GENERATOR INTERCONNECTION AFFECTED SYSTEM IMPACT STUDY REPORT

ASGI-2017-006

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By SPP Generator Interconnections Dept.

REVISION HISTORY

Date	Author	Change Description
6/14/2017	SPP	Affected System Impact Study for ASGI-2017-006 Report Revision 0 Issued
6/15/2017	SPP	Affected System Impact Study for ASGI-2017-006 Report Revision 1 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 Associated Electric Cooperative Inc. (AECI). AECI request GI-53/SIS-24, 238 MW wind generating facility, has been assigned the SPP queue identifier ASGI-2017-006.

This ASIS addresses the effects to the SPP system of interconnecting the generators to the AECI transmission system for the system topology and requests included in SPP DISIS-2016-001. ASGI-2017-006 is requesting the interconnection of one-hundred nineteen (119) Vestas V110 2.0 MW wind turbines and associated facilities interconnecting to AECI at the Maryville 161 kV substation in Nodaway County, Missouri.

Power flow and stability analysis from this ASIS has determined that the ASGI-2017-006 request can interconnect 238.0 MW of generation with Energy Resource Interconnection Service (ERIS) with the study dispatch assumption listed in **Table 1**.

Additionally the power flow analysis determined ASGI-2017-006 can interconnect 238.0MW of generation with Network Resource Interconnection Service (NRIS) with the study dispatch assumption listed in **Table 1** and after 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 issues were observed for the transmission system for the twenty-eight (28) selected faults for the interconnection of ASGI-2017-006 and the analysis shows that the generators will meet Low Voltage Ride-Through (LVRT) requirements of FERC Order #661A. 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 Southwest Power Pool (SPP) Open Access Transmission Tariff (OATT) for interconnection requests into the system of AECI.

The purpose of this study is to evaluate the impacts of interconnecting the AECI GI-53/SIS-24 request assigned the SPP queue identifier ASGI-2017-006. ASGI-2017-006 is requesting the interconnection of one-hundred nineteen (119) Vestas V110 2.0 MW wind turbines and associated facilities interconnecting to AECI at the Maryville 161 kV substation in Nodaway County, Missouri.

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	Fuel Source	POI	Status
GEN-2008-129	80 increase (total 643/675)	Thermal	Pleasant Hill 161kV	Commercial Operation
GEN-2010-036	4.6	Hydro	6th Street 115kV	Commercial Operation
GEN-2011-011	50 increase (total 900)	Thermal	Iatan 345kV	Commercial Operation

Table 1: Generation Requests Included within ASIS

Project	MW	Fuel Source	POI	Status
GEN-2014-021	300.0	Wind	Tap Nebraska City- Mullins Creek 345kV	IA Executed/On schedule for 2017 COD
GEN-2015-005	200.1	Wind	Tap Nebraska City - Sibley 345kV	Commercial Operation
GEN-2016-040	18.4 uprate to GEN-2015-005 (total 218.5)	Wind	Tap Nebraska City - Sibley 345kV	Facility Study Stage
ASGI-2016-003	12	Thermal	Paola 161kV	Affected System Facility Study Stage
ASGI-2017-006	238	Wind	Maryville (AECI) 161 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 13 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

Table 2: Upgrade Projects Required for Interconnection Service

Upgrade Project	Type	Description	Status	Study Assignment
Iatan – Stranger 345kV CKT 1	Voltage Conversion	Convert 18.2 miles of 161kV from Iatan to Stranger Creek to 345kV operation.	On Schedule for 1/1/2019	2015 Integrated Transmission Plan – 10 Year Assessment. (ITP-10)

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

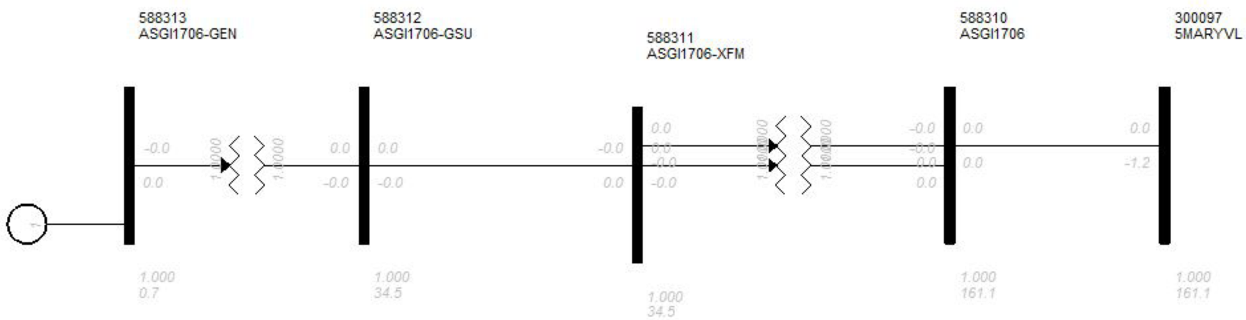
GENERATING FACILITY

The Affected System Interconnection Customers' request is the interconnection of one-hundred nineteen (119) Vestas V110 2.0 MW wind turbines and associated facilities interconnecting to AECI at the Maryville 161 kV substation in Nodaway County, Missouri.

