continued

Fault ID	17W			18S			26S		
	Volt. Recov.	Post Cont. Volt	Stability	Volt. Recov.	Post Cont. Volt	Stability	Volt. Recov.	Post Cont. Volt	Stability
FLT264-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT265-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT270-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT271-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT272-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable

*Oklaunion and Oklaunion HVDC buses 511456 & 511565 Overvoltage During and Post Fault

The results with the addition of the Tolk to Potter County 345 kV circuit 1 showed that the undervoltage steady state violations observed at the Oklaunion 345 kV, Parmer 115 kV, and Newhart 230 kV substation during several fault conditions in the 17WP and 18SP models were resolved.

The addition of the Tolk to Potter County 345 kV circuit 1 did not prevent GEN-2016-015 from tripping offline for faults close to its point of interconnection substation, Andrews 230 kV substation. Disabling the frequency protection relays prevents the unit tripping without adverse system impacts. The GEN-2016-015 customer will have to coordinate with the inverter manufacturer to verify that the generators will not trip for faults on the system with normal clearing time and provide the results to SPP.

The addition of the Tolk to Potter County 345 kV circuit 1 did not prevent transient voltage recovery violations (high voltage) observed at the Oklaunion 345 kV substation in the 17WP and 18SP models with FLT49, the three-phase fault on the Oklaunion to Lawton Eastside 345 kV line which caused the Oklaunion 345 kV substation to be radially connected to the TUCO 345 kV substation. The recommended mitigation for this violation is to adjust the Oklaunion relays so that the Oklaunion 100 MVar capacitor banks and the 90 MVar HVDC capacitor filters are tripped when the Oklaunion to Lawton Eastside 345 kV line is tripped offline and the Oklaunion DC tie is blocked.

The three phase faults events following prior-outage events were performed with the complete set of network upgrades identified in the steady state analysis. The network upgrades include:

1. Tolk to Potter County 345 kV circuit 1.
2. Border to Chisholm 345 kV circuit 1
3. Crawfish Draw 345kV switching substation
 - a. Tap on Border to TUCO 345kV circuit 1
 - b. Tap on OKU to TUCO 345kV circuit 1
4. Crawfish Draw to Tolk 345kV circuit 1

Some prior outage events were modified and additional prior outage faults were defined to account for the configuration change due to the additional network upgrades. The modified and additional prior outage events simulated for the post-mitigation cases are provided in Table 4-6 below.

Table 4-6: Modified/Additional Prior-Outage Fault Definitions for Post-Mitigation

Fault ID	Fault Description
FLT146-PO1	Prior Outage of the Tuco 345 kV (525832) to Tuco 230 kV (525830) to Tuco 13.2 kV (525824) XFMR CKT 1; 3 phase fault on the Crawfish Draw (560022) to Border (515458) 345 kV line circuit 1, near Tuco. a. Apply fault at the Crawfish Draw 345 kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
FLT45-PO2	Prior Outage of the OKU (511456) to L.E.S (511468) 345 kV line circuit 1, Trip OKU HVDC and cap banks; 3 phase fault on the Crawfish Draw (560022) to Border (515458) 345 kV line circuit a. Apply fault at the Crawfish Draw 345 kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
FLT49T-PO29	Prior Outage of the Tolk (525549) to Potter County (523961) circuit 1; 3 phase fault on the OKU (511456) to L.E.S (511468) 345 kV line circuit 1, near OKU. a. Apply fault at the OKU 345 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. Trip OKU HVDC and cap banks
FLT45-PO29	Prior Outage of the Tolk (525549) to Potter County (523961) circuit 1; 3 phase fault on the Crawfish Draw (560022) to Border (515458) 345 kV line circuit a. Apply fault at the Crawfish Draw 345 kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
FLT49T-PO30	Prior Outage of the Tolk (525549) to Crawfish Draw (560022) circuit 1; 3 phase fault on the OKU (511456) to L.E.S (511468) 345 kV line circuit 1, near OKU. a. Apply fault at the OKU 345 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. Trip OKU HVDC and cap banks
FLT45-PO30	Prior Outage of the Tolk (525549) to Crawfish Draw (560022) circuit 1; 3 phase fault on the Crawfish Draw (560022) to Border (515458) 345 kV line circuit a. Apply fault at the Crawfish Draw 345 kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
FLT49T-PO31	Prior Outage of Crawfish Draw (560022) to Border (515458) 345 kV line circuit 1; 3 phase fault on the OKU (511456) to L.E.S (511468) 345 kV line circuit 1, near OKU. a. Apply fault at the OKU 345 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. Trip OKU HVDC and cap banks

Table 4-7 shows the results from the P6 events, the three phase faults following prior outages. The results showed that the DISIS-2016-001 Group 6 project outputs may have to be curtailed following a few prior outage events.

Table 4-7: Post-Mitigation Dynamic Stability Results (Prior-Outage Events)

Fault ID	17W			18S			26S		
	Volt. Recov.	Post Cont. Volt	Stability	Volt. Recov.	Post Cont. Volt	Stability	Volt. Recov.	Post Cont. Volt	Stability
FLT49T-PO1	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT146-PO1	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT45-PO2	Pass	Fail**	Negatively Damped**	Pass	Fail**	Stable	Pass	Pass	Stable
FLT59-PO3	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT56-PO4	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT52-PO5	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT65-PO6	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT66-PO7	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT73-PO8	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT71-PO9	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT73-PO10	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT191-PO11	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT181-PO12	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable

Table 4-7 continued

Fault ID	17W			18S			26S		
	Volt. Recov.	Post Cont. Volt	Stability	Volt. Recov.	Post Cont. Volt	Stability	Volt. Recov.	Post Cont. Volt	Stability
FLT196-PO13	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT198-PO14	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT198-PO15	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT197-PO15	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT198-PO16	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT210-PO17	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT221-PO18	Pass	Pass	G16-015 trip	Pass	Pass	G16-015 trip	Pass	Pass	G16-015 trip
FLT129-PO19	Pass	Pass	G16-015 trip	Pass	Pass	G16-015 trip	Pass	Pass	G16-015 trip
FLT220-PO20	Pass	Pass	G16-015 trip	Pass	Pass	G16-015 trip	Pass	Pass	G16-015 trip
FLT230-PO21	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT36-PO21	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT230-PO22	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT36-PO22	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT251-PO23	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT245-PO24	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT244-PO24	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT257-PO25	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT267-PO25	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT01-PO27	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT02-PO28	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT49T-PO29	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT45-PO29	Pass	Fail***	Stable	Pass	Fail***	Stable	Pass	Pass	Stable
FLT49T-PO30	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT45-PO30	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT49T-PO31	Pass	Fail****	Negatively Damped****	Pass	Fail****	Stable	Pass	Pass	Stable

**DISIS-2016-001 units need to be curtailed by approximately 200 MW in 17W and 50 MW in 18S after PO2

***DISIS-2016-001 units need to be curtailed by approximately 200 MW in 17W and 50 MW in 18S after PO29

****DISIS-2016-001 units need to be curtailed by approximately 350 MW in 17W and 250 MW in 18S after PO31

The results showed that similar to the three phase fault conditions, GEN-2016-015 tripped offline due to over frequency protection relays for faults close to its point of interconnection substation, Andrews 230 kV substation.

The curtailment levels determined for system performance criteria violations during the prior outage events are summarized in the Table 4-8 below. The DISIS-2016-001 Group 6 project were proportionally scaled down to the values provided in the table until acceptable system performance was observed.

Table 4-8: Post-Mitigation Curtailment Levels for Prior Outage Events

Fault ID	Fault Description	17W	18S	26S
FLT45-PO2	Prior Outage of the OKU (511456) to L.E.S (511468) 345 kV line circuit 1, Trip OKU HVDC and cap banks; 3 phase fault on the Crawfish Draw (560022) to Border (515458) 345 kV line circuit a. Apply fault at the Crawfish Draw 345 kV bus. b. Clear fault after 5 cycles by tripping the faulted line.	200 MW	50 MW	N/A
FLT45-PO29	Prior Outage of the Tolk (525549) to Potter County (523961) circuit 1; 3 phase fault on the Crawfish Draw (560022) to Border (515458) 345 kV line circuit a. Apply fault at the Crawfish Draw 345 kV bus. b. Clear fault after 5 cycles by tripping the faulted line.	200 MW	50 MW	N/A
FLT49T-PO31	Prior Outage of Crawfish Draw (560022) to Border (515458) 345 kV line circuit 1; 3 phase fault on the OKU (511456) to L.E.S (511468) 345 kV line circuit 1, near OKU. a. Apply fault at the OKU 345 kV bus. b. Clear fault after 5 cycles by tripping the faulted line. Trip OKU HVDC and cap banks	350 MW	250 MW	N/A

5.0 Conclusions

The purpose of this ReStudy#3 was to evaluate the impacts of the DISIS-2016-001-3 Group 6 active generation interconnection projects on the SPP transmission system shown in Table 5-1 and assess mitigation upgrades or measures that may be required to maintain system stability and system performance per SPP's Disturbance Performance Requirements. The reactive power and dynamic stability analyses were performed for the evaluation using the PTI PSS/E version 33.7 software. The 2017 winter peak, 2018 summer peak and 2026 summer peak models were used in the study.

