Limited Operation Impact Study for Generator Interconnection

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ASGI-2016-001 ASGI-2016-002

August 2016 Generator Interconnection



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Revision History

| Date | Author | Change Description |
|------------|--------|--|
| 08/24/2016 | SPP | Limited Operation Impact Study (LOIS) for ASGI-2016-001 and ASGI-2016-002 Report Revision 0 Issued |

Executive Summary

<OMITTED TEXT> (Affected System Interconnection Customer) has requested an Affected System Limited Operation System Impact Study (AS-LOIS) consistent with Southwest Power Pool Open Access Transmission Tariff (OATT) for ASGI-2016-001 and ASGI-2016-002. ASGI-2016-001 (2.5MW) and ASGI-2016-002 (0.35MW) wind generating facilities are to be interconnected into the Distribution System of South Plains Electric Cooperative, Inc. (SPEC). The South Plains Electric Cooperative system interconnects to Southwestern Public Service (SPS) in Lubbock County, Texas. ASGI-2016-001 and ASGI-2016-002 have requested this Limited Operation Interconnection Study (LOIS) to determine the impacts of interconnecting to the transmission system before all required Network Upgrades identified in the DISIS-2014-002, DISIS-2015-001, DISIS-2015-002, and potentially DISIS-2016-001 (or most recent iteration) Impact Study can be placed into service.

This Affected System LOIS addresses the effects of interconnecting the generators to the rest of the transmission system for the system topology and conditions as expected on December 31, 2016 and prior to the completion of the required Network Upgrades listed in Table 2. These required Network Upgrades are not expected to be in service by January 1, 2017 for ASGI-2016-001 and August 1, 2016 for ASGI-2016-002. ASGI-2016-001 is requesting the interconnection of one (1) Envision 2.5 MW wind turbine and associated facilities interconnecting to SPEC Distribution connected at the Wolfforth 115kV substation in Lubbock County, Texas. ASGI-2016-002 is requesting an uprate to ASGI-2015-002 of 350kW and associated facilities interconnecting at the SP-Yuma 115kV substation in Lubbock County, Texas. The Affected System LOIS assumes that only the higher queued projects listed within Table 1 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 Affected System LOIS may need to be restudied to ensure that interconnection service remains for the customer's request.

Power flow analysis from this Affected System LOIS has determined that the ASGI-2016-001 and ASGI-2016-002 requests can interconnect 2.85 MW of generation with Energy Resource Interconnection Service (ERIS) prior to the completion of the required Network Upgrades, listed within Table 2 of this report, provided the Network Upgrades are able to be placed in service prior to December 31, 2020. 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 Affected System 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 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.

Transient stability and short circuit analysis was not performed for this LOIS study. Transient stability analysis will be conducted as part of the DISIS-2016-001 study.

Nothing in this study should be construed as a guarantee of delivery or transmission service. If the customer(s) 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(s).

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Purpose

<OMITTED TEXT> (Affected System Interconnection Customer) has requested an Affected System Limited Operation System Impact Study (AS-LOIS) consistent with the Southwest Power Pool (SPP) Open Access Transmission Tariff (OATT) for interconnection requests into the Transmission System of Southwest Public Service (SPS).

The purpose of this study is to evaluate the impacts of interconnecting ASGI-2016-001 and ASGI-2016-002 requests. ASGI-2016-001 is requesting the interconnection of one (1) Envision 2.5 MW wind turbine and associated facilities interconnecting to SPEC Distribution connected Wolfforth 115kV substation in Lubbock County, Texas. ASGI-2016-002 is requesting an uprate to ASGI-2015-002 of 350kW and associated facilities interconnecting at the SP-Yuma 115kV substation in Lubbock County, Texas. The Affected System Interconnection Customer(s) have requested this amount to be studied with Energy Resource Interconnection Service (ERIS) to commence on or around January, 2017 and August, 2016.

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 (b) below, 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 to interconnect to the Transmission System listed in Table 1; 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(s).

Nothing within this System Impact Study constitutes a request for transmission service or confers upon the Interconnection Customer(s) any right to receive transmission service rights. Should the Customer(s) 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. Those listed within Table 1 are the generation interconnection requests that are assumed to have rights to either full or partial interconnection service prior to the requested January 2017 in-service for this AS-LOIS. Also listed in Table 1 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.

| Project | MW | Total MW | Fuel Source | POI | Status |
|---------------|-------|-------------|----------------|--|--|
| ASGI-2010-010 | 42.2 | 42.2 | Gas | Lovington 115kV | Lea County Affected Study |
| ASGI-2010-020 | 30 | 30 | Wind | Tap LE-Tatum – LE Crossroads 69kV | Lea County Affected Study |
| ASGI-2010-021 | 15 | 15 | Wind | Tap LE-Saunders Tap – LE Anderson 69kV | Lea County Affected Study |
| ASGI-2011-001 | 27.3 | 27.3 | Wind | Lovington 115kV | COMMERCIAL OPERATION |
| ASGI-2011-003 | 10 | 10 | Wind | Hendricks 69kV | COMMERCIAL OPERATION |
| ASGI-2011-004 | 20 | 20 | Wind | Pleasant Hill 69kV | UNDER STUDY |
| ASGI-2012-002 | 18.15 | 18.15 | Wind | FE-Clovis Interchange 115kV | UNDER STUDY |
| ASGI-2013-002 | 18.4 | 18.4 | Wind | FE Tucumcari 115kV | UNDER STUDY |
| ASGI-2013-003 | 18.4 | 18.4 | Wind | FE Clovis 115kV | UNDER STUDY |
| ASGI-2013-005 | 1.65 | 1.65 | Wind | FE Clovis 115kV | UNDER STUDY |
| ASGI-2013-006 | 2 | 2 | Wind | SP-Erskine 115kV | COMMERICAL OPERATION |
| ASGI-2014-001 | 2.5 | 2.5 | Wind | SP-Erskine 115kV | COMMERICAL OPERATION |
| ASGI-2015-002 | 2.3 | 2.3 | Wind | SP-Yuma 115kV | COMMERICAL OPERATION |
| GEN-2001-033 | 180 | 180 | Wind | San Juan Tap 230kV | IA FULLY EXECUTED/COMMERCIAL OPERATION (120MW) |
| GEN-2001-036 | 80 | 80 | Wind | Norton 115kV | IA FULLY EXECUTED/COMMERCIAL OPERATION |
| GEN-2006-018 | 170 | 170 | СТ | TUCO Interchange 230kV | IA FULLY EXECUTED/COMMERCIAL OPERATION |
| GEN-2006-026 | 502 | 502 | Gas | Hobbs 230kV & Hobbs 115kV | IA FULLY EXECUTED/COMMERCIAL OPERATION |
| GEN-2008-022 | 300 | 300 | Wind | Tap Tolk - Eddy County (Crossroads) 345kV | IA FULLY EXECUTED/COMMERCIAL OPERATION |
| GEN-2010-006 | 205 | 205 | Gas | Jones 230kV | IA FULLY EXECUTED/COMMERCIAL OPERATION |
| GEN-2010-046 | 56 | 56 | Gas | TUCO Interchange 230kV | IA FULLY EXECUTED/ON SCHEDULE FOR 2016 |
| GEN-2011-025 | 80 | 80 | Wind | Tap Floyd County - Crosby County 115kV | IA FULLY EXECUTED/ON SCHEDULE FOR 2016 |
| GEN-2011-045 | 205 | 205 | NG CT | Jones 230kV | IA FULLY EXECUTED/COMMERCIAL OPERATION |
| GEN-2011-046 | 27 | 27 | Diesel CT | Lopez 115kV | IA FULLY EXECUTED/COMMERCIAL OPERATION |
| GEN-2011-048 | 175 | 175 | СТ | Mustang 230kV | IA FULLY EXECUTED/COMMERCIAL OPERATION |
| GEN-2012-001 | 61.2 | 61.2 | Wind | Cirrus Tap 230kV | IA FULLY EXECUTED/COMMERCIAL OPERATION |
| GEN-2012-020 | 478 | 478 | Wind | TUCO Interchange 230kV | IA FULLY EXECUTED/ON SCHEDULE FOR 2016 |