INTERCONNECTION FACILITIES

The POI for ASGI-2017-006 Interconnection Customer connects to the Affected System Maryville 161 kV substation in Nodaway County, Missouri. Figure 1 depicts the one-line diagram for the POI and the Interconnection Request(s).

Figure 1: Proposed ASGI-2017-006 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 and AECI 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 NRIS are dispatched in an additional analysis into the interconnecting Transmission Owner's (T.O.) area at 100% nameplate with ERIS only requests at 80% nameplate. This method allows for identification of network constraints that are common between regional groupings to have affecting requests share the mitigating upgrade costs throughout the cluster.

For this 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 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 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)
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 into the AECI transmission system at the available MW 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**.

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 AECI footprint for ERIS and NRIS.

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: Affected System Thermal Constraints for Transmission Reinforcement Mitigation

Dispatch Group	Season	Source	Flow	Monitored Element	RATEA (MVA)	RATEB (MVA)	TDF	TC% LOADING	Contingency
00NR	17SP	ASGI_17_06	FROM->TO	HAWTHORN (HAWT 20) 345/161/13.8KV TRANSFORMER CKT 20	500	550	0.03183	101.1587	HAWTHORN (HAWT 22) 345/161/13.8KV TRANSFORMER CKT 22

Table 4: Affected System Voltage Constraints for Transmission Reinforcement Mitigation

Dispatch Group	Season	Source	Flow	Monitored Element	TC Voltage (PU)	TC Voltage (PU)	Voltage Differ (PU)	Vmin (PU)	Vmax (PU)	TDF	Contingency
				Currently, None							

Table 5: Affected System Thermal Constraints Not Requiring Additional Transmission Reinforcement Mitigation

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

The twenty-eight (28) contingencies were identified for use in this ASIS. These faults are listed within **Table 5**. 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_001_5MARYVL_2MARYVL_161_69kV	Fault on the AECI Maryville (300097) 161kV to (300258) 69kV transformer circuit 1, near Maryville 161kV. a. Apply fault at the AECI Maryville 161kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
2	FLT_002_5MARYVL_2MARYVL_161_69kV	Fault on the AECI Maryville (300097) 161kV to (300258) 69kV transformer circuit 2, near Maryville 161kV. a. Apply fault at the AECI Maryville 161kV bus. b. Clear fault after 5 cycles by tripping the faulted line.

Table 6: Contingencies Evaluated

Contingency Number and Name		Description
3	FLT_003_5MARYVL_5NODWAY_161kV	Fault on the AECI Maryville (300097) to AECI Nodaway (300104) 161kV line, near Maryville. a. Apply fault at the AECI Maryville 161kV 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_004_5MARYVL_MARYVLE5_161kV	Fault on the AECI Maryville (300097) to Maryville (541251) 161kV line, near AECI Maryville. a. Apply fault at the AECI Maryville 161kV 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_005_5MARYVL_CRESTON5_161kV	Fault on the AECI Maryville (300097) to Creston (652560) 161kV line, near Maryville. a. Apply fault at the AECI Maryville 161kV 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_006_5NODWAY_5GENTRY_161kV	Fault on the AECI Nodaway (300104) to AECI Gentry (300073) 161kV line, near Nodaway. a. Apply fault at the AECI Nodaway 161kV 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_007_2MARYVL_2HOPKNS_69kV	Fault on the AECI Maryville (300258) to AECI Hopkins (300256) 69kV line, near Maryville. a. Apply fault at the AECI Maryville 69kV 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.
8	FLT_008_2MARYVL_2SKIDMR_69kV	Fault on the AECI Maryville (300258) to AECI Skidmore (300266) 69kV line, near Maryville. a. Apply fault at the AECI Maryville 69kV 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_009_MARYVLE5_MIDWAY5_161kV	Fault on the Maryville (541251) to Midway (541369) 161kV line, near Maryville. a. Apply fault at the Maryville 161kV 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_010_MARYVLE5_CLRNDA5_161kV	Fault on the Maryville (541251) to MEC Clarinda (635034) 161kV line, near Maryville. a. Apply fault at the Maryville 161kV 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_011_MARYVLE5_MRVL1_161_69kV	Fault on the Maryville (541251) 161kV to (541378) 69kV to (542418) 13.2kV transformer circuit 22, near Maryville 161kV. a. Apply fault at the Maryville 161kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
12	FLT_012_MARYVLE5_MRVL2_161_69kV	Fault on the Maryville (541251) 161kV to (541359) 69kV to (542419) 13.2kV transformer circuit 33, near Maryville 161kV. a. Apply fault at the Maryville 161kV bus. b. Clear fault after 5 cycles by tripping the faulted line.