Table 5-1: Group 6 Interconnection Requests

Request	Capacity (MW)	Generator Model	Point of Interconnection
GEN-2015-041	5 MW uprate to GEN-2013-016 (total power = 196 MW summer/208 MW winter)	GENROU (525845) (combustion turbine)	TUCO 345kV (525832)
GEN-2016-015	100	TMEIC 1.667MW PV inverters (solar)	Andrews 230kV (528604)
GEN-2016-056	200	GE 2.0MW (wind)	Carlisle 230 kV (526161)
GEN-2016-062	250.7	GE 2.3MW (wind)	Andrews 230kV (528604)
GEN-2016-069	31.4	Hanwha 3.8MW & Hanwha 0.95MW (solar)	Chaves County 115kV (527482)
ASGI-2016-002	0.35 MW uprate to ASGI-2015-002 (total power = 2.65MW)	GE 2.65MW (previously GE 2.3MW)	SP-Yuma 115kV (526475)
ASGI-2016-004	10	3 x Alstom 3.2MW & 4 x Renewtech 100kW	Palo Duro 115kV (524530)

The results of the reactive power analysis, also known as the low-wind/no-wind condition analysis or low-irradiance analysis, performed using all three models showed that the projects may require shunt reactors on their collector substation high voltage bus:

1. GEN-2016-015 – 0.8 MVAR
2. GEN-2016-056 – 7.6 MVAR
3. GEN-2016-062 – 12.7 MVAR
4. GEN-2016-069 – 0.4 MVAR

The shunt reactors are needed to reduce the reactive power transfer at the POI to approximately zero during low/no-wind or low-irradiance conditions while the generation interconnection project remained connected to the grid.

The dynamic stability analysis was performed using the three loading scenarios 2017WP, 2018SP and 2026SP simulating up to 205 faults that included three-phase and single-line-to-ground faults including faults with stuck breakers.

The dynamic stability analysis showed that without mitigations GEN-2016-015 tripped offline, there were transient voltage recovery violations (high voltage) observed at the Oklaunion 345 kV substation, and steady state undervoltage violations observed at the Oklaunion 345 kV, the Palmer 115 kV, and Newhart 230 kV substations during specific three phase fault conditions.

Disabling the GEN-2016-015 frequency protection relays prevents the unit tripping without adverse system impacts. The GEN-2016-015 customer will have to coordinate with the inverter manufacturer to verify that the generators will not trip for faults on the system with normal clearing time and provide the results to SPP.

The recommended mitigation for the transient overvoltage violation is to adjust the Oklaunion substation relays so that the Oklaunion 100 MVar capacitor banks and the 90 MVar HVDC capacitor filters are tripped when the Oklaunion to Lawton Eastside 345 kV line is tripped offline and the Oklaunion DC tie is blocked.

With the addition of Tolk to Potter County 345 kV circuit 1, a network upgrade identified by SPP in the steady state analysis, the undervoltage violations observed in the pre-mitigation conditions were resolved.

With these mitigations implemented in the study cases, there were no other machine rotor angle damping or transient voltage recovery violations observed in the simulated (non-prior outage) fault events.

The three phase faults following the prior outage event were also simulated with the complete set of network upgrades identified in the steady state analysis:

1. Tolk to Potter County 345 kV circuit 1.
2. Border to Chisholm circuit 1
3. Crawfish Draw 345kV substation
 - a. Tap on Border to TUCO 345kV circuit 1
 - b. Tap on OKU to TUCO 345kV circuit 1
4. Crawfish Draw to Tolk 345kV circuit 1

The results of the prior outage analysis showed that the total output from the DISIS-2016-001 Group 6 projects may have to be curtailed by approximately 350 MW in order to prevent system performance violations following prior outage conditions.



Aneden
Consulting

**Submitted to
Southwest Power Pool**



Report On

**Definitive Interconnection System Impact Study
DISIS-2016-001-3 Study Group 7
ReStudy#3**

Revision R2

Date of Submittal
April 11, 2019

anedenconsulting.com

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APPENDICES

APPENDIX A: SPP Disturbance Performance Requirements
APPENDIX B: DISIS-2016-001-3 Group 7 Generator Dynamic Models
APPENDIX C: Dynamic Stability Simulation Plots

Executive Summary

Aneden Consulting (Aneden) was retained by the Southwest Power Pool (SPP) to complete the reactive power and the dynamic stability analyses as part of the Definitive Interconnection System Impact Study DISIS-2016-001-3 (ReStudy #3) for Southwestern Oklahoma Area defined as Group 7. The purpose of the analyses was to identify impacts to the transmission system caused by the active interconnection requests in Group 7 and develop mitigation upgrades or measures to resolve any detrimental impacts.

The DISIS-2016-001-3 Group 7 currently includes two generation interconnection requests shown in Table ES-1 below.

Table ES-1: DISIS-2016-001-3 Interconnection Projects Evaluated

Request	Capacity (MW)	Generator Model	Point of Interconnection
GEN-2016-037	300.0	Vestas V110 2.0 MW (solar)	Tap Chisholm (511553) – Gracemont (515800) 345kV, (G16-037-TAP, 560078)
GEN-2016-051	9.8 uprate to GEN-2003-022 & GEN-2004-020 (total power = 156.8MW)	GE 1.6 MW (wind)	Tap Clinton Junction (511534) – Weatherford Southeast (511536) 138kV, (Weatherford Windfarm Tap 138kV, 511506)

Aneden perform reactive power and dynamic stability analyses using DISIS-2016-001-3 study models developed to reflect the system conditions for the current study generation interconnection requests - 2017 winter peak (2017WP), 2018 summer peak (2018SP) and 2026 summer peak (2026SP). All analyses were performed using the Siemens PTI PSS/E software version 33.7 and the results are summarized below.

The results of the reactive power analysis, also known as the low-wind/no-wind condition analysis or low-irradiance analysis, performed using all three models showed the following shunt reactor sizes may be needed at each project collector substation high voltage bus:

1. GEN-2016-037 – 30.0 MVAR
2. GEN-2016-051 – 0.5 MVAR

The dynamic stability analysis was performed to identify the potential system criteria violations prior to developing mitigation solutions. The dynamic stability analysis was performed using the three loading scenarios 2017WP, 2018SP and 2026SP simulating up to 95 fault conditions that included three-phase, single-line-to-ground faults with stuck and three phase faults on prior outage cases.

The results of the dynamic stability analysis showed unstable responses from GEN-2016-037 and prior-queued GEN-2015-071 following a three-phase fault on the GEN-2016-037 POI substation to Gracemont 345 kV line.

The following mitigation upgrades, identified in the steady state analysis performed by SPP, were tested to mitigate the observed violations:

1. Border to Chisholm 345kV circuit 1

The mitigation upgrades listed above were included in the subsequent post-mitigation dynamic stability analyses presented in this report.

The results of the dynamic stability analysis showed that after implementing the Border to Chisholm 345 kV line, there was no generation tripping or system instability observed as a result of interconnecting all study projects at 100% for the three phase and stuck breaker fault conditions.

The results of the dynamic stability analysis also showed that with the Border to Chisholm 345 kV line network upgrade, GEN-2016-037 was unstable with a prior outage on either the Border to Chisholm 345 kV line or the GEN-2016-037 POI to Gracemont 345 kV line followed by a three-phase fault on the other line. Similarly, GEN-2016-051 tripped with the prior-outage on the WTH SE (511497) to WTH JCT (511489) 138kV line followed by the three-phase fault on the Weatherford (511506) to Clinton Junction (511534) 138 kV line. As a result, GEN-2016-037 may have to be curtailed to 140 MW and the GEN-2003-022, GEN-2004-020, & GEN-2016-051 facility may have to be curtailed to 100 MW following the respective prior-outage events.

1.0 Introduction

Aneden Consulting (Aneden) was retained by the Southwest Power Pool (SPP) to complete the reactive power analysis and dynamic stability analysis as part of the Definitive Interconnection System Impact Study DISIS-2016-001-3 ReStudy #3 (ReStudy#3) for Southwestern Oklahoma Area, defined as Group 7. The purpose of the analyses was to identify impacts to the transmission system caused by the active interconnection requests in Group 7 and develop mitigation upgrades or measures to resolve any detrimental impacts.

The active DISIS-2016-001-3 Group 7 projects studied in this ReStudy#3 are listed below in Table 1-1 below.

Table 1-1: Active DISIS-2016-001-3 Group 7 Interconnection Requests

Request	Capacity (MW)	Generator Model	Point of Interconnection
GEN-2016-037	300.0	Vestas V110 2.0 MW (solar)	Tap Chisholm (511553) – Gracemont (515800) 345kV, (G16-037-TAP, 560078)
GEN-2016-051	9.8 uprate to GEN-2003-022 & GEN-2004-020 (total power = 156.8MW)	GE 1.6 MW (wind)	Tap Clinton Junction (511534) – Weatherford Southeast (511536) 138kV, (Weatherford Windfarm Tap 138kV, 511506)

The active Higher Queued Group 7 projects studied in this ReStudy#3 are listed below in Table 1-2 below.

