Limited and Interim Operational Impact Study for Generation Interconnection Request

GEN-2011-045
GEN-2011-046
GEN-2011-048
ASGI-2011-004
GEN-2012-001

May, 2012
Generation Interconnection

SPP Southwest Power Pool

Executive Summary

<OMITTED TEXT> (Customers) have requested a Limited and Interim Operation Impact Study under the Southwest Power Pool Open Access Transmission Tariff (OATT) for interconnection for a total of 488 MW of Combustion and Wind Turbine generation within the balancing authority of Southwestern Public Service (SPS) in Lubbock, Quay, Denver, Yoakum, and Crosby Counties, Texas. Customers have requested these separate Limited Operation and Interim Operation Studies to determine the impacts of interconnecting their generating facilities to the transmission system before such time that SPP can complete the required interconnection studies. Limited Operation Studies are conducted under GIA Section 5.9. Interim Operation Studies are conducted under GIA Section 11A.

This study assumed that only the higher queued projects identified in Table 3 of this study might go into service before the completion of all Network Upgrades identified in DISIS-2011-002 and DISIS-2012-001. If any additional generation projects not identified in Table 3 but with queue priority equal to or over the study projects, listed in Table 4, request to go into commercial operation before all Network Upgrades identified through the DISIS-2011-002 and DISIS-2012-001 study process as required, then this study must be conducted again to determine whether sufficient limited interconnection service exists to interconnect the GEN-2011-045, GEN-2011-046, GEN-2011-048, ASGI-2011-004, and GEN-2012-001 interconnection requests in addition to all higher priority requests in operation or pending operation.

A power flow analysis shows that the Customers Combustion and Wind Turbine facilities can interconnect a maximum of 488 MW of interconnection capacity. Powerflow analysis was based on both summer and winter peak conditions and light loading cases. This interconnection request was studied for Energy Resource Interconnection Service (ERIS) only in this LOIS.

The construction lead time to construct the necessary facilities required for Limited Operation or Interim Operation will be determined by the Transmission Owner during the Facility Study. Any proposed in service date will be contingent upon the completion of the substation or additions.

The generation facilities were studied with a total of 488 MW. This Impact study addresses the dynamic stability effects of interconnecting the plants to the rest of the SPS transmission system for the system condition as it will be on December 31, 2012. Two seasonal base cases were used in the study to analyze the stability impacts of the proposed generation facility. The cases studied were modified 2012 summer peak and 2012 winter peak cases that were adjusted to reflect system conditions at the requested in-service date. Each case was modified to include prior queued projects that are listed in the body of the report. Sixty-eight (68) contingencies were identified for use in this study. The Combustion and Wind Turbines were modeled using information provided by the Customers. Stability Analysis indicates that with the addition of stabilizers on certain generating units in the SPS balancing authority and additional reactive support at the GEN-2012-001 34.5kV substation, the transmission system will remain stable for the studied contingencies for the added generation.

The cost of the addition of stabilizers will be determined in the Facility Study.

Nothing in this study should be construed as a guarantee of transmission service. If the customer wishes to sell power from the facility, a separate request for transmission service shall be requested on Southwest Power Pool's OASIS by the Customer.

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Introduction

<OMITTED TEXT> (Customers) have requested a Limited and Interim Operation Impact Study under the Southwest Power Pool Open Access Transmission Tariff (OATT) for interconnection of 488 MW of Combustion and Wind Turbine generation within the balancing authority of Southwestern Public Service (SPS) in Lubbock, Quay, Denver, Yoakum, and Crosby Counties, Texas. Customers have requested these separate Limited Operation and Interim Operation Studies to determine the impacts of interconnecting their generating facilities to the transmission system before such time that SPP can complete the required interconnection studies. Limited Operation Studies are conducted under GIA Section 5.9. Interim Operation Studies are conducted under GIA Section 11A.

This Impact study addresses the dynamic stability effects of interconnecting the plants to the rest of the SPS transmission system for the system condition as it will be on December 31, 2012. The Combustion and Wind Turbine generation facilities were studied with a total of 488 MW. Two seasonal base cases were used in the study to analyze the stability impacts of the proposed generation facility. The cases studied were modified versions of the 2012 summer peak and 2012 winter peak to reflect the system conditions at the requested in-service date. Each case was modified to include prior queued projects that are listed in the body of the report. Sixty-eight (68) contingencies were identified for this study.

Purpose

The purpose of this Limited and Interim Operation Impact Study (L&IOIS) is to evaluate the impact of the proposed interconnection on the reliability of the Transmission System. The L&IOIS 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 L&IOIS 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 3; 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 projects not included in this study signing an interconnection agreement, may require a re-study of this request 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.

