GENERATOR INTERCONNECTION AFFECTED SYSTEM IMPACT STUDY REPORT

ASGI-2016-011

ASGI-2016-012

ASGI-2016-013

Published June 2017

By SPP Generator Interconnections Dept.

REVISION HISTORY

Date	Author	Change Description
06/30/2017	SPP	Affected System Impact Study for ASGI-2016-011, ASGI-2016-012, & ASGI-2016-013 Report Revision 0 Issued

EXECUTIVE SUMMARY

An Affected System Interconnection Customer has requested an Affected System Impact Study (ASIS) consistent with Southwest Power Pool (SPP) Open Access Transmission Tariff (OATT) for interconnection requests into the system of Peoples Electric Cooperative (PEC). The PEC facilities connect with the facilities of Southwestern Power Administration (SWPA) and Western Farmers Electric Cooperative (WFEC). This report will detail the results from the three Group 14 requests in this study: ASGI-2016-011, ASGI-2016-012, & ASGI-2016-013. All three requests are thermal units totaling 7.4, 61.7, and 4.9 MW, respectively.

This ASIS addresses the effects of the proposed generators on the SPP transmission system based on the system topology and requests included in the SPP DISIS-2016-001 study:

- ASGI-2016-011 requested the interconnection of three (3) Caterpillar G3520H Gas Engines and associated facilities interconnecting to the PEC distribution system served from the PEC Gerty substation, which connects to SWPA facilities at the Allen 138 kV tap.

- ASGI-2016-012 requested the interconnection of twenty-five (25) Caterpillar G3520H Gas Engines and associated facilities interconnecting to the PEC distribution system served from the PEC Centrahoma substation, which connects to SWPA facilities at the Tupelo 138 kV substation.

- ASGI-2016-013 requested the interconnection of two (2) Caterpillar G3520H Gas Engines and associated facilities interconnecting to the PEC distribution system served from the PEC Ashland 138 kV substation on the WFEC 138 kV line between Coalgate and Pittsburgh.

Power flow and stability analysis from this ASIS has determined that ASGI-2016-011, ASGI-2016-012, & ASGI-2016-013 can interconnect all of their respective generation (mentioned above) with Energy Resource Interconnection Service (ERIS) prior to the completion of the required Network Upgrades listed within **Table 2** of this report. It should be noted that although this ASIS analyzed many of the more-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 analysis for this ASIS has determined that no issues were observed for the transmission system for the forty-nine (49) selected faults for the interconnection of ASGI-2016-011, ASGI-2016-012, & ASGI-2016-013. As discussed above, this amount may be reduced further dependent upon system conditions.

Nothing in this study should be construed as a guarantee of delivery or transmission service. If the customer(s) wishes to move power across the facilities of SPP, a separate request for transmission service must be made on Southwest Power Pool's OASIS by the Customer(s).

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PURPOSE

An Affected System Interconnection Customer has requested an Affected System Impact Study (ASIS) consistent with the SPP OATT for interconnection requests into the system of PEC. The PEC facilities connect with the facilities of SWPA and WFEC.

The purpose of this study is to evaluate the impacts of interconnecting the following generators on the SPP transmission system based on the system topology and requests included in the SPP DISIS-2016-001 study:

- ASGI-2016-011 requested the interconnection of three (3) Caterpillar G3520H Gas Engines and associated facilities interconnecting to the PEC distribution system served from the PEC Gerty substation, which connects to SWPA facilities at the Allen 138 kV tap.

- ASGI-2016-012 requested the interconnection of twenty-five (25) Caterpillar G3520H Gas Engines and associated facilities interconnecting to the PEC distribution system served from the PEC Centrahoma substation, which connects to SWPA facilities at the Tupelo 138 kV substation.

- ASGI-2016-013 requested the interconnection of two (2) Caterpillar G3520H Gas Engines and associated facilities interconnecting to the PEC distribution system served from the PEC Ashland 138 kV substation on the WFEC 138 kV line between Coalgate and Pittsburgh.

The Affected System Interconnection Customer(s) have requested these amounts to be studied with ERIS to commence on or around June 1, 2017.

The ASIS 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 ASIS 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 ASIS 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) or that of the applicable transmission provider.

This ASIS 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 in-service for this ASIS. Also listed in Table 1 are both the amount of MW of interconnection service expected at the effective time of this study and the total

MW requested of interconnection service, the fuel type, the point of interconnection (POI), and the current status of each particular prior queued request.

Table 1: Generation Requests Included within ASIS

Project	MW	Total MW	Fuel Source	POI	Status
GEN-2015-036	303.6	303.6	Wind	Johnston County 345kV Substation	FACILITY STUDY STAGE
GEN-2016-028	100	100	Wind	Clayton 138 kV Sub	FACILITY STUDY STAGE
GEN-2016-030	100	100	Solar	Brown 138 kV	FACILITY STUDY STAGE
GEN-2016-063	200	200	Wind	Hugo-Sunnyside 345 kV	FACILITY STUDY STAGE
ASGI-2016-011	7.4	7.4	Thermal	Allen Tap 138 kV	Current Study
ASGI-2016-012	61.7	61.7	Thermal	Tupelo 138 kV	Current Study
ASGI-2016-013	4.9	4.9	Thermal	Ashland 138 kV	Current Study

This ASIS was required because the Affected System Interconnection Customer(s) are requesting interconnection at a location electrically close to the SPP system.

Table 2 below lists the higher queued required upgrade projects for which these requests have cost responsibility. DISIS-2016-001 Group 14 Impact Study was posted February 28, 2017.

DISIS-2016-001 reports can be located at the following Generation Interconnection Study URL: http://sppoasis.spp.org/documents/swpp/transmission/GenStudies.cfm?YearType=2016_Impact_Studies

ASGI-2016-011, ASGI-2016-012, & ASGI-2016-013 are included as prior queued to DISIS-2016-002 cluster and will be evaluated for impacts prior to the DISIS-2016-002 study.

Table 2: Upgrade Projects Required for Interconnection Service

Upgrade Project	Type	Description	Status	Study Assignment
Currently, None				

Any changes to these assumptions may require a re-study of this ASIS at the expense of the Customer(s).

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 FACILITIES

ASGI-2016-011 requested the interconnection of three (3) Caterpillar G3520H Gas Engines and associated facilities interconnecting to the PEC distribution system served from the PEC Gerty substation, which connects to SWPA facilities at the Allen 138 kV tap in Hughes County, Oklahoma.

ASGI-2016-012 requested the interconnection of twenty-five (25) Caterpillar G3520H Gas Engines and associated facilities interconnecting to the PEC distribution system served from the PEC Centrahoma substation, which connects to SWPA facilities at the Tupelo 138 kV substation in Coal County, Oklahoma.

ASGI-2016-013 requested the interconnection of two (2) Caterpillar G3520H Gas Engines and associated facilities interconnecting to the PEC distribution system served from the PEC Ashland 138 kV substation on the 138 kV WFEC line between Coalgate and Pittsburgh, in Coal County, Oklahoma. Figures 1-3 depict the one-line diagram for the POI and the Interconnection Request(s).

