# LOIS-2015-001 CLUSTER

## GEN-2015-007 & GEN-2015-023

## Limited Operation Impact Study

Published September 2019

By Generator Interconnection

# REVISION HISTORY

| DATE | AUTHOR | CHANGE DESCRIPTION | COMMENTS |
|---|---|---|---|
| 09/24/2019 | SPP | | Initial Posting |
| | | | |
| | | | |

# EXECUTIVE SUMMARY

Both the GEN-2015-007 and GEN-2015-023 Interconnection Customers have requested Limited Operation System (LOIS) Impact Studies under GIA Section 5.9 of the Southwest Power Pool Open Access Transmission Tariff (OATT). This LOIS-2015-001 Cluster study analyzes the interconnecting of these two requests totaling 460.72 MW of new generation into the transmission system of Nebraska Public Power District (NPPD). Customers of both requests agreed to be studied together with the same study assumptions. This LOIS determines the impacts of interconnecting to the transmission system before all required Network Upgrades identified in the DISIS-2015-001-4 (or most recent iteration) Impact Study can be placed into service and assumes only the system topology and conditions as expected for year-end 2019. The table below lists the details of both requests:

| Request | Quantity of Units | Type | Total MW Amount | Service | Area | Requested Point of Interconnection | Requested In-Service Date |
|---|---|---|---|---|---|---|---|
| GEN-2015-007 | 6 | 1.715 MW GE Wind Turbines | 160.00 | ER | NPPD | Hoskins 345kV | 12/31/2016 |
| | 1 | 2.5 MW GE Wind Turbines | | | | | |
| | 64 | 2.3 MW GE Wind Turbines | | | | | |
| GEN-2015-023 | 168 | 1.79MW GE Wind Turbines | 300.72 | ER/NR | NPPD | Holt County 345kV | 12/31/2019 |

For this LOIS, power flow analysis was conducted. The LOIS assumes that only the higher queued projects listed within **Table 1A** and **Table 1B** of this study might go into service before the completion of all Network Upgrades identified within **Table 2** of this report. If additional generation projects, listed within **Table 3**, with queue priority equal to or higher than the study project request rights to go into commercial operation before all Network Upgrades identified within **Table 2** of this report are completed, this LOIS may need to be restudied to ensure that interconnection service remains for the customer's request.

Power flow analysis from this LOIS has determined that the following amounts can interconnect on an interim basis prior to the completion of the required Network Upgrades, listed within **Table 2***Table 2* of this report:

- the GEN-2015-007 request can interconnect **160 MW** of generation with Energy Resource Interconnection Service, and
- the GEN-2015-023 request can interconnect **195 MW** with Network Resource Interconnection Service

Should any other projects, other than those listed within Table 1 of this report, come into service an additional study may be required to determine if any limited operation service is available. It should be noted that although this LOIS analyzed many of the most probable contingencies, it is not an all-inclusive list that can account for every operational situation. Additionally, the generator may not be able to inject any power onto the Transmission System due to constraints that fall below the threshold of mitigation for a Generator Interconnection request. Because of this, it is likely that the Customers may be required to reduce their generation output to **0 MW** under certain system conditions to allow system operators to maintain the reliability of the transmission network.

**Note that** a prior LOIS study for GEN-2015-023[1] (posted 7/16/19) reported that 300.72MW was available for interconnection. During the process of the current study, SPP discovered that the 7/16/19 power flow study contained an incorrect assumption regarding the dispatch of nearby prior queued generation requests that were granted service under the WAPA/IS tariff with WAPA/IS Project Numbers GI-0717 and GI-0718 (referred to in this study as GEN-2007-017IS and GEN-2007-018IS respectively). This study corrects that assumption and revises the allowable interconnection amounts as shown above.

Transient stability analysis was not performed for this LOIS study. The DISIS-2015-001-1 transient stability analysis results as part of the DISIS-2015-001-1 report are posted to account for the GEN-GEN-2015-007 and GEN-2015-023 impacts[2]. Nothing in this study should be construed as a guarantee of delivery or transmission service. If the customer wishes to sell power from the facility, a separate request for transmission service must be requested on Southwest Power Pool's OASIS by the Customer.

[1] GEN-2015-023 LOIS report link: http://opsportal.spp.org/documents/studies/files/2015_Generation_Studies/20190208_GEN-2015-023_LOIS_FINAL_w_Stability.pdf

[2] DISIS-2015-001-1 Report Link http://opsportal.spp.org/documents/studies/files/2015_Generation_Studies/DISIS-2015-001_SecondPosting_FINAL.pdf

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# PURPOSE

Both the GEN-2015-007 and GEN-2015-023 Interconnection Customers have requested Limited Operation Service (LOIS) under the Southwest Power Pool (SPP) Open Access Transmission Tariff (OATT) for interconnection requests into the Transmission System of NPPD.

The purpose of this study is to evaluate the interconnection of these two requests totaling 460.72 MW of new generation prior to the completion of all required upgrades. The table below lists the details of both requests:

| Request | Quantity of Units | Type | Total MW Amount | Service | Area | Requested Point of Interconnection | Requested In-Service Date |
|---|---|---|---|---|---|---|---|
| GEN-2015-007 | 6 | 1.715 MW GE Wind Turbines | 160.00 | ER | NPPD | Hoskins 345kV | 12/31/2016 |
| | 1 | 2.5 MW GE Wind Turbines | | | | | |
| | 64 | 2.3 MW GE Wind Turbines | | | | | |
| GEN-2015-023 | 168 | 1.79MW Wind Turbines | 300.72 | ER/NR | NPPD | Holt County 345kV | 12/31/2019 |

Only power flow analysis was conducted for this Limited Operation Interconnection Service. Limited Operation Studies are conducted under GIA Section 5.9.