Table 1: Generation Requests Included within LOIS

| Project | MW | Total MW | Fuel Source | POI | Status |
|-------------------------------|-------|-------------|----------------|------------------------|--|
| GEN-2012-034 | 7 | 7 | ст | Mustang 230kV | IA FULLY EXECUTED/COMMERCIAL OPERATION |
| GEN-2012-035 | 7 | 7 | ст | Mustang 230kV | IA FULLY EXECUTED/COMMERCIAL OPERATION |
| GEN-2012-036 | 7 | 7 | ст | Mustang 230kV | IA FULLY EXECUTED/COMMERCIAL OPERATION |
| GEN-2012-037 | 203 | 203 | СТ | TUCO Interchange 345kV | IA FULLY EXECUTED/COMMERCIAL OPERATION |
| GEN-2013-016 | 203 | 203 | СТ | TUCO Interchange 345kV | IA FULLY EXECUTED/ON SCHEDULE FOR 2017 |
| GEN-2013-022 | 25 | 25 | Solar | Norton 115kV | IA FULLY EXECUTED/ON SCHEDULE FOR 2016 |
| GEN-2014-033 | 70 | 70 | Solar | Chaves County 115kV | IA FULLY EXECUTED/ON SCHEDULE FOR 2016 |
| GEN-2014-034 | 70 | 70 | Solar | Chaves County 115kV | IA FULLY EXECUTED/ON SCHEDULE FOR 2016 |
| GEN-2014-040 | 320.4 | 320.4 | Wind | Castro 115kV | IA FULLY EXECUTED/ON SCHEDULE FOR 2016 |
| SPS Distributed (Hopi) | 10 | 10 | Solar | Hopi 115kV | COMMERCIAL OPERATION |
| SPS Distributed (Monument) | 10 | 10 | Solar | Monument 115kV | COMMERCIAL OPERATION |
| SPS Distributed (Lea Road) | 10 | 10 | Solar | Lea Road 115kV | COMMERCIAL OPERATION |
| SPS Distributed (Jal) | 10 | 10 | Solar | S Jal 115kV | COMMERCIAL OPERATION |
| SPS Distributed (Ocotillo) | 10 | 10 | Solar | S_Jal 115kV | COMMERCIAL OPERATION |
| SPS Distributed (Yuma) | 2.57 | 2.57 | Wind | SP-Yuma 69kV | COMMERCIAL OPERATION |
| ASGI-2016-001 | 2.5 | 2.5 | Wind | Wolfforth 115kV | UNDER AFFECTED SYSTEM LOIS STUDY |
| ASGI-2016-002 | 0.35 | 0.35 | Wind | SP-Yuma 115kV | UNDER AFFECTED SYSTEM LOIS STUDY |

This LOIS was required because the Affected System Interconnection Customer(s) are requesting interconnection prior to the completion of higher queued required upgrades listed within the latest iteration of their Definitive Interconnection System Impact Study (DISIS).

Table 2 below lists the higher queued required upgrade projects for which these requests have cost responsibility. DISIS-2014-002-6 Group 06 (South Texas Pan Handle/New Mexico Area) Impact Restudy was posted March 11, 2016, DISIS-2015-001-2 Group 06 Impact Restudy was posted March 9, 2016, and DISIS_2015-002-1 Group 06 Impact Restudy was posted August 1, 2016. The clusters have been restudied since the original posting.

DISIS-2014-002 reports can be located at the following Generation Interconnection Study URL: <u>http://sppoasis.spp.org/documents/swpp/transmission/GenStudies.cfm?YearType=2014 Impact Studies</u>

DISIS-2015-001 and DISIS-2015-002 reports can be located at the following Generation Interconnection Study URL:

http://sppoasis.spp.org/documents/swpp/transmission/GenStudies.cfm?YearType=2015 Impact S tudies

ASGI-2016-001 and ASGI-2016-002 are included within the DISIS-2016-001 cluster and will be evaluated for impacts as part of the DISIS-2016-001 study completion.