Figure 1: Proposed ASGI-2016-011 Configuration and Request Power Flow Model

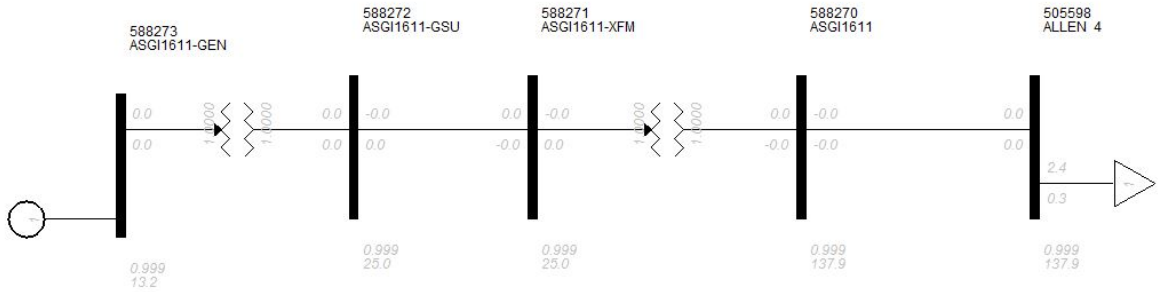


Figure 2: Proposed ASGI-2016-012 Configuration and Request Power Flow Model

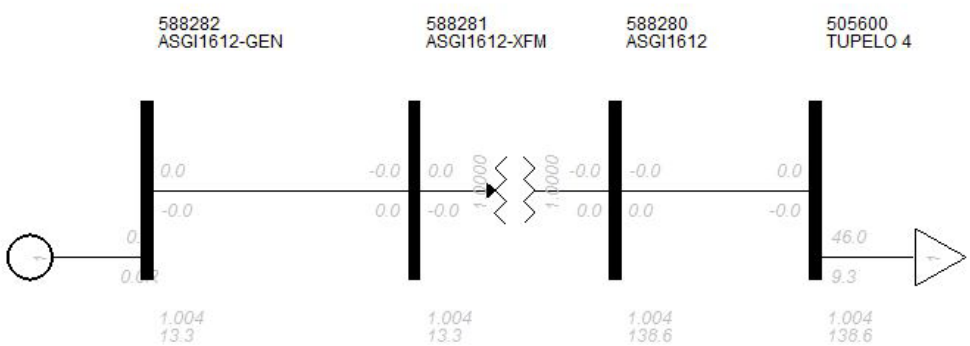
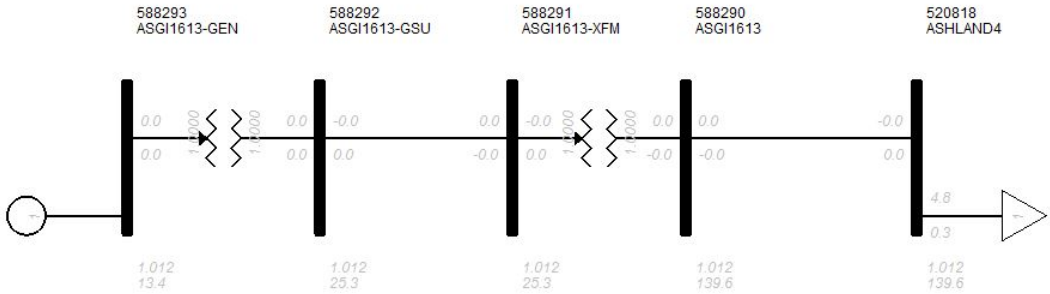


Figure 3: Proposed ASGI-2016-013 Configuration and Request Power Flow Model



BASE CASE NETWORK UPGRADES

The Network Upgrades included within the cases used for this Affected System Impact Study are those facilities that are a part of the SPP Transmission Expansion Plan or the Balanced Portfolio projects. 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 ASIS. 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 2016 ITP Near-Term study models including these seasonal models:

- Year 1 (2016) Winter Peak (16WP)
- Year 2 (2017) Spring (17G)
- Year 2 (2017) Summer Peak (17SP)
- Year 5 (2020) Light (20L)
- Year 5 (2020) Summer (20SP)
- Year 5 (2020) Winter (20WP) peak
- Year 10 (2025) Summer (25SP) 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. MISO 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 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 ASIS, 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

Transmission Owner	Voltage Criteria (System Intact)	Voltage Criteria (Contingency)
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 ASIS ACCC analysis indicates that the Affected System Interconnection Customer(s) can interconnect their generation at the available MW amount listed in the results tables before all required upgrades listed within the DISIS-2016-001 studies or latest iteration can be placed into service. ACCC results for the ASIS can be found in **Table 3**, **Table 4** and **Table 5**.

Table 3 and **Table 4** results are based on the study assumption of system conditions prior to the DISIS-2016-002 identified and assigned Network Upgrades.

Constraints listed in **Table 5** 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 3: Thermal Constraints Requiring Additional Transmission Reinforcements

Dispatch Group	Season	Source	Flow	Monitored Element	RATEA (MVA)	RATEB (MVA)	TDF	TC% LOADING	Max MW Available	Contingency
				Currently, None						

Table 4: Voltage Constraints Requiring Additional Transmission Reinforcements

Dispatch Group	Season	Source	Flow	Monitored Element	RATEA (MVA)	RATEB (MVA)	TDF	TC% LOADING	Max MW Available	Contingency
				Currently, None						

Table 5: Constraints that do not require additional Transmission Reinforcements

Dispatch Group	Season	Source	Flow	Monitored Element	RATEA (MVA)	RATEB (MVA)	TDF	TC% LOADING	Contingency
				Currently, None					

STABILITY ANALYSIS

Transient stability analysis is used to determine if the transmission system can maintain angular stability and ensure bus voltages stay within planning criteria bandwidth during and after a disturbance while considering the addition of a generator interconnection request.

MODEL PREPARATION

Transient stability analysis was performed using modified versions of the 2015 series of Model Development Working Group (MDWG) dynamic study models including the 2016 winter, 2017 and 2025 summer peak dynamic cases. The cases were adapted to resemble the power flow study cases with regards to prior queued generation requests and topology. Finally the prior queued and study generation was dispatched into the SPP footprint. Initial simulations are then carried out for a no-disturbance run of twenty (20) seconds to verify the numerical stability of the model.

DISTURBANCES

Forty-nine (49) contingencies were identified for use in this ASIS. These faults are listed within **Table 6**. These contingencies included three-phase faults and single-phase line faults at locations defined by SPP. Single-phase line faults were simulated by applying fault impedance to the positive sequence network at the fault location to represent the effect of the negative and zero sequence networks on the positive sequence network. The fault impedance was computed to give a positive sequence voltage at the specified fault location of approximately 60% of pre-fault voltage. This method is in agreement with SPP current practice.

With the exception of transformers, the typical sequence of events for a three-phase and single-phase fault is as follows:

1. apply fault at particular location
2. continue fault for five (5) cycles, clear the fault by tripping the faulted facility
3. run for an additional twenty (20) cycles, reclose into fault
4. continue fault for five (5) cycles, clear the fault by tripping the faulted facility

Transformer faults are typically modeled as three-phase faults, unless otherwise noted. The sequence of events for a transformer fault is as follows:

1. apply fault for five (5) cycles
2. clear the fault by tripping the affected transformer facility (unless otherwise noted there will be no re-closing into a transformer fault)

Table 6: Contingencies Evaluated

Contingency Number and Name		Description
1	FLT_01_TUPELO4_ALLEN4_138kV_3PH	3PH Fault on the Tupelo (505600) to Allen (505598) 138kV line, near Tupelo. a. Apply fault at the Tupelo 138kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.

Table 6: Contingencies Evaluated

Contingency Number and Name		Description
2	FLT_02_TUPELO4_SBROWN4_138kV_3PH	3PH Fault on the Tupelo (505600) to South Brown (505602) 138kV line, near Tupelo. a. Apply fault at the Tupelo 138kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
3	FLT_03_TUPELO4_ATKWEST4_138kV_3PH	3PH Fault on the Tupelo (505600) to Atoka West (521188) 138kV line, near Tupelo. a. Apply fault at the Tupelo 138kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
4	FLT_04_TUPELO4_ALLENGT4_138kV_3PH	3PH Fault on the Tupelo (505600) to Allen Natural Gas Tap (510881) 138kV line, near Tupelo. a. Apply fault at the Tupelo 138kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
5	FLT_05_TUPELO4_TUPLOTP4_138kV_3PH	3PH Fault on the Tupelo (505600) to Tupelo Tap (521071) 138kV line, near Tupelo. a. Apply fault at the Tupelo 138kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
6	FLT_06_TUPELO4_TUPELO4_138kV_3PH	3PH Fault on the Tupelo (505600) to WFEC Tupelo(520406) 138kV line, near Tupelo. a. Apply fault at the Tupelo 138kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
7	FLT_07_SBROWN4_KRSYJCTS4_138kV_3PH	3PH Fault on the South Brown (505602) to Kiersey Junction South (521109) 138kV line, near South Brown. a. Apply fault at the South Brown 138kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.

Table 6: Contingencies Evaluated

Contingency Number and Name		Description
8	FLT_08_SBROWN4_DENISON4_138kV_3PH	3PH Fault on the South Brown (505602) to Denison (505604) 138kV line, near South Brown. a. Apply fault at the South Brown 138kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
9	FLT_09_SBROWN4_KRSYJCTN4_138kV_3PH	3PH Fault on the South Brown (505602) to Kiersey Junction North (521108) 138kV line, near South Brown. a. Apply fault at the South Brown 138kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
10	FLT_10_SBROWN4_BROWN4_138kV_3PH	3PH Fault on the South Brown (505602) to Brown (515157) 138kV line, near South Brown. a. Apply fault at the South Brown 138kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
11	FLT_11_SBROWN4_RUSSETT4_138kV_3PH	3PH Fault on the South Brown (505602) to Russett (521044) 138kV line, near South Brown. a. Apply fault at the South Brown 138kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
12	FLT_12_SBROWN4_COLBRTP4_138kV_3PH	3PH Fault on the South Brown (505602) to Colbert Tap (515159) 138kV line, near South Brown. a. Apply fault at the South Brown 138kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
13	FLT_13_COLBRTP4_BUTRFLD4_138kV_3PH	3PH Fault on the Colbert Tap (515159) to Butterfield (515176) 138kV line, near Colbert Tap. a. Apply fault at the Colbert Tap 138kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.