The LOIS considers the Base Case as well as all Generating Facilities (and with respect to any identified Network Upgrades associated with such higher queued interconnection) that, on the date the LOIS is commenced:

a) are directly interconnected to the Transmission System;
b) are interconnected to Affected Systems and may have an impact on the Interconnection Request;
c) have a pending higher queued Interconnection Request or projects to interconnect to the Transmission System listed in Table 1A and Table 1B; or
d) have no Queue Position but have executed an LGIA or requested that an unexecuted LGIA be filed with FERC.

Any changes to these assumptions (for example, one or more of the previously queued requests not included within this study execute an interconnection agreement and commencing commercial operation) may require a re-study of this LOIS at the expense of the Customer.

Nothing within this System Impact Study constitutes a request for transmission service or confers upon the Interconnection Customer any right to receive transmission service rights. Should the Customer require transmission service, those rights should be requested through SPP's Open Access Same-Time Information System (OASIS).

This LOIS study included prior queued generation interconnection requests and projects. Those listed within **Table 1A** are the generation interconnection requests that are assumed to have rights to either full or partial interconnection service at the time this study was performed. Also listed in **Table 1A** are both the amount of MWs of interconnection service expected at the effective time of this study and the total MWs requested of interconnection service, the fuel type, the point of interconnection (POI), and the current status of each particular prior queued request. **Table 1B** lists the prior queued projects included within the study and their status.

*Table 1A: Generation Requests Included within LOIS*

| Project | MW | Total MW | Fuel Source | POI | Status |
|---|---|---|---|---|---|
| GEN-2003-021N | 15 | 15 | Wind | Ainsworth Wind Tap 115kV | IA FULLY EXECUTED/COMMERCIAL OPERATION |
| GEN-2003-021N | 60 | 60 | Wind | Ainsworth Wind Tap 115kV | IA FULLY EXECUTED/COMMERCIAL OPERATION |
| GEN-2006-020N | 42 | 42 | Wind | Bloomfield 115kV | IA FULLY EXECUTED/COMMERCIAL OPERATION |
| GEN-2006-038N005 | 80 | 80 | Wind | Broken Bow 115kV | IA FULLY EXECUTED/COMMERCIAL OPERATION |
| GEN-2006-038N019 | 80 | 80 | Wind | Petersburg North 115kV | IA FULLY EXECUTED/COMMERCIAL OPERATION |
| GEN-2007-011N08 | 81 | 81 | Wind | Bloomfield 115kV | IA FULLY EXECUTED/COMMERCIAL OPERATION |
| GEN-2008-119O | 60 | 60 | Wind | S1399 161kV | IA FULLY EXECUTED/COMMERCIAL OPERATION |
| GEN-2006-037N1 | 74.8 | 74.8 | Wind | Broken Bow 115kV | IA FULLY EXECUTED/COMMERCIAL OPERATION |
| GEN-2006-044N | 40.5 | 40.5 | Wind | North Petersburg 115kV | IA FULLY EXECUTED/COMMERCIAL OPERATION |
| GEN-2008-086N02 | 100.5 | 100.5 | Wind | Meadow Grove 230kV | IA FULLY EXECUTED/COMMERCIAL OPERATION |
| GEN-2008-086N02 | 100.5 | 100.5 | Wind | Meadow Grove 230kV | IA FULLY EXECUTED/COMMERCIAL OPERATION |
| GEN-2008-123N | 89.7 | 89.7 | Wind | Tap Pauline - Hildreth (Rosemont) 115kV | IA FULLY EXECUTED/COMMERCIAL OPERATION |
| GEN-2009-040 | 73.8 | 73.8 | Wind | Tap Smittyville - Knob Hill 115KV | IA FULLY EXECUTED/COMMERCIAL OPERATION |
| GEN-2010-051 | 200 | 200 | Wind | Hoskins-Twin Church 230kV | IA FULLY EXECUTED/COMMERCIAL OPERATION |
| GEN-2011-018 | 73.6 | 73.6 | Wind | Steele City 115kV | IA FULLY EXECUTED/COMMERCIAL OPERATION |

*Table 1A: Generation Requests Included within LOIS*

| Project | MW | Total MW | Fuel Source | POI | Status |
|---|---|---|---|---|---|
| GEN-2011-027 | 120 | 120 | Wind | Hoskins-Twin Church 230kV | IA FULLY EXECUTED/COMMERCIAL OPERATION |
| GEN-2013-002 | 50.6 | 50.6 | Wind | Monolith 115kV | IA FULLY EXECUTED/ON SUSPENSION |
| GEN-2013-008 | 1.2 | 1.2 | Wind | Steele City 115kV | IA FULLY EXECUTED/COMMERCIAL OPERATION |
| GEN-2013-019 | 73.6 | 73.6 | Wind | Monolith 115kV | IA FULLY EXECUTED/ON SUSPENSION |
| GEN-2013-032 | 204 | 204 | Wind | Antelope 115kV | IA FULLY EXECUTED/COMMERCIAL OPERATION |
| GEN-2014-004 | 3.96 | 3.96 | Wind | Steele City 115kV | IA FULLY EXECUTED/COMMERCIAL OPERATION |
| GEN-2014-013 | 73.5 | 73.5 | Wind | Meadow Grove 230kV | IA FULLY EXECUTED/COMMERCIAL OPERATION |
| GEN-2014-031 | 35.8 | 35.8 | Wind | Meadow Grove 230kV | IA FULLY EXECUTED/COMMERCIAL OPERATION |
| GEN-2014-032 | 5.11 | 5.11 | Wind | Meadow Grove 230kV | IA FULLY EXECUTED/COMMERCIAL OPERATION |
| GEN-2014-032 | 5.11 | 5.11 | Wind | Meadow Grove 230kV | IA FULLY EXECUTED/COMMERCIAL OPERATION |
| GEN-2014-039 | 73.39 | 73.39 | Wind | Friend 115kV | IA FULLY EXECUTED/ON SCHEDULE |
| GEN-2007-017IS | 200 | 200 | Wind | Grand Prairie 345kV | On Schedule |
| GEN-2007-018IS | 200 | 200 | Wind | Grand Prairie 345kV | On Schedule |
| GEN-2015-007 | 160.0 | 160.0 | Wind | Hoskins 345kV | IA FULLY EXECUTED/ON SCHEDULE |
| GEN-2015-023 | 300.72 | 300.72 | Wind | Holt 345kV | IA FULLY EXECUTED/ON SCHEDULE |