Table 6: Contingencies Evaluated

Contingency Number and Name		Description
13	FLT_013_MRVL2_FILMORE2_69kV	Fault on the Maryville (541359) to Filmore (541381) 69kV line, near Maryville. a. Apply fault at the Maryville 69kV 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.
14	FLT_014_MRVL2_PICKRG2_69kV	Fault on the Maryville (541359) to Pickering (541379) 69kV line, near Maryville. a. Apply fault at the Maryville 69kV 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_015_MRVL1_NODAWAY2_69kV	Fault on the Maryville (541378) to Nodaway (541380) 69kV line, near Maryville. a. Apply fault at the Maryville 69kV 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_016_COOPER3_STJOE3_345kV	Fault on the Cooper (640139) to St. Joseph (541199) 345kV line, near Cooper. a. Apply fault at the Cooper 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
17	FLT_017_COOPER3_7FAIRPT_345kV	Fault on the Cooper (640139) to AECI Fairport (300039) 345kV line, near Cooper. a. Apply fault at the Cooper 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
18	FLT_018_COOPER3_ATCHSNT3_345kV	Fault on the Cooper (640139) to MEC Atchison (635017) 345kV line, near Cooper. a. Apply fault at the Cooper 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
19	FLT_019_COOPER3_S34583_345kV	Fault on the Cooper (640139) to Nebraska City (645458) 345kV line, near Cooper. a. Apply fault at the Cooper 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
20	FLT_020_7FAIRPT_STJOE3_345kV	Fault on the AECI Fairport (300039) to St. Joseph (541199) 345kV line, near Fairport. a. Apply fault at the AECI Fairport 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
21	FLT_021_CLRNDA5_BROOKST5_161kV	Fault on the MEC Clarinda (635034) to Brooks Tap (635038) 161kV line, near Clarinda. a. Apply fault at the Clarinda 161kV 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_022_MIDWAY5_AVENUECTY5_161kV	Fault on the Midway (541369) to Avenue City Tap (541394) 161kV line, near Midway. a. Apply fault at the Midway 161kV 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
23	FLT_023_CLRNDA5_CLARNDA8_161_69 kV	Fault on the MEC Clarinda (635034) 161kV to (635035) 69kV transformer, near MEC Clarinda 161kV. a. Apply fault at the MEC Clarinda 161kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
24	FLT_024_MARYVLE5_CLRNDA5SB_161kV	**Fault with stuck breaker** on the Maryville (541251) to MEC Clarinda (635034) 161kV line, near Maryville. a. Apply fault at the Maryville 161kV bus. b. Clear fault after 16 cycles by tripping the faulted line and the Maryville (541251) 161kV to (541359) 69kV to (542419) 13.2kV transformer circuit 33.
25	FLT_025_MARYVLE5_MIDWAY5SB_161kV	**Fault with stuck breaker** on the Maryville (541251) to Midway (541369) 161kV line, near Maryville. a. Apply fault at the Maryville 161kV bus. b. Clear fault after 16 cycles by tripping the faulted line.
26	FLT_026_MARYVLE5_MIDWAY5PO_161kV	**Prior outage** on the Maryville (541251) to MEC Clarinda (635034) 161kV line: Fault on the Maryville (541251) to Midway (541369) 161kV line, near Maryville. a. Prior Outage Maryville to MEC Clarinda 161kV line. b. Apply fault at the Maryville 161kV bus. c. Clear fault after 5 cycles by tripping the faulted line. d. Wait 20 cycles, and then re-close the line in (b) back into the fault. e. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
27	FLT_027_5MARYVL_5NODWAYPO_161kV	**Prior outage** on the AECI Maryville (300097) to Creston (652560) 161kV line: Fault on the AECI Maryville (300097) to AECI Nodaway (300104) 161kV line, near Maryville. a. Prior Outage AECI Maryville to Creston 161kV line. b. Apply fault at the AECI Maryville 161kV bus. c. Clear fault after 5 cycles by tripping the faulted line. d. Wait 20 cycles, and then re-close the line in (b) back into the fault. e. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
28	FLT_028_COOPER3_STJOE3PO_345kV	**Prior outage** on the Cooper (640139) to AECI Fairport (300039) 345kV line: Fault on the Cooper (640139) to St. Joseph (541199) 345kV line, near Cooper. a. Prior Outage Cooper (640139) to AECI Fairport 345kV line. b. Apply fault at the Cooper 345kV bus. c. Clear fault after 5 cycles by tripping the faulted line. d. Wait 20 cycles, and then re-close the line in (b) back into the fault. e. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.

RESULTS

Results of the stability analysis are summarized in **Table 7**. These results are valid for ASGI-2017-006 interconnecting with a generation amount up to 238 MW.