Table 6: Contingencies Evaluated

Contingency Number and Name		Description
14	FLT_14_COLBRTP4_BODLE4_138kV_3PH	3PH Fault on the Colbert Tap (515159) to Bodle (515155) 138kV line, near Colbert Tap. a. Apply fault at the Colbert Tap 138kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
15	FLT_15_COLBERT4_COLBRT4_138kV_3PH	3PH Fault on the Colbert (520860) to OKGE Colbert (515193) 138kV line, near Colbert. a. Apply fault at the Colbert 138kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
16	FLT_16_COLBERT4_KIERSEY4_138kV_3PH	3PH Fault on the Colbert (520860) to Kiersey (520963) 138kV line, near Colbert. a. Apply fault at the Colbert 138kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
17	FLT_17_COLBERT4_SEAWAY4_138kV_3PH	3PH Fault on the Colbert (520860) to Seaway (520426) 138kV line, near Colbert. a. Apply fault at the Colbert 138kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
18	FLT_18_DURANT4_BENNGTN4_138kV_3PH	3PH Fault on the Durant (520884) to Bennington (520826) 138kV line, near Durant. a. Apply fault at the Durant 138kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
19	FLT_19_DURANT4_SCOLEMN4_138kV_3PH	3PH Fault on the Durant (520884) to South Coleman (521049) 138kV line, near Durant. a. Apply fault at the Durant 138kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.

Table 6: Contingencies Evaluated

Contingency Number and Name		Description
20	FLT_20_RUSSET4_RUSSETT4_138kV_3PH	3PH Fault on the OKGE Russett (515120) to Russett (521044) 138kV line, near OKGE Russett. a. Apply fault at the OKGE Russett 138kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
21	FLT_21_RUSSET4_JOHNCO4_138kV_3PH	3PH Fault on the OKGE Russett (515120) to Johnson County (514808) 138kV line, near OKGE Russett. a. Apply fault at the OKGE Russett 138kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
22	FLT_22_RUSSET4_GLASSES4_138kV_3PH	3PH Fault on the OKGE Russett (515120) to Glasses Madill (515147) 138kV line, near OKGE Russett. a. Apply fault at the OKGE Russett 138kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
23	FLT_23_RUSSET4_SPRNDAL4_138kV_3PH	3PH Fault on the OKGE Russett (515120) to Springdale (515172) 138kV line, near OKGE Russett. a. Apply fault at the OKGE Russett 138kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
24	FLT_24_ALLEN4_EXPLOR4_138kV_3PH	3PH Fault on the Allen (505598) to Explorer (505596) 138kV line, near Allen. a. Apply fault at the Allen 138kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
25	FLT_25_EXPLOR4_GREASYC4_138kV_3PH	3PH Fault on the Explorer (505596) to Greasy Creek (505595) 138kV line, near Explorer. a. Apply fault at the Explorer 138kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.

Table 6: Contingencies Evaluated

Contingency Number and Name		Description
26	FLT_26_GREASYC4_WELEETKA4_138kV_3PH	3PH Fault on the Greasy Creek (505595) to Weleetka (505592) 138kV line, near Greasy Creek. a. Apply fault at the Greasy Creek 138kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
27	FLT_27_WELEETKA4_CHECOTA4_138kV_3PH	3PH Fault on the Weleetka (505592) to Checota (505594) 138kV line, near Weleetka. a. Apply fault at the Weleetka 138kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
28	FLT_28_WELEETKA4_WELETK4_138kV_3PH	3PH Fault on the Weleetka (505592) to AEP Weleetka (510902) 138kV line, near Weleetka. a. Apply fault at the Weleetka 138kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
29	FLT_29_WELEETKA4_WELEETK5_138_161kV_1PH	3PH Fault on the Weleetka (505592) 138kV to (505590) 69kV to (505591) 13.8kV transformer circuit 1, near Weleetka 138kV. a. Apply fault at the Weleetka 138kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
30	FLT_30_WELETK4_FIXCT4_138kV_3PH	3PH Fault on the Weleetka (505592) to Fixico Tap (510877) 138kV line, near Weleetka. a. Apply fault at the Weleetka 138kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
31	FLT_31_WELETK4_DUSTIN4_138kV_3PH	3PH Fault on the Weleetka (505592) to Dustin (510921) 138kV line, near Weleetka. a. Apply fault at the Weleetka 138kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
32	FLT_32_WELETK4_HENRYET4_138kV_3PH	3PH Fault on the Weleetka (505592) to Henryetta (510892) 138kV line, near Weleetka. a. Apply fault at the Weleetka 138kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.

Table 6: Contingencies Evaluated

Contingency Number and Name		Description
33	FLT_33_WELETK4_ECHEN4_138kV_3PH	3PH Fault on the Weleetka (505592) to EC.Hen (510923) 138kV line, near Weleetka. a. Apply fault at the Weleetka 138kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
34	FLT_34_WELETK4_WELEETK2_138_69kV_1PH	3PH Fault on the Weleetka (505592) 138kV to (510903) 69kV to (510941) 13.8kV transformer circuit 2, near Weleetka 138kV. a. Apply fault at the Weleetka 138kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.
35	FLT_35_ASHLAND4_COLGATE4_138kV_3PH	3PH Fault on the Ashland (520818) to Colgate (520862) 138kV line, near Ashland. a. Apply fault at the Ashland 138kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
36	FLT_36_ASHLAND4_PITTSBG4_138kV_3PH	3PH Fault on the Ashland (520818) to Pittsburg (521030) 138kV line, near Ashland. a. Apply fault at the Ashland 138kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
37	FLT_37_COLGATE4_TUPELO4_138kV_3PH	3PH Fault on the Colgate (520862) to Tupelo (505600) 138kV line, near Colgate. a. Apply fault at the Colgate 138kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
38	FLT_38_SAVANNA4_PITTSBG4_138kV_3PH	3PH Fault on the Savanna (521047) to Pittsburg (521030) 138kV line, near Ashland. a. Apply fault at the Ashland 138kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
39	FLT_39_SAVANNA4_HARTSHN4_138kV_3PH	3PH Fault on the Savanna (521047) to Hartshorne (520934) 138kV line, near Ashland. a. Apply fault at the Ashland 138kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.

Table 6: Contingencies Evaluated

Contingency Number and Name		Description
40	FLT_40_HARTSHN4_LONEOAK4_138kV_3PH	3PH Fault on the Hartshorne (520934) to Lone Oak (510897) 138kV line, near Hartshorne. a. Apply fault at the Hartshorne 138kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
41	FLT_41_HARTSHN4_MANNING4_138kV_3PH	3PH Fault on the Hartshorne (520934) to Manning (520896) 138kV line, near Hartshorne. a. Apply fault at the Hartshorne 138kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
42	FLT_42_LONEOAK4_SMCALTP4_138kV_3PH	3PH Fault on the Lone Oak (510897) to South McAlester Tap (510906) 138kV line, near Lone Oak. a. Apply fault at the Lone Oak 138kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
43	FLT_43_LONEOAK4_MCALEST4_138kV_3PH	3PH Fault on the Lone Oak (510897) to McAlester (510908) 138kV line, near Lone Oak. a. Apply fault at the Lone Oak 138kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
44	FLT_44_LONEOAK4_ENOWILT4_138kV_3PH	3PH Fault on the Lone Oak (510897) to Enogex Wilburton Tap (510944) 138kV line, near Lone Oak. a. Apply fault at the Lone Oak 138kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
45	FLT_45_LONEOAK4_CARBON4_138kV_3PH	3PH Fault on the Lone Oak (510897) to Carbon (520844) 138kV line, near Lone Oak. a. Apply fault at the Lone Oak 138kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
46	FLT_46_LONEOAK4_LONEOAK2_138_69kV_1PH	3PH Fault on the Lone Oak (510897) 138kV to (510896) 69kV to (510940) 13.8kV transformer circuit 1, near Lone Oak 138kV. a. Apply fault at the Lone Oak 138kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.

Table 6: Contingencies Evaluated

Contingency Number and Name		Description
47	FLT_47_WELETK4_PHAROAH4_138kV_3PH	3PH Fault on the Weleetka (505592) to Pharoah SW (510026) 138kV line, near Weleetka. a. Apply fault at the Weleetka 138kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
48	FLT_48_GREASYC4_EXPLOR4SB_138kV_1PH	**SLG Fault with stuck breaker** on the Greasy Creek (505595) to Explorer (505596) 138kV line, near Greasy Creek. a. Apply single line to ground at the Greasy Creek 138kV bus. b. Clear fault after 16 cycles by tripping the faulted line and the Greasy Creek (505595) bus as well as Explorer bus (505596).
49	FLT_49_SBROWN4_DENISON4SB_138kV_1PH	**SLG Fault with stuck breaker** on the South Brown (505602) to Denison (505604) 138kV line, near South Brown. a. Apply single line to ground fault at the South Brown 138kV bus. b. Clear fault after 16 cycles by tripping the faulted line and the South Brown bus (505602).