 Table 2: Upgrade Projects not included but Required for Full Interconnection

 Service

| Upgrade Project | Project Type Description | | | Study Assignment |
|---|--|--|---|------------------|
| Tolk – Plant X 230kV circuit #1 & circuit #2 rebuild | Rebuild | Rebuild circuit #1 and circuit #2 to at least 1200 amps | Executed GIAs with anticipated completion date of 12/2017. | DISIS-2014-002 |
| TUCO 345/230/13kV Transformer replacement | Transformer Replacement | Replace existing TUCO 345/230/13kV 560MVA Rate B transformer circuit #1 with 644MVA Rate B transformer | Executed GIAs with anticipated completion date of 10/2020. | DISIS-2014-002 |
| Crawfish Draw 345/230kV Substation and Transformer | Build Substation and Transformer | Tap and tie in Border – TUCO 345kV and TUCO – Swisher 230kV. Build Crawfish Draw 345/230 Substation and 345/230/13kV transformer | Interconnection Facilities Studies (IFS) Pending | DISIS-2015-001 |
| Kress Interchange – Swisher 230kV | ress Interchange – Swisher 230kV Replace terminal equipment equipment 230kV | | Interconnection Facilities Studies (IFS) Pending | DISIS-2015-001 |
| Oklaunion 345kV Reactive Power | klaunion 345kV Reactive Power Power Bank(s) Klaunion 345kV Reactive Power Bank(s) Bank(s) Klaunion Bank(s) Klaunion Bank(s) Ba | | Interconnection Facilities Studies (IFS) Pending | DISIS-2015-001 |
| Border – Chisholm 345kV circuit #2 | order – Chisholm 345kV circuit #2 Build Second Circuit Build Second Circuit Build Second Circuit Build approximately 25 miles of second circuit 345kV circuit from Border – Chisholm | | Interconnection Facilities Studies (IFS) Pending | DISIS-2015-002 |
| Border 345kV Reactive Power | Build Reactive Power Devices | Install six (6) steps of 50Mvar Capacitor Bank(s) and +300Mvars Capacitive Static Var Compensator (SVC) | Interconnection Facilities Studies (IFS) Pending | DISIS-2015-002 |

Table 2: Upgrade Projects not included but Required for Full InterconnectionService

| Upgrade Project | Туре | Description | Status | Study Assignment |
|--|--|--|--|------------------|
| Chisholm 345kV Substation | 45kV Substation 15kV Substation | | Interconnection Facilities Studies (IFS) Pending | DISIS-2015-002 |
| Crawfish Draw – Border 345kV circuit #2 | sh Draw – Border 5kV circuit #2 Build Second Circuit Circuit Border Border | | Interconnection Facilities Studies (IFS) Pending | DISIS-2015-002 |
| GEN-2014-074 Tap Dynamic Reactive Power Support | Build Reactive Power Device | Install Statcom at GEN- 2014-074 | Interconnection Facilities Studies (IFS) Pending | DISIS-2015-002 |
| Grapevine – Nichols 230kV circuit #1 | Replace Terminal Equipment | Replace terminal equipment for Grapevine – Nichols circuit | Interconnection Facilities Studies (IFS) Pending | DISIS-2015-002 |
| Grapevine – Wheeler 230kV circuit #1 | Replace Terminal Equipment | Replace terminal equipment for Grapevine – Wheeler circuit | Interconnection Facilities Studies (IFS) Pending | DISIS-2015-002 |
| Oklaunion 345kV Reactive Power Support Incremental Upgrade | Build Reactive Power Device(s) | Install +/-100Mvars Capacitive and inductive Static Var Compensator (SVC | Interconnection Facilities Studies (IFS) Pending | DISIS-2015-002 |
| Wheeler – Sweetwater 230kV circuit #1 | Rebuild | Rebuild AEP's portion of the circuit and replace terminal equipment on SPS's portion | Interconnection Facilities Studies (IFS) Pending | DISIS-2015-002 |
| Potential DISIS 2016-001 Network Upgrade(s) | | | DISIS Study Pending | DISIS-2016-001 |

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 Affected System LOIS at the expense of the Customer(s).

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 |
|--------------|-------|-------------|----------------|--|---|
| GEN-2013-027 | 150 | 150 | Wind | Tap Tolk - Yoakum 230kV | IA FULLY EXECUTED/ON |
| GEN-2014-035 | 30 | 30 | Solar | Chaves County 115kV | IA FULLY EXECUTED/ON |
| GEN-2014-047 | 40 | 40 | Solar | Tap Tolk - Eddy County (Crossroads) 345kV | IA FULLY EXECUTED/ON |
| GEN-2014-074 | 152 | 152 | Wind | Tap TUCO Interchange - Oklaunion (GEN-2014-074 Tap) 345kV | FACILITY STUDY STAGE |
| GEN-2014-012 | 225 | 225 | Gas | Tap Hobbs Interchange - Andrews 230kV | IA FULLY EXECUTED/ON SCHEDULE FOR 2019 |
| GEN-2015-014 | 150 | 150 | Wind | Tap Cochran - Lehman 115kV | FACILITY STUDY STAGE |
| GEN-2015-020 | 100 | 100 | Wind | Oasis 115kV | FACILITY STUDY STAGE |
| GEN-2015-022 | 112 | 112 | Wind | Swisher 115kV | FACILITY STUDY STAGE |
| GEN-2015-031 | 150.5 | 150.5 | Solar | Tap Amarillo South - Swisher 230kV | FACILITY STUDY STAGE |
| GEN-2015-031 | 150.5 | 150.5 | Wind | Tap Amarillo South - Swisher 230kV | FACILITY STUDY STAGE |
| GEN-2015-056 | 101.2 | 101.2 | Wind | Crossroads 345kV | FACILITY STUDY STAGE |
| GEN-2015-058 | 50 | 50 | Wind | Atoka 115kV | FACILITY STUDY STAGE |
| GEN-2015-068 | 300 | 300 | Wind | TUCO Interchange 345kV | FACILITY STUDY STAGE |
| GEN-2015-068 | 300 | 300 | Solar | TUCO Interchange 345kV | FACILITY STUDY STAGE |
| GEN-2015-075 | 51.5 | 51.5 | Wind | Carlisle 69kV | FACILITY STUDY STAGE |
| GEN-2015-079 | | | | Tap Yoakum - Hobbs Interchange | FACILITY STUDY STAGE |
| | 129.2 | 129.2 | Wind | 230kV | |
| GEN-2015-080 | | | | Tap Yoakum - Hobbs Interchange | FACILITY STUDY STAGE |
| | 129.2 | 129.2 | Solar | 230kV | |
| GEN-2015-018 | 80 | 80 | Wind | Tap Bailey - Curry Co. 115kV | DISIS STUDY STAGE |
| | | | | Tap TUCO - OKU 345kV (GEN-2014- | DISIS STUDY STAGE |
| GEN-2015-033 | 152 | 152 | Wind | 074 Tap) | |
| GEN-2015-039 | 50 | 50 | Solar | Tap Deaf Smith - Plant X 230 kV | DISIS STUDY STAGE |
| GEN-2015-040 | 50 | 50 | Solar | Mustang 230kV | DISIS STUDY STAGE |
| GEN-2015-041 | 5 | 5 | СТ | TUCO Interchange 345kV | DISIS STUDY STAGE |
| GEN-2015-078 | 50 | 50 | Solar | Mustang 115kV | DISIS STUDY STAGE |
| GEN-2016-002 | 74 | 74 | Wind | Happy 115 kV substation | DISIS STUDY STAGE |
| GEN-2016-015 | 100 | 100 | Solar | Andrews 230kV | DISIS STUDY STAGE |
| GEN-2016-038 | 300 | 300 | Wind | Harrington 230kV | DISIS STUDY STAGE |
| GEN-2016-039 | 112 | 112 | Solar | Swisher 230kV | DISIS STUDY STAGE |
| GEN-2016-056 | 200 | 200 | Wind | Carlisle 230 kV | DISIS STUDY STAGE |
| GEN-2016-058 | 200 | 200 | Solar | Yoakum 345kV | DISIS STUDY STAGE |
| GEN-2016-059 | 300 | 300 | Wind | Harrington 230kV | DISIS STUDY STAGE |
| GEN-2016-062 | 250.7 | 250.7 | Wind | Andrews 230kV | DISIS STUDY STAGE |
| GEN-2016-069 | 31.35 | 31.35 | Solar | Chaves County 115kV | DISIS STUDY STAGE |