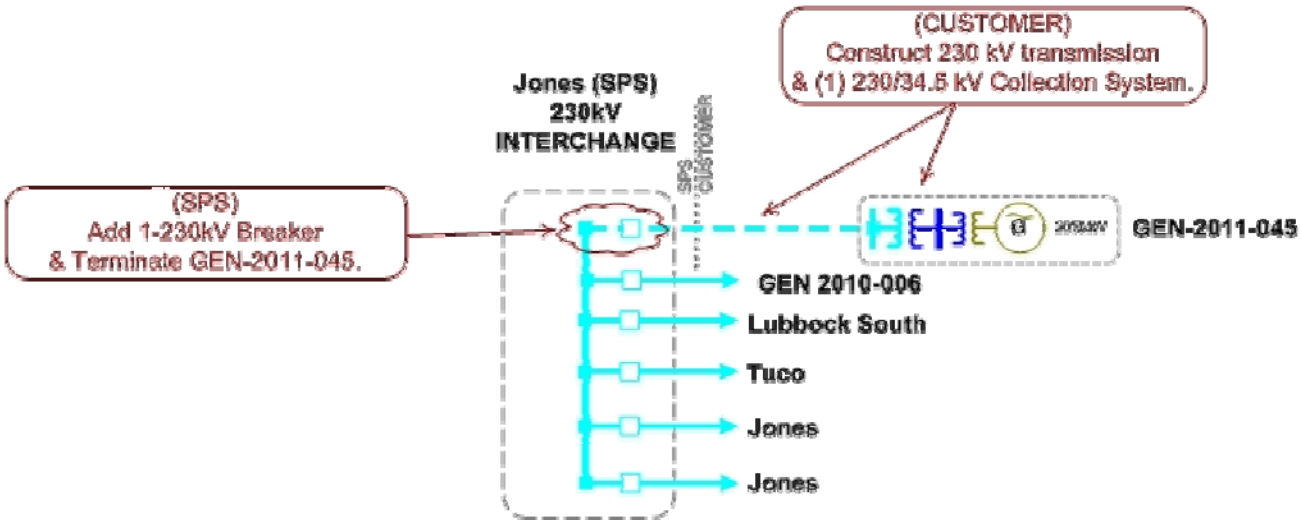
Facilities

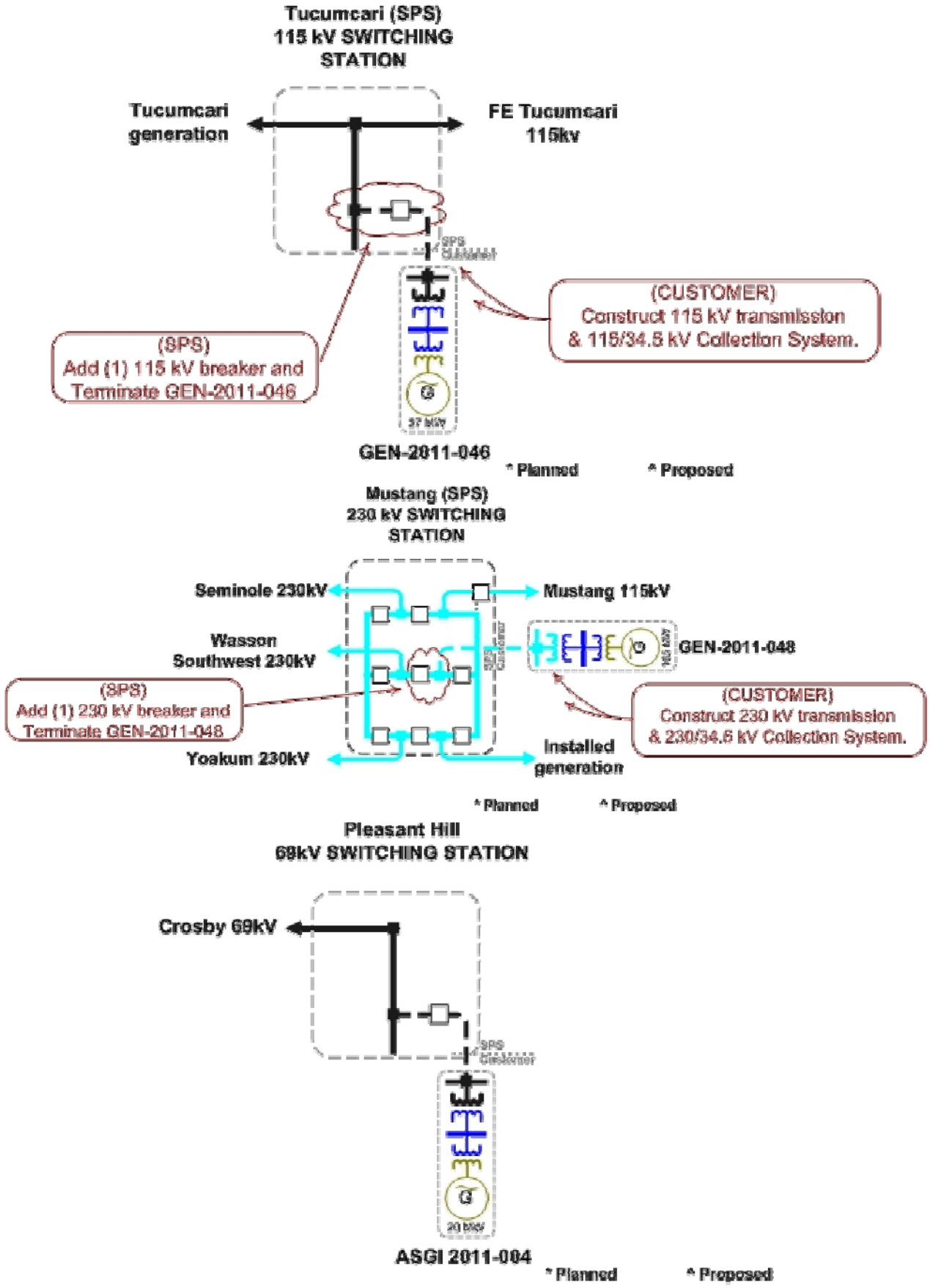
Generating Facility

The projects were modeled with the information provided by the customers for a total of 488MW of generation interconnection.

Interconnection Facility

The Point of Interconnection for GEN-2011-045 will be at the SPS Jones 230kV Power Station Bus. For GEN-2011-046, the Point of Interconnection will be at the SPS Tucumcari 115kV bus. For GEN-2011-048, the Point of Interconnection will be at the Mustang 230kV bus. For ASGI-2011-004, an Affected System Interconnection request that is interconnecting to the Golden Spread Electric Cooperative transmission system, the Affected System bus is the SPS Crosby County 115kV bus. For GEN-2012-001, the Point of Interconnection will be at a tap on the Grassland – Borden 230kV Ckt . Figure 1 shows one-line illustrations of the facilities and the POIs. Figure 2 shows a one-line bus interconnection of the Point of Interconnections.




Tucumcari (SPS)
115 kV SWITCHING
STATION
Tucumcari
generation
FE Tucumcari
115kv
(SPS)
Add (1) 115 kV breaker and
Terminate GEN-2011-046
(CUSTOMER)
Construct 115 kV transmission
& 115/34.5 kV Collection System.
GEN-2011-046
* Planned
^ Proposed
Mustang (SPS)
230 kV SWITCHING
STATION
Seminole 230kV
Mustang 115kV
Wasson
Southwest 230kV
GEN-2011-048
(SPS)
Add (1) 230 kV breaker and
Terminate GEN-2011-048
(CUSTOMER)
Construct 230 kV transmission
& 230/34.5 kV Collection System.
Yoakum 230kV
Installed
generation
* Planned
^ Proposed
Pleasant Hill
69kV SWITCHING STATION
Crosby 69kV
ASGI 2011-004
* Planned
^ Proposed