RESULTS

Initial stability simulations showed angle instabilities for ASGI-2016-011, ASGI-2016-012, and ASGI-2016-013 for contingencies at the Tupelo substation and nearby. It was determined that the generator documentation for these projects provided saturated reactances, rather than unsaturated reactances, which are required for the PSSE generator model. After correcting the reactances in the PSSE generator model, the simulation was repeated. The project generators as well as all the monitored synchronous generators exhibited no angular instabilities for the contingencies simulated.

Results of the stability analysis are summarized in **Table 7**. These results are valid for ASGI-2016-011, ASGI-2016-012, and ASGI-2016-013, with generation amounts up to 7.4, 61.7, and 4.9 MW, respectively.

Table 7: Fault Analysis Results

Contingency Number and Name		2016WP	2017SP	2025SP
1	FLT_01_TUPELO4_ALLEN4_138kV_3PH	Stable	Stable	Stable
2	FLT_02_TUPELO4_SBROWN4_138kV_3PH	Stable	Stable	Stable
3	FLT_03_TUPELO4_ATKWEST4_138kV_3PH	Stable	Stable	Stable
4	FLT_04_TUPELO4_ALLENGT4_138kV_3PH	Stable	Stable	Stable
5	FLT_05_TUPELO4_TUPLOTP4_138kV_3PH	Stable	Stable	Stable
6	FLT_06_TUPELO4_TUPELO4_138kV_3PH	Stable	Stable	Stable
7	FLT_07_SBROWN4_KRSYJCTS4_138kV_3PH	Stable	Stable	Stable
8	FLT_08_SBROWN4_DENISON4_138kV_3PH	Stable	Stable	Stable
9	FLT_09_SBROWN4_KRSYJCTN4_138kV_3PH	Stable	Stable	Stable
10	FLT_10_SBROWN4_BROWN4_138kV_3PH	Stable	Stable	Stable
11	FLT_11_SBROWN4_RUSSETT4_138kV_3PH	Stable	Stable	Stable
12	FLT_12_SBROWN4_COLBRTP4_138kV_3PH	Stable	Stable	Stable
13	FLT_13_COLBRTP4_BUTRFLD4_138kV_3PH	Stable	Stable	Stable

Table 7: Fault Analysis Results

Contingency Number and Name		2016WP	2017SP	2025SP
14	FLT_14_COLBRTP4_BODLE4_138kV_3PH	Stable	Stable	Stable
15	FLT_15_COLBERT4_COLBRT4_138kV_3PH	Stable	Stable	Stable
16	FLT_16_COLBERT4_KIERSEY4_138kV_3PH	Stable	Stable	Stable
17	FLT_17_COLBERT4_SEAWAY4_138kV_3PH	Stable	Stable	Stable
18	FLT_18_DURANT4_BENNGTN4_138kV_3PH	Stable	Stable	Stable
19	FLT_19_DURANT4_SCOLEMN4_138kV_3PH	Stable	Stable	Stable
20	FLT_20_RUSSET4_RUSSETT4_138kV_3PH	Stable	Stable	Stable
21	FLT_21_RUSSET4_JOHNCO4_138kV_3PH	Stable	Stable	Stable
22	FLT_22_RUSSET4_GLASSES4_138kV_3PH	Stable	Stable	Stable
23	FLT_23_RUSSET4_SPRNDAL4_138kV_3PH	Stable	Stable	Stable
24	FLT_24_ALLEN4_EXPLOR4_138kV_3PH	Stable	Stable	Stable
25	FLT_25_EXPLOR4_GREASYC4_138kV_3PH	Stable	Stable	Stable
26	FLT_26_GREASYC4_WELEETKA4_138kV_3PH	Stable	Stable	Stable
27	FLT_27_WELEETKA4_CHECOTA4_138kV_3PH	Stable	Stable	Stable
28	FLT_28_WELEETKA4_WELETK4_138kV_3PH	Stable	Stable	Stable
29	FLT_29_WELEETKA4_WELEETK5_138_161kV_1PH	Stable	Stable	Stable
30	FLT_30_WELETK4_FIXCT4_138kV_3PH	Stable	Stable	Stable
31	FLT_31_WELETK4_DUSTIN4_138kV_3PH	Stable	Stable	Stable
32	FLT_32_WELETK4_HENRYET4_138kV_3PH	Stable	Stable	Stable
33	FLT_33_WELETK4_ECHEN4_138kV_3PH	Stable	Stable	Stable
34	FLT_34_WELETK4_WELEETK2_138_69kV_1PH	Stable	Stable	Stable
35	FLT_35_ASHLAND4_COLGATE4_138kV_3PH	Stable	Stable	Stable
36	FLT_36_ASHLAND4_PITTSBG4_138kV_3PH	Stable	Stable	Stable
37	FLT_37_COLGATE4_TUPELO4_138kV_3PH	Stable	Stable	Stable
38	FLT_38_SAVANNA4_PITTSBG4_138kV_3PH	Stable	Stable	Stable
39	FLT_39_SAVANNA4_HARTSHN4_138kV_3PH	Stable	Stable	Stable
40	FLT_40_HARTSHN4_LONEOAK4_138kV_3PH	Stable	Stable	Stable
41	FLT_41_HARTSHN4_MANNING4_138kV_3PH	Stable	Stable	Stable
42	FLT_42_LONEOAK4_SMCALTP4_138kV_3PH	Stable	Stable	Stable
43	FLT_43_LONEOAK4_MCALEST4_138kV_3PH	Stable	Stable	Stable
44	FLT_44_LONEOAK4_ENOWILT4_138kV_3PH	Stable	Stable	Stable
45	FLT_45_LONEOAK4_CARBON4_138kV_3PH	Stable	Stable	Stable
46	FLT_46_LONEOAK4_LONEOAK2_138_69kV_1PH	Stable	Stable	Stable
47	FLT_47_WELETK4_PHAROAH4_138kV_3PH	Stable	Stable	Stable
48	FLT_48_GREASYC4_EXPLOR4SB_138kV_1PH	Stable	Stable	Stable
49	FLT_49_SBROWN4_DENISON4SB_138kV_1PH	Stable	Stable	Stable

SHORT CIRCUIT ANALYSIS

A short circuit analysis was performed on the 2017 Summer Peak and 2025 Summer Peak power flow case using the PSS/E ASCC program. Since the power flow model does not contain negative and zero sequence data, only three-phase symmetrical fault current levels were calculated at the point of interconnection up to and including five levels away. The results of the short circuit analysis are shown below.

ASGI-2016-011_17SP

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                          PSS®E-32.2.0 ASCC SHORT CIRCUIT CURRENTS           THU, JUN 15 2017
10:32
2015 MDWG FINAL WITH 2013 MMWG, UPDATED WITH 2014 SERC & MRO
MDWG 17S WITH MMWG 15S, MRO 16W TOPO/16S PROF, SERC 16S

OPTIONS USED:
    - FLAT CONDITIONS
         - BUS VOLTAGES SET TO 1 PU AT 0 PHASE ANGLE
         - GENERATOR P=0, Q=0
         - TRANSFOMRER TAP RATIOS=1.0 PU and PHASE ANGLES=0.0
         - LINE CHARGING=0.0 IN +/-/0 SEQUENCE
         - LOAD=0.0 IN +/- SEQUENCE, CONSIDERED IN ZERO SEQUENCE
         - LINE/FIXED/SWITCHED SHUNTS=0.0 AND MAGNETIZING ADMITTANCE=0.0 IN +/-/0 SEQUENCE
         - DC LINES AND FACTS DEVICES BLOCKED
         - TRANSFORMER ZERO SEQUENCE IMPEDANCE CORRECTIONS IGNORED