*Table 1B: Upgrade Projects included within LOIS (already in service)*

| Upgrade Project | Type | Description | Status | Study Assignment |
|---|---|---|---|---|
| Twin Church - Dixon County 230kV | Rebuild | Increase conductor clearances to accommodate 320MVA facility rating | In Service | |

*Table 1B: Upgrade Projects included within LOIS (already in service)*

| Upgrade Project | Type | Description | Status | Study Assignment |
|---|---|---|---|---|
| Battle Creek-County Line 115kV CKT 1 | Rebuild | Rebuild approximately 11 miles of 115kV from Battle Creek to County Line. | In Service | |
| County Line-Neligh East 115kV CKT 1 | Rebuild | Rebuild approximately 12 miles of 115kV from County Line to Neligh East. | In Service | |

This LOIS was required because the Customers are requesting interconnection prior to the completion of all of their required upgrades listed within the latest iteration of their Definitive Interconnection System Impact Study (DISIS). **Table 2** below lists the upgrade projects that are not yet in service but are required for interconnection service. Both of the interconnection requests are included within the DISIS-2015-001-2 study that was posted 03/09/2016.

*Table 2: Upgrade Projects not included (not yet in service) but Required for Full Interconnection Service*

| Upgrade Project | Type | Description | Status | Study Assignment |
|---|---|---|---|---|
| Gentleman – Thedford(Cherry) – Holt 345kV Ckt 1 | New Line | Build approximately 222 Miles of 345kV from Gentleman to Thedford to Holt per SPP-NTC-200220 | Expected In Service Date: May 1, 2021 | 2012 Integrated Transmission Plan 10-Year Assessment (2015 ITPNT) |

Any changes to these assumptions, for example, one or more of the previously queued requests not included within this study execute an interconnection agreement and commencing commercial operation, may require a re-study of this LOIS at the expense of the Customer. The higher or equally queued projects that were not included in this study are listed in **Table 3**. While this list is not all inclusive it is a list of the most probable and affecting prior queued requests that were not included within this LOIS, either because no request for an LOIS has been made or the request is on suspension, etc.

*Table 3: Higher or Equally Queued GI Requests not included within LOIS*

| Project | MW | Total MW | Fuel Source | POI | Status |
|---|---|---|---|---|---|
| | | | | | |

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

# FACILITIES

## GENERATING FACILITY

Request GEN-2015-007, totals 160 MW; it consists of six (6) 1.715 MW, one (1) 2.5MW, and sixty-four (64) 2.3 MW GE wind turbine generators and associated facilities connected to NPPD's Hoskins 345kV Substation.
Request GEN-2015-023, totals 300.72 MW; it consists of one-hundred sixty-eight (168) 1.79 MW GE wind turbine generators and associated facilities connected to NPPD's new Holt 345kV Substation.

## INTERCONNECTION FACILITIES

Figure 1 depicts the one-line diagram of the local transmission system including the POI and the power flow model representing GEN-2015-007.

*Figure 1: Proposed POI Configuration and GEN-2015-007 Power Flow Model*

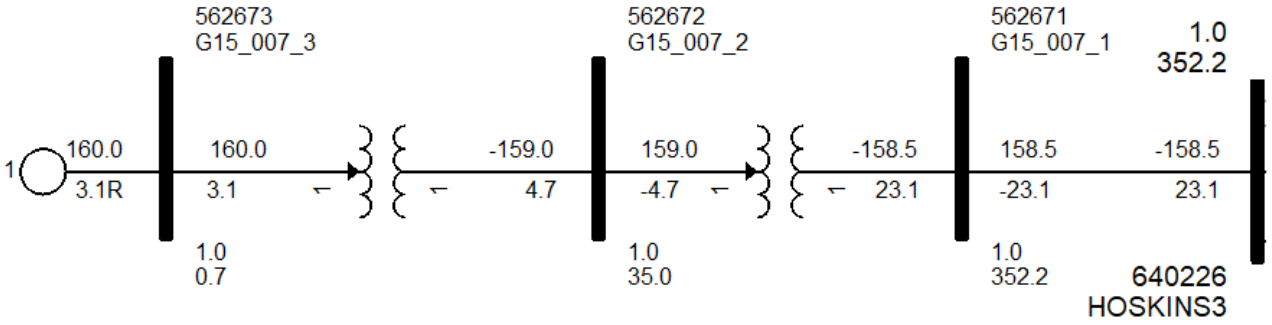
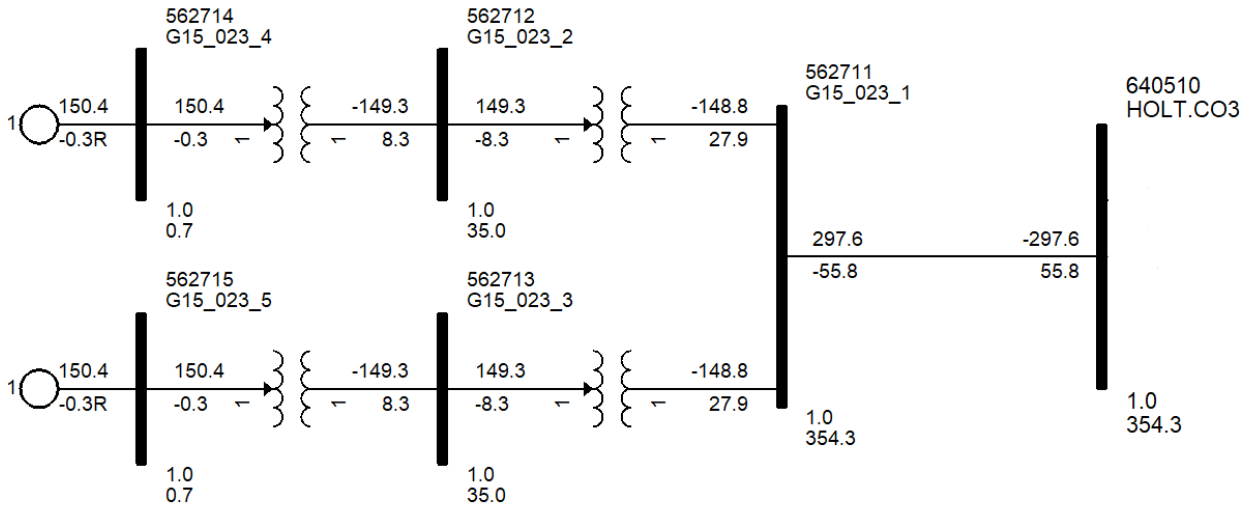