Table 7: Fault Analysis Results

Contingency Number and Name		Single Phase			Three Phase		
		2016WP	2017SP	2025SP	2016WP	2017SP	2025SP
1	FLT_001_5MARYVL_2MARYVL_161_69kV	Stable	Stable	Stable	Stable	Stable	Stable
2	FLT_002_5MARYVL_2MARYVL_161_69kV	Stable	Stable	Stable	Stable	Stable	Stable
3	FLT_003_5MARYVL_5NODWAY_161kV	Stable	Stable	Stable	Stable	Stable	Stable
4	FLT_004_5MARYVL_MARYVLE5_161kV	Stable	Stable	Stable	Stable	Stable	Stable
5	FLT_005_5MARYVL_CRESTON5_161kV	Stable	Stable	Stable	Stable	Stable	Stable
6	FLT_006_5NODWAY_5GENTRY_161kV	Stable	Stable	Stable	Stable	Stable	Stable
7	FLT_007_2MARYVL_2HOPKNS_69kV	Stable	Stable	Stable	Stable	Stable	Stable
8	FLT_008_2MARYVL_2SKIDMR_69kV	Stable	Stable	Stable	Stable	Stable	Stable
9	FLT_009_MARYVLE5_MIDWAY5_161kV	Stable	Stable	Stable	Stable	Stable	Stable
10	FLT_010_MARYVLE5_CLRNDA5_161kV	Stable	Stable	Stable	Stable	Stable	Stable
11	FLT_011_MARYVLE5_MRVL1_161_69kV	Stable	Stable	Stable	Stable	Stable	Stable
12	FLT_012_MARYVLE5_MRVL2_161_69kV	Stable	Stable	Stable	Stable	Stable	Stable
13	FLT_013_MRVL2_FILMORE2_69kV	Stable	Stable	Stable	Stable	Stable	Stable
14	FLT_014_MRVL2_PICKRG2_69kV	Stable	Stable	Stable	Stable	Stable	Stable
15	FLT_015_MRVL1_NODAWAY2_69kV	Stable	Stable	Stable	Stable	Stable	Stable
16	FLT_016_COOPER3_STJOE3_345kV	Stable	Stable	Stable	Stable	Stable	Stable
17	FLT_017_COOPER3_7FAIRPT_345kV	Stable	Stable	Stable	Stable	Stable	Stable
18	FLT_018_COOPER3_ATCHSNT3_345kV	Stable	Stable	Stable	Stable	Stable	Stable
19	FLT_019_COOPER3_S34583_345kV	Stable	Stable	Stable	Stable	Stable	Stable
20	FLT_020_7FAIRPT_STJOE3_345kV	Stable	Stable	Stable	Stable	Stable	Stable
21	FLT_021_CLRNDA5_BROOKST5_161kV	Stable	Stable	Stable	Stable	Stable	Stable
22	FLT_022_MIDWAY5_AVENUECTY5_161kV	Stable	Stable	Stable	Stable	Stable	Stable
23	FLT_023_CLRNDA5_CLARNDA8_161_69kV	Stable	Stable	Stable	Stable	Stable	Stable
24	FLT_024_MARYVLE5_CLRNDA5SB_161kV	Stable	Stable	Stable			
25	FLT_025_MARYVLE5_MIDWAY5SB_161kV	Stable	Stable	Stable			
26	FLT_026_MARYVLE5_MIDWAY5PO_161kV	Stable	Stable	Stable	Stable	Stable	Stable
27	FLT_027_5MARYVL_5NODWAYPO_161kV	Stable	Stable	Stable	Stable	Stable	Stable
28	FLT_028_COOPER3_STJOE3PO_345kV	Stable	Stable	Stable	Stable	Stable	Stable

FERC LVRT COMPLIANCE

FERC Order #661A places specific requirements on wind farms through its Low Voltage Ride Through (LVRT) provisions. For Interconnection Agreements signed after December 31, 2006, wind farms shall stay on line for faults at the POI that draw the voltage down at the POI to 0.0 pu.

Fault contingencies were developed to verify that wind farms remain on line when the POI voltage is drawn down to 0.0 pu. These contingencies are shown in **Table 8**.

Table 8: LVRT Contingencies

Contingency Number and Name		Description
1	FLT_001_5MARYVL_2MARYVL_161_69kV	Fault on the AECI Maryville (300097) 161kV to (300258) 69kV transformer circuit 1, near Maryville 161kV. a. Apply fault at the AECI Maryville 161kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
2	FLT_002_5MARYVL_2MARYVL_161_69kV	Fault on the AECI Maryville (300097) 161kV to (300258) 69kV transformer circuit 2, near Maryville 161kV. a. Apply fault at the AECI Maryville 161kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
3	FLT_003_5MARYVL_5NODWAY_161kV	Fault on the AECI Maryville (300097) to AECI Nodaway (300104) 161kV line, near Maryville. a. Apply fault at the AECI Maryville 161kV 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_004_5MARYVL_MARYVLE5_161kV	Fault on the AECI Maryville (300097) to Maryville (541251) 161kV line, near AECI Maryville. a. Apply fault at the AECI Maryville 161kV 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_005_5MARYVL_CRESTON5_161kV	Fault on the AECI Maryville (300097) to Creston (652560) 161kV line, near Maryville. a. Apply fault at the AECI Maryville 161kV 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.