Table 1-2: Active Higher Queued Group 7 Interconnection Requests

Request	Size (MW)	Generator Model	Point of Interconnection
GEN-2001-026	74.25	NEG Micon 1.65MW (599006)	Washita 138 kV (521089)
GEN-2002-005	118.5	Acciona 1.5MW (599018)	Red Hills Tap 138 kV (521116)
GEN-2003-004/GEN-2004-023/GEN-2005-003	151.2	Vestas V80 1.8MW (599003)	Washita 138 kV (521089)
GEN-2003-005/GEN-2011-037	105.6	G.E. 1.6MW (599023)	Anadarko - Paradise (Blue Canyon) 138 kV (521129)
GEN-2003-022/GEN-2004-020	147	GE 1.5MW (599160)	Clinton Junction-Weatherford Southeast 138kV (511506)
GEN-2006-002	100.8	GE 1.5MW (599036) & 1.6MW (599038)	Sweetwater 230 kV (511541)
GEN-2006-035	224	Gamesa G87 2.0MW (599049 & 599050)	Sweetwater 230 kV (511541)
GEN-2006-043	98.9	Siemens 93m 2.3MW (599051)	Sweetwater 230 kV (511541)
GEN-2007-052	150	GE LM6000 CT 50MW (521110, 521111, 521112)	Anadarko 138 kV (520814)
GEN-2008-023	148.8	GE 1.6MW (599092 & 599094)	Hobart Junction 138 kV (511463)
GEN-2008-037	99	Vestas V90 VCUS 1.8 MW (599098)	Slick Hills 138 kV (521089)
GEN-2011-049/GEN-2015-004	303.6	Siemens 101m 2.3MW (583093 & 583096)	Border 345 kV (515458)
GEN-2012-028	74	Vestas V110 VCSS 2.0 MW (521143)	Gotebo 69kV (520925)
GEN-2015-013	119.952	Eaton Power Xpert Solar Inverters 1.666MW (584553)	Snyder 138 kV (521052)
GEN-2015-055	40	Advanced Energy AE 500NX 0.5MW solar inverters (584933)	Erick 138 kV (520903)
GEN-2015-071	200	Vestas V110 VCSS 2.0MW (585083)	Chisholm 345 kV (511533)

1.1 Scope

The Study included reactive power and dynamic stability analyses. The methodology, assumptions and results of the analyses are presented in the following four main sections:

1. Study Assumptions and Criteria
2. Reactive Power Analysis
3. Dynamic Stability Analysis
4. Conclusions

1.2 Study Limitations

The assessments and conclusions provided in this report are based on assumptions and information provided to Aneden by other supporting parties. While the assumptions and information provided may be appropriate for the purposes of this report, Aneden does not guarantee that those conditions assumed will occur. In addition, Aneden did not independently verify the accuracy or completeness of the information provided. As such, the conclusions and results presented in this report may vary depending on the extent to which actual future conditions differ from the assumptions made or information used herein.

2.0 Study Assumptions and Criteria

The reactive power and dynamic stability analyses were performed using the PTI PSS/E software version 33.7. The main assumptions and criteria applied in the study are summarized in the sections below.

2.1 Study System

The study system for the dynamic stability analysis consisted of generators and transmission buses at or above 115 kV within 5 buses of the DISIS-2016-001-3 Group 7 projects in the monitored areas listed in Table 2-1 below.

Table 2-1: Monitored Areas

Area Number	Name
520	AEPW
524	OKGE
525	WFEC
526	SPS
531	MIDW
534	SUNC
536	WERE

2.2 Study Models

The reactive power and dynamic stability analyses were completed using the models developed from the 2016 SPP Model Development Working Group (MDWG) PSS/E models. Table 2-2 summarizes the study models used for each analysis.

Table 2-2: Study Models

Case Name	Reactive Power	Dynamic Stability
17W_DIS16013_G07	X	X
18S_DIS16013_G07	X	X
26S_DIS16013_G07	X	X

2.3 Group 7 Interconnection Request Configurations

The modeling configurations for both Group 7 projects in the study models are shown in Figure 2-1 and Figure 2-2.

Figure 2-1: GEN-2016-037 Single Line Diagram

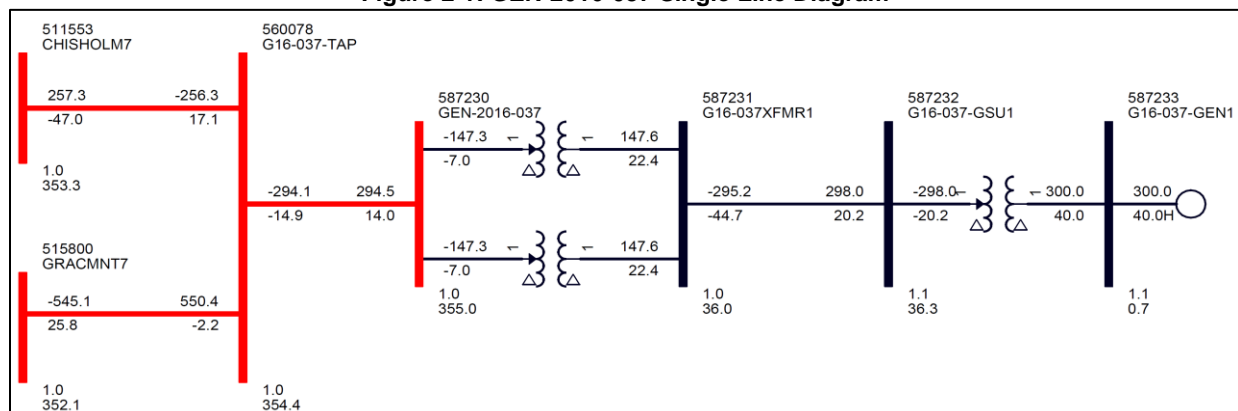
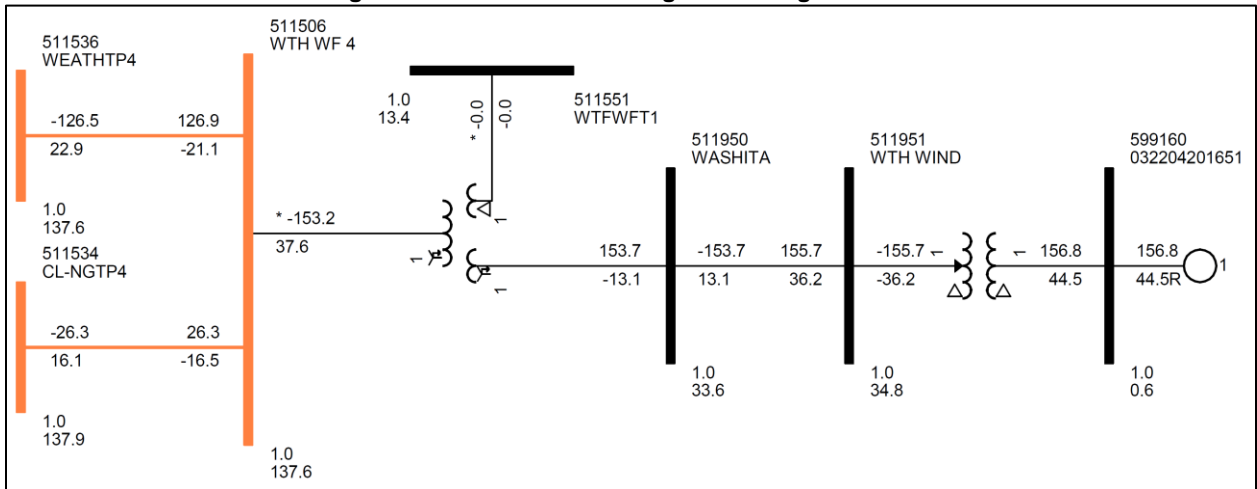


Figure 2-2: GEN-2016-051 Single Line Diagram



2.4 Dynamic Performance Requirements

The dynamic stability analysis results were assessed according to the following excerpt from SPP’s Disturbance Performance Requirements. The complete document is provided in Appendix A.

“Machine Rotor Angles shall exhibit well damped angular oscillations following a disturbance on the Bulk Electric System for all NERC TPL-001-4 P1 through P7 events. Machines with rotor angle deviations greater than or equal to 16 degrees (measured as absolute maximum peak to absolute minimum peak) shall be evaluated against SPPR1 or SPPR5 requirements below. Machines with rotor angle deviations less than 16 degrees which do not exhibit convergence shall be evaluated on an individual basis. Rotor angle deviations will be calculated relative to the system swing machine.

Well damped angular oscillations shall meet one of the following two requirements when calculated directly from the rotor angle:

1. Successive Positive Peak Ratio One (SPPR1) must be less than or equal to 0.95 where

SPPR1 is calculated as follows:

$$SPPR1 = \frac{\text{Peak Rotor Angle of 2nd Positive Peak minus Minimum Value}}{\text{Peak Rotor Angle of 1st Positive Peak minus Minimum Value}} \leq 0.95$$

-or- $\text{Damping Factor \%} = (1 - SPPR1) \times 100\% \geq 5\%$

The machine rotor angle damping ratio may be determined by appropriate modal analysis (i.e. Prony Analysis) where the following equivalent requirement must be met:

$$\text{Damping Ratio} \geq 0.0081633$$

2. Successive Positive Peak Ratio Five (SPPR5) must be less than or equal to 0.774 where SPPR5 is calculated as follows:

$$\text{SPPR5} = \frac{\text{Peak Rotor Angle of 6th Positive Peak minus Minimum Value}}{\text{Peak Rotor Angle of 1st Positive Peak minus Minimum Value}} \leq 0.774$$

-or- $\text{Damping Factor \%} = (1 - \text{SPPR5}) \times 100\% \geq 22.6\%$

The machine rotor angle damping ratio may be determined by appropriate modal analysis (i.e. Prony Analysis) where the following equivalent requirement must be met:

$$\text{Damping Ratio} \geq 0.0081633$$

Bus voltages on the Bulk Electric System shall recover above 0.70 per unit, 2.5 seconds after the fault is cleared. Bus voltages shall not swing above 1.20 per unit after the fault is cleared, unless affected transmission system elements are designed to handle the rise above 1.2 per unit.”