Figure 2 depicts the one-line diagram of the local transmission system including the POI and the power flow model representing GEN-2015-023.

*Figure 2: Proposed POI Configuration and GEN-2015-023 Power Flow Model*



## BASE CASE NETWORK UPGRADES

The Network Upgrades included within the cases used for this LOIS study are those facilities that are a part of the SPP Transmission Expansion Plan or the Balanced Portfolio projects that have in-service dates at the time this study was performed. These facilities have an approved Notification to Construct (NTC), or are in construction stages and expected to be in-service at the effective time of this study. No other upgrades were included for this LOIS. If for some reason, construction on these projects is delayed or discontinued, a restudy may be needed to determine the interconnection service availability of the Customer.

Power flow analysis is used to determine if the transmission system can accommodate the injection from the request without violating thermal or voltage transmission planning criteria.

# POWER FLOW ANALYSIS

Power flow analysis is used to determine if the transmission system can accommodate the injection from the request without violating thermal or voltage transmission planning criteria.

## *MODEL PREPARATION*

Power flow analysis was performed using modified versions of the 2015 series of 2017 ITP Near-Term study models including these seasonal models:

- 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 (21WP) peak
- Year 10 (2026) Summer (26SP) peak

To incorporate the Interconnection Customers' request, a re-dispatch of existing generation within SPP was performed with respect to the amount of the Customers' injection.

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 is dispatched at 20% nameplate of maximum generation. SPP projects are dispatched across the SPP footprint using load factor ratios.

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

For this LOIS, only the previous queued requests listed in Table 1 were assumed to be in-service at 100% dispatch.

# STUDY METHODOLOGY AND CRITERIA

## THERMAL OVERLOADS

Network constraints are found by using PSS/E AC Contingency Calculation (ACCC) analysis with PSS/E MUST First Contingency Incremental Transfer Capability (FCITC) analysis on the entire cluster grouping dispatched at the various levels previously mentioned.

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

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

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

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

The contingency set includes all SPP control area branches and ties 69kV and above, first tier Non-SPP control area branches and ties 115 kV and above, any defined contingencies for these control areas, and generation unit outages for the SPP control areas with SPP reserve share program redispatch.

The monitored elements include all SPP control area branches, ties, and buses 69 kV and above, and all first tier Non-SPP control area branches and ties 69 kV and above. NERC Power Transfer Distribution Flowgates for SPP and first tier Non-SPP control area are monitored. Additional NERC Flowgates are monitored in second tier or greater Non-SPP control areas. Voltage monitoring was performed for SPP control area buses 69 kV and above.

## VOLTAGE

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

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

***SPP Areas (69kV+):***

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

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

***SPP Buses with more stringent voltage criteria:***

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

***Affected System Areas (115kV+):***

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

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

## RESULTS

The LOIS ACCC analysis indicates that the Interconnection Customer(s) can interconnect their generation into the SPP transmission system at the available MW listed in the results tables before all required upgrades listed within the DISIS-2015-001-4 studies or latest iteration can be placed into service. ACCC results for the LOIS can be found in *Table 4* and *Table 5*. These transmission constraints occur when this study's generation is dispatched into the SPP footprint for ERIS and NPPD footprint for NRIS. For a list of all Network Upgrades assigned to the Interconnection Customer(s) please refer to the DISIS-2015-001-4 (or most recent iteration)

**Note that** a prior LOIS study for GEN-2015-023[3] (posted 7/16/19) reported that 300.72MW was available for interconnection. During the process of the current study, SPP discovered that the 7/16/19 power flow study contained an incorrect assumption regarding the dispatch of nearby prior queued generation requests that were granted service under the WAPA/IS tariff with WAPA/IS Project Numbers GI-0717 and GI-0718 (referred to in this study as GEN-2007-017IS and GEN-2007-018IS respectively). This study corrects that assumption and revises the allowable interconnection amounts as shown above.

## 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** under certain system conditions to allow system operators to maintain the reliability of the transmission network.

[3] GEN-2015-023 LOIS report link:
http://opsportal.spp.org/documents/studies/files/2015_Generation_Studies/20190208_GEN-2015-023_LOIS_FINAL_w_Stability.pdf