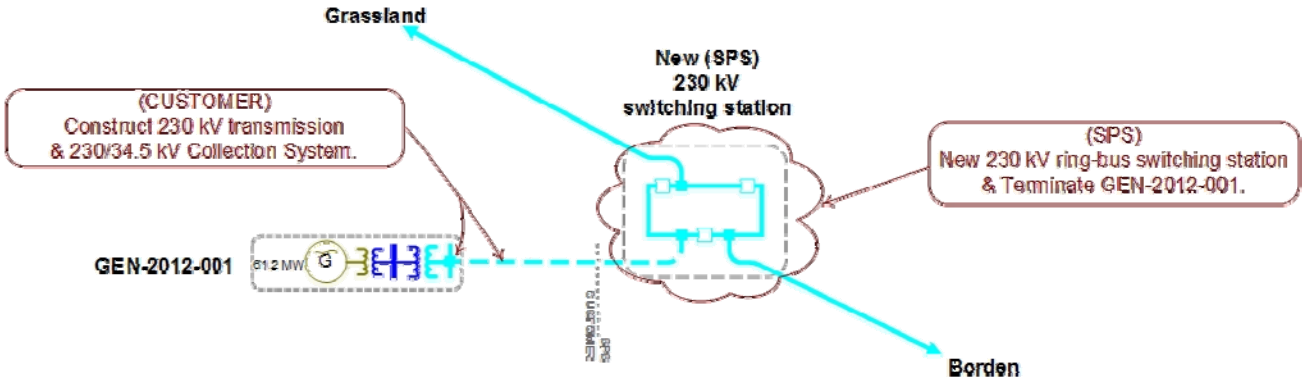
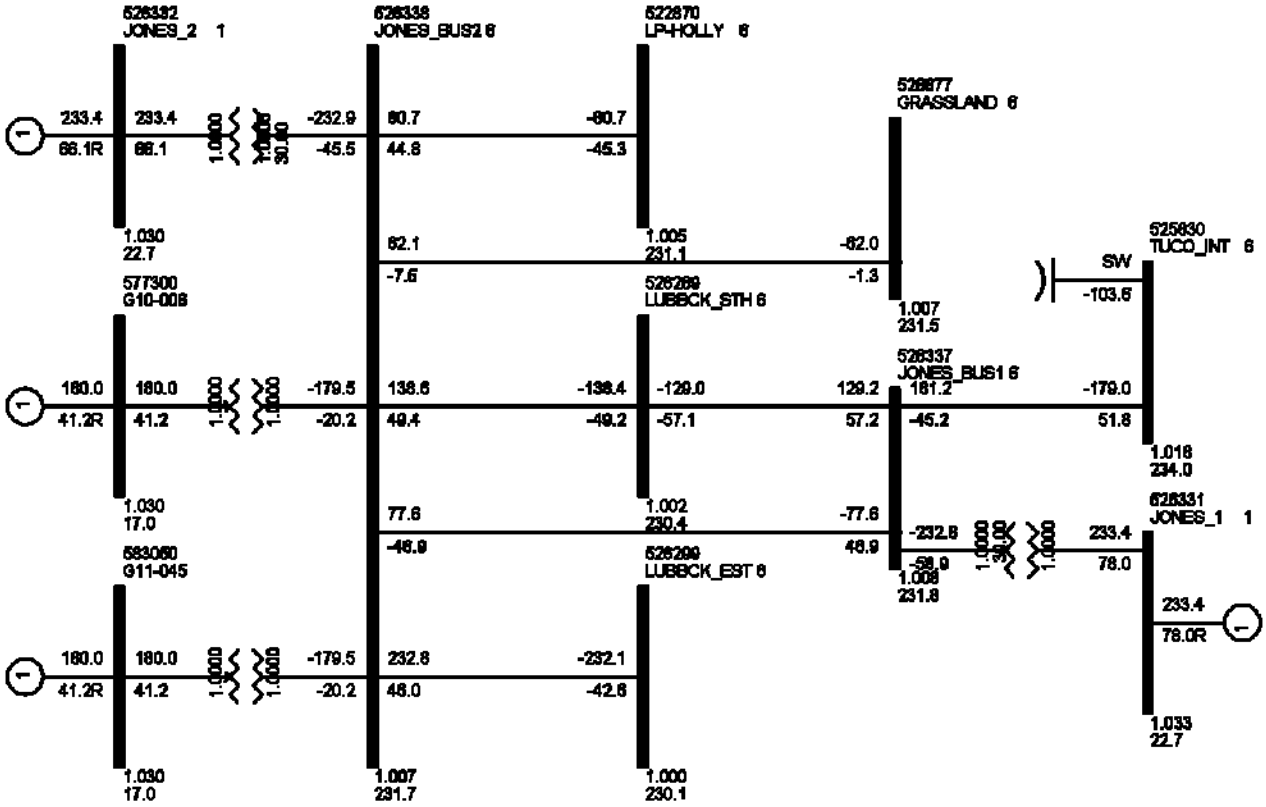
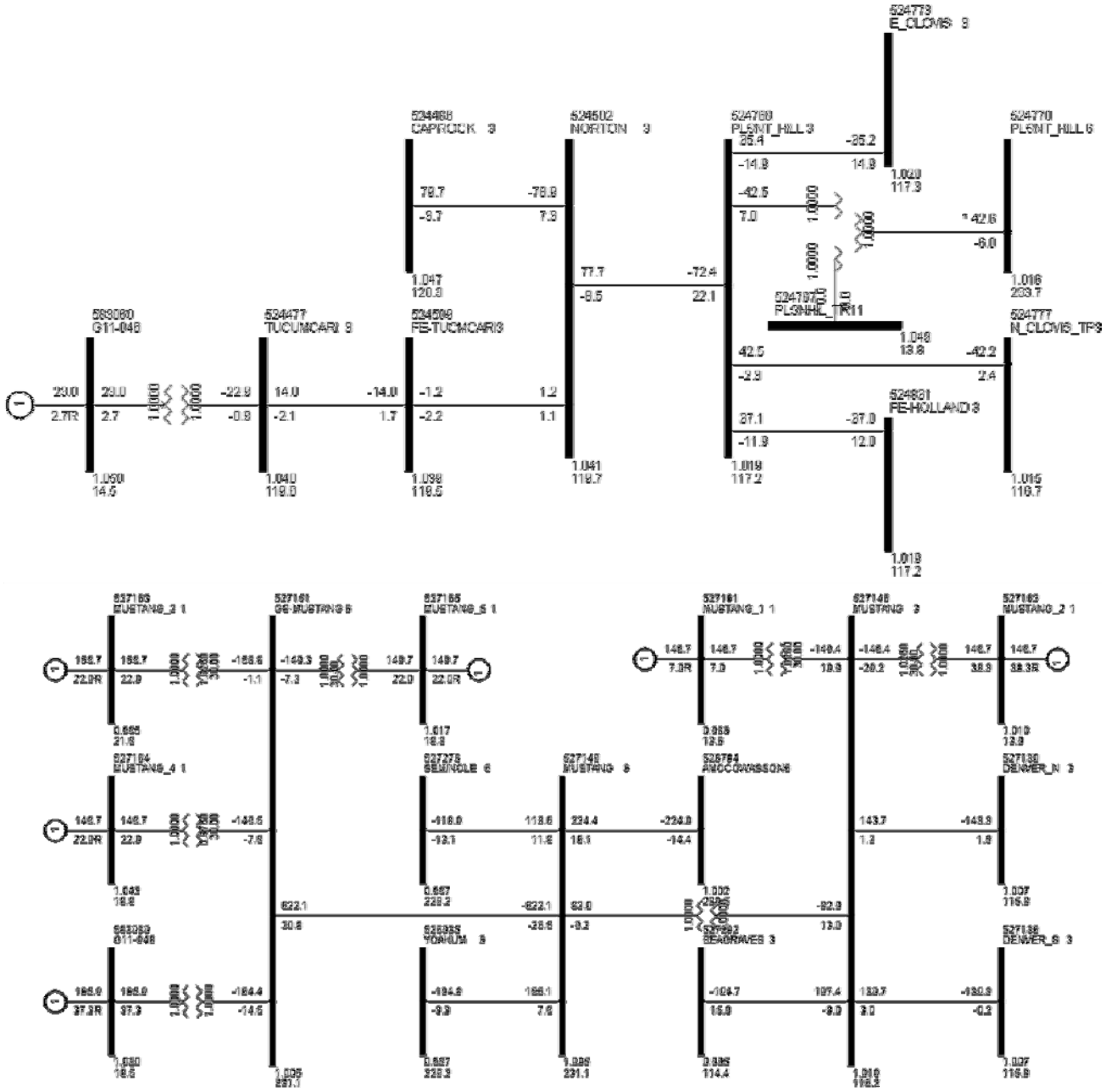