The required prior queued project wind farms remained online for the fault contingencies described in this section as well as the fault contingencies described in the Disturbances section of this report. ASGI-2017-006 is found to be in compliance with FERC Order #661A.

SHORT CIRCUIT ANALYSIS

A short circuit analysis was performed on the 2017 & 2025 Summer Peak power flow cases 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 on the next page.

ASGI-2017-006 – 2017 Summer Peak

PSS(R)E-32.2.2 ASCC SHORT CIRCUIT CURRENTS THU, MAY 18 2017 17:52
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

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X---------- BUS ----------X        /I+/    AN(I+)
300097 [5MARYVL     161.00] AMP    11605.0   -80.57
300104 [5NODWAY     161.00] AMP    11095.2   -81.50
300258 [2MARYVL     69.000] AMP     7107.0   -79.41
541251 [MARYVLE5    161.00] AMP    11387.9   -80.46
588310 [ASGI1706    161.00] AMP     8036.3   -81.95
652560 [CRESTON5    161.00] AMP     7907.7   -77.17
300073 [5GENTRY     161.00] AMP     9990.4   -80.32
300256 [2HOPKNS     69.000] AMP     3263.8   -67.92
300266 [2SKIDMR     69.000] AMP     5703.1   -72.38
541359 [MRVL#2      69.000] AMP     3548.8   -88.73
541369 [MIDWAY_5    161.00] AMP     6132.4   -78.79
541378 [MRVL#1      69.000] AMP     4717.7   -80.47
631069 [ANTA TP5    161.00] AMP     6766.5   -80.63
635034 [CLRNDA 5    161.00] AMP     6698.5   -74.38
635038 [BROOKST5    161.00] AMP     5248.5   -74.15
635645 [MCKSBRG 3   161.00] AMP     7177.0   -77.47
652569 [CRESTON8    69.000] AMP    11039.5   -80.72
300076 [5FAIRPT     161.00] AMP    16592.9   -83.49
300177 [2COIN       69.000] AMP     2446.2   -62.79
300246 [2CONCPT     69.000] AMP     3980.3   -66.69
300260 [2MIDWAY     69.000] AMP     3400.6   -66.89
300263 [2QUITMN     69.000] AMP     3697.9   -65.21
300265 [2SHERID     69.000] AMP     2250.9   -61.82
541368 [MIDWY1 2    69.000] AMP     5003.4   -80.69
541379 [PICKRG_2    69.000] AMP     2518.0   -77.02
541380 [NODAWAY2    69.000] AMP     4352.7   -75.22
541381 [FILMORE2    69.000] AMP     3087.4   -83.36
541390 [MIDWY2 2    69.000] AMP     7317.5   -83.28
541394 [AVENUECTY 5 161.00] AMP     6173.0   -83.29
630381 [SLAKEN 8    69.000] AMP    10936.3   -80.72
630385 [SLAKES 8    69.000] AMP    10841.6   -80.77
630419 [ECRESTN8    69.000] AMP     7197.0   -76.14
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631070 [ANITA 5 161.00] AMP 6057.0 -79.54
631078 [WNTRST 5 161.00] AMP 8007.9 -79.51
635032 [HASTING5 161.00] AMP 6998.7 -75.04
635035 [CLARNDA8 69.000] AMP 9563.0 -78.78
635037 [BROOKS 5 161.00] AMP 3693.7 -74.28
652603 [EXIRA 5 161.00] AMP 6777.6 -81.79
300039 [7FAIRPT 345.00] AMP 12168.9 -84.59
300087 [5HICKCK 161.00] AMP 5178.8 -78.45
300107 [5OSBORN 161.00] AMP 7263.3 -77.92
300176 [2BURLJT 69.000] AMP 2830.7 -62.07
300180 [2IPL TP 69.000] AMP 2519.8 -62.89
300183 [2NEWPTP 69.000] AMP 2187.7 -62.84
300249 [2FAIRPT 69.000] AMP 16705.4 -81.52
300255 [2GRNTCTY 69.000] AMP 2338.4 -60.81
300264 [2SAVANH 69.000] AMP 2884.6 -62.98
300270 [2CLYDE 69.000] AMP 4076.5 -69.13
301347 [5WINSLOW 161.00] AMP 9322.4 -83.88
541252 [ST JOEREA 5 161.00] AMP 6549.5 -85.03
541358 [AMOIL 2 69.000] AMP 4975.4 -80.52
541362 [BURLJCT2 69.000] AMP 1630.9 -66.90
541389 [MDWYTP 2 69.000] AMP 4885.8 -79.45
629170 [VILISCAJCT8 69.000] AMP 2683.1 -71.44
629177 [PRESCOT TP8 69.000] AMP 2607.8 -67.39
630009 [ANITA 8 69.000] AMP 6661.6 -83.29
630352 [ORIENTM8 69.000] AMP 4187.2 -68.36
630378 [LORIMRR8 69.000] AMP 4550.9 -73.10
630393 [GRVLYCHM 69.000] AMP 9765.0 -78.30
630395 [WNTRSET8 69.000] AMP 6273.5 -79.41
630446 [CRESTN8_ 69.000] AMP 7314.8 -76.11
630448 [12MILRC8 69.000] AMP 4103.0 -67.21
631072 [GU CTR 5 161.00] AMP 4814.2 -78.98
635031 [BUNGE 5 161.00] AMP 22468.4 -84.07
635033 [HASTING8 69.000] AMP 9086.3 -79.08
635051 [ESSEX T8 69.000] AMP 3869.2 -71.35
635063 [COBURG T 8 69.000] AMP 3778.1 -71.05
635641 [NORWLK5 161.00] AMP 21349.3 -84.64
652561 [DENISON5 161.00] AMP 5559.0 -81.25
300068 [5CHILLI 161.00] AMP 4893.6 -78.22
300094 [5LOCUST 161.00] AMP 2513.5 -77.60
300182 [2MOUND 69.000] AMP 2112.5 -62.67
300188 [2STRDTP 69.000] AMP 2756.9 -63.83
300189 [2TARKIO 69.000] AMP 3242.6 -66.57
300190 [2NEWPNT 69.000] AMP 1661.9 -61.17
300202 [2JAMESN 69.000] AMP 4018.9 -60.25
300203 [2KIDDER 69.000] AMP 4138.5 -62.12
300209 [2PATBRG 69.000] AMP 3139.2 -59.26
300226 [2HICKRY 69.000] AMP 5271.5 -76.48
300245 [2ALBANYR 69.000] AMP 3493.3 -63.36
300248 [2DRLNGT 69.000] AMP 4792.4 -66.63
300250 [2FILLMR 69.000] AMP 1816.7 -60.41
300251 [2FLGGSP 69.000] AMP 2996.7 -62.67
300257 [2KINGCT 69.000] AMP 4101.6 -66.31