                                  THREE PHASE FAULT
X---------- BUS ----------X          /I+/    AN(I+)
505598 [ALLEN  4    138.00] AMP     5477.7   -76.43
505596 [EXPLOR 4    138.00] AMP     5414.0   -76.12
505600 [TUPELO 4    138.00] AMP    10654.9   -79.04
510916 [ALLEN--4    138.00] AMP     5470.3   -76.43
588270 [ASGI1611    138.00] AMP     4158.6   -77.16
505595 [GREASYC4    138.00] AMP     6880.1   -76.47
505602 [S BROWN4    138.00] AMP     8061.5   -77.45
510881 [ALLENGT4    138.00] AMP    10312.2   -78.88
510884 [HOLDEXP4    138.00] AMP     5287.4   -76.01
520406 [TUPELO4     138.00] AMP     9719.7   -79.20
521071 [TUPLOTP4    138.00] AMP    10367.6   -78.88
521188 [ATKWEST4    138.00] AMP     5189.0   -80.78
585330 [ASGI-2015-00138.00] AMP     4686.3   -80.23
588280 [ASGI1612    138.00] AMP     5869.8   -79.98
505592 [WELEETK4    138.00] AMP    14161.1   -78.74
505604 [DENISON4    138.00] AMP     3068.7   -75.83
510880 [COALGTP4    138.00] AMP     6081.8   -77.55
510887 [ATOKA--4    138.00] AMP     5796.6   -79.47
510935 [EXPCOLT4    138.00] AMP     7515.2   -77.69
515157 [BROWN  4    138.00] AMP     8021.4   -77.39
515159 [COLBRTP4    138.00] AMP     6141.1   -76.06
515192 [LULA   4    138.00] AMP     9192.9   -79.26
520862 [COLGATE4    138.00] AMP     5998.2   -79.87
521044 [RUSSETT4    138.00] AMP    10861.7   -77.84
521075 [STONEWAL  LH138.00] AMP     8615.8   -77.90
521108 [KRSYJCTN4   138.00] AMP     7709.4   -77.95
521109 [KRSYJCTS4   138.00] AMP     7494.8   -77.63
505590 [WELEETK5    161.00] AMP     6173.2   -82.13
505594 [CHECOTA4    138.00] AMP     6256.4   -77.07
510862 [COALGAT4    138.00] AMP     5860.2   -77.44
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510863 [ALLENNG4    138.00] AMP     5568.7   -76.85
510882 [ATOKA--2    69.000] AMP     3997.4   -77.93
510895 [LEHIGH-4    138.00] AMP     5689.6   -77.93
510902 [WELETK4     138.00] AMP    13900.1   -78.63
510936 [EXPCOLG4    138.00] AMP     7412.9   -77.64
510949 [WAPANUCKA  4138.00] AMP     5806.1   -79.67
515120 [RUSSET-4    138.00] AMP    10928.6   -77.86
515153 [COLEMNT4    138.00] AMP     7998.5   -77.39
515155 [BODLE  4    138.00] AMP     6036.1   -75.61
515176 [BUTRFLD4    138.00] AMP     5567.2   -75.87
515191 [LULA   2    69.000] AMP     5939.7   -81.20
515500 [FRISCCO4    138.00] AMP     7968.9   -79.97
520818 [ASHLAND4    138.00] AMP     4664.9   -80.22
520963 [KIERSEY4    138.00] AMP     5404.2   -75.29
520969 [LASALLE4    138.00] AMP     6472.8   -76.69
521026 [PHAROAH4    138.00] AMP    13918.0   -78.81
521049 [SCOLEMN4    138.00] AMP     6975.9   -78.99
521187 [ATKEAST4    138.00] AMP     5098.5   -80.94
587200 [GEN-2016-030138.00] AMP     5846.9   -78.11
300686 [4WOODY      138.00] AMP     7307.0   -79.20
300895 [2CHECOTA    69.000] AMP     5392.2   -77.57
505552 [GORE   5    161.00] AMP    11262.9   -79.93
505574 [EUFAULA4    138.00] AMP     8682.8   -80.40
510877 [FIXCT4      138.00] AMP     7030.6   -71.70
510879 [ATOKA P2    69.000] AMP     3426.3   -74.37
510891 [LANE   2    69.000] AMP     2765.2   -68.59
510892 [HENRYET4    138.00] AMP     8315.1   -81.39
510903 [WELEETK2    69.000] AMP    10180.2   -83.25
510921 [DUSTIN-4    138.00] AMP     8497.1   -81.31
510923 [EC.HEN-4    138.00] AMP     8386.5   -77.18
514808 [JOHNCO 4    138.00] AMP    14513.4   -82.93
515147 [GLASSES4    138.00] AMP     7917.3   -75.47
515152 [BROWNTP4    138.00] AMP     7951.5   -77.33
515154 [EXPLRPL4    138.00] AMP     4403.6   -76.30
515172 [SPRNDAL4    138.00] AMP    11030.4   -78.06
515190 [AOCPT  2    69.000] AMP     5640.5   -74.87
515193 [COLBRT-4    138.00] AMP     4728.7   -75.16
515362 [HARDEN 4    138.00] AMP     8101.9   -80.15
515511 [SOCPMPT2    69.000] AMP     5600.3   -80.79
520860 [COLBERT4    138.00] AMP     4722.8   -75.08
520884 [DURANT 4    138.00] AMP     5385.8   -81.43
520886 [DUSTIN 4    138.00] AMP     7075.6   -79.65
520968 [LANE   4    138.00] AMP     4828.6   -81.59
520971 [LATTAJT4    138.00] AMP     5517.0   -76.13
521030 [PITTSBG4    138.00] AMP     4406.6   -80.33
521084 [WETUMKA4    138.00] AMP     8383.8   -80.72
588290 [ASGI1613    138.00] AMP     4664.9   -80.22
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ASGI-2016-011_25SP

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              PSS®E-32.2.0 ASCC SHORT CIRCUIT CURRENTS          THU, JUN 15 2017  10:32
2015 MDWG FINAL WITH 2013 MMWG, UPDATED WITH 2014 SERC & MRO
MDWG 2025S WITH MMWG 2024S, MRO & SERC 2025 SUMMER

OPTIONS USED:
    - FLAT CONDITIONS
         - BUS VOLTAGES SET TO 1 PU AT 0 PHASE ANGLE
         - GENERATOR P=0, Q=0
         - TRANSFOMRER TAP RATIOS=1.0 PU and PHASE ANGLES=0.0
         - LINE CHARGING=0.0 IN +/-/0 SEQUENCE
         - LOAD=0.0 IN +/- SEQUENCE, CONSIDERED IN ZERO SEQUENCE
         - LINE/FIXED/SWITCHED SHUNTS=0.0 AND MAGNETIZING ADMITTANCE=0.0 IN +/-/0 SEQUENCE
         - DC LINES AND FACTS DEVICES BLOCKED
         - TRANSFORMER ZERO SEQUENCE IMPEDANCE CORRECTIONS IGNORED

                                   THREE PHASE FAULT
X---------- BUS ----------X          /I+/    AN(I+)
505598 [ALLEN  4    138.00] AMP     5543.0   -76.48
505596 [EXPLOR 4    138.00] AMP     5538.7   -76.24
505600 [TUPELO 4    138.00] AMP    10721.6   -79.04
510916 [ALLEN--4    138.00] AMP     5535.4   -76.48
588270 [ASGI1611    138.00] AMP     4195.6   -77.20
505595 [GREASYC4    138.00] AMP     7183.0   -76.76
505602 [S BROWN4    138.00] AMP     8074.3   -77.43
510881 [ALLENGT4    138.00] AMP    10374.4   -78.88
510884 [HOLDEXP4    138.00] AMP     5406.3   -76.13
520406 [TUPELO4     138.00] AMP     9776.4   -79.20
521071 [TUPLOTP4    138.00] AMP    10427.0   -78.87
521188 [ATKWEST4    138.00] AMP     5200.9   -80.78
585330 [ASGI-2015-00138.00] AMP     4699.2   -80.23
588280 [ASGI1612    138.00] AMP     5887.2   -79.97
505592 [WELEETK4    138.00] AMP    16081.9   -80.03
505604 [DENISON4    138.00] AMP     3070.6   -75.83
510880 [COALGTP4    138.00] AMP     6100.4   -77.54
510887 [ATOKA--4    138.00] AMP     5810.7   -79.47
510935 [EXPCOLT4    138.00] AMP     7548.2   -77.68
515157 [BROWN  4    138.00] AMP     8034.1   -77.38
515159 [COLBRTP4    138.00] AMP     6148.5   -76.04
515192 [LULA   4    138.00] AMP     9233.0   -79.26
520862 [COLGATE4    138.00] AMP     6023.9   -79.89
521044 [RUSSETT4    138.00] AMP    10881.1   -77.82
521075 [STONEWAL  LH138.00] AMP     8656.0   -77.89
521108 [KRSYJCTN4   138.00] AMP     7720.9   -77.94
521109 [KRSYJCTS4   138.00] AMP     7505.9   -77.62
505590 [WELEETK5    161.00] AMP     6448.0   -82.87
505594 [CHECOTA4    138.00] AMP     6180.2   -77.04
510862 [COALGAT4    138.00] AMP     5877.4   -77.43
510863 [ALLENNG4    138.00] AMP     5586.7   -76.84
510882 [ATOKA--2    69.000] AMP     4001.0   -77.93
510895 [LEHIGH-4    138.00] AMP     5704.8   -77.92
510902 [WELETK4     138.00] AMP    16758.3   -80.45
510936 [EXPCOLG4    138.00] AMP     7445.0   -77.63
510949 [WAPANUCKA  4138.00] AMP     5824.3   -79.67
515120 [RUSSET-4    138.00] AMP    10948.2   -77.85
515153 [COLEMNT4    138.00] AMP     8011.1   -77.37
515155 [BODLE  4    138.00] AMP     6043.3   -75.60
515176 [BUTRFLD4    138.00] AMP     5573.2   -75.86
515191 [LULA   2    69.000] AMP     5945.9   -81.20
515500 [FRISCCO4    138.00] AMP     7990.5   -79.96
520818 [ASHLAND4    138.00] AMP     4684.1   -80.25
520963 [KIERSEY4    138.00] AMP     5409.9   -75.28
520969 [LASALLE4    138.00] AMP     6494.9   -76.67
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521026 [PHAROAH4    138.00] AMP    15721.9   -80.05
521049 [SCOLEMN4    138.00] AMP     6984.9   -78.98
521187 [ATKEAST4    138.00] AMP     5107.8   -80.94
587200 [GEN-2016-030138.00] AMP     5853.6   -78.10
300686 [4WOODY      138.00] AMP     7568.6   -79.58
300895 [2CHECOTA    69.000] AMP     5367.3   -77.55
505552 [GORE   5    161.00] AMP    11096.1   -79.97
505574 [EUFAULA4    138.00] AMP     8288.5   -80.07
510877 [FIXCT4      138.00] AMP     7132.7   -71.59
510879 [ATOKA P2    69.000] AMP     3429.2   -74.37
510891 [LANE   2    69.000] AMP     2766.5   -68.58
510892 [HENRYET4    138.00] AMP     8885.2   -82.11
510903 [WELEETK2    69.000] AMP    10768.1   -84.19
510921 [DUSTIN-4    138.00] AMP     9221.8   -82.30
510923 [EC.HEN-4    138.00] AMP     8997.7   -77.62
514808 [JOHNCO 4    138.00] AMP    14543.9   -82.92
515147 [GLASSES4    138.00] AMP     7929.2   -75.46
515152 [BROWNTP4    138.00] AMP     7963.9   -77.31
515154 [EXPLRPL4    138.00] AMP     4407.4   -76.29
515172 [SPRNDAL4    138.00] AMP    11047.1   -78.04
515190 [AOCPT  2    69.000] AMP     5644.5   -74.86
515193 [COLBRT-4    138.00] AMP     4733.0   -75.15
515362 [HARDEN 4    138.00] AMP     8121.3   -80.14
515511 [SOCPMPT2    69.000] AMP     5605.8   -80.79
520860 [COLBERT4    138.00] AMP     4727.1   -75.07
520884 [DURANT 4    138.00] AMP     5390.1   -81.42
520886 [DUSTIN 4    138.00] AMP     7439.4   -80.19
520968 [LANE   4    138.00] AMP     4836.0   -81.59
520971 [LATTAJT4    138.00] AMP     5533.2   -76.11
521030 [PITTSBG4    138.00] AMP     4428.0   -80.37
521084 [WETUMKA4    138.00] AMP     8911.7   -81.44
588290 [ASGI1613    138.00] AMP     4684.1   -80.25
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ASGI-2016-012_17SP