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

Facilities

Generating Facility

The Affected System Interconnection Customers' request is to interconnect two requests, ASGI-2016-001 and ASGI-2016-002. ASGI-2016-001 is requesting the interconnection of one (1) Envision 2.5 MW wind turbine and associated facilities interconnecting SPEC Distribution connected to Wolfforth 115kV substation in Lubbock County, Texas. ASGI-2016-002 is requesting an uprate to ASGI-2015-002 of 350kW and associated facilities interconnecting at the SP-Yuma 115kV substation in Lubbock County, Texas.

Interconnection Facilities

The POI for ASGI-2016-001 Interconnection Customer connects to the Affected System Wolfforth 115kV substation in Lubbock County, Texas. Figure 1 depicts the one-line diagram for the POI and the Interconnection Request(s).

Figure 1: Proposed ASGI-2016-001 Configuration and Request Power Flow Model



The POI for ASGI-2016-002 Interconnection Customer connects to the Affected System at the SP-Yuma 115kV substation in Lubbock County, Texas. Figure 2 depicts the one-line diagram for the POI and the Interconnection Request(s).

Figure 2: Proposed ASGI-2016-002 Configuration and Request Power Flow Model



Base Case Network Upgrades

The Network Upgrades included within the cases used for this Affected System 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 prior to the ASGI-2016-001 and ASGI-2016-002 Affected System LOIS. 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(s).

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 transmission service request study models including the 2016 Winter Peak (16WP), 2017 Spring (17G), and 2017 Summer Peak (17SP), 2020 Light (20L), and 2020 Summer (SP) and Winter (WP) peak seasonal models. 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, Energy Resource Interconnection Service (ERIS), is evaluated for the generating plants within a geographical area of the interconnection request(s) for the VERs dispatched at 100% nameplate of maximum generation. The VERs in the remote areas is dispatched at 20% nameplate of maximum generation. These projects are dispatched across the SPP footprint using load factor ratios.

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

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

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

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 100% of Rate A - normal) and for contingency (n-1) (greater than 100% of Rate B – emergency) conditions.

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

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

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 monitor 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.

Results

The LOIS ACCC analysis indicates that the Affected System Interconnection Customer(s) can interconnect their generation into the SPS transmission system at the available MW listed in the results tables before all required upgrades listed within the DISIS-2014-002, DISIS-2015-001, DISIS-2015-002, or DISIS-2016-001 studies or latest iteration can be placed into service. Should any other

GI 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. ACCC results for the LOIS can be found in Table 4 and Table 5.

Table 4 results are based on the study assumption of system conditions as of 12/31/2016 prior to the in-service DISIS-2014-002 identified and assigned Network Upgrades. These Network Upgrade(s) include Tolk – Plant X 230kV circuit #1 and circuit #2 rebuilds, and TUCO 345/230/13kV transformer replacement.

Table 5 results are based on the study assumption if for any unforeseen reason the Network Upgrades, Tolk – Plant X 230kV circuit #1 and circuit #2 rebuilds, and TUCO 345/230/13kV transformer replacement are not in-service by their anticipated in-service date. This assumption also accounts for GEN-2013-027, GEN-2014-035, and GEN-2014-047 generation. If the Network Upgrade(s) are not in-service by 12/31/2020, then higher queued and equally queued generation could be limited further for LOIS.

Constraints listed in Table 6 do not require additional transmission reinforcement for Interconnection Service, but could require Interconnection Customer to reduce generation in operational conditions. These transmission constraints occur when this study's generation is dispatched into the SPP footprint for Energy Resource Interconnection Service (ERIS).

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.

Table 4: Interconnection Constraints for Mitigation of LOIS as of 12/31/2016

| Dispatch Group | Season | Source | Flow | Monitored Element | RATEA (MVA) | RATEB (MVA) | TDF | TC% LOADING | Max MW Available | Contingency |
|-------------------|--------|------------|------|-------------------|----------------|----------------|-----|----------------|---------------------|-------------|
| 06ALL | n/a | ASGI_16_01 | n/a | n/a | n/a | n/a | n/a | n/a | 2.5 | n/a |
| 06ALL | n/a | ASGI_16_02 | n/a | n/a | n/a | n/a | n/a | n/a | 0.35 | n/a |

Table 5: Interconnection Constraints for Mitigation of LOIS if DISIS-2014-002 Network Upgrade In-service is delayed and with GEN-2013-027,GEN-2014-035, and GEN-2014-047 generation