300259 [2MAYSVL 69.000] AMP 4636.5 -60.42
300267 [2STANBR 69.000] AMP 3795.4 -65.85
300290 [2OSBORN 69.000] AMP 6108.0 -75.26
301310 [5REX 161.00] AMP 6466.0 -77.53
541199 [ST JOE 3 345.00] AMP 19033.0 -85.10
541253 [ST JOE 5 161.00] AMP 20215.3 -86.57
541363 [TARKIO_2 69.000] AMP 946.7 -59.47
541367 [BRWNCRV2 69.000] AMP 1754.7 -60.19
541376 [AMOILTP2 69.000] AMP 4731.6 -79.13
629178 [PRESCOTREC8 69.000] AMP 2361.8 -67.54
629179 [COBURGREC8 69.000] AMP 3447.9 -69.13
630376 [ORIENT R 69.000] AMP 3663.7 -67.58
630377 [CARBJCT8 69.000] AMP 1747.3 -66.04
630379 [LORIMOR8 69.000] AMP 3533.1 -71.96
630388 [WINCOR 8 69.000] AMP 5637.0 -76.12
630392 [PATTREC8 69.000] AMP 5240.6 -75.58
630396 [CASEY R 69.000] AMP 3367.2 -69.25
630443 [ARISTAP8 69.000] AMP 3907.4 -71.13
630605 [AFTON WEST8 69.000] AMP 3349.4 -64.99
631071 [SCRANTN5 161.00] AMP 5795.7 -78.37
635030 [RIVRBND5 161.00] AMP 31603.3 -85.27
635050 [SHENAND8 69.000] AMP 4124.6 -72.31
635052 [IMOGENT8 69.000] AMP 4421.0 -74.56
635065 [REDOAK 8 69.000] AMP 3833.3 -71.10
635066 [EMERSON8 69.000] AMP 5216.6 -73.10
635069 [MACEDON8 69.000] AMP 2165.2 -69.36
635076 [MALVERN8 69.000] AMP 6348.7 -75.73
635631 [BOONVIL5 161.00] AMP 20088.1 -85.61
635640 [NORWLK3 345.00] AMP 15360.2 -84.97
635653 [GRENFLD5 161.00] AMP 20525.9 -83.59
640139 [COOPER 3 345.00] AMP 25183.4 -86.03
652567 [DENISON4 230.00] AMP 4463.7 -80.05