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                              PSS®E-32.2.0 ASCC SHORT CIRCUIT CURRENTS           WED, JUN 14 2017
15:55
2015 MDWG FINAL WITH 2013 MMWG, UPDATED WITH 2014 SERC & MRO
MDWG 17S WITH MMWG 15S, MRO 16W TOPO/16S PROF, SERC 16S

OPTIONS USED:
    - FLAT CONDITIONS
         - BUS VOLTAGES SET TO 1 PU AT 0 PHASE ANGLE
         - GENERATOR P=0, Q=0
         - TRANSFOMRER TAP RATIOS=1.0 PU and PHASE ANGLES=0.0
         - LINE CHARGING=0.0 IN +/-/0 SEQUENCE
         - LOAD=0.0 IN +/- SEQUENCE, CONSIDERED IN ZERO SEQUENCE
         - LINE/FIXED/SWITCHED SHUNTS=0.0 AND MAGNETIZING ADMITTANCE=0.0 IN +/-/0 SEQUENCE
         - DC LINES AND FACTS DEVICES BLOCKED
         - TRANSFORMER ZERO SEQUENCE IMPEDANCE CORRECTIONS IGNORED

                                     THREE PHASE FAULT
X---------- BUS ----------X          /I+/    AN(I+)
505600 [TUPELO 4    138.00] AMP    10654.9   -79.04
505598 [ALLEN  4    138.00] AMP     5477.7   -76.43
505602 [S BROWN4    138.00] AMP     8061.5   -77.45
510881 [ALLENGT4    138.00] AMP    10312.2   -78.88
520406 [TUPELO4     138.00] AMP     9719.7   -79.20
521071 [TUPLOTP4    138.00] AMP    10367.6   -78.88
521188 [ATKWEST4    138.00] AMP     5189.0   -80.78
585330 [ASGI-2015-00138.00] AMP     4686.3   -80.23
588280 [ASGI1612    138.00] AMP     5869.8   -79.98
505596 [EXPLOR 4    138.00] AMP     5414.0   -76.12
505604 [DENISON4    138.00] AMP     3068.7   -75.83
510880 [COALGTP4    138.00] AMP     6081.8   -77.55
510887 [ATOKA--4    138.00] AMP     5796.6   -79.47
510916 [ALLEN--4    138.00] AMP     5470.3   -76.43
510935 [EXPCOLT4    138.00] AMP     7515.2   -77.69
515157 [BROWN  4    138.00] AMP     8021.4   -77.39
515159 [COLBRTP4    138.00] AMP     6141.1   -76.06
515192 [LULA   4    138.00] AMP     9192.9   -79.26
520862 [COLGATE4    138.00] AMP     5998.2   -79.87
521044 [RUSSETT4    138.00] AMP    10861.7   -77.84
521075 [STONEWAL  LH138.00] AMP     8615.8   -77.90
521108 [KRSYJCTN4   138.00] AMP     7709.4   -77.95
521109 [KRSYJCTS4   138.00] AMP     7494.8   -77.63
588270 [ASGI1611    138.00] AMP     4158.6   -77.16
505595 [GREASYC4    138.00] AMP     6880.1   -76.47
510862 [COALGAT4    138.00] AMP     5860.2   -77.44
510863 [ALLENNG4    138.00] AMP     5568.7   -76.85
510882 [ATOKA--2    69.000] AMP     3997.4   -77.93
510884 [HOLDEXP4    138.00] AMP     5287.4   -76.01
510895 [LEHIGH-4    138.00] AMP     5689.6   -77.93
510936 [EXPCOLG4    138.00] AMP     7412.9   -77.64
510949 [WAPANUCKA  4138.00] AMP     5806.1   -79.67
515120 [RUSSET-4    138.00] AMP    10928.6   -77.86
515153 [COLEMNT4    138.00] AMP     7998.5   -77.39
515155 [BODLE  4    138.00] AMP     6036.1   -75.61
515176 [BUTRFLD4    138.00] AMP     5567.2   -75.87
515191 [LULA   2    69.000] AMP     5939.7   -81.20
515500 [FRISCCO4    138.00] AMP     7968.9   -79.97
520818 [ASHLAND4    138.00] AMP     4664.9   -80.22
520963 [KIERSEY4    138.00] AMP     5404.2   -75.29
520969 [LASALLE4    138.00] AMP     6472.8   -76.69
521049 [SCOLEMN4    138.00] AMP     6975.9   -78.99
521187 [ATKEAST4    138.00] AMP     5098.5   -80.94
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587200 [GEN-2016-030138.00] AMP     5846.9   -78.11
505592 [WELEETK4    138.00] AMP    14161.1   -78.74
510879 [ATOKA P2    69.000] AMP     3426.3   -74.37
510891 [LANE   2    69.000] AMP     2765.2   -68.59
514808 [JOHNCO 4    138.00] AMP    14513.4   -82.93
515147 [GLASSES4    138.00] AMP     7917.3   -75.47
515152 [BROWNTP4    138.00] AMP     7951.5   -77.33
515154 [EXPLRPL4    138.00] AMP     4403.6   -76.30
515172 [SPRNDAL4    138.00] AMP    11030.4   -78.06
515190 [AOCPT  2    69.000] AMP     5640.5   -74.87
515193 [COLBRT-4    138.00] AMP     4728.7   -75.16
515362 [HARDEN 4    138.00] AMP     8101.9   -80.15
515511 [SOCPMPT2    69.000] AMP     5600.3   -80.79
520860 [COLBERT4    138.00] AMP     4722.8   -75.08
520884 [DURANT 4    138.00] AMP     5385.8   -81.43
520968 [LANE   4    138.00] AMP     4828.6   -81.59
520971 [LATTAJT4    138.00] AMP     5517.0   -76.13
521030 [PITTSBG4    138.00] AMP     4406.6   -80.33
588290 [ASGI1613    138.00] AMP     4664.9   -80.22
505590 [WELEETK5    161.00] AMP     6173.2   -82.13
505594 [CHECOTA4    138.00] AMP     6256.4   -77.07
510874 [MCGEETP2    69.000] AMP     2241.0   -64.61
510885 [PITTSB-2    69.000] AMP     2300.6   -63.22
510902 [WELETK4     138.00] AMP    13900.1   -78.63
514809 [JOHNCO 7    345.00] AMP     9294.9   -84.51
515122 [SXMLCKT4    138.00] AMP    10674.3   -79.91
515149 [MADINDT4    138.00] AMP     7908.0   -75.52
515150 [CANEYCK4    138.00] AMP     8350.6   -77.54
515151 [LTLCITY4    138.00] AMP     6972.7   -77.22
515162 [FNDTION4    138.00] AMP    11195.5   -78.34
515164 [ROCKYPT4    138.00] AMP    10023.1   -80.55
515183 [SOCPUMP2    69.000] AMP     5558.4   -80.74
515189 [AOCPA  2    69.000] AMP     6732.1   -77.63
515197 [HOMERTP2    69.000] AMP     5494.4   -74.30
515318 [SOTHADA4    138.00] AMP    11066.3   -80.81
520426 [SEAWAY4     138.00] AMP     3967.0   -75.01
520826 [BENNGTN4    138.00] AMP     4719.7   -83.15
520874 [DARWIN 4    138.00] AMP     4691.3   -83.64
520970 [LATTA  4    138.00] AMP     4564.4   -74.97
521014 [OILCNTR4    138.00] AMP     4994.8   -75.77
521026 [PHAROAH4    138.00] AMP    13918.0   -78.81
521047 [SAVANNA4    138.00] AMP     5062.2   -80.43
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ASGI-2016-012_25SP