3.0 Reactive Power Analysis

The reactive power analysis, also known as the low-wind/no-wind condition analysis or low-irradiance analysis, was performed for the Group 7 projects to determine the reactive power contribution from each project’s interconnection line and collector transformer and cables during low/no generator output conditions while each project is still connected to the grid and to size shunt reactors that would reduce the project reactive power contribution to the POI to approximately zero. The reactive power analysis was performed using the three DISIS-2016-001-3 Group 7 study models, 2017WP, 2018SP and 2026SP.

3.1 Methodology and Criteria

Each Group 7 project generator was switched out of service while other collector system elements remained in-service. A shunt reactor was tested at the study project substation high side bus or 34.5kV collector system substation bus to bring the MVar flow into the POI down to approximately zero.

3.2 Results

The results from the reactive power analysis showed that the Group 7 projects each required varying shunt reactance at the high side of the project substation, to reduce the POI MVar to zero. This represents the contributions from each project’s collector systems. Figure 3-1 and Figure 3-2 illustrate the shunt reactor sizes required. Reactive compensation can be provided either by discrete reactive devices or by the generator itself if it possesses that capability.

Table 3-1: Shunt Reactors for Low Wind Study

Machine	POI Bus Number	POI Bus Name	Reactor Size (MVar)		
			17WP	18SP	26SP
GEN-2016-037	560078	G16-037-TAP	30.0	30.0	30.0
GEN-2016-051	511506	WTH WF4	0.5	0.5	0.5

Figure 3-1: GEN-2016-037 Shunt Reactor

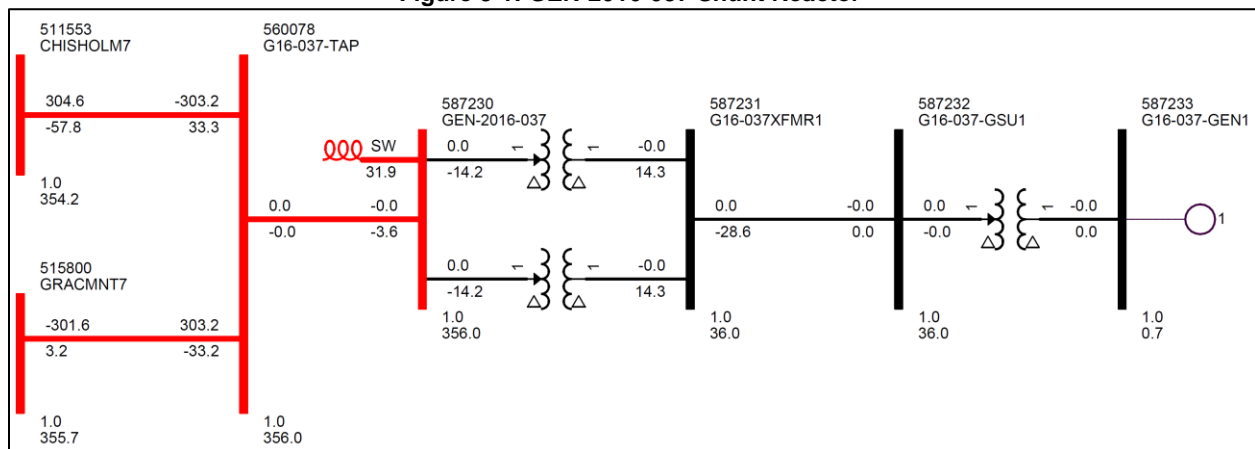
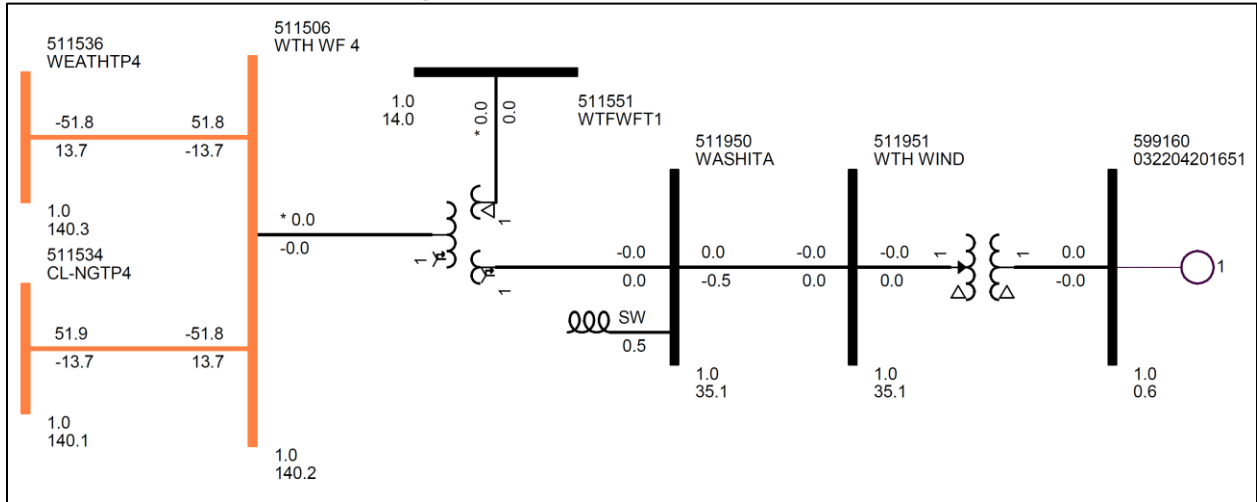


Figure 3-2: GEN-2016-051 Shunt Reactor



4.0 Dynamic Stability Analysis

Aneden performed a dynamic stability analysis to assess the system performance and identify any system stability issues associated with DISIS-2016-001-3 ReStudy#7 Group 7 interconnection requests. The analysis was performed according to SPP's Disturbance Performance Requirements. The Group 7 project dynamic modeling data is provided in Appendix B. The simulation plots can be found in Appendix C.

4.1 Methodology and Criteria

The dynamic stability analysis was performed using the DISIS-2016-001-3 (Group 7) study models described in Section 2.2 above. The power flow models and associated dynamics database were initialized (no-fault test) to confirm that there were no errors in the initial conditions of the immediate system and the dynamic data. The dynamics model data for the DISIS-2016-001-3 (Group 7) requests is provided in Appendix B. The stability analysis was performed using PSS/E version 33.7.

During the fault simulations, the active power (PELEC), reactive power (QELEC), terminal voltage (ETERM), and frequency (FREQ) were monitored for the Group 7 generation interconnection requests. The machine rotor angle for synchronous machines and speed for asynchronous machines within five (5) buses away from the POI of each of the Group 7 projects and within the study area including 520 (AEPW), 524 (OKGE), 525 (WFEC), 526 (SPS), 531 (MIDW), 534 (SUNC) and 536 (WERE) were monitored.

4.2 Fault Definitions

Aneden developed ninety-five (95) faults including three-phase line faults with reclosing, three-phase transformer faults with normal clearing, single-line-to-ground (SLG) fault with stuck breaker and three phase faults on prior outage cases. The single-line-to-ground fault impedance values were determined by applying a fault on the base case large enough to produce a 0.6 pu voltage value on the faulted bus. The fault events are described in Table 4-1 below. Fault descriptions from the previous DISIS-2016-001-3 Group 7 studies were included. These contingencies were applied to the 2017 winter peak, 2018 summer peak, and the 2026 summer peak models.

Table 4-1: Fault Definitions

Fault ID	Fault Description
FLT01-3PH	3 phase fault on the Erick (520903) to Buloj (520402) 138kV line, near Erick.
	a. Apply fault at the Erick 138kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT02-3PH	d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
	3 phase fault on the Erick (520903) to (AEPW) Sayre-4 (511504) 138kV line, near Erick.
	a. Apply fault at the Erick 138kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
FLT03-3PH	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
	d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
	3 phase fault on the Elk City (511458) to Falcon Road (511511) 138kV line, near Elk City.
	a. Apply fault at the Elk City 138kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
	d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.

Table 4-1 continued

Fault ID	Fault Description
FLT04-3PH	3 phase fault on the Elk City (511458) to Clinton Junction (511485) 138kV line, near Elk City.
	a. Apply fault at the Elk City 138kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT05-3PH	3 phase fault on the Elk City 230kV (511490) to Elk City 138kV (511458) to Elk City 13.8kV (511482) transformer, near Elk City 230kV.
	a. Apply fault at the Elk City 230kV bus.
FLT06-3PH	3 phase fault on the Ellis (511561) to Morewood Switch (521001) 138kV line, near Ellis.
	a. Apply fault at the Ellis 138kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT07-3PH	3 phase fault on the Morewood Switch (521001) to Nine Mile (521128) 138kV line, near Morewood Switch.
	a. Apply fault at the Morewood 138kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT08-3PH	3 phase fault on the Clinton AF Tap (511446) to Hobart Junct. (511463) 138kV line, near Clinton AF Tap.
	a. Apply fault at the Clinton AF Tap 138kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT09-3PH	3 phase fault on the Hobart Junct. (511463) to Carnegie South (511445) 138kV line, near Hobart Junct.
	a. Apply fault at the Hobart Junct. 138kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT10-3PH	3 phase fault on the Hobart Junct. (511463) to (OMPA) Altus (529302) 138kV line, near Hobart Junct.
	a. Apply fault at the Hobart Junct. 138kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT11-3PH	3 phase fault on the Altus (511440) to (OMPA) Parklane (529345) 138kV line, near Altus.
	a. Apply fault at the Altus 138kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT27-3PH	3 phase fault on the Chisholm (511557) to Elk City (511490) 230kV line, near Chisholm.
	a. Apply fault at the Chisholm 230kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT28-3PH	3 phase fault on the Chisholm (511557) to Sweetwater (511541) 230kV line, near Chisholm.
	a. Apply fault at the Chisholm 230kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.