| Dispatch Group | Season | Source | Flow | Monitored Element | RATEA (MVA) | RATEB (MVA) | TDF | TC% LOADING | Max MW Available | Contingency |
|-------------------|--------|------------|----------|---|----------------|----------------|---------|----------------|---------------------|---|
| | | | | TUCO INTERCHANGE (GE M1022338) | | | | | 0 | TUCO INTERCHANGE (SIEM 8743066) 345/230/13.2KV |
| 06ALL | 20L | ASGI_16_01 | FROM->TO | 345/230/13.2KV TRANSFORMER CKT 1 | 560 | 560 | 0.34822 | 107.6065 | 0 | TRANSFORMER CKT 2 |
| | | | | TUCO INTERCHANGE (GE M1022338) | | | | | 0 | TUCO INTERCHANGE (SIEM 8743066) 345/230/13.2KV |
| 06ALL | 20L | ASGI_16_01 | FROM->TO | 345/230/13.2KV TRANSFORMER CKT 1 | 560 | 560 | 0.34822 | 108.3773 | 0 | TRANSFORMER CKT 2 |
| | | | | TUCO INTERCHANGE (GE M1022338) | | | | | 0 | TUCO INTERCHANGE (SIEM 8743066) 345/230/13.2KV |
| 06ALL | 20WP | ASGI_16_01 | FROM->TO | 345/230/13.2KV TRANSFORMER CKT 1 | 560 | 560 | 0.3692 | 117.4583 | 0 | TRANSFORMER CKT 2 |
| | | | | TUCO INTERCHANGE (GE M1022338) | | | | | 0 | TUCO INTERCHANGE (SIEM 8743066) 345/230/13.2KV |
| 06ALL | 20WP | ASGI_16_01 | FROM->TO | 345/230/13.2KV TRANSFORMER CKT 1 | 560 | 560 | 0.3692 | 118.7455 | 0 | TRANSFORMER CKT 2 |
| | | | | TUCO INTERCHANGE (GE M1022338) | | | | | 0 | TUCO INTERCHANGE (SIEM 8743066) 345/230/13.2KV |
| 06ALL | 20L | ASGI_16_01 | FROM->TO | 345/230/13.2KV TRANSFORMER CKT 1 | 560 | 560 | 0.34822 | 107.6065 | 0 | TRANSFORMER CKT 2 |
| | | | | TUCO INTERCHANGE (GE M1022338) | | | | | 0 | TUCO INTERCHANGE (SIEM 8743066) 345/230/13.2KV |
| 06ALL | 20L | ASGI_16_01 | FROM->TO | 345/230/13.2KV TRANSFORMER CKT 1 | 560 | 560 | 0.34822 | 108.3773 | 0 | TRANSFORMER CKT 2 |
| | | | | TUCO INTERCHANGE (GE M1022338) | | | | | 0 | TUCO INTERCHANGE (SIEM 8743066) 345/230/13.2KV |
| 06ALL | 20WP | ASGI_16_01 | FROM->TO | 345/230/13.2KV TRANSFORMER CKT 1 | 560 | 560 | 0.3692 | 117.4583 | 0 | TRANSFORMER CKT 2 |
| | | | | TUCO INTERCHANGE (GE M1022338) | | | | | 0 | TUCO INTERCHANGE (SIEM 8743066) 345/230/13.2KV |
| 06ALL | 20WP | ASGI_16_01 | FROM->TO | 345/230/13.2KV TRANSFORMER CKT 1 | 560 | 560 | 0.3692 | 118.7455 | 0 | TRANSFORMER CKT 2 |
| | | | | PLANT X STATION - TOLK STATION EAST 230KV | | | | | 0 | |
| 06ALL | 20SP | ASGI_16_02 | TO->FROM | CKT 2 | 478 | 501.5 | 0.33612 | 99.2 | 0 | PLANT X STATION - TOLK STATION WEST 230KV CKT 1 |
| | | | | PLANT X STATION - TOLK STATION EAST 230KV | | | | | 0 | |
| 06ALL | 20SP | ASGI_16_02 | TO->FROM | CKT 2 | 478 | 501.5 | 0.33612 | 99.2 | Ū | PLANT X STATION - TOLK STATION WEST 230KV CKT 1 |
| | | | | PLANT X STATION - TOLK STATION WEST | | | | | 0 | |
| 06ALL | 20SP | ASGI_16_02 | TO->FROM | 230KV CKT 1 | 478 | 502 | 0.33918 | 99.9 | Ű | PLANT X STATION - TOLK STATION EAST 230KV CKT 2 |
| | | | | PLANT X STATION - TOLK STATION WEST | | | | | 0 | |
| 06ALL | 20SP | ASGI_16_02 | TO->FROM | 230KV CKT 1 | 478 | 502 | 0.33918 | 99.9 | Ū | PLANT X STATION - TOLK STATION EAST 230KV CKT 2 |
| | | | | TUCO INTERCHANGE (GE M1022338) | | | | | 0 | TUCO INTERCHANGE (SIEM 8743066) 345/230/13.2KV |
| 06ALL | 20L | ASGI_16_02 | FROM->TO | 345/230/13.2KV TRANSFORMER CKT 1 | 560 | 560 | 0.24585 | 107.6065 | Ū | TRANSFORMER CKT 2 |
| | | | | TUCO INTERCHANGE (GE M1022338) | | | | | 0 | TUCO INTERCHANGE (SIEM 8743066) 345/230/13.2KV |
| 06ALL | 20L | ASGI_16_02 | FROM->TO | 345/230/13.2KV TRANSFORMER CKT 1 | 560 | 560 | 0.24585 | 108.3773 | Ű | TRANSFORMER CKT 2 |
| | | | | TUCO INTERCHANGE (GE M1022338) | | | | | 0 | TUCO INTERCHANGE (SIEM 8743066) 345/230/13.2KV |
| 06ALL | 20WP | ASGI_16_02 | FROM->TO | 345/230/13.2KV TRANSFORMER CKT 1 | 560 | 560 | 0.26689 | 118.7455 | Ŭ | TRANSFORMER CKT 2 |
| | | | | TUCO INTERCHANGE (GE M1022338) | | | | | 0 | TUCO INTERCHANGE (SIEM 8743066) 345/230/13.2KV |
| 06ALL | 20WP | ASGI_16_02 | FROM->TO | 345/230/13.2KV TRANSFORMER CKT 1 | 560 | 560 | 0.26689 | 117.4583 | Ŭ | TRANSFORMER CKT 2 |