Figure 1: GEN-2011-045, GEN-2011-046, GEN-2011-048, ASGI-2011-004, and GEN-2012-001 Facility and Proposed Interconnection Configurations





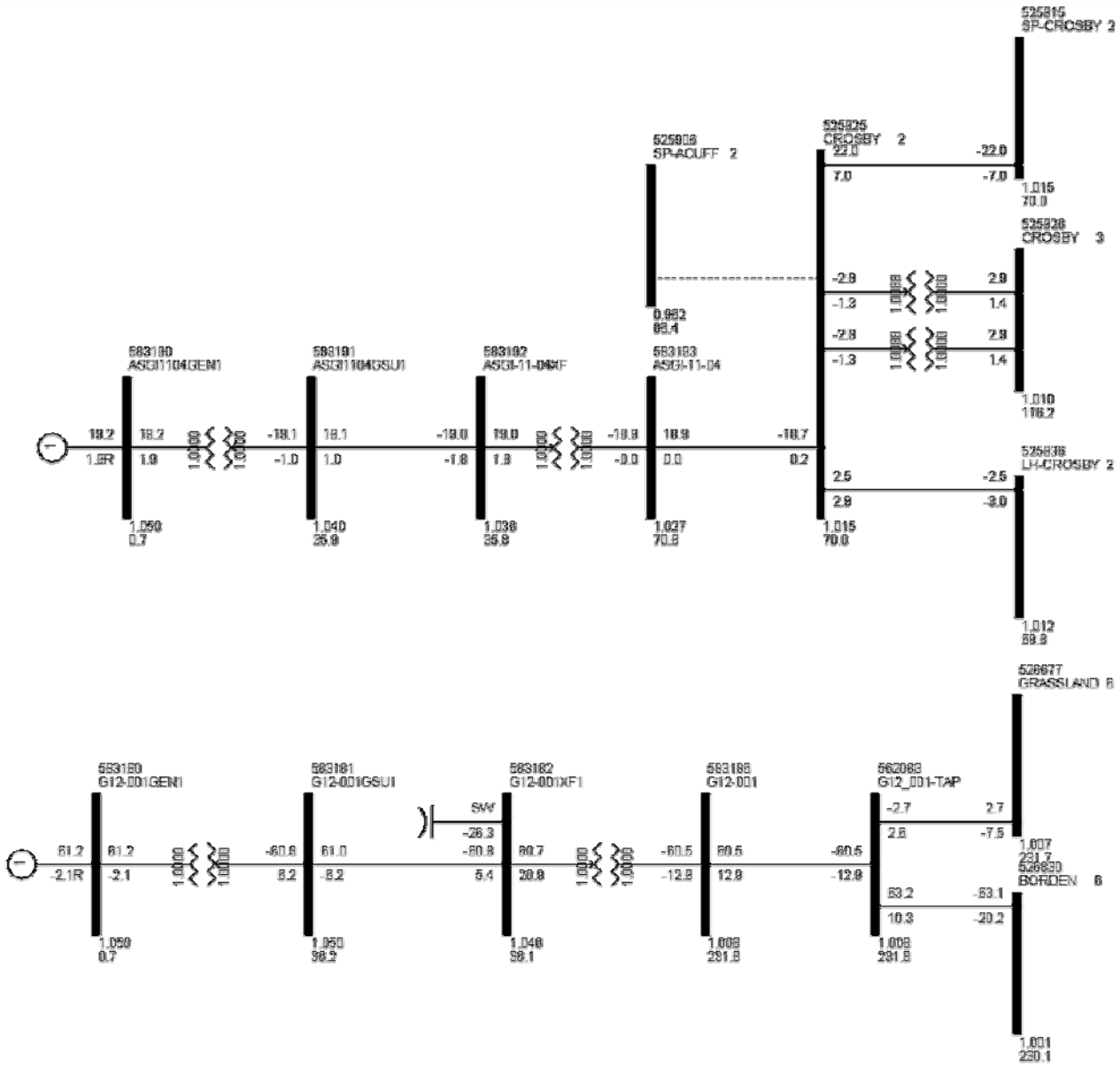


Figure 2: GEN-2011-045, GEN-2011-046, GEN-2011-048, ASGI-2011-004, and GEN-2012-001 Bus Interconnection

Additional Facilities Cost$

GEN-2012-001 - Additional reactive support, a minimum of 24 MVAr of capacitors, at the GEN-2012-001 34.5kV substation is required for interim operation of GEN-2012-001. The study results from DISIS-2012-001 and the facility study may revise this requirement for operation with system upgrades placed in-service.