Table 4-1 continued

Fault ID	Fault Description
FLT29-3PH	3 phase fault on the Wheeler (523777) to Grapevine (523771) 230kV line, near Wheeler.
	a. Apply fault at the Wheeler 230kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT30-3PH	3 phase fault on the Chisholm (511553) to G16-037-TAP (560078) 345kV line, near Chisholm.
	a. Apply fault at the Chisholm 345kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT31-3PH	3 phase fault on the Chisholm (511553) 345kV to Chisholm (511557) 230kV to Chisholm (511558) 13.8kV transformer, near Chisholm.
	a. Apply fault at the Chisholm 345kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
FLT32-3PH	3 phase fault on the Gracemont (515800) to Minco (514801) 345kV line, near Gracemont.
	a. Apply fault at the Gracemont 345kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT33-3PH	3 phase fault on the L.E.S. (511468) to Terry Road (511568) 345kV line, near L.E.S..
	a. Apply fault at the L.E.S. 345kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT34-3PH	3 phase faults on the L.E.S. (511468) to O.K.U. (511456) 345kV line, near L.E.S.
	a. Apply fault at the L.E.S. 345kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT35-3PH	3 phase faults on the O.K.U. (511456) to Tuco (525832) 345kV line, near O.K.U.
	a. Apply fault at the O.K.U. 345kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT36-3PH	3 phase fault on the TUCO_Int (525832) 345kV/ (525830) 230kV/ (525824) 13.2kV transformer, near the 345kV bus.
	a. Apply fault at the TUCO_Int 345kV bus.
	b. Clear fault after 5 cycles by tripping the faulted transformer.
FLT37-3PH	3 phase fault on the Cimarron (514901) to Mathewson (515497) 345kV line, ckt 1, near Cimarron.
	a. Apply fault at the Cimarron 345kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT38-3PH	3 phase fault on the Cimarron (514901) to Northwest (514880) 345kV line, near Cimarron.
	a. Apply fault at the Cimarron 345kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
	d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.

Table 4-1 continued

Fault ID	Fault Description
FLT39-3PH	3 phase fault on the Cimarron (514901) to Draper (514934) 345kV line, near Cimarron.
	a. Apply fault at the Cimarron 345kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT40-3PH	3 phase fault on the Border (515458) to TUCO (525832) 345kV line, near Border.
	a. Apply fault at the Border 345kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT41-3PH	3 phase fault on the Northwest (514880) to Arcadia (514908) 345kV line, near Northwest.
	a. Apply fault at the Northwest 345kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT48-3PH	3 phase fault on the Gracemont (515800) to G16-091-TAP (587744) 345 kV line, near Gracemont
	a. Apply fault at the Gracemont 345kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT62-3PH	3 phase fault on the Gracemont (515800) to G15-093T (585270) 345kV line, near Gracemont.
	a. Apply fault at the Gracemont 345kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line. Trip G15-093
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT66-3PH	3 phase fault on the Border (515458) to Woodward (515375) 345kV line, near Border.
	a. Apply fault at the Border 345kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT75-3PH	3 phase fault on the Cimarron (514901) to Mathewson (515497) 345kV CKT 1 & 2, near Cimarron.
	a. Apply fault at the Cimarron 345kV bus.
FLT92-3PH	3 phase fault on the Weatherford (511506) to Clinton Junction (511534) 138 kV line, near Weatherford.
	a. Apply fault at the Weatherford 138kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT93-3PH	3 phase fault on the Weatherford (511506) to Weatherford Tap (511536) 138 kV line, near Weatherford.
	a. Apply fault at the Weatherford 138kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT94-3PH	3 phase fault on the Weatherford Tap (511536) to WTH SE (511497) 138 kV line, near Weatherford Tap.
	a. Apply fault at the Weatherford Tap 138kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT95-3PH	3 phase fault on the WTH SE (511497)138 kV to WTH SE (511496) 69kV to WTH SE (511505) 13.8 kV transformer, near WTH SE.
	a. Apply fault at the WTH SE 138kV bus.
	b. Clear fault after 5 cycles by tripping the faulted transformer.

Table 4-1 continued

Fault ID	Fault Description
FLT96-3PH	3 phase fault on the WTH SE (511497) to WTH JCT (511489) 138 kV line, near WTH SE.
	a. Apply fault at the WTH SE 138kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT98-3PH	d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
	3 phase fault on the Clinton Junction Tap (511534) to Clinton Junction (511485) 138 kV line, near Clinton Junction Tap.
	a. Apply fault at the Clinton Junction Tap 138kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
FLT99-3PH	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
	d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
	3 phase fault on the Clinton Junction (511485) 138 kV to Clinton Junction (511484) 69kV to Clinton Junction (511499) 13.8 kV transformer, near Clinton Junction 138kV.
	a. Apply fault at the Clinton Junction 138kV bus.
FLT100-3PH	b. Clear fault after 5 cycles by tripping the faulted transformer.
	3 phase fault on the Clinton Junction (511485) to Clinton (520856) 138 kV line, near Clinton Junction.
	a. Apply fault at the Clinton Junction 138kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
FLT101-3PH	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
	d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
	3 phase fault on the Clinton Junction (511485) to Elk City (511458) 138 kV line, near Clinton Junction.
	a. Apply fault at the Clinton Junction 138kV bus.
FLT9001-3PH	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
	d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT9002-3PH	3 phase fault on the Elk City 138/69/13.8 kV Transformer (511458/511459/511493), near Elk City 138kV.
	a. Apply fault at the Morewood Switch 138kV bus.
	b. Clear fault after 5 cycles by tripping the faulted transformer.
FLT9003-3PH	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
	d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
	3 phase fault on the RHWIND4 (521116) to Ellis (511561) 138kV line, near RHWIND4.
	a. Apply fault at the RHWIND4 138kV bus.
FLT9004-3PH	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
	d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
	3 phase fault on the RHWIND4 (521116) to Elk City (511458) 138kV line, near RHWIND4.
FLT9005-3PH	a. Apply fault at the RHWIND4 138kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
	d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT9006-3PH	3 phase fault on the Clinton AF Tap (511446) to Elk City (511458) 138kV line, near Clinton AF Tap.
	a. Apply fault at the SWEETWT6 (511541) to STLN-DEMARC6 (523779) 230 kV line, near SWEETWT6.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT9006-3PH	d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.

Table 4-1 continued

Fault ID	Fault Description
FLT9007-3PH	3 phase fault on the WHEELER (523777) 230kV / (523776) 115kV / (523774) 13.2 kV Transformer, near WHEELER 230kV.
	a. Apply fault at the WHEELER 230kV bus.
	b. Clear fault after 5 cycles by tripping the faulted transformer.
FLT9008-3PH	3 phase fault on the Gracemont (515800) 340kV / (515802) 138kV / (515801) 13.8 kV Transformer, near Gracemont 345kV.
	a. Apply fault at the Gracemont 345kV bus.
	b. Clear fault after 5 cycles by tripping the faulted transformer.
FLT9009-3PH	3 phase fault on the Minco (514801) to Cimaron (514901) 345 kV line, near Minco.
	a. Apply fault at the Minco 345kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT9010-3PH	3 phase fault on the Cimaron (514901) 345kV / (514898) 138kV / (515714) 13.8 kV Transformer, near Cimaron 345kV.
	a. Apply fault at the Cimaron 345kV bus.
	b. Clear fault after 5 cycles by tripping the faulted transformer.
FLT9011-3PH	3 phase fault on the L.E.S. (511468) 340kV / (511467) 138kV / (511414) 13.8 kV Transformer, near L.E.S. 345kV.
	a. Apply fault at the L.E.S. 345kV bus.
	b. Clear fault after 5 cycles by tripping the faulted transformer.
FLT9012-3PH	3 phase fault on the Gracemont (515802) to Anadarko (520814) 138 kV line, near Gracemont.
	a. Apply fault at the Gracemont 138kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT9013-3PH	3 phase fault on the Gracemont (515802) to Washita (521089) 138 kV line, near Gracemont.
	a. Apply fault at the Gracemont 138kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT9015-3PH	3 phase fault on the Sweetwater (511541) to Stateline Demarcation (523779) to Wheeler (523777) 230 kV line, near Sweetwater.
	a. Apply fault at the Sweetwater 230kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT9016-3PH	3 phase fault on the G16-037-Tap (560078) to Gracemont (515800) 345 kV line, near G16-037-Tap.
	a. Apply fault at the G16-037-Tap 345 kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT9017-3PH	3 phase fault on the G16-091-TAP (587744) to L.E.S (511468) 345 kV line, near G16-091-TAP.
	a. Apply fault at the G16-091-TAP 345kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT44-SB	a. Apply a single phase fault on Sayre-4 (511504) 138kV bus.
	b. Wait 16 cycles and remove fault.
	c. Trip Sayer-4 (511504) to Erick (520903) 138kV line.
	d. Trip Sayer-4 (511504) to Falcon Road (511511) 138kV line.