| Dispatch Group | Season | Source | Flow | Monitored Element | RATEA (MVA) | RATEB (MVA) | TDF | TC% LOADING | Max MW Available | Contingency |
|-------------------|--------|------------|----------|----------------------------------|----------------|----------------|---------|----------------|---------------------|--|
| | | | | TUCO INTERCHANGE (GE M1022338) | | | | | 0 | TUCO INTERCHANGE (SIEM 8743066) 345/230/13.2KV |
| 06ALL | 20L | ASGI_16_02 | FROM->TO | 345/230/13.2KV TRANSFORMER CKT 1 | 560 | 560 | 0.24585 | 107.6065 | 0 | TRANSFORMER CKT 2 |
| | | | | TUCO INTERCHANGE (GE M1022338) | | | | | 0 | TUCO INTERCHANGE (SIEM 8743066) 345/230/13.2KV |
| 06ALL | 20L | ASGI_16_02 | FROM->TO | 345/230/13.2KV TRANSFORMER CKT 1 | 560 | 560 | 0.24585 | 108.3773 | 0 | TRANSFORMER CKT 2 |
| | | | | TUCO INTERCHANGE (GE M1022338) | | | | | 0 | TUCO INTERCHANGE (SIEM 8743066) 345/230/13.2KV |
| 06ALL | 20WP | ASGI_16_02 | FROM->TO | 345/230/13.2KV TRANSFORMER CKT 1 | 560 | 560 | 0.26689 | 118.7455 | 0 | TRANSFORMER CKT 2 |
| | | | | TUCO INTERCHANGE (GE M1022338) | | | | | 0 | TUCO INTERCHANGE (SIEM 8743066) 345/230/13.2KV |
| 06ALL | 20WP | ASGI_16_02 | FROM->TO | 345/230/13.2KV TRANSFORMER CKT 1 | 560 | 560 | 0.26689 | 117.4583 | U | TRANSFORMER CKT 2 |

Table 6: Constraints that do not require additional Transmission Reinforcements LOIS as of 12/31/2016

| Dispatch Group | Season | Source | Flow | Monitored Element | RATEA (MVA) | RATEB (MVA) | TDF | TC% LOADING | Contingency |
|-------------------|--------|------------|------------|--------------------------------------|----------------|----------------|---------|----------------|---------------------------------|
| | | | | CASTRO COUNTY INTERCHANGE - NEWHART | | | | | |
| 06ALL | 16WP | ASGI_16_02 | FROM->TO | 115KV CKT 1 | 159.35 | 177.08 | 0.03755 | 98.5 | P12:115:SPS:T04.1.DFSMTH.CASTRO |
| | | | | CASTRO COUNTY INTERCHANGE - NEWHART | | | | | |
| 06ALL | 20WP | ASGI_16_02 | FROM->TO | 115KV CKT 1 | 159.35 | 177.08 | 0.03265 | 105.2337 | P12:115:SPS:T04.1.DFSMTH.CASTRO |
| | | | | CLEARWATER - GILL ENERGY CENTER WEST | | | | | |
| 06ALL | 16WP | ASGI_16_01 | FROM->TO | 138KV CKT 1 | 143 | 143 | 0.0319 | 97.6 | DBL-G1524-WI |
| 0.001 | 10110 | | FROM . TO | CLEARWATER - GILL ENERGY CENTER WEST | 1.12 | 1.12 | 0 00000 | 07.6 | |
| UBALL | 16009 | ASGI_16_02 | FRUIVI->TU | | 143 | 143 | 0.03298 | 97.6 | DBL-01524-WI |
| 06411 | 176 | ASGL 16 01 | FROM->TO | 138KV CKT 1 | 143 | 143 | 0 03176 | 106 833 | DBI-G1524-WI |
| 00/ ILL | 1,0 | 7661_10_01 | | CLEARWATER - GILL ENERGY CENTER WEST | 115 | 115 | 0.03170 | 100.035 | |
| 06ALL | 17G | ASGI 16 01 | FROM->TO | 138KV CKT 1 | 143 | 143 | 0.03176 | 99.3 | DBL-THIS-G15 |
| | | | | CLEARWATER - GILL ENERGY CENTER WEST | | | | | |
| 06ALL | 17G | ASGI_16_02 | FROM->TO | 138KV CKT 1 | 143 | 143 | 0.03283 | 99.3 | DBL-THIS-G15 |
| | | | | CLEARWATER - GILL ENERGY CENTER WEST | | | | | |
| 06ALL | 17G | ASGI_16_02 | FROM->TO | 138KV CKT 1 | 143 | 143 | 0.03283 | 106.833 | DBL-G1524-WI |
| 06ALL | 16WP | ASGI_16_02 | TO->FROM | CLEARWATER - MILAN TAP 138KV CKT 1 | 110 | 110 | 0.03298 | 126.5544 | DBL-THIS-G15 |
| 06ALL | 16WP | ASGI_16_01 | TO->FROM | CLEARWATER - MILAN TAP 138KV CKT 1 | 110 | 110 | 0.0319 | 126.5544 | DBL-THIS-G15 |
| 06ALL | 16WP | ASGI_16_01 | TO->FROM | CLEARWATER - MILAN TAP 138KV CKT 1 | 110 | 110 | 0.0319 | 136.2343 | DBL-G1524-WI |
| 06ALL | 16WP | ASGI_16_02 | TO->FROM | CLEARWATER - MILAN TAP 138KV CKT 1 | 110 | 110 | 0.03298 | 136.2343 | DBL-G1524-WI |
| 06ALL | 17G | ASGI_16_02 | TO->FROM | CLEARWATER - MILAN TAP 138KV CKT 1 | 110 | 110 | 0.03283 | 139.9178 | DBL-THIS-G15 |
| 06ALL | 17G | ASGI_16_01 | TO->FROM | CLEARWATER - MILAN TAP 138KV CKT 1 | 110 | 110 | 0.03176 | 149.6386 | DBL-G1524-WI |
| 06ALL | 17G | ASGI_16_01 | TO->FROM | CLEARWATER - MILAN TAP 138KV CKT 1 | 110 | 110 | 0.03176 | 139.9178 | DBL-THIS-G15 |
| 06ALL | 17G | ASGI_16_02 | TO->FROM | CLEARWATER - MILAN TAP 138KV CKT 1 | 110 | 110 | 0.03283 | 149.6386 | DBL-G1524-WI |
| 06ALL | 17SP | ASGI_16_01 | TO->FROM | CLEARWATER - MILAN TAP 138KV CKT 1 | 110 | 110 | 0.03487 | 108.7263 | DBL-THIS-G15 |
| 06ALL | 17SP | ASGI_16_01 | TO->FROM | CLEARWATER - MILAN TAP 138KV CKT 1 | 110 | 110 | 0.03487 | 119.21 | DBL-G1524-WI |
| 06ALL | 17SP | ASGI_16_02 | TO->FROM | CLEARWATER - MILAN TAP 138KV CKT 1 | 110 | 110 | 0.03606 | 108.7263 | DBL-THIS-G15 |
| 06ALL | 17SP | ASGI_16_02 | TO->FROM | CLEARWATER - MILAN TAP 138KV CKT 1 | 110 | 110 | 0.03606 | 119.21 | DBL-G1524-WI |