ASGI-2017-006 – 2025 Summer Peak

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                    PSS(R)E-32.2.2 ASCC SHORT CIRCUIT CURRENTS        THU, MAY 18 2017  17:52
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+)
300097 [5MARYVL     161.00] AMP   11708.3  -80.65
300104 [5NODWAY     161.00] AMP   11151.2  -81.53
300258 [2MARYVL     69.000] AMP    7116.3  -79.43
541251 [MARYVLE5    161.00] AMP   11487.6  -80.53
588310 [ASGI1706    161.00] AMP    8073.8  -81.98
652560 [CRESTON5    161.00] AMP    9099.4  -79.09
300073 [5GENTRY     161.00] AMP    9989.5  -80.31
300256 [2HOPKNS     69.000] AMP    3265.2  -67.92
300266 [2SKIDMR     69.000] AMP    5707.0  -72.39
541359 [MRVL#2      69.000] AMP    3552.8  -88.75
541369 [MIDWAY_5    161.00] AMP    6126.3  -78.79
541378 [MRVL#1      69.000] AMP    4722.6  -80.49
631069 [ANTA TP5    161.00] AMP    6945.1  -80.78
635034 [CLRNDA 5    161.00] AMP    6819.1  -74.49
635038 [BROOKST5    161.00] AMP    5419.1  -74.40
635645 [MCKSBRG 3   161.00] AMP    7647.5  -78.02
652569 [CRESTON8    69.000] AMP   14729.2  -83.03
300076 [5FAIRPT     161.00] AMP   16557.4  -83.46
300177 [2COIN       69.000] AMP    2447.1  -62.79
300246 [2CONCPT     69.000] AMP    3981.4  -66.69
300260 [2MIDWAY     69.000] AMP    3401.4  -66.89
300263 [2QUITMN     69.000] AMP    3699.6  -65.20
300265 [2SHERID     69.000] AMP    2251.3  -61.82
541368 [MIDWY1 2    69.000] AMP    5004.1  -80.68
541379 [PICKRG_2    69.000] AMP    2520.1  -77.03
541380 [NODAWAY2    69.000] AMP    4356.4  -75.23
541381 [FILMORE2    69.000] AMP    3090.5  -83.37
541390 [MIDWY2 2    69.000] AMP    7313.8  -83.28
541394 [AVENUECTY 5 161.00] AMP    6115.8  -83.22
630381 [SLAKEN 8    69.000] AMP   14585.6  -83.03
630385 [SLAKES 8    69.000] AMP   14561.2  -83.12
630419 [ECRESTN8    69.000] AMP    8577.9  -76.58
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631070 [ANITA 5 161.00] AMP 6196.5 -79.62
631078 [WNTRST 5 161.00] AMP 8262.3 -79.61
635032 [HASTING5 161.00] AMP 7038.0 -75.03
635035 [CLARNDA8 69.000] AMP 9653.9 -78.90
635037 [BROOKS 5 161.00] AMP 3777.4 -74.46
652603 [EXIRA 5 161.00] AMP 6911.3 -81.88
300039 [7FAIRPT 345.00] AMP 12076.1 -84.52
300087 [5HICKCK 161.00] AMP 5183.6 -78.44
300107 [5OSBORN 161.00] AMP 7257.8 -77.92
300176 [2BURLJT 69.000] AMP 2831.6 -62.07
300180 [2IPL TP 69.000] AMP 2520.8 -62.88
300183 [2NEWPTP 69.000] AMP 2188.1 -62.83
300249 [2FAIRPT 69.000] AMP 16694.7 -81.50
300255 [2GRNTCTY 69.000] AMP 2338.6 -60.81
300264 [2SAVANH 69.000] AMP 2884.9 -62.98
300270 [2CLYDE 69.000] AMP 4077.1 -69.13
301347 [5WINSLOW 161.00] AMP 9312.3 -83.86
541252 [ST JOEREA 5 161.00] AMP 6474.3 -84.92
541358 [AMOIL 2 69.000] AMP 4976.2 -80.52
541362 [BURLJCT2 69.000] AMP 1631.7 -66.89
541389 [MDWYTP 2 69.000] AMP 4886.7 -79.44
629170 [VILISCAJCT8 69.000] AMP 2690.3 -71.45
629177 [PRESCOT TP8 69.000] AMP 2773.7 -66.98
630009 [ANITA 8 69.000] AMP 6767.4 -83.26
630352 [ORIENTM8 69.000] AMP 4507.7 -67.88
630378 [LORIMRR8 69.000] AMP 4975.9 -72.94
630393 [GRVLYCHM 69.000] AMP 12594.8 -79.60
630395 [WNTRSET8 69.000] AMP 6309.2 -79.46
630446 [CRESTN8_ 69.000] AMP 8732.5 -76.54
630448 [12MILRC8 69.000] AMP 4514.7 -66.54
631072 [GU CTR 5 161.00] AMP 4871.1 -79.02
635031 [BUNGE 5 161.00] AMP 22663.3 -84.05
635033 [HASTING8 69.000] AMP 9115.5 -79.09
635051 [ESSEX T8 69.000] AMP 3878.8 -71.36
635063 [COBURG T 8 69.000] AMP 3787.8 -71.05
635641 [NORWLK5 161.00] AMP 21716.3 -84.61
652561 [DENISON5 161.00] AMP 5607.4 -81.31
300068 [5CHILLI 161.00] AMP 4901.1 -78.20
300094 [5LOCUST 161.00] AMP 2515.2 -77.59
300182 [2MOUND 69.000] AMP 2112.9 -62.66
300188 [2STRDTP 69.000] AMP 2758.1 -63.83
300189 [2TARKIO 69.000] AMP 3243.8 -66.57
300190 [2NEWPNT 69.000] AMP 1662.1 -61.17
300202 [2JAMESN 69.000] AMP 4018.8 -60.24
300203 [2KIDDER 69.000] AMP 4137.9 -62.12
300209 [2PATBRG 69.000] AMP 3139.0 -59.25
300226 [2HICKRY 69.000] AMP 5274.0 -76.47
300245 [2ALBANYR 69.000] AMP 3493.4 -63.35
300248 [2DRLNGT 69.000] AMP 4792.4 -66.62
300250 [2FILLMR 69.000] AMP 1816.8 -60.41
300251 [2FLGGSP 69.000] AMP 2996.8 -62.67
300257 [2KINGCT 69.000] AMP 4101.4 -66.31