Table 4-1 continued

Fault ID	Fault Description
FLT45-SB	a. Apply a single phase fault on Morewood Switch (521001) 138kV bus.
	b. Wait 16 cycles and remove fault.
	c. Trip Morewood Switch (521001) to Morewood (521002) 138kV line.
	d. Trip Morewood Switch (521001) to Ellis (511561) 138kV line.
FLT51-SB	a. Apply a single phase fault on Gracemont (515800) 345kV bus.
	b. Wait 16 cycles and remove fault.
	c. Trip Gracemont (515800) to G16-037-Tap (560078) 345kV line.
	d. Trip Gracemont (515800) to Minco (514801) 345kV line.
FLT63-SB	a. Apply a single phase fault on Buloj (520402) 138kV bus.
	b. Wait 16 cycles and remove fault.
	c. Trip Erick (520903) to Buloj (520402) 138kV line
	d. Trip Sweetwater (521060) to Buloj (520402) 138kV line
FLT64-SB	a. Apply a single phase fault on CHISHOLM6 (511557) 230kV bus.
	b. Wait 16 cycles and remove fault.
	c. Trip Chisholm (511553) 345kV/ (511557) 230kV / (511558) 13.2kV transformer.
	d. Trip Chisholm (511557) 230kV Bus
FLT113_SB	a. Apply a single phase fault on Clinton Junction (511485) 138 kV bus.
	b. Wait 16 cycles and remove fault.
	c. Trip Clinton Junction (511485) to Elk City (511458) 138 kV line.
	d. Trip Clinton Junction (511485) to Clinton (520856) 138 kV line.
FLT9018*	3 phase fault on the Chisholm (511553) to Border (515458) 345 kV line, near Chisholm.
	a. Apply fault at the Chisholm 345kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT07-PO1	Prior Outage: Switch out the Falcon Road (511511) to Elk City (511458) 138kV line.
	3 phase fault on the Morewood Switch (521001) to Nine Mile (521128) 138kV line, near Morewood Switch.
	a. Apply fault at the Morewood 138kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT06-PO1	Prior Outage: Switch out the Falcon Road (511511) to Elk City (511458) 138kV line.
	3 phase fault on the Ellis (511561) to Morewood Switch (521001) 138kV line, near Ellis.
	a. Apply fault at the Ellis 138kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT9002-PO1	Prior Outage: Switch out the Falcon Road (511511) to Elk City (511458) 138kV line.
	3 phase fault on the Morewood Switch (521001) 138kV / (521000) 69kV / (521172) 13.8 kV Transformer, near Morewood Switch 138kV.
	a. Apply fault at the Morewood Switch 138kV bus.
	b. Clear fault after 5 cycles by tripping the faulted transformer.
FLT9004-PO1	Prior Outage: Switch out the Falcon Road (511511) to Elk City (511458) 138kV line.
	3 phase fault on the RHWIND4 (521116) to Elk City (511458) 138kV line, near RHWIND4.
	a. Apply fault at the RHWIND4 138kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT04-PO2	Prior Outage: Switch out the Erick (520903) to Buloj (520402) 138kV line.
	3 phase fault on the Elk City (511458) to Clinton Junction (511485) 138kV line, near Elk City.
	a. Apply fault at the Elk City 138kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.	

Table 4-1 continued

Fault ID	Fault Description
FLT05-PO2	Prior Outage: Switch out the Erick (520903) to Buloj (520402) 138kV line.
	3 phase fault on the Elk City 230kV (511490) to Elk City 138kV (511458) to Elk City 13.8kV (511482) transformer, near Elk City 230kV.
	a. Apply fault at the Elk City 230kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
FLT9001-PO2	Prior Outage: Switch out the Erick (520903) to Buloj (520402) 138kV line.
	3 phase fault on the Elk City 138/69/13.8 kV Transformer (511458/511459/511493), near Elk City 138kV.
	a. Apply fault at the Elk City 138kV bus.
	b. Clear fault after 5 cycles by tripping the faulted transformer.
FLT9003-PO3	Prior Outage: Switch out the Erick (520903) to Buloj (520402) 138kV line.
	3 phase fault on the RHWIND4 (521116) to Ellis (511561) 138kV line, near RHWIND4.
	a. Apply fault at the RHWIND4 138kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.	
FLT9004-PO2	Prior Outage: Switch out the Erick (520903) to Buloj (520402) 138kV line.
	3 phase fault on the RHWIND4 (521116) to Elk City (511458) 138kV line, near RHWIND4.
	a. Apply fault at the RHWIND4 138kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.	
FLT9005-PO2	Prior Outage: Switch out the Erick (520903) to Buloj (520402) 138kV line.
	3 phase fault on the Clinton AF Tap (511446) to Elk City (511458) 138kV line, near Clinton AF Tap.
	a. Apply fault at the Clinton AF Tap 138kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.	
FLT32-PO3	Prior Outage: Switch out Chisholm (511553) 345kV/(511557) 230kV/(511558) 13.8kV transformer.
	3 phase fault on the Gracemont (515800) to Minco 345kV line, near Gracemont.
	a. Apply fault at the Gracemont 345kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.	
FLT48-PO3	Prior Outage: Switch out Chisholm (511553) 345kV/(511557) 230kV/(511558) 13.8kV transformer.
	3 phase fault on the Gracemont (515800) to G16-091-TAP (587744) 345kV line, near Gracemont 345kV.
	a. Apply fault at the Gracemont 345kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.	
FLT9008-PO3	Prior Outage: Switch out Chisholm (511553) 345kV/ (511557) 230kV/ (511558) 13.8kV transformer.
	3 phase fault on the Gracemont (515800) 340kV / (515802) 138kV / (515801) 13.8 kV Transformer, near Gracemont 345kV.
	a. Apply fault at the Gracemont 345kV bus.
b. Clear fault after 5 cycles by tripping the faulted transformer.	
FLT31-PO4	Prior Outage: Switch out the Gracemont (515800) to Minco (514801) 345kV line.
	3 phase fault on the Chisholm (511553) 345kV to Chisholm (511557) 230kV to Chisholm 13.8kV transformer, near Chisholm.
	a. Apply fault at the Chisholm 345kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.

Table 4-1 continued

Fault ID	Fault Description
FLT48-PO4	Prior Outage: Switch out the Gracemont (515800) to Minco (514801) 345kV line.
	3 phase fault on the Gracemont (515800) to G16-091-TAP (587744) 345kV line, near Gracemont 345kV.
	a. Apply fault at the Gracemont 345kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT48-PO5	Prior Outage: Switch out the Chisholm (511557) to Elk City (511490) 230kV line.
	3 phase fault on the Gracemont (515800) to G16-091-TAP (587744) 345kV line, near Gracemont 345kV.
	a. Apply fault at the Gracemont 345kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT9006-PO5	Prior Outage: Switch out the Chisholm (511557) to Elk City (511490) 230kV line.
	3 phase fault on the Sweetwater (511541) to Stateline Demarcation (523779) to Wheeler (523777) 230 kV line, near Sweetwater.
	a. Apply fault at the Sweetwater 230kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT27-PO6	Prior Outage: Switch out the Sweetwater (511541) to Stateline Demarcation (523779) to Wheeler (523777) 230 kV line.
	3 phase fault on the Chisholm (511557) to Elk City (511490) 230kV line, near Chisholm.
	a. Apply fault at the Chisholm 230kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT48-PO6	Prior Outage: Switch out the Sweetwater (511541) to Stateline Demarcation (523779) to Wheeler (523777) 230 kV line.
	3 phase fault on the Gracemont (515800) to G16-091-TAP (587744) 345kV line, near Gracemont 345kV.
	a. Apply fault at the Gracemont 345kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT27-PO7	Prior Outage: Switch out the Gracemont (515800) to G16-037-TAP (560078) 345kV line.
	3 phase fault on the Chisholm (511557) to Elk City (511490) 230kV line, near Chisholm.
	a. Apply fault at the Chisholm 230kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT28-PO7	Prior Outage: Switch out the Gracemont (515800) to G16-037-TAP (560078) 345kV line.
	3 phase fault on the Chisholm (511557) to Sweetwater (511541) 230kV line, near Chisholm.
	a. Apply fault at the Chisholm 230kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT9006-PO7	Prior Outage: Switch out the Gracemont (515800) to G16-037-TAP (560078) 345kV line.
	3 phase fault on the Sweetwater (511541) to Stateline Demarcation (523779) to Wheeler (523777) 230 kV line, near Sweetwater.
	a. Apply fault at the Sweetwater 230kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.	

Table 4-1 continued

Fault ID	Fault Description
FLT9018-PO7*	Prior Outage: Switch out the Gracemont (515800) to G16-037-TAP (560078) 345kV line.
	3 phase fault on the Chisholm (511553) to Border (515458) 345 kV line, near Chisholm.
	a. Apply fault at the Chisholm 345kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT32-PO8	Prior Outage: Switch out the G16-037-Tap (560078) to Chisholm (511553) 345kV line.
	3 phase fault on the Gracemont (515800) to Minco (514801) 345kV line, near Gracemont.
	a. Apply fault at the Gracemont 345kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT48-PO8	Prior Outage: Switch out the G16-037-Tap (560078) to Chisholm (511553) 345kV line.
	3 phase fault on the Gracemont (515800) to G16-091-TAP (587744) 345 kV line, near Gracemont
	a. Apply fault at the Gracemont 345kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT9008-PO8	Prior Outage: Switch out the G16-037-Tap (560078) to Chisholm (511553) 345kV line.
	3 phase fault on the Gracemont (515800) 340kV / (515802) 138kV / (515801) 13.8 kV Transformer, near Gracemont 345kV.
	a. Apply fault at the Gracemont 345kV bus.
	b. Clear fault after 5 cycles by tripping the faulted transformer.
FLT93-PO9	Prior Outage: Switch out the Clinton Junction (511485) to Elk City (511458) 138kV line.
	3 phase fault on the Weatherford (511506) to Weatherford Tap (511536) 138 kV line, near Weatherford.
	a. Apply fault at the Weatherford 138kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT92-PO10	Prior Outage: Switch out the WTH SE (511497) to WTH JCT (511489) 138kV line.
	3 phase fault on the Weatherford (511506) to Clinton Junction (511534) 138 kV line, near Weatherford.
	a. Apply fault at the Weatherford 138kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT27-PO11*	Prior Outage: Switch out the Chisholm (511553) to Border (515458) 345 kV line
	3 phase fault on the Chisholm (511557) to Elk City (511490) 230kV line, near Chisholm.
	a. Apply fault at the Chisholm 230kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT28-PO11*	Prior Outage: Switch out the Chisholm (511553) to Border (515458) 345 kV line
	3 phase fault on the Chisholm (511557) to Sweetwater (511541) 230kV line, near Chisholm.
	a. Apply fault at the Chisholm 230kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
	d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.