Stabilizers – Cost$ to install stabilizers needed on certain generating units in the SPS balancing authority will be determined in the Facility Study.

Powerflow Analysis

A powerflow analysis was conducted for the Interconnection Customers facilities using a modified version of the 2012 spring, 2012 summer, and 2012 winter seasonal models. The output of the Interconnection Customers facilities were offset in the model by a reduction in output of existing online SPP generation. This method allows the request to be studied as an Energy Resource (ERIS) Interconnection Request. This analysis was conducted assuming that previous queued requests listed in Table 3 were in-service.

The Southwest Power Pool (SPP) Criteria states that:

> "The transmission system of the SPP region shall be planned and constructed so that the contingencies as set forth in the Criteria will meet the applicable NERC Reliability Standards for transmission planning. All MDWG power flow models shall be tested to verify compliance with the System Performance Standards from NERC Table 1 – Category A."

The ACCC function of PSS/E was used to simulate single contingencies in portions of or all of the control area of SPS and other control areas within SPP and the resulting data analyzed. This satisfies the "more probable" contingency testing criteria mandated by NERC and the SPP criteria.

Higher queued projects listed in Table 4 were not modeled as in service. If any of these come in service, this study will need to be performed again to determine if any limited interconnection service is available.

The ACCC analysis indicates that the Customers projects can interconnect 488 MW of generation into the SPS transmission system. This interconnection request was studied for Energy Resource Interconnection Service (ERIS) only in this L&IOIS.

***Table 1**: ACCC Analysis for GEN-2011-045, GEN-2011-046, GEN-2011-048, ASGI-2011-004, and GEN-2012-001*

SEASON	SOURCE	DIRECTION	MONTCOMMONNAME	RATEA	RATEB	TDF	TC%LOADING	MW Available	CONTNAME
	G11_045		None						
	G11_046		None						
	G11_048		None						
	ASGI11004		None						
	G12_001		None						

Stability Analysis

Contingencies Simulated

Sixty-eight (68) contingencies were considered for the transient stability simulations. These contingencies included three phase faults and single phase line faults at locations defined by SPP. Single-phase line faults were simulated by applying a 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.

The faults that were defined and simulated are listed in Table 2 below.

***Table 2**: Contingencies Evaluated*

Cont. No.	Cont. Name	Description
1.	FLT_01_CRVEALMOOR4_BORDEN6_138_230kV_3PH	3 phase fault on the Cap Rock Vealmoor 138kV (522896) to Borden Co. (526830) 230kV transformer, near Vealmoor. a. Apply fault at Vealmoor 138kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.
2.	FLT_02_G12001TAP_BORDEN6_230kV_3PH	3 phase fault on the GEN-2012-001 Tap (562089) to Borden (526830) 230kV line, near GEN-2012-001 Tap. a. Apply fault at GEN-2012-001 Tap 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
3.	FLT_03_G12001TAP_BORDEN6_230kV_1PH	*Single phase fault and sequence like previous*
4.	FLT_04_G12001TAP_GRASSLAND6_230kV_3PH	3 phase fault on the GEN-2012-001 Tap (562089) to Grassland (526677) 230kV line, near GEN-2012-001 Tap. a. Apply fault at GEN-2012-001 Tap 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
5.	FLT_05_G12001TAP_GRASSLAND6_230kV_1PH	*Single phase fault and sequence like previous*
6.	FLT_06_GRASSLAND6_JONESBUS26_230kV_3PH	3 phase fault on the Grassland (526677) to Jones Bus 2 (526338) 230kV line, near Grassland. a. Apply fault at Grassland 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
7.	FLT_07_GRASSLAND6_JONESBUS26_230kV_1PH	*Single phase fault and sequence like previous*

Cont. No.	Cont. Name	Description
8.	FLT_08_GRASSLAND6_GRASSLAND6_115_230kV_3PH	3 phase fault on the Grassland (526676) 115kV to Grassland (526677) 230kV transformer, near Grassland 115kV. a. Apply fault at Grassland 115kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.
9.	FLT_09_JONESBUS26_LUBBCKSTH6_230kV_3PH	3 phase fault on the Jones Bus 2 (526338) to Lubbock South (526269) 230kV line, near Jones Bus 2. a. Apply fault at Jones Bus 2 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
10.	FLT_10_JONESBUS26_LUBBCKSTH6_230kV_1PH	*Single phase fault and sequence like previous*
11.	FLT_11_JONESBUS16_JONESBUS26_230kV_3PH	3 phase fault on the Jones Bus 1 (526337) to Jones Bus 2 (526338) 230kV line, near Jones Bus 1. a. Apply fault at Jones Bus 1 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
12.	FLT_12_JONESBUS16_JONESBUS26_230kV_1PH	*Single phase fault and sequence like previous*
13.	FLT_13_TUCOINT6_JONESBUS16_230kV_3PH	3 phase fault on the Tuco (525830) to Jones Bus 1 (526337) 230kV line, near Tuco. a. Apply fault at Tuco 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
14.	FLT_14_TUCOINT6_JONESBUS16_230kV_1PH	*Single phase fault and sequence like previous*
15.	FLT_15_TUCOINT7_TUCOINT6_345_230kV_3PH	3 phase fault on the Tuco 345kV (525832) to Tuco 230kV (525830) transformer, near Tuco 345kV. a. Apply fault at Tuco 345kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.
16.	FLT_16_TUCOINT7_OKU7_345kV_3PH	3 phase fault on the Tuco (525832) to Oklaunion (511456) 345kV line, near Tuco. a. Apply fault at Tuco 345kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
17.	FLT_17_TUCOINT7_OKU7_345kV_1PH	*Single phase fault and sequence like previous*
18.	FLT_18_TOLKEAST6_TUCOINT6_230kV_3PH	3 phase fault on the Tolk East (525524) to Tuco (525830) 230kV line, near Tolk East. a. Apply fault at Tolk East 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
19.	FLT_19_TOLKEAST6_TUCOINT6_230kV_1PH	*Single phase fault and sequence like previous*
20.	FLT_20_MUSTANG6_SEAGRAVES3_230kV_3PH	3 phase fault on the Mustang (527149) to Seagraves (527276) 230kV line, near Mustang. a. Apply fault at Mustang 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
21.	FLT_21_MUSTANG6_SEAGRAVES3_230kV_1PH	*Single phase fault and sequence like previous*
22.	FLT_22_MUSTANG6_AMOCOWASSON6_230kV_3PH	3 phase fault on the Mustang (527149) to AMOCO Wasson (526784) 230kV line, near Mustang. a. Apply fault at Mustang 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
23.	FLT_23_MUSTANG6_AMOCOWASSON6_230kV_1PH	*Single phase fault and sequence like previous*