300259 [2MAYSVL 69.000] AMP 4635.6 -60.42
300267 [2STANBR 69.000] AMP 3795.7 -65.85
300290 [2OSBORN 69.000] AMP 6106.5 -75.26
301310 [5REX 161.00] AMP 6461.9 -77.52
541199 [ST JOE 3 345.00] AMP 18579.5 -84.90
541253 [ST JOE 5 161.00] AMP 18928.3 -86.42
541363 [TARKIO_2 69.000] AMP 947.0 -59.46
541367 [BRWNCRV2 69.000] AMP 1754.8 -60.19
541376 [AMOILTP2 69.000] AMP 4732.2 -79.13
629178 [PRESCOTREC8 69.000] AMP 2497.2 -67.18
629179 [COBURGREC8 69.000] AMP 3456.0 -69.13
630376 [ORIENT R 69.000] AMP 3879.2 -67.14
630377 [CARBJCT8 69.000] AMP 1820.0 -65.71
630379 [LORIMOR8 69.000] AMP 3741.6 -71.73
630388 [WINCOR 8 69.000] AMP 5663.4 -76.14
630392 [PATTREC8 69.000] AMP 5264.9 -75.60
630396 [CASEY R 69.000] AMP 3432.7 -69.06
630443 [ARISTAP8 69.000] AMP 4236.1 -70.88
630605 [AFTON WEST8 69.000] AMP 3617.1 -64.27
631071 [SCRANTN5 161.00] AMP 5836.1 -78.35
635030 [RIVRBND5 161.00] AMP 31984.9 -85.25
635050 [SHENAND8 69.000] AMP 4132.6 -72.32
635052 [IMOGENT8 69.000] AMP 4429.0 -74.57
635065 [REDOAK 8 69.000] AMP 3841.4 -71.10
635066 [EMERSON8 69.000] AMP 5228.1 -73.10
635069 [MACEDON8 69.000] AMP 2166.9 -69.36
635076 [MALVERN8 69.000] AMP 6360.6 -75.72
635631 [BOONVIL5 161.00] AMP 20345.1 -85.59
635640 [NORWLK3 345.00] AMP 15665.6 -84.92
635653 [GRENFLD5 161.00] AMP 20851.9 -83.54
640139 [COOPER 3 345.00] AMP 25206.1 -86.00
652567 [DENISON4 230.00] AMP 4508.8 -80.12

CONCLUSION

An Affected System Interconnection Customer has requested an Affected System Impact Study (ASIS) under the Southwest Power Pool Open Access Transmission Tariff (OATT) for ASGI-2017-006. ASGI-2017-006 (238 MW) wind generating facilities is to be interconnected into the system of AECI. ASGI-2017-006 has requested this ASIS to determine the impacts of interconnecting to the transmission system with all required Network Upgrades identified in the DISIS-2016-001 Impact Study placed into service.

Power flow and stability analysis from this ASIS has determined that the ASGI-2017-006 request can interconnect 238.0 MW of generation with ERIS with the study dispatch assumption listed in **Table 1**.

Additionally the power flow analysis determined ASGI-2017-006 can interconnect 238.0MW of generation with Network Resource Interconnection Service (NRIS) with the study dispatch assumption listed in **Table 1** and after 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 issues were observed for the transmission system for the twenty-eight (28) selected faults for the interconnection of ASGI-2017-006.

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.

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