Table 4-1 continued

Fault ID	Fault Description
FLT9006-PO11*	Prior Outage: Switch out the Chisholm (511553) to Border (515458) 345 kV line
	3 phase fault on the Sweetwater (511541) to Stateline Demarcation (523779) to Wheeler (523777) 230 kV line, near Sweetwater.
	a. Apply fault at the Sweetwater 230kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
FLT9016-PO11*	Prior Outage: Switch out the Chisholm (511553) to Border (515458) 345 kV line
	3 phase fault on the G16-037-Tap (560078) to Gracemont (515800) 345 kV line, near G16-037-Tap.
	a. Apply fault at the G16-037-Tap 345 kV bus.
	b. Clear fault after 5 cycles by tripping the faulted line.
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.
	d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.

*faults only applied to the Post-Mitigation Results Only

4.3 Pre-Mitigation Results

Table 4-2 shows the results of the dynamic stability analysis without any additional network upgrades. The results showed unstable responses from GEN-2016-037 and prior-queued GEN-2015-071 following a three-phase fault on the GEN-2016-037 POI to Gracemont 345 kV line.

In addition, with the prior-outage conditions, GEN-2016-037 was unstable with prior outage on the GEN-2016-037 POI to Gracemont 345 kV line followed by a three-phase fault on other lines. GEN-2016-051 tripped offline with a prior-outage on the WTH SE (511497) to WTH JCT (511489) 138kV line followed by the three-phase fault on the Weatherford (511506) to Clinton Junction (511534) 138 kV line

Table 4-2: Pre-Mitigation Dynamic Stability Results

Fault ID	17W			18S			26S		
	Volt. Recov.	Post Cont. Volt	Stability	Volt. Recov.	Post Cont. Volt	Stability	Volt. Recov.	Post Cont. Volt	Stability
FLT01-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT02-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT03-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT04-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT05-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT06-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT07-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT08-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT09-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT10-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT11-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT27-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT28-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT29-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT30-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT31-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT32-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT33-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT34-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT35-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT36-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT37-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable

Table 4-2 continued

Fault ID	17W			18S			26S		
	Volt. Recov.	Post Cont. Volt	Stability	Volt. Recov.	Post Cont. Volt	Stability	Volt. Recov.	Post Cont. Volt	Stability
FLT38-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT39-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT40-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT41-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT48-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT62-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT66-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT75-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT92-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT93-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT94-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT95-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT96-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT98-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT99-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT100-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT101-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9001-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9002-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9003-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9004-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9005-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9006-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9007-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9008-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9009-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9010-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9011-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9012-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9013-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9015-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9016-3PH	Pass	Pass	Unstable	Pass	Pass	Unstable	Pass	Pass	Unstable
FLT9017-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT44-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT45-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT51-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT63-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT64-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT113_SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT07-PO1	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT06-PO1	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9002-PO1	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9004-PO1	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT04-PO2	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT05-PO2	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9001-PO2	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9003-PO3	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9004-PO2	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9005-PO2	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT32-PO3	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT48-PO3	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9008-PO3	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable

Table 4-2 continued

Fault ID	17W			18S			26S		
	Volt. Recov.	Post Cont. Volt	Stability	Volt. Recov.	Post Cont. Volt	Stability	Volt. Recov.	Post Cont. Volt	Stability
FLT31-PO4	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT48-PO4	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT48-PO5	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9006-PO5	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT27-PO6	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT48-PO6	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT27-PO7	Fail	Fail	Unstable	Fail	Fail	Unstable	Pass	Pass	Unstable
FLT28-PO7	Pass	Pass	Unstable	Pass	Pass	Unstable	Pass	Pass	Unstable
FLT9006-PO7	Fail	Fail	Unstable	Fail	Fail	Unstable	Fail	Fail	Unstable
FLT32-PO8	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT48-PO8	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9008-PO8	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT93-PO9	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT92-PO10	Pass	Pass	GEN-2016-051 Trip	Pass	Pass	GEN-2016-051 Trip	Pass	Pass	GEN-2016-051 Trip

4.4 Post-Mitigation Results

The following mitigation upgrades, identified in the steady state analysis performed by SPP, was tested as mitigation for instability following the three-phase fault on the GEN-2016-037 POI to Gracemont 345 kV line discussed in Section 4.3 above:

1. Border to Chisholm 345kV circuit 1

The Border to Chisholm 345 kV line mitigates the observed instability observed with FLT9016, three phase fault GEN-2016-037 Tap to Gracemont 345 kV line as shown in Figure 4-1 and Figure 4-2 below. This upgrade was included in the subsequent post-mitigation dynamic stability analyses presented as shown in Table 4-3 below.