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                          PSS®E-32.2.0 ASCC SHORT CIRCUIT CURRENTS          WED, JUN 14 2017
16:08
2015 MDWG FINAL WITH 2013 MMWG, UPDATED WITH 2014 SERC & MRO
MDWG 2025S WITH MMWG 2024S, MRO & SERC 2025 SUMMER

OPTIONS USED:
    - FLAT CONDITIONS
         - BUS VOLTAGES SET TO 1 PU AT 0 PHASE ANGLE
         - GENERATOR P=0, Q=0
         - TRANSFOMRER TAP RATIOS=1.0 PU and PHASE ANGLES=0.0
         - LINE CHARGING=0.0 IN +/-/0 SEQUENCE
         - LOAD=0.0 IN +/- SEQUENCE, CONSIDERED IN ZERO SEQUENCE
         - LINE/FIXED/SWITCHED SHUNTS=0.0 AND MAGNETIZING ADMITTANCE=0.0 IN +/-/0 SEQUENCE
         - DC LINES AND FACTS DEVICES BLOCKED
         - TRANSFORMER ZERO SEQUENCE IMPEDANCE CORRECTIONS IGNORED

                                   THREE PHASE FAULT
X---------- BUS ----------X          /I+/    AN(I+)
505600 [TUPELO 4    138.00] AMP    10721.6   -79.04
505598 [ALLEN  4    138.00] AMP     5543.0   -76.48
505602 [S BROWN4    138.00] AMP     8074.3   -77.43
510881 [ALLENGT4    138.00] AMP    10374.4   -78.88
520406 [TUPELO4     138.00] AMP     9776.4   -79.20
521071 [TUPLOTP4    138.00] AMP    10427.0   -78.87
521188 [ATKWEST4    138.00] AMP     5200.9   -80.78
585330 [ASGI-2015-00138.00] AMP     4699.2   -80.23
588280 [ASGI1612    138.00] AMP     5887.2   -79.97
505596 [EXPLOR 4    138.00] AMP     5538.7   -76.24
505604 [DENISON4    138.00] AMP     3070.6   -75.83
510880 [COALGTP4    138.00] AMP     6100.4   -77.54
510887 [ATOKA--4    138.00] AMP     5810.7   -79.47
510916 [ALLEN--4    138.00] AMP     5535.4   -76.48
510935 [EXPCOLT4    138.00] AMP     7548.2   -77.68
515157 [BROWN  4    138.00] AMP     8034.1   -77.38
515159 [COLBRTP4    138.00] AMP     6148.5   -76.04
515192 [LULA   4    138.00] AMP     9233.0   -79.26
520862 [COLGATE4    138.00] AMP     6023.9   -79.89
521044 [RUSSETT4    138.00] AMP    10881.1   -77.82
521075 [STONEWAL  LH138.00] AMP     8656.0   -77.89
521108 [KRSYJCTN4   138.00] AMP     7720.9   -77.94
521109 [KRSYJCTS4   138.00] AMP     7505.9   -77.62
588270 [ASGI1611    138.00] AMP     4195.6   -77.20
505595 [GREASYC4    138.00] AMP     7183.0   -76.76
510862 [COALGAT4    138.00] AMP     5877.4   -77.43
510863 [ALLENNG4    138.00] AMP     5586.7   -76.84
510882 [ATOKA--2    69.000] AMP     4001.0   -77.93
510884 [HOLDEXP4    138.00] AMP     5406.3   -76.13
510895 [LEHIGH-4    138.00] AMP     5704.8   -77.92
510936 [EXPCOLG4    138.00] AMP     7445.0   -77.63
510949 [WAPANUCKA  4138.00] AMP     5824.3   -79.67
515120 [RUSSET-4    138.00] AMP    10948.2   -77.85
515153 [COLEMNT4    138.00] AMP     8011.1   -77.37
515155 [BODLE  4    138.00] AMP     6043.3   -75.60
515176 [BUTRFLD4    138.00] AMP     5573.2   -75.86
515191 [LULA   2    69.000] AMP     5945.9   -81.20
515500 [FRISCCO4    138.00] AMP     7990.5   -79.96
520818 [ASHLAND4    138.00] AMP     4684.1   -80.25
520963 [KIERSEY4    138.00] AMP     5409.9   -75.28
520969 [LASALLE4    138.00] AMP     6494.9   -76.67
521049 [SCOLEMN4    138.00] AMP     6984.9   -78.98
521187 [ATKEAST4    138.00] AMP     5107.8   -80.94
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587200 [GEN-2016-030138.00] AMP     5853.6   -78.10
505592 [WELEETK4    138.00] AMP    16081.9   -80.03
510879 [ATOKA P2    69.000] AMP     3429.2   -74.37
510891 [LANE   2    69.000] AMP     2766.5   -68.58
514808 [JOHNCO 4    138.00] AMP    14543.9   -82.92
515147 [GLASSES4    138.00] AMP     7929.2   -75.46
515152 [BROWNTP4    138.00] AMP     7963.9   -77.31
515154 [EXPLRPL4    138.00] AMP     4407.4   -76.29
515172 [SPRNDAL4    138.00] AMP    11047.1   -78.04
515190 [AOCPT  2    69.000] AMP     5644.5   -74.86
515193 [COLBRT-4    138.00] AMP     4733.0   -75.15
515362 [HARDEN 4    138.00] AMP     8121.3   -80.14
515511 [SOCPMPT2    69.000] AMP     5605.8   -80.79
520860 [COLBERT4    138.00] AMP     4727.1   -75.07
520884 [DURANT 4    138.00] AMP     5390.1   -81.42
520968 [LANE   4    138.00] AMP     4836.0   -81.59
520971 [LATTAJT4    138.00] AMP     5533.2   -76.11
521030 [PITTSBG4    138.00] AMP     4428.0   -80.37
588290 [ASGI1613    138.00] AMP     4684.1   -80.25
505590 [WELEETK5    161.00] AMP     6448.0   -82.87
505594 [CHECOTA4    138.00] AMP     6180.2   -77.04
510874 [MCGEETP2    69.000] AMP     2241.6   -64.61
510885 [PITTSB-2    69.000] AMP     2303.3   -63.21
510902 [WELETK4     138.00] AMP    16758.3   -80.45
514809 [JOHNCO 7    345.00] AMP     9321.6   -84.50
515122 [SXMLCKT4    138.00] AMP    10689.8   -79.89
515149 [MADINDT4    138.00] AMP     7920.0   -75.51
515150 [CANEYCK4    138.00] AMP     8365.3   -77.53
515151 [LTLCITY4    138.00] AMP     6982.4   -77.21
515162 [FNDTION4    138.00] AMP    11212.2   -78.32
515164 [ROCKYPT4    138.00] AMP    10037.1   -80.54
515183 [SOCPUMP2    69.000] AMP     5563.8   -80.74
515189 [AOCPA  2    69.000] AMP     6737.0   -77.62
515197 [HOMERTP2    69.000] AMP     5498.2   -74.30
515318 [SOTHADA4    138.00] AMP    11088.5   -80.80
520426 [SEAWAY4     138.00] AMP     3970.1   -75.00
520826 [BENNGTN4    138.00] AMP     4721.8   -83.15
520874 [DARWIN 4    138.00] AMP     4694.5   -83.64
520970 [LATTA  4    138.00] AMP     4575.5   -74.95
521014 [OILCNTR4    138.00] AMP     5008.6   -75.75
521026 [PHAROAH4    138.00] AMP    15721.9   -80.05
521047 [SAVANNA4    138.00] AMP     5096.9   -80.50
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ASGI-2016-013_17SP

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                              PSS®E-32.2.0 ASCC SHORT CIRCUIT CURRENTS           THU, JUN 15 2017
10:33
2015 MDWG FINAL WITH 2013 MMWG, UPDATED WITH 2014 SERC & MRO
MDWG 17S WITH MMWG 15S, MRO 16W TOPO/16S PROF, SERC 16S