Cont. No.	Cont. Name	Description
24.	FLT_24_MUSTANG6_YOAKUM6_230kV_3PH	3 phase fault on the Mustang (527149) to Yoakum (526935) 230kV line, near Mustang. a. Apply fault at Mustang 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
25.	FLT_25_MUSTANG6_YOAKUM6_230kV_1PH	*Single phase fault and sequence like previous*
26.	FLT_26_SEMINOLE3_DENVERS3_115kV_3PH	3 phase fault on the Seminole (527275) to Denver South (527136) 115kV line, near Seminole. a. Apply fault at Seminole 115kV 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_SEMINOLE3_DENVERS3_115kV_1PH	*Single phase fault and sequence like previous*
28.	FLT_28_YOAKUM6_TOLKWEST6_230kV_3PH	3 phase fault on the Yoakum (526935) to Tolk West (525531) 230kV line, near Yoakum. a. Apply fault at Yoakum 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
29.	FLT_29_YOAKUM6_TOLKWEST6_230kV_1PH	*Single phase fault and sequence like previous*
30.	FLT_30_CROSBY3_FLOYDCNTY3_115kV_3PH	3 phase fault on the Crosby (525926) to Floyd County (525780) 115kV line, near Crosby. a. Apply fault at Crosby 115kV 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_CROSBY3_FLOYDCNTY3_115kV_1PH	*Single phase fault and sequence like previous*
32.	FLT_32_FLOYDCNTY3_CROSBY3_115kV_3PH	3 phase fault on the Floyd County (525780) to Crosby (525926) 115kV line, near Floyd County. a. Apply fault at Floyd County 115kV 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.
33.	FLT_33_FLOYDCNTY3_CROSBY3_115kV_1PH	*Single phase fault and sequence like previous*
34.	FLT_34_FLOYDCNTY3_TUCOINT3_115kV_3PH	3 phase fault on the Floyd County (525780) to Tuco Int. (525828) 115kV line, near Floyd County. a. Apply fault at Floyd County 115kV 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.
35.	FLT_35_FLOYDCNTY3_TUCOINT3_115kV_1PH	*Single phase fault and sequence like previous*
36.	FLT_36_FLOYDCNTY3_COX3_115kV_3PH	3 phase fault on the Floyd County (525780) to Cox (525326) 115kV line, near Floyd County. a. Apply fault at Floyd County 115kV 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.

Cont. No.	Cont. Name	Description
37.	FLT_37_FLOYDCNTY3_COX3_115kV_1PH	*Single phase fault and sequence like previous*
38.	FLT_38_TUCOINT3_HALECNTY3_115kV_3PH	3 phase fault on the Tuco Int. (525828) to Hale County (525454) 115kV line, near Tuco Int. a. Apply fault at Tuco Int. 115kV 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_TUCOINT3_HALECNTY3_115kV_1PH	*Single phase fault and sequence like previous*
40.	FLT_40_TUCOINT3_STANTON3_115kV_3PH	3 phase fault on the Tuco Int. (525828) to Stanton (526076) 115kV line, near Tuco Int. a. Apply fault at Tuco Int. 115kV 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_TUCOINT3_STANTON3_115kV_1PH	*Single phase fault and sequence like previous*
42.	FLT_42_TUCOINT3_LUBBOCKEST3_115kV_3PH	3 phase fault on the Tuco Int. (525828) to Lubbock East (526298) 115kV line, near Tuco Int. a. Apply fault at Tuco Int. 115kV 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_TUCOINT3_LUBBOCKEST3_115kV_1PH	*Single phase fault and sequence like previous*
44.	FLT_44_TUCOINT3_TUCOINT6_115_230kV_3PH	3 phase fault on the Tuco Int. (525828) 115kV to Tuco Int. (525830) 230kV transformer, near Tuco Int 115kV. a. Apply fault at Tuco Int. 115kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.
45.	FLT_45_TUCOINT3_TUCOINT6_115_230kV_1PH	*Single phase fault and sequence like previous*
46.	FLT_46_CROSBY3_LUBBOCKEST3_115kV_3PH	3 phase fault on the Crosby (525926) to Lubbock East (526298) 115kV line, near Crosby. a. Apply fault at Crosby 115kV 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.
47.	FLT_47_CROSBY3_LUBBOCKEST3_115kV_1PH	*Single phase fault and sequence like previous*
48.	FLT_48_LUBBOCKEST3_LUBBOCKSTH3_115kV_3PH	3 phase fault on the Lubbock East (526298) to Lubbock South (526268) 115kV line, near Lubbock East. a. Apply fault at Lubbock East 115kV 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.
49.	FLT_49_LUBBOCKEST3_LUBBOCKSTH3_115kV_1PH	*Single phase fault and sequence like previous*