Figure 4-1: Power Plots for FLT9016

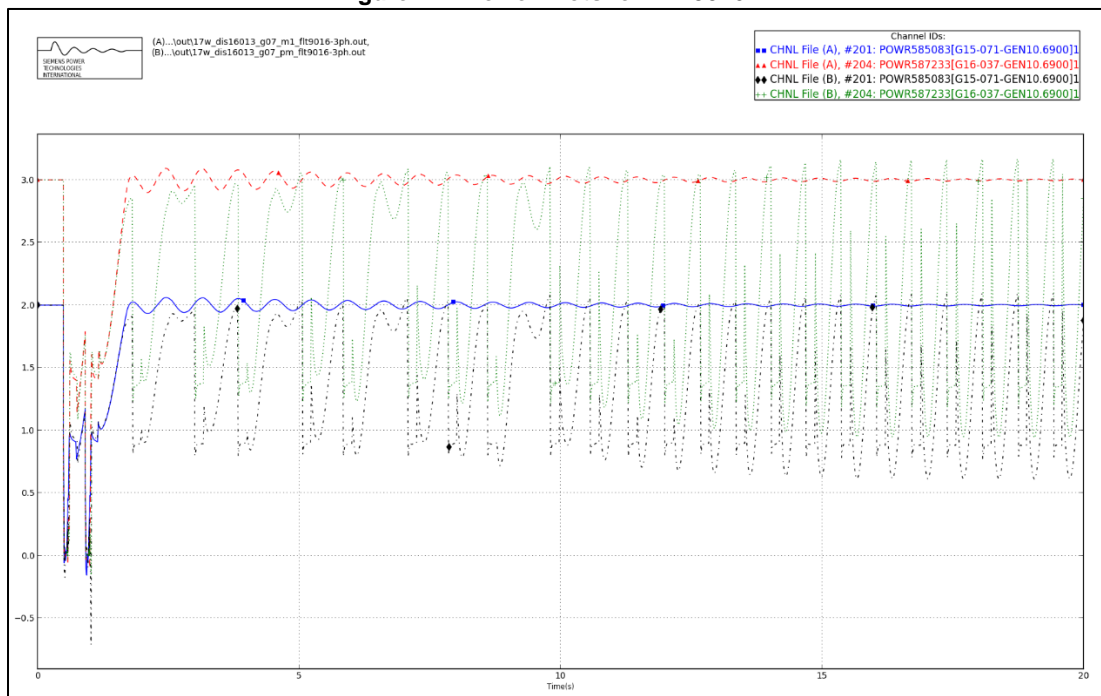


Figure 4-2: Voltage Plots for FLT9016

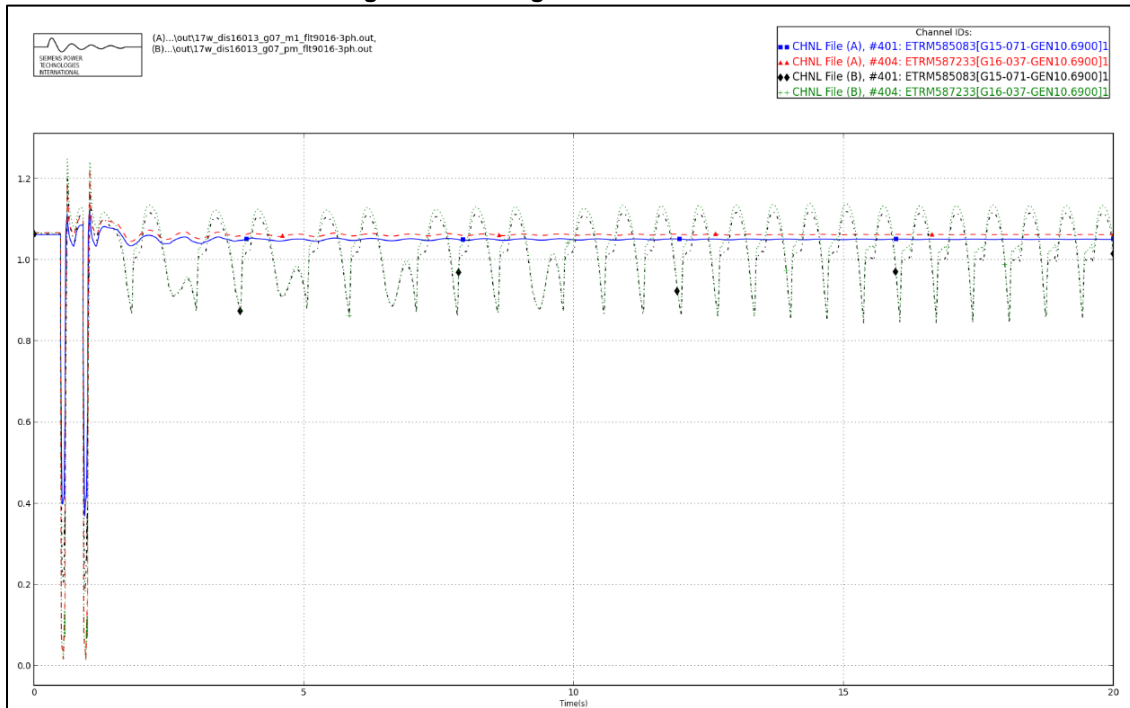


Table 4-3: Post- Mitigation Dynamic Stability Results

Fault ID	17W			18S			26S		
	Volt. Recov.	Post Cont. Volt	Stability	Volt. Recov.	Post Cont. Volt	Stability	Volt. Recov.	Post Cont. Volt	Stability
FLT01-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT02-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT03-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT04-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT05-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT06-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT07-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT08-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT09-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT10-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT11-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT27-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT28-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT29-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT30-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT31-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT32-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT33-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT34-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT35-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT36-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT37-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT38-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT39-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT40-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable

Table 4-2 continued

Fault ID	17W			18S			26S		
	Volt. Recov.	Post Cont. Volt	Stability	Volt. Recov.	Post Cont. Volt	Stability	Volt. Recov.	Post Cont. Volt	Stability
FLT41-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT48-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT62-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT66-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT75-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT92-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT93-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT94-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT95-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT96-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT98-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT99-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT100-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT101-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9001-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9002-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9003-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9004-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9005-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9006-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9007-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9008-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9009-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9010-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9011-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9012-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9013-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9015-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9016-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9017-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9018-3PH	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT44-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT45-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT51-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT63-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT64-SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT113_SB	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT07-PO1	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT06-PO1	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9002-PO1	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9004-PO1	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT04-PO2	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT05-PO2	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9001-PO2	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9003-PO3	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9004-PO2	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9005-PO2	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT32-PO3	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT48-PO3	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9008-PO3	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT31-PO4	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT48-PO4	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT48-PO5	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9006-PO5	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT27-PO6	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT48-PO6	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable

Table 4-2 continued

Fault ID	17W			18S			26S		
	Volt. Recov.	Post Cont. Volt	Stability	Volt. Recov.	Post Cont. Volt	Stability	Volt. Recov.	Post Cont. Volt	Stability
FLT27-PO7	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT28-PO7	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9006-PO7	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9018-PO7	Fail*	Pass	Unstable*	Fail*	Pass	Unstable*	Fail*	Pass	Unstable*
FLT32-PO8	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT48-PO8	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9008-PO8	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT93-PO9	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT92-PO10	Pass	Pass	GEN Trip**	Pass	Pass	GEN Trip**	Pass	Pass	GEN Trip**
FLT27-PO11	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT28-PO11	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9006-PO11	Pass	Pass	Stable	Pass	Pass	Stable	Pass	Pass	Stable
FLT9016-PO11	Fail*	Pass	Unstable*	Fail***	Pass	Unstable*	Fail***	Pass	Unstable*

*Generator 16-037 Unstable, **GEN-2016-051 tripped

The results of the dynamic stability analysis with the Border to Chisholm 345 kV line network upgrade showed that there was no generator tripping with the three phase faults and the single-line-ground faults with stuck breaker. However, with the prior outage on either the Border to Chisholm 345 kV line or the GEN-2016-037 POI to Gracemont 345 kV line followed by a three-phase fault on the other line, the GEN-2016-037 was unstable. Similarly, GEN-2016-051 tripped with the prior-outage on the WTH SE (511497) to WTH JCT (511489) 138kV line followed by the three-phase fault on the Weatherford (511506) to Clinton Junction (511534) 138 kV line. These system performance criteria violations observed with the prior-outage conditions were mitigated by curtailing the GEN-2016-037 and GEN-2003-022, GEN-2004-020, & GEN-2016-051 facility as applicable as shown in Table 4-4 below.

Table 4-4: Post- Mitigation Dynamic Prior Outage Curtailment Requirements

Fault ID	Fault Description	17W	18S	26S
FLT9018-PO7	Prior Outage: Switch out the Gracemont (515800) to G16-037-TAP (560078) 345kV line.	GEN-2016-037 Curtailed to 240 MW	GEN-2016-037 Curtailed to 270 MW	GEN-2016-037 Curtailed to 280 MW
	3 phase fault on the Chisholm (511553) to Border (515458) 345 kV line, near Chisholm.			
	a. Apply fault at the Chisholm 345kV bus.			
	b. Clear fault after 5 cycles by tripping the faulted line.			
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.			
d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.				
FLT92-PO10	Prior Outage: Switch out the WTH SE (511497) to WTH JCT (511489) 138kV line.	GEN-2016-051 Curtailed to 100 MW	GEN-2016-051 Curtailed to 110 MW	GEN-2016-051 Curtailed to 110 MW
	3 phase fault on the Weatherford (511506) to Clinton Junction (511534) 138 kV line, near Weatherford.			
	a. Apply fault at the Weatherford 138kV bus.			
	b. Clear fault after 5 cycles by tripping the faulted line.			
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.			
d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.				
FLT9016-PO11	Prior Outage: Switch out the Chisholm (511553) to Border (515458) 345 kV line	GEN-2016-037 Curtailed to 140 MW	GEN-2016-037 Curtailed to 260 MW	GEN-2016-037 Curtailed to 270 MW
	3 phase fault on the G16-037-Tap (560078) to Gracemont (515800) 345 kV line, near G16-037-Tap.			
	a. Apply fault at the G16-037-Tap 345 kV bus.			
	b. Clear fault after 5 cycles by tripping the faulted line.			
	c. Wait 20 cycles, and then re-close the line in (b) back into the fault.			
d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.				

5.0 Conclusions

The purpose of this ReStudy#3 was to evaluate the impacts of the DISIS-2016-001-3 (Group 7) active generation interconnection projects on the SPP transmission system as shown in Table 5-1 and assess mitigation upgrades or measures that may be required to maintain system stability and system performance per SPP's Disturbance Performance Requirements. The reactive power and dynamic stability analyses were performed for the evaluation using the PTI PSS/E version 33.7 software. The 2017 winter peak, 2018 summer peak and 2026 summer peak models were used in the study.

Table 5-1: Group 7 Interconnection Request

Request	Capacity (MW)	Generator Model	Point of Interconnection
GEN-2016-037	300.0	Vestas V110 2.0 MW (solar)	Tap Chisholm (511553) – Gracemont (515800) 345kV, (G16-037-TAP, 560078)
GEN-2016-051	9.8 uprate to GEN-2003-022 & GEN-2004-020 (total power = 156.8MW)	GE 1.6 MW (wind)	Tap Clinton Junction (511534) – Weatherford Southeast (511536) 138kV, (Weatherford Windfarm Tap 138kV, 511506)

The results of the reactive power analysis, also known as the low-wind/no-wind condition analysis or low-irradiance analysis, performed using all three models showed that the projects may require shunt reactors on their collector substation high voltage bus:

1. GEN-2016-037 – 30.0 MVAR
2. GEN-2016-051 – 0.5 MVAR

The shunt reactors are needed to reduce the reactive power transfer at the POI to approximately zero during low/no-wind or low-irradiance conditions while the generation interconnection project remained connected to the grid.

The dynamic stability analysis was performed using the three loading scenarios 2017WP, 2018SP and 2026SP simulating up to 95 faults that included three-phase, single-line-to-ground faults including faults with stuck breakers and three phase faults on prior outage cases.

The results of the dynamic stability analysis showed that a new 345 kV line between Border and Chisholm substations will be required to mitigate unstable responses from GEN-2016-037 and prior-queued GEN-2015-071 following a three-phase fault on the GEN-2016-037 POI substation to Gracemont 345 kV line. After implementing the Border to Chisholm 345 kV line, there was no generation tripping or system instability observed as a result of interconnecting all study projects for the three phase and stuck breaker fault conditions. For prior outage conditions, the results of the dynamic stability analysis also showed that with the Border to Chisholm 345 kV line network upgrade, GEN-2016-037 was unstable with either the Border to Chisholm 345 kV line or the GEN-2016-037 POI to Gracemont 345 kV line followed by a three-phase fault on the other line. Similarly, GEN-2016-051 tripped with the prior-outage on the WTH SE (511497) to WTH JCT (511489) 138kV line followed by the three-phase fault on the Weatherford (511506) to Clinton Junction (511534) 138 kV line. As a result, GEN-2016-037 may have to be curtailed to 140 MW and GEN-2003-022, GEN-2004-020, & GEN-2016-051 facility may have to be curtailed to 100 MW following the respective prior-outage events.