OPTIONS USED:
    - FLAT CONDITIONS
         - BUS VOLTAGES SET TO 1 PU AT 0 PHASE ANGLE
         - GENERATOR P=0, Q=0
         - TRANSFOMRER TAP RATIOS=1.0 PU and PHASE ANGLES=0.0
         - LINE CHARGING=0.0 IN +/-/0 SEQUENCE
         - LOAD=0.0 IN +/- SEQUENCE, CONSIDERED IN ZERO SEQUENCE
         - LINE/FIXED/SWITCHED SHUNTS=0.0 AND MAGNETIZING ADMITTANCE=0.0 IN +/-/0 SEQUENCE
         - DC LINES AND FACTS DEVICES BLOCKED
         - TRANSFORMER ZERO SEQUENCE IMPEDANCE CORRECTIONS IGNORED

                                     THREE PHASE FAULT
X---------- BUS ----------X             /I+/    AN(I+)
520818 [ASHLAND4    138.00] AMP     4664.9   -80.22
520862 [COLGATE4    138.00] AMP     5998.2   -79.87
521030 [PITTSBG4    138.00] AMP     4406.6   -80.33
588290 [ASGI1613    138.00] AMP     4664.9   -80.22
520406 [TUPELO4     138.00] AMP     9719.7   -79.20
521047 [SAVANNA4    138.00] AMP     5062.2   -80.43
505600 [TUPELO 4    138.00] AMP    10654.9   -79.04
520934 [HARTSHN4    138.00] AMP     8361.4   -80.25
505598 [ALLEN  4    138.00] AMP     5477.7   -76.43
505602 [S BROWN4    138.00] AMP     8061.5   -77.45
510881 [ALLENGT4    138.00] AMP    10312.2   -78.88
510897 [LONEOAK4    138.00] AMP     8571.0   -80.25
520986 [MANNING4    138.00] AMP     4258.5   -80.24
521071 [TUPLOTP4    138.00] AMP    10367.6   -78.88
521188 [ATKWEST4    138.00] AMP     5189.0   -80.78
585330 [ASGI-2015-00138.00] AMP     4686.3   -80.23
588280 [ASGI1612    138.00] AMP     5869.8   -79.98
505596 [EXPLOR 4    138.00] AMP     5414.0   -76.12
505604 [DENISON4    138.00] AMP     3068.7   -75.83
510880 [COALGTP4    138.00] AMP     6081.8   -77.55
510887 [ATOKA--4    138.00] AMP     5796.6   -79.47
510896 [LONEOAK2    69.000] AMP     7025.7   -83.13
510906 [SMCALTP4    138.00] AMP     8273.8   -80.57
510908 [MCALEST4    138.00] AMP     9551.0   -81.93
510916 [ALLEN--4    138.00] AMP     5470.3   -76.43
510935 [EXPCOLT4    138.00] AMP     7515.2   -77.69
510944 [ENOWILT4    138.00] AMP     8400.2   -79.87
515157 [BROWN  4    138.00] AMP     8021.4   -77.39
515159 [COLBRTP4    138.00] AMP     6141.1   -76.06
515192 [LULA   4    138.00] AMP     9192.9   -79.26
520418 [LIMESTONEJ4 138.00] AMP     3540.7   -80.24
520844 [CARBON 4    138.00] AMP     6628.0   -80.21
521044 [RUSSETT4    138.00] AMP    10861.7   -77.84
521075 [STONEWAL  LH138.00] AMP     8615.8   -77.90
521108 [KRSYJCTN4   138.00] AMP     7709.4   -77.95
521109 [KRSYJCTS4   138.00] AMP     7494.8   -77.63
588270 [ASGI1611    138.00] AMP     4158.6   -77.16
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ASGI-2016-013_25SP

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                              PSS®E-32.2.0 ASCC SHORT CIRCUIT CURRENTS           THU, JUN 15 2017
10:33
2015 MDWG FINAL WITH 2013 MMWG, UPDATED WITH 2014 SERC & MRO
MDWG 2025S WITH MMWG 2024S, MRO & SERC 2025 SUMMER

OPTIONS USED:
    - FLAT CONDITIONS
         - BUS VOLTAGES SET TO 1 PU AT 0 PHASE ANGLE
         - GENERATOR P=0, Q=0
         - TRANSFOMRER TAP RATIOS=1.0 PU and PHASE ANGLES=0.0
         - LINE CHARGING=0.0 IN +/-/0 SEQUENCE
         - LOAD=0.0 IN +/- SEQUENCE, CONSIDERED IN ZERO SEQUENCE
         - LINE/FIXED/SWITCHED SHUNTS=0.0 AND MAGNETIZING ADMITTANCE=0.0 IN +/-/0 SEQUENCE
         - DC LINES AND FACTS DEVICES BLOCKED
         - TRANSFORMER ZERO SEQUENCE IMPEDANCE CORRECTIONS IGNORED

                                     THREE PHASE FAULT
X---------- BUS ----------X             /I+/    AN(I+)
520818 [ASHLAND4    138.00] AMP     4684.1   -80.25
520862 [COLGATE4    138.00] AMP     6023.9   -79.89
521030 [PITTSBG4    138.00] AMP     4428.0   -80.37
588290 [ASGI1613    138.00] AMP     4684.1   -80.25
520406 [TUPELO4     138.00] AMP     9776.4   -79.20
521047 [SAVANNA4    138.00] AMP     5096.9   -80.50
505600 [TUPELO 4    138.00] AMP    10721.6   -79.04
520934 [HARTSHN4    138.00] AMP     8477.6   -80.40
505598 [ALLEN  4    138.00] AMP     5543.0   -76.48
505602 [S BROWN4    138.00] AMP     8074.3   -77.43
510881 [ALLENGT4    138.00] AMP    10374.4   -78.88
510897 [LONEOAK4    138.00] AMP     8693.8   -80.41
520986 [MANNING4    138.00] AMP     4288.4   -80.32
521071 [TUPLOTP4    138.00] AMP    10427.0   -78.87
521188 [ATKWEST4    138.00] AMP     5200.9   -80.78
585330 [ASGI-2015-00138.00] AMP     4699.2   -80.23
588280 [ASGI1612    138.00] AMP     5887.2   -79.97
505596 [EXPLOR 4    138.00] AMP     5538.7   -76.24
505604 [DENISON4    138.00] AMP     3070.6   -75.83
510880 [COALGTP4    138.00] AMP     6100.4   -77.54
510887 [ATOKA--4    138.00] AMP     5810.7   -79.47
510896 [LONEOAK2    69.000] AMP     7052.0   -83.21
510906 [SMCALTP4    138.00] AMP     8396.3   -80.73
510908 [MCALEST4    138.00] AMP     9717.4   -82.14
510916 [ALLEN--4    138.00] AMP     5535.4   -76.48
510935 [EXPCOLT4    138.00] AMP     7548.2   -77.68
510944 [ENOWILT4    138.00] AMP     8517.2   -80.02
515157 [BROWN  4    138.00] AMP     8034.1   -77.38
515159 [COLBRTP4    138.00] AMP     6148.5   -76.04
515192 [LULA   4    138.00] AMP     9233.0   -79.26
520418 [LIMESTONEJ4 138.00] AMP     3561.4   -80.30
520844 [CARBON 4    138.00] AMP     6717.9   -80.36
521044 [RUSSETT4    138.00] AMP    10881.1   -77.82
521075 [STONEWAL  LH138.00] AMP     8656.0   -77.89
521108 [KRSYJCTN4   138.00] AMP     7720.9   -77.94
521109 [KRSYJCTS4   138.00] AMP     7505.9   -77.62
588270 [ASGI1611    138.00] AMP     4195.6   -77.20
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CONCLUSION

An Affected System Interconnection Customer has requested an Affected System Impact Study (ASIS) consistent with Southwest Power Pool (SPP) Open Access Transmission Tariff (OATT) for interconnection requests into the system of PEC. The PEC facilities connect with the facilities of SWPA and WFEC. The three Group 14 requests in this study are: ASGI-2016-011, ASGI-2016-012, & ASGI-2016-013. All three requests are thermal units totaling 7.4, 61.7, and 4.9 MW, respectively.

Power flow and stability analysis has determined that ASGI-2016-011, ASGI-2016-012, & ASGI-2016-013 can interconnect all of their respective generation (mentioned above) with ERIS prior to the completion of the required Network Upgrades, listed within **Table 2** of this report. It should be noted that although this ASIS 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 analysis for this ASIS has determined that no violations were observed for the transmission system for the forty-nine (49) selected faults for the interconnection of ASGI-2016-011, ASGI-2016-012, and ASGI-2016-013.

Any changes to these assumptions may require a re-study of this ASIS at the expense of the Customer. Changed assumptions may include, but are not limited to: one or more previously-queued requests not included within this study executing an interconnection agreement and commencing 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.