Cont. No.	Cont. Name	Description
50.	FLT_50_LUBBOCKEST3_LUBBOCKEST6_115_230kV_3PH	3 phase fault on the Lubbock East (526298) 115kV to Lubbock East (526299) 230kV transformer, near Lubbock East 115kV. a. Apply fault at Lubbock East 115kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.
51.	FLT_51_LUBBOCKEST3_LUBBOCKEST6_115_230kV_1PH	*Single phase fault and sequence like previous*
52.	FLT_52_PLSNTHILL3_ECLOVIS3_115kV_3PH	3 phase fault on the Pleasant Hill (524768) to East Clovis (524773) 115kV line, near Pleasant Hill. a. Apply fault at Pleasant Hill 115kV 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.
53.	FLT_53_PLSNTHILL3_ECLOVIS3_115kV_1PH	*Single phase fault and sequence like previous*
54.	FLT_54_PLSNTHILL3_NCLOVISTP3_115kV_3PH	3 phase fault on the Pleasant Hill (524768) to North Clovis (524777) 115kV line, near Pleasant Hill. a. Apply fault at Pleasant Hill 115kV 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.
55.	FLT_55_PLSNTHILL3_NCLOVISTP3_115kV_1PH	*Single phase fault and sequence like previous*
56.	FLT_56_PLSNTHILL3_FEHOLLAND3_115kV_3PH	3 phase fault on the Pleasant Hill (524768) to F. E. Holland (524831) 115kV line, near Pleasant Hill. a. Apply fault at Pleasant Hill 115kV 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.
57.	FLT_57_PLSNTHILL3_FEHOLLAND3_115kV_1PH	*Single phase fault and sequence like previous*
58.	FLT_58_PLSNTHILL3_PLSNTHILL6_115_230kV_3PH	3 phase fault on the Pleasant Hill (524768) 115kV to Pleasant Hill (524770) 230kV transformer, near Pleasant Hill 115kV. a. Apply fault at Pleasant Hill 115kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.
59.	FLT_59_OASIS6_SNJUANTAP6_230kV_3PH	3 phase fault on the Oasis (524875) to San Juan Tap (524885) 230kV line, near Oasis. a. Apply fault at Oasis 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
60.	FLT_60_OASIS6_SNJUANTAP6_230kV_1PH	*Single phase fault and sequence like previous*
61.	FLT_61_OASIS6_OASIS3_230_115kV_3PH	3 phase fault on the Oasis (524875) 230kV to Oasis (524874) 115kV transformer, near Oasis 230kV. a. Apply fault at Oasis 230kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.
62.	FLT_62_OASIS6_OASIS3_230_115kV_1PH	*Single phase fault and sequence like previous*

Cont. No.	Cont. Name	Description
63.	FLT_63_OASIS6_SW4K336_230kV_3PH	3 phase fault on the Oasis (524875) to SWK336 (524915) 230kV line, near Oasis. a. Apply fault at Oasis 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
64.	FLT_64_OASIS6_SW4K336_230kV_1PH	*Single phase fault and sequence like previous*
65.	FLT_65_LELOVINGTON3_LEACNTY3_115kV_3PH	3 phase fault on the L.E. Lovington (528334) to Lea County (527848) 115kV line, near L.E. Lovington. a. Apply fault at L.E. Lovington 115kV 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.
66.	FLT_66_LELOVINGTON3_LEACNTY3_115kV_1PH	*Single phase fault and sequence like previous*
67.	FLT_67_LELOVINGTON3_LEWAITS3_115kV_3PH	3 phase fault on the L.E. Lovington (528334) to L.E. Waits (528325) 115kV line, near L.E. Lovington. a. Apply fault at L.E. Lovington 115kV 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.
68.	FLT_68_LELOVINGTON3_LEWAITS3_115kV_1PH	*Single phase fault and sequence like previous*

Further Model Preparation

The base cases contain prior queued projects as shown in Table 3.

The Combustion and Wind Turbine generation from the study customer and the previously queued customers were dispatched into the SPP footprint.

Initial simulations were carried out on both base cases and cases with the added generation for a no-disturbance run of 20 seconds to verify the numerical stability of the model. All cases were confirmed to be stable.

***Table 3**: Prior Queued Projects Included*

Project	MW
ASGI-2010-010	42
ASGI-2010-020	30
ASGI-2010-021	15
ASGI-2011-001	27.3
ASGI-2011-002	10
ASGI-2011-003	10
GEN-2001-033	120
GEN-2001-036	80

Project	MW
GEN-2006-018	170
GEN-2006-026	502
GEN-2010-006	205

The projects listed in Table 4 are higher or equally queued projects that are not included in this analysis. If any of these projects come into service, this study will need to be re-performed to determine if any limited service is available.

***Table 4**: Prior Queued Projects Not Included*

Project	MW
GEN-2001-033	60
GEN-2008-008	60
GEN-2008-009	60
GEN-2008-014	150
GEN-2008-016	248
GEN-2008-022	300
GEN-2009-067S	20
GEN-2010-020	20
GEN-2010-046	56
GEN-2010-058	20
GEN-2011-025	82.3
GEN-2011-049	250.7

Results

Results of the stability analysis are summarized in Table 5. These results are valid for GEN-2011-045, GEN-2011-046, GEN-2011-048, ASGI-2011-004, and GEN-2012-001 interconnecting with a generation amount up to 488 MW. The results indicate that with the addition of stabilizers on certain generating units in the SPS balancing authority and additional reactive support at the GEN-2012-001 34.5kV substation, the transmission system remains stable for all contingencies studied.

***Table 5**: Contingencies Evaluated*

Cont. No.	Cont. Name	Description	2011 Summer	2011 Winter
1.	FLT_01_CRVEALMOOR4_BORDEN6_138_230kV_3PH	3 phase fault on the Cap Rock Vealmoor 138kV (522896) to Borden Co. (526830) 230kV transformer, near Vealmoor.	Stable	Stable
2.	FLT_02_G12001TAP_BORDEN6_230kV_3PH	3 phase fault on the GEN-2011-058 Tap (562089) to Borden (526830) 230kV line, near GEN-2011-058 Tap.	Stable	Stable
3.	FLT_03_G12001TAP_BORDEN6_230kV_1PH	*Single phase fault and sequence like previous*	Stable	Stable