| Dispatch Group | Season | Source | Flow | Monitored Element | RATEA (MVA) | RATEB (MVA) | TDF | TC% LOADING | Contingency |
|-------------------|--------|-------------|------------|-----------------------------------|----------------|----------------|-----------|----------------|---|
| | | | | EDDY_NORTH 6230.00 (WAUK WT01134) | | | | | |
| 06ALL | 25SP | ASGI_16_02 | FROM->TO | 230/115/13.2KV TRANSFORMER CKT 2 | 248.9 | 286 | 0.06618 | 100.9919 | EDDY COUNTY INTERCHANGE - EDDY_NORTH 6230.00 230KV CKT @1 |
| | | | | EDDY_NORTH 6230.00 (WAUK WT01134) | | | | | |
| 06ALL | 25SP | ASGI_16_02 | FROM->TO | 230/115/13.2KV TRANSFORMER CKT 2 | 248.9 | 286 | 0.06618 | 100.2006 | EDDY COUNTY INTERCHANGE - EDDY_NORTH 6230.00 230KV CKT @1 |
| | | | | EDDY_NORTH 6230.00 (WAUK WT01134) | | | | | |
| 06ALL | 16WP | ASGI_16_02 | FROM->TO | 230/115/13.2KV TRANSFORMER CKT 2 | 273.8 | 311 | 0.04087 | 99.9 | EDDY COUNTY INTERCHANGE - EDDY_NORTH 6230.00 230KV CKT @1 |
| 00011 | 1010 | | | EDDY_NORTH 6230.00 (WAUK WT01134) | 272.0 | 211 | 0.04007 | 100 2025 | |
| UGALL | 1600 | ASGI_16_02 | FROIVI->TO | 230/115/13.2KV TRANSFORMER CKT 2 | 273.8 | 311 | 0.04087 | 100.3825 | EDDY COUNTY INTERCHANGE - EDDY_NORTH 6230.00 230KV CKT @1 |
| 06411 | 1750 | ASGL 16 02 | | 220/115/12 2KV/TPANSEOPMED CKT 2 | 248.0 | 286 | 0 04227 | 07 / | |
| UUALL | 1756 | A301_10_02 | | EDDY NORTH 6230 00 (WALK WT01134) | 240.5 | 200 | 0.04327 | 57.4 | |
| 06411 | 175P | ASGI 16 02 | FROM->TO | 230/115/13.2KV TRANSFORMER CKT 2 | 248.9 | 286 | 0.04327 | 96.6 | EDDY COUNTY INTERCHANGE - EDDY NORTH 6230.00 230KV CKT @1 |
| 06411 | 201 | ASGL 16.01 | TO->FROM | | 133 | 153 | 0.03105 | 125 8563 | |
| OGALL | 201 | ASGL 16_01 | | | 122 | 153 | 0.03105 | 107 65 47 | |
| OGALL | 201 | ASGI_10_01 | | | 155 | 155 | 0.03103 | 107.0347 | |
| UGALL | 20L | ASGI_16_02 | TO->FROM | FPL SWITCH - WOODWARD 138KV CKT 1 | 133 | 153 | 0.03184 | 107.6547 | DBL-G1151-TG |
| 06ALL | 20L | ASGI_16_01 | TO->FROM | FPL SWITCH - WOODWARD 138KV CKT 1 | 133 | 153 | 0.03105 | 106.4155 | DBL-WWRD-G11 |
| 06ALL | 20L | ASGI_16_02 | TO->FROM | FPL SWITCH - WOODWARD 138KV CKT 1 | 133 | 153 | 0.03184 | 106.4155 | DBL-WWRD-G11 |
| 06ALL | 20L | ASGI_16_02 | TO->FROM | FPL SWITCH - WOODWARD 138KV CKT 1 | 133 | 153 | 0.03184 | 125.8563 | DBL-TGA-MATT |
| | | | | GRAPEVINE INTERCHANGE - NICHOLS | | | | | |
| 06ALL | 20WP | ASGI_16_02 | TO->FROM | STATION 230KV CKT 1 | 329.05 | 360.92 | 0.09768 | 96.3 | DBL-TGA-MATT |
| 00011 | 2014/5 | | TO . 50014 | GRAPEVINE INTERCHANGE - NICHOLS | 220.05 | 260.02 | 0 4 4 0 2 | 00.7 | |
| UGALL | 20WP | ASGI_16_01 | TO->FROM | | 329.05 | 360.92 | 0.1182 | 99.7 | G14-0741 345.00 - OKLAUNION 345KV CKT 1 |
| 06411 | 2014/0 | ASGL 16 02 | | GRAPEVINE INTERCHANGE - NICHOLS | 220.05 | 260.02 | 0 11012 | 100 2602 | DBI BVP C111 |
| UUALL | 2000 | A301_10_02 | | GRADEVINE INTERCHANGE - NICHOLS | 329.03 | 300.92 | 0.11012 | 100.3003 | |
| 06411 | 20WP | ASGI 16 02 | TO->FROM | STATION 230KV CKT 1 | 329.05 | 360.92 | 0 12547 | 99.7 | G14-074T 345.00 - OKLAUNION 345KV CKT 1 |
| 00,122 | 2011 | //001_10_02 | | GRAPEVINE INTERCHANGE - NICHOLS | 323.03 | 300.52 | 0.125 17 | | |
| 06ALL | 20WP | ASGI 16 02 | TO->FROM | STATION 230KV CKT 1 | 329.05 | 360.92 | 0.11012 | 102.0493 | DBL-G1114-WW |
| | | | | GRAPEVINE INTERCHANGE - NICHOLS | | | | | |
| 06ALL | 20WP | ASGI_16_01 | TO->FROM | STATION 230KV CKT 1 | 329.05 | 360.92 | 0.09302 | 100.3603 | DBL-BVR-G111 |
| | | | | GRAPEVINE INTERCHANGE - NICHOLS | | | | | |
| 06ALL | 20WP | ASGI_16_02 | TO->FROM | STATION 230KV CKT 1 | 329.05 | 360.92 | 0.12547 | 99.8 | G14-074T 345.00 - TUCO INTERCHANGE 345KV CKT 1 |
| | | | | GRAPEVINE INTERCHANGE - NICHOLS | | | | | |
| 06ALL | 20WP | ASGI_16_01 | TO->FROM | STATION 230KV CKT 1 | 329.05 | 360.92 | 0.09302 | 102.0493 | DBL-G1114-WW |
| 0.000 | 2014/2 | | | GRAPEVINE INTERCHANGE - NICHOLS | | | 0.4400 | | |
| 06ALL | 20WP | ASGI_16_01 | TO->FROM | | 329.05 | 360.92 | 0.1182 | 99.8 | G14-0741 345.00 - TUCO INTERCHANGE 345KV CKT 1 |
| 06411 | 2014/0 | ASCI 16 01 | | GRAPEVINE INTERCHANGE - NICHOLS | 220.05 | 260.02 | 0.09462 | 06.2 | DRI TCA MATT |
| UUALL | 2000 | A301_10_01 | | GRAPEVINE INTERCHANGE - NICHOLS | 329.03 | 300.92 | 0.06403 | 50.5 | |
| 06411 | 201 | ASGI 16 02 | TO->FROM | STATION 230KV CKT 1 | 318.7 | 350.57 | 0.09672 | 95.5 | DBI-G1114-WW |
| | | 1.0010_02 | | GRAPEVINE INTERCHANGE - NICHOLS | 510.7 | 000.07 | 0.00072 | 55.5 | |
| 06ALL | 20L | ASGI_16_01 | TO->FROM | STATION 230KV CKT 1 | 318.7 | 350.57 | 0.07961 | 95.5 | DBL-G1114-WW |
| 06ALL | 16WP | ASGI 16 01 | FROM->TO | HARPER - MILAN TAP 138KV CKT 1 | 143.4 | 143.4 | 0.0319 | 103.8211 | DBL-THIS-G15 |
| 06ALL | 16WP | ASGI 16 02 | FROM->TO | HARPER - MILAN TAP 138KV CKT 1 | 143.4 | 143.4 | 0.03298 | 103.8211 | DBL-THIS-G15 |
| | | | | | | | | | |