*Table 4: Thermal Constraints that Limit the Available Service*

| GROUP | SEASON | SOURCE | DIRECTION | MONTCOMMONNAME | RATEA | RATEB | TDF | TC%LOADING | CONTNAME |
|---|---|---|---|---|---|---|---|---|---|
| 09ALL | 17WP | G15_023 | 'TO->FROM' | 'GRPRAR2-LNX3345.00 - YANKTON 345KV CKT Z' | 720 | 720 | 1 | 100.5392 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 09ALL | 17WP | G15_023 | 'TO->FROM' | 'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z' | 720 | 720 | 1 | 100.7982 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 17WP | G15_023 | 'TO->FROM' | 'FTTHOM2-LNX3345.00 - GRPRAR2-LNX3345.00 345KV CKT 1' | 720 | 720 | 1 | 100.0839 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 09ALL | 17WP | G15_023 | 'TO->FROM' | 'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z' | 720 | 720 | 1 | 101.6865 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 09ALL | 17WP | G15_023 | 'TO->FROM' | 'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z' | 720 | 720 | 1 | 100.7982 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 18G | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41842 | 104.6165 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 09ALL | 18G | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41906 | 103.9352 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 18G | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41842 | 101.2943 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 09ALL | 18G | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41906 | 101.4474 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 09ALL | 18G | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41842 | 103.7783 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 18G | G15_023 | 'TO->FROM' | 'GRPRAR2-LNX3345.00 - YANKTON 345KV CKT Z' | 720 | 720 | 1 | 100.2304 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 09ALL | 18G | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41906 | 100.8016 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 18G | G15_023 | 'TO->FROM' | 'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z' | 720 | 720 | 1 | 100.6215 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 18G | G15_023 | 'TO->FROM' | 'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z' | 720 | 720 | 1 | 101.381 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 09ALL | 18G | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41842 | 100.6495 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 18G | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41906 | 104.7746 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 09ALL | 18G | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41906 | 100.8016 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 18G | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41842 | 100.6495 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 18G | G15_023 | 'TO->FROM' | 'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z' | 720 | 720 | 1 | 100.6215 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 18G | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41906 | 103.9352 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 18G | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41842 | 103.7783 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09NR | 18G | G15_023 | 'TO->FROM' | 'FTTHOM2-LNX3345.00 - GRPRAR2-LNX3345.00 345KV CKT 1' | 720 | 720 | 1 | 100 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 09NR | 18G | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.42495 | 105.1356 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 09NR | 18G | G15_023 | 'TO->FROM' | 'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z' | 720 | 720 | 1 | 100.5864 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09NR | 18G | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.42495 | 104.4663 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09NR | 18G | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.4243 | 101.1627 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09NR | 18G | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.42495 | 101.3156 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09NR | 18G | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.4243 | 101.6523 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 09NR | 18G | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.42495 | 101.806 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 09NR | 18G | G15_023 | 'TO->FROM' | 'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z' | 720 | 720 | 1 | 101.5527 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 09NR | 18G | G15_023 | 'TO->FROM' | 'GRPRAR2-LNX3345.00 - YANKTON 345KV CKT Z' | 720 | 720 | 1 | 100.41 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 09NR | 18G | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.4243 | 104.9771 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 09NR | 18G | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.4243 | 104.3086 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09NR | 18G | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.42495 | 101.3156 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09NR | 18G | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.4243 | 101.1627 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09NR | 18G | G15_023 | 'TO->FROM' | 'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z' | 720 | 720 | 1 | 100.5864 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09NR | 18G | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.42495 | 104.4663 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09NR | 18G | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.4243 | 104.3086 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 18SP | G15_023 | 'TO->FROM' | 'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z' | 720 | 720 | 1 | 102.0267 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 09ALL | 18SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.42008 | 109.4885 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 09ALL | 18SP | G15_023 | 'TO->FROM' | 'GRPRAR2-LNX3345.00 - YANKTON 345KV CKT Z' | 720 | 720 | 1 | 100.8836 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 09ALL | 18SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.42008 | 109.0628 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 18SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.42008 | 112.4877 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 18SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41944 | 109.3232 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 09ALL | 18SP | G15_023 | 'TO->FROM' | 'FTTHOM2-LNX3345.00 - GRPRAR2-LNX3345.00 345KV CKT 1' | 720 | 720 | 1 | 100.4009 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 09ALL | 18SP | G15_023 | 'TO->FROM' | 'GRPRAR2-LNX3345.00 - YANKTON 345KV CKT Z' | 720 | 720 | 1 | 100 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 18SP | G15_023 | 'TO->FROM' | 'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z' | 720 | 720 | 1 | 101.1299 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 18SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.42008 | 113.1149 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 09ALL | 18SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41944 | 112.9442 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 09ALL | 18SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41944 | 108.8982 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 18SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41944 | 112.3179 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |

| GROUP | SEASON | SOURCE | DIRECTION | MONTCOMMONNAME | RATEA | RATEB | TDF | TC%LOADING | CONTNAME |
|---|---|---|---|---|---|---|---|---|---|
| 09ALL | 18SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41944 | 108.8982 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 18SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.42008 | 112.4877 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 18SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41944 | 112.3179 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 18SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.42008 | 109.0628 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 18SP | G15_023 | 'TO->FROM' | 'GRPRAR2-LNX3345.00 - YANKTON 345KV CKT Z' | 720 | 720 | 1 | 100 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 18SP | G15_023 | 'TO->FROM' | 'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z' | 720 | 720 | 1 | 101.1299 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 00NR | 18SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.42435 | 109.2077 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 00NR | 18SP | G15_023 | 'TO->FROM' | 'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z' | 720 | 720 | 1 | 101.831 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 00NR | 18SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.42435 | 110.1175 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 00NR | 18SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.425 | 109.3727 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 00NR | 18SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.425 | 112.7934 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 00NR | 18SP | G15_023 | 'TO->FROM' | 'GRPRAR2-LNX3345.00 - YANKTON 345KV CKT Z' | 720 | 720 | 1 | 100.7407 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 00NR | 18SP | G15_023 | 'TO->FROM' | 'FTTHOM2-LNX3345.00 - GRPRAR2-LNX3345.00 345KV CKT 1' | 720 | 720 | 1 | 102.2389 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 00NR | 18SP | G15_023 | 'TO->FROM' | 'GRPRAR2-LNX3345.00 - YANKTON 345KV CKT Z' | 720 | 720 | 1 | 102.6927 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 00NR | 18SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.425 | 114.1719 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 00NR | 18SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.425 | 110.2839 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 00NR | 18SP | G15_023 | 'TO->FROM' | 'FTTHOM2-LNX3345.00 - GRPRAR2-LNX3345.00 345KV CKT 1' | 720 | 720 | 1 | 100.1339 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 00NR | 18SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.42435 | 113.9994 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 00NR | 18SP | G15_023 | 'TO->FROM' | 'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z' | 720 | 720 | 1 | 103.8874 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 00NR | 18SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.42435 | 112.6231 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 00NR | 18SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.425 | 109.3727 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 00NR | 18SP | G15_023 | 'TO->FROM' | 'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z' | 720 | 720 | 1 | 101.831 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 00NR | 18SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.42435 | 112.6231 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 00NR | 18SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.425 | 112.7934 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 00NR | 18SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.42435 | 109.2077 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 00NR | 18SP | G15_023 | 'TO->FROM' | 'FTTHOM2-LNX3345.00 - GRPRAR2-LNX3345.00 345KV CKT 1' | 720 | 720 | 1 | 100.1339 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 00NR | 18SP | G15_023 | 'TO->FROM' | 'GRPRAR2-LNX3345.00 - YANKTON 345KV CKT Z' | 720 | 720 | 1 | 100.7407 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 21L | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41431 | 109.3359 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 09ALL | 21L | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41431 | 108.554 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 21L | G15_023 | 'TO->FROM' | 'GRPRAR2-LNX3345.00 - YANKTON 345KV CKT Z' | 720 | 720 | 1 | 101.0443 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 09ALL | 21L | G15_023 | 'TO->FROM' | 'FTTHOM2-LNX3345.00 - GRPRAR2-LNX3345.00 345KV CKT 1' | 720 | 720 | 1 | 100.5494 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 09ALL | 21L | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41431 | 100.5366 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 21L | G15_023 | 'TO->FROM' | 'GRPRAR2-LNX3345.00 - YANKTON 345KV CKT Z' | 720 | 720 | 1 | 100.1428 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 21L | G15_023 | 'TO->FROM' | 'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z' | 720 | 720 | 1 | 102.1846 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 09ALL | 21L | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41494 | 103.1925 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 21L | G15_023 | 'TO->FROM' | 'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z' | 720 | 720 | 1 | 101.2403 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 21L | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41494 | 100.6385 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 09ALL | 21L | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41431 | 101.0054 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 09ALL | 21L | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41494 | 103.8252 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 09ALL | 21L | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41494 | 100.1922 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 21L | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41494 | 103.1925 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 21L | G15_023 | 'TO->FROM' | 'GRPRAR2-LNX3345.00 - YANKTON 345KV CKT Z' | 720 | 720 | 1 | 100.1428 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 21L | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41494 | 100.1922 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 21L | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41431 | 100.5366 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 21L | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41431 | 108.554 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 21L | G15_023 | 'TO->FROM' | 'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z' | 720 | 720 | 1 | 101.2403 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09NR | 21L | G15_023 | 'TO->FROM' | 'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z' | 720 | 720 | 1 | 102.0458 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 09NR | 21L | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.42379 | 107.0181 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 09NR | 21L | G15_023 | 'TO->FROM' | 'GRPRAR2-LNX3345.00 - YANKTON 345KV CKT Z' | 720 | 720 | 1 | 100 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09NR | 21L | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.42444 | 101.3767 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 09NR | 21L | G15_023 | 'TO->FROM' | 'FTTHOM2-LNX3345.00 - GRPRAR2-LNX3345.00 345KV CKT 1' | 720 | 720 | 1 | 100.4217 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 09NR | 21L | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.42444 | 100.7372 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09NR | 21L | G15_023 | 'TO->FROM' | 'GRPRAR2-LNX3345.00 - YANKTON 345KV CKT Z' | 720 | 720 | 1 | 100.905 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 09NR | 21L | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.42379 | 106.2301 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |

| GROUP | SEASON | SOURCE | DIRECTION | MONTCOMMONNAME | RATEA | RATEB | TDF | TC%LOADING | CONTNAME |
|---|---|---|---|---|---|---|---|---|---|
| 09NR | 21L | G15_023 | 'TO->FROM' | 'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z' | 720 | 720 | 1 | 101.0949 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09NR | 21L | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.42379 | 106.2301 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09NR | 21L | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.42444 | 100.7372 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09NR | 21L | G15_023 | 'TO->FROM' | 'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z' | 720 | 720 | 1 | 101.0949 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09NR | 21L | G15_023 | 'TO->FROM' | 'GRPRAR2-LNX3345.00 - YANKTON 345KV CKT Z' | 720 | 720 | 1 | 100 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 21SP | G15_023 | 'TO->FROM' | 'GRPRAR2-LNX3345.00 - YANKTON 345KV CKT Z' | 720 | 720 | 1 | 101.0394 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 09ALL | 21SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41997 | 107.255 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 09ALL | 21SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41997 | 110.7856 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 09ALL | 21SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41933 | 106.6591 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 21SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41933 | 109.9858 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 21SP | G15_023 | 'TO->FROM' | 'GRPRAR2-LNX3345.00 - YANKTON 345KV CKT Z' | 720 | 720 | 1 | 100.18 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 21SP | G15_023 | 'TO->FROM' | 'FTTHOM2-LNX3345.00 - GRPRAR2-LNX3345.00 345KV CKT 1' | 720 | 720 | 1 | 100.5444 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 09ALL | 21SP | G15_023 | 'TO->FROM' | 'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z' | 720 | 720 | 1 | 102.1809 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 09ALL | 21SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41997 | 110.1521 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 21SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41933 | 107.0932 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 09ALL | 21SP | G15_023 | 'TO->FROM' | 'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z' | 720 | 720 | 1 | 101.2791 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 21SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41997 | 106.8203 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 21SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41933 | 110.6183 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 09ALL | 21SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41997 | 106.8203 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 21SP | G15_023 | 'TO->FROM' | 'GRPRAR2-LNX3345.00 - YANKTON 345KV CKT Z' | 720 | 720 | 1 | 100.18 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 21SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41933 | 106.6591 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 21SP | G15_023 | 'TO->FROM' | 'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z' | 720 | 720 | 1 | 101.2791 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 21SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41933 | 109.9858 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 21SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41997 | 110.1521 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 00NR | 21SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.42409 | 110.5102 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 00NR | 21SP | G15_023 | 'TO->FROM' | 'GRPRAR2-LNX3345.00 - YANKTON 345KV CKT Z' | 720 | 720 | 1 | 100.5287 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 00NR | 21SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.42409 | 107.1723 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 00NR | 21SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.42474 | 110.6772 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 00NR | 21SP | G15_023 | 'TO->FROM' | 'GRPRAR2-LNX3345.00 - YANKTON 345KV CKT Z' | 720 | 720 | 1 | 101.8832 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 00NR | 21SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.42409 | 107.8449 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 00NR | 21SP | G15_023 | 'TO->FROM' | 'FTTHOM2-LNX3345.00 - GRPRAR2-LNX3345.00 345KV CKT 1' | 720 | 720 | 1 | 101.4031 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 00NR | 21SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.42474 | 108.0079 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 00NR | 21SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.42474 | 111.6734 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 00NR | 21SP | G15_023 | 'TO->FROM' | 'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z' | 720 | 720 | 1 | 101.6219 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 00NR | 21SP | G15_023 | 'TO->FROM' | 'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z' | 720 | 720 | 1 | 103.0511 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 00NR | 21SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.42474 | 107.3343 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 00NR | 21SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.42409 | 111.5048 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 00NR | 21SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.42474 | 107.3343 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 00NR | 21SP | G15_023 | 'TO->FROM' | 'GRPRAR2-LNX3345.00 - YANKTON 345KV CKT Z' | 720 | 720 | 1 | 100.5287 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 00NR | 21SP | G15_023 | 'TO->FROM' | 'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z' | 720 | 720 | 1 | 101.6219 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 00NR | 21SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.42409 | 107.1723 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 00NR | 21SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.42474 | 110.6772 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 00NR | 21SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.42409 | 110.5102 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 21WP | G15_023 | 'FROM->TO' | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' | 720 | 720 | 1 | 100 | 'FTTHOMPSON-GRANDPRAIRIE-TLINE-REACTOR-CKT1' |
| 09ALL | 21WP | G15_023 | 'TO->FROM' | 'GRPRAR2-LNX3345.00 - YANKTON 345KV CKT Z' | 720 | 720 | 1 | 100.7313 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 09ALL | 21WP | G15_023 | 'TO->FROM' | 'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z' | 720 | 720 | 1 | 100.9685 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 21WP | G15_023 | 'TO->FROM' | 'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z' | 720 | 720 | 1 | 101.8753 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 09ALL | 21WP | G15_023 | 'TO->FROM' | 'FTTHOM2-LNX3345.00 - GRPRAR2-LNX3345.00 345KV CKT 1' | 720 | 720 | 1 | 100.2612 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 09ALL | 21WP | G15_023 | 'FROM->TO' | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' | 720 | 720 | 1 | 100 | 'FTTHOM2-LNX3345.00 - GRPRAR2-LNX3345.00 345KV CKT 1' |
| 09ALL | 21WP | G15_023 | 'TO->FROM' | 'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z' | 720 | 720 | 1 | 100.9685 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 00NR | 21WP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.42406 | 100 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 00NR | 21WP | G15_023 | 'TO->FROM' | 'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z' | 720 | 720 | 1 | 101.1733 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 00NR | 21WP | G15_023 | 'TO->FROM' | 'GRPRAR2-LNX3345.00 - YANKTON 345KV CKT Z' | 720 | 720 | 1 | 100.0745 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 00NR | 21WP | G15_023 | 'TO->FROM' | 'GRPRAR2-LNX3345.00 - YANKTON 345KV CKT Z' | 720 | 720 | 1 | 100.9388 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |

| GROUP | SEASON | SOURCE | DIRECTION | MONTCOMMONNAME | RATEA | RATEB | TDF | TC%LOADING | CONTNAME |
|---|---|---|---|---|---|---|---|---|---|
| 00NR | 21WP | G15_023 | 'TO->FROM' | 'FTTHOM2-LNX3345.00 - GRPRAR2-LNX3345.00 345KV CKT 1' | 720 | 720 | 1 | 100.4526 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 00NR | 21WP | G15_023 | 'TO->FROM' | 'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z' | 720 | 720 | 1 | 102.0796 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 00NR | 21WP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.4247 | 100.1366 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 00NR | 21WP | G15_023 | 'FROM->TO' | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' | 720 | 720 | 1 | 100.1418 | 'FTTHOM2-LNX3345.00 - GRPRAR2-LNX3345.00 345KV CKT 1' |
| 00NR | 21WP | G15_023 | 'FROM->TO' | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' | 720 | 720 | 1 | 100.1407 | 'FTTHOMPSON-GRANDPRAIRIE-TLINE-REACTOR-CKT1' |
| 00NR | 21WP | G15_023 | 'TO->FROM' | 'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z' | 720 | 720 | 1 | 101.1733 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 00NR | 21WP | G15_023 | 'TO->FROM' | 'GRPRAR2-LNX3345.00 - YANKTON 345KV CKT Z' | 720 | 720 | 1 | 100.0745 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 26SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41982 | 106.8653 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 09ALL | 26SP | G15_023 | 'TO->FROM' | 'FTTHOM2-LNX3345.00 - GRPRAR2-LNX3345.00 345KV CKT 1' | 720 | 720 | 1 | 100.4453 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 09ALL | 26SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41982 | 103.4728 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 09ALL | 26SP | G15_023 | 'TO->FROM' | 'GRPRAR2-LNX3345.00 - YANKTON 345KV CKT Z' | 720 | 720 | 1 | 100.0732 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 26SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41919 | 102.8439 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 26SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41919 | 106.0388 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 26SP | G15_023 | 'TO->FROM' | 'GRPRAR2-LNX3345.00 - YANKTON 345KV CKT Z' | 720 | 720 | 1 | 100.9311 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 09ALL | 26SP | G15_023 | 'TO->FROM' | 'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z' | 720 | 720 | 1 | 102.0725 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 09ALL | 26SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41919 | 106.704 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 09ALL | 26SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41982 | 102.9994 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 26SP | G15_023 | 'TO->FROM' | 'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z' | 720 | 720 | 1 | 101.1726 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 26SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41919 | 103.3167 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 09ALL | 26SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41982 | 106.1991 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 26SP | G15_023 | 'TO->FROM' | 'GRPRAR2-LNX3345.00 - YANKTON 345KV CKT Z' | 720 | 720 | 1 | 100.0732 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 26SP | G15_023 | 'TO->FROM' | 'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z' | 720 | 720 | 1 | 101.1726 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 26SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41982 | 106.1991 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 26SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41982 | 102.9994 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 26SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41919 | 102.8439 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 09ALL | 26SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.41919 | 106.0388 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 00NR | 26SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.42474 | 102.0446 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 00NR | 26SP | G15_023 | 'TO->FROM' | 'GRPRAR2-LNX3345.00 - YANKTON 345KV CKT Z' | 720 | 720 | 1 | 100.0576 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 00NR | 26SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.42409 | 105.0569 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 00NR | 26SP | G15_023 | 'TO->FROM' | 'FTTHOM2-LNX3345.00 - GRPRAR2-LNX3345.00 345KV CKT 1' | 720 | 720 | 1 | 100.4363 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 00NR | 26SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.42409 | 101.8906 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 00NR | 26SP | G15_023 | 'TO->FROM' | 'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z' | 720 | 720 | 1 | 102.0637 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 00NR | 26SP | G15_023 | 'TO->FROM' | 'GRPRAR2-LNX3345.00 - YANKTON 345KV CKT Z' | 720 | 720 | 1 | 100.9217 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 00NR | 26SP | G15_023 | 'TO->FROM' | 'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z' | 720 | 720 | 1 | 101.1588 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 00NR | 26SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.42474 | 102.5294 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 00NR | 26SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.42474 | 105.8908 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 00NR | 26SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.42474 | 105.2157 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 00NR | 26SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.42409 | 102.3747 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 00NR | 26SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.42409 | 105.731 | 'GR ISLD-LNX3345.00 - HOLT.CO3 345.00 345KV CKT 1' |
| 00NR | 26SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.42474 | 105.2157 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 00NR | 26SP | G15_023 | 'TO->FROM' | 'FT THOMPSON - FTTHOM2-LNX3345.00 345KV CKT Z' | 720 | 720 | 1 | 101.1588 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 00NR | 26SP | G15_023 | 'TO->FROM' | 'GRPRAR2-LNX3345.00 - YANKTON 345KV CKT Z' | 720 | 720 | 1 | 100.0576 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 00NR | 26SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.42409 | 105.0569 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 00NR | 26SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1A) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.42409 | 101.8906 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |
| 00NR | 26SP | G15_023 | 'FROM->TO' | 'FT THOMPSON (FT2 KU1B) 345/230/13.8KV TRANSFORMER CKT 1' | 250 | 313 | 0.42474 | 102.0446 | 'GR ISLD-LNX3345.00 - GR ISLD3 345.00 345KV CKT Z' |

*Table 5: Voltage Constraints that Limit the Available Service*

| GROUP | SCENARIO | SEASON | SOURCE | MONTCOMMONNAME | BC VOLTAGE | TC VOLTAGE | VOLTAGE DIFF | VINIT | VMIN | VMAX | TDF | CONTNAME |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 09ALL | 0 | 21L | G15_023 | 'AINSWORTH 115KV' | 1.030132 | 1.057987 | 0.027855 | 1.04036 | 0.9 | 1.05 | 0.65108 | 'GEN640025 D-AINSWORTH WIND' |
| 09ALL | 0 | 21L | G15_023 | 'CALAMUS 115KV' | 1.031936 | 1.055785 | 0.023849 | 1.04049 | 0.9 | 1.05 | 0.65108 | 'GEN640025 D-AINSWORTH WIND' |

# STABILITY ANALYSIS

Transient stability analysis was not performed for this LOIS study. The results from DISIS 2015-001-1 Group 9 stability study and the prior GEN-2015-023 LOIS stability study remain valid.

# CONCLUSION

Both the GEN-2015-007 and GEN-2015-023 Interconnection Customers have requested Limited Operation System (LOIS) Impact Studies under GIA Section 5.9 of the Southwest Power Pool Open Access Transmission Tariff (OATT). This LOIS-2015-001 Cluster study analyzes the interconnecting of these two requests totaling 460.72 MW of new generation into the transmission system of Nebraska Public Power District (NPPD). Customers of both requests agreed to be studied together with the same study assumptions. This LOIS determines the impacts of interconnecting to the transmission system before all required Network Upgrades identified in the DISIS-2015-001-4 (or most recent iteration) Impact Study can be placed into service.

Power flow analysis from this LOIS has determined that the following amounts can interconnect on an interim basis prior to the completion of the required Network Upgrades, listed within **Table 2***Table 2* of this report:

- the GEN-2015-007 request can interconnect **160 MW** of generation with Energy Resource Interconnection Service, and
- the GEN-2015-023 request can interconnect **195 MW** with Network Resource Interconnection Service

Should any other projects (other than those listed within Table 1 of this report) come into service, an additional study may be required to determine if any limited operation service is available. Refer to *Table 4* and *Table 5* for the constraints which limit the interconnection amounts.

Transient stability analysis was not performed for this LOIS study. The results from DISIS 2015-001-1 remain valid.

Any changes to these assumptions may require a re-study of this LOIS at the expense of the Customer. (For example, one or more of the previously queued requests not included within this study executes an interconnection agreement and commences commercial operation.)

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