| Dispatch Group | Season | Source | Flow | Monitored Element | RATEA (MVA) | RATEB (MVA) | TDF | TC% LOADING | Contingency |
|-------------------|--------|------------|----------|---|----------------|----------------|---------|----------------|--|
| 06ALL | 16WP | ASGI_16_01 | FROM->TO | HARPER - MILAN TAP 138KV CKT 1 | 143.4 | 143.4 | 0.0319 | 111.3075 | DBL-G1524-WI |
| 06ALL | 16WP | ASGI_16_02 | FROM->TO | HARPER - MILAN TAP 138KV CKT 1 | 143.4 | 143.4 | 0.03298 | 111.3075 | DBL-G1524-WI |
| 06ALL | 17G | ASGI_16_01 | FROM->TO | HARPER - MILAN TAP 138KV CKT 1 | 138.6 | 143.4 | 0.03176 | 122.7809 | DBL-G1524-WI |
| 06ALL | 17G | ASGI_16_01 | FROM->TO | HARPER - MILAN TAP 138KV CKT 1 | 138.6 | 143.4 | 0.03176 | 115.2507 | DBL-THIS-G15 |
| 06ALL | 17G | ASGI_16_02 | FROM->TO | HARPER - MILAN TAP 138KV CKT 1 | 138.6 | 143.4 | 0.03283 | 122.7809 | DBL-G1524-WI |
| 06ALL | 17G | ASGI_16_02 | FROM->TO | HARPER - MILAN TAP 138KV CKT 1 | 138.6 | 143.4 | 0.03283 | 115.2507 | DBL-THIS-G15 |
| 06ALL | 25SP | ASGI_16_01 | FROM->TO | SUNDOWN INTERCHANGE (WH XDS70381) 230/115/13.8KV TRANSFORMER CKT 1 | 187 | 187 | 0.04346 | 100 | TERRY COUNTY INTERCHANGE - WOLFFORTH INTERCHANGE 115KV CKT 1 |
| 06ALL | 25SP | ASGI_16_01 | FROM->TO | SUNDOWN INTERCHANGE (WH XDS70381) 230/115/13.8KV TRANSFORMER CKT 1 | 187 | 187 | 0.04346 | 96 | TERRY COUNTY INTERCHANGE - WOLFFORTH INTERCHANGE 115KV CKT 1 |
| 06ALL | 25SP | ASGI_16_01 | FROM->TO | SUNDOWN INTERCHANGE (WH XDS70381) 230/115/13.8KV TRANSFORMER CKT 1 | 187 | 187 | 0.04346 | 100 | TERRY COUNTY INTERCHANGE - WOLFFORTH INTERCHANGE 115KV CKT 1 |
| 06ALL | 25SP | ASGI_16_01 | FROM->TO | SUNDOWN INTERCHANGE (WH XDS70381) 230/115/13.8KV TRANSFORMER CKT 1 | 187 | 187 | 0.04346 | 96 | TERRY COUNTY INTERCHANGE - WOLFFORTH INTERCHANGE 115KV CKT 1 |

Stability Analysis

Transient stability analysis was not performed for this LOIS study. The results will be included with the DISIS 2016-001 analysis posting.

Conclusion

<OMITTED TEXT> (Affected System Interconnection Customer) has requested an Affected System Limited Operation System Impact Study (AS-LOIS) under the Southwest Power Pool Open Access Transmission Tariff (OATT) for ASGI-2016-001 and ASGI-2016-002. ASGI-2016-001 (2.5MW) and ASGI-2016-002 (0.35MW) wind generating facilities are to be interconnected into the Distribution System of South Plains Electric Cooperative, Inc. (SPEC). The South Plains Electric Cooperative system is interconnecting to the Southwestern Public Power (SPS) in Lubbock County, Texas. ASGI-2016-001 and ASGI-2016-002 have requested this Limited Operation Interconnection Study (LOIS) to determine the impacts of interconnecting to the transmission system before all required Network Upgrades identified in the DISIS-2014-002, DISIS-2015-001, DISIS-2015-002, and potentially DISIS-2016-001 (or most recent iteration) Impact Study can be placed into service.

Power flow analysis from this Affected System LOIS has determined that the ASGI-2016-001 and ASGI-2016-002 request can interconnect 2.85 MW of generation with Energy Interconnection Resource Service (ERIS) prior to the completion of the required Network Upgrades, listed within Table 2 of this report, provided the Network Upgrades are able to be placed in service prior to December 31, 2020. 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 Affected System 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 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.

Transient stability and short circuit analysis was not performed for this LOIS study. Transient stability analysis will be conducted as part of the DISIS-2016-001 study.

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 in this System Impact Study constitutes a request for transmission service or confers upon the Interconnection Customer any right to receive transmission service.