Cont. No.	Cont. Name	Description	2011 Summer	2011 Winter
4.	FLT_04_G12001TAP_GRASSLAND6_230kV_3PH	3 phase fault on the GEN-2011-058 Tap (562089) to Grassland (526677) 230kV line, near GEN-2011-058 Tap.	Stable	Stable
5.	FLT_05_G12001TAP_GRASSLAND6_230kV_1PH	*Single phase fault and sequence like previous*	Stable	Stable
6.	FLT_06_GRASSLAND6_JONESBUS26_230kV_3PH	3 phase fault on the Grassland (526677) to Jones Bus 2 (526338) 230kV line, near Grassland.	Stable	Stable
7.	FLT_07_GRASSLAND6_JONESBUS26_230kV_1PH	*Single phase fault and sequence like previous*	Stable	Stable
8.	FLT_08_GRASSLAND6_GRASSLAND6_115_230kV_3PH	3 phase fault on the Grassland (526676) 115kV to Grassland (526677) 230kV transformer, near Grassland 115kV.	Stable	Stable
9.	FLT_09_JONESBUS26_LUBBCKSTH6_230kV_3PH	3 phase fault on the Jones Bus 2 (526338) to Lubbock South (526269) 230kV line, near Jones Bus 2.	Stable	Stable
10.	FLT_10_JONESBUS26_LUBBCKSTH6_230kV_1PH	*Single phase fault and sequence like previous*	Stable	Stable
11.	FLT_11_JONESBUS16_JONESBUS26_230kV_3PH	3 phase fault on the Jones Bus 1 (526337) to Jones Bus 2 (526338) 230kV line, near Jones Bus 1.	Stable	Stable
12.	FLT_12_JONESBUS16_JONESBUS26_230kV_1PH	*Single phase fault and sequence like previous*	Stable	Stable
13.	FLT_13_TUCOINT6_JONESBUS16_230kV_3PH	3 phase fault on the Tuco (525830) to Jones Bus 1 (526337) 230kV line, near Tuco.	Stable	Stable
14.	FLT_14_TUCOINT6_JONESBUS16_230kV_1PH	*Single phase fault and sequence like previous*	Stable	Stable
15.	FLT_15_TUCOINT7_TUCOINT6_345_230kV_3PH	3 phase fault on the Tuco 345kV (525832) to Tuco 230kV (525830) transformer, near Tuco 345kV.	Stable	Stable
16.	FLT_16_TUCOINT7_OKU7_345kV_3PH	3 phase fault on the Tuco (525832) to Oklaunion (511456) 345kV line, near Tuco.	Stable	Stable
17.	FLT_17_TUCOINT7_OKU7_345kV_1PH	*Single phase fault and sequence like previous*	Stable	Stable
18.	FLT_18_TOLKEAST6_TUCOINT6_230kV_3PH	3 phase fault on the Tolk East (525524) to Tuco (525830) 230kV line, near Tolk East.	Stable	Stable
19.	FLT_19_TOLKEAST6_TUCOINT6_230kV_1PH	*Single phase fault and sequence like previous*	Stable	Stable
20.	FLT_20_MUSTANG6_SEAGRAVES3_230kV_3PH	3 phase fault on the Mustang (527149) to Seagraves (527276) 230kV line, near Mustang.	Stable	Stable
21.	FLT_21_MUSTANG6_SEAGRAVES3_230kV_1PH	*Single phase fault and sequence like previous*	Stable	Stable
22.	FLT_22_MUSTANG6_AMOCOWASSON6_230kV_3PH	3 phase fault on the Mustang (527149) to AMOCO Wasson (526784) 230kV line, near Mustang.	Stable	Stable
23.	FLT_23_MUSTANG6_AMOCOWASSON6_230kV_1PH	*Single phase fault and sequence like previous*	Stable	Stable
24.	FLT_24_MUSTANG6_YOAKUM6_230kV_3PH	3 phase fault on the Mustang (527149) to Yoakum (526935) 230kV line, near Mustang.	Stable	Stable
25.	FLT_25_MUSTANG6_YOAKUM6_230kV_1PH	*Single phase fault and sequence like previous*	Stable	Stable
26.	FLT_26_SEMINOLE3_DENVERS3_115kV_3PH	3 phase fault on the Seminole (527275) to Denver South (527136) 115kV line, near Seminole.	Stable	Stable
27.	FLT_27_SEMINOLE3_DENVERS3_115kV_1PH	*Single phase fault and sequence like previous*	Stable	Stable

Cont. No.	Cont. Name	Description	2011 Summer	2011 Winter
28.	FLT_28_YOAKUM6_TOLKWEST6_230kV_3PH	3 phase fault on the Yoakum (526935) to Tolk West (525531) 230kV line, near Yoakum.	Stable	Stable
29.	FLT_29_YOAKUM6_TOLKWEST6_230kV_1PH	*Single phase fault and sequence like previous*	Stable	Stable
30.	FLT_30_CROSBY3_FLOYDCNTY3_115kV_3PH	3 phase fault on the Crosby (525926) to Floyd County (525780) 115kV line, near Crosby.	Stable	Stable
31.	FLT_31_CROSBY3_FLOYDCNTY3_115kV_1PH	*Single phase fault and sequence like previous*	Stable	Stable
32.	FLT_32_FLOYDCNTY3_CROSBY3_115kV_3PH	3 phase fault on the Floyd County (525780) to Crosby (525926) 115kV line, near Floyd County.	Stable	Stable
33.	FLT_33_FLOYDCNTY3_CROSBY3_115kV_1PH	*Single phase fault and sequence like previous*	Stable	Stable
34.	FLT_34_FLOYDCNTY3_TUCOINT3_115kV_3PH	3 phase fault on the Floyd County (525780) to Tuco Int. (525828) 115kV line, near Floyd County.	Stable	Stable
35.	FLT_35_FLOYDCNTY3_TUCOINT3_115kV_1PH	*Single phase fault and sequence like previous*	Stable	Stable
36.	FLT_36_FLOYDCNTY3_COX3_115kV_3PH	3 phase fault on the Floyd County (525780) to Cox (525326) 115kV line, near Floyd County.	Stable	Stable
37.	FLT_37_FLOYDCNTY3_COX3_115kV_1PH	*Single phase fault and sequence like previous*	Stable	Stable
38.	FLT_38_TUCOINT3_HALECNTY3_115kV_3PH	3 phase fault on the Tuco Int. (525828) to Hale County (525454) 115kV line, near Tuco Int.	Stable	Stable
39.	FLT_39_TUCOINT3_HALECNTY3_115kV_1PH	*Single phase fault and sequence like previous*	Stable	Stable
40.	FLT_40_TUCOINT3_STANTON3_115kV_3PH	3 phase fault on the Tuco Int. (525828) to Stanton (526076) 115kV line, near Tuco Int.	Stable	Stable
41.	FLT_41_TUCOINT3_STANTON3_115kV_1PH	*Single phase fault and sequence like previous*	Stable	Stable
42.	FLT_42_TUCOINT3_LUBBOCKEST3_115kV_3PH	3 phase fault on the Tuco Int. (525828) to Lubbock East (526298) 115kV line, near Tuco Int.	Stable	Stable
43.	FLT_43_TUCOINT3_LUBBOCKEST3_115kV_1PH	*Single phase fault and sequence like previous*	Stable	Stable
44.	FLT_44_TUCOINT3_TUCOINT6_115_230kV_3PH	3 phase fault on the Tuco Int. (525828) 115kV to Tuco Int. (525830) 230kV transformer, near Tuco Int 115kV.	Stable	Stable
45.	FLT_45_TUCOINT3_TUCOINT6_115_230kV_1PH	*Single phase fault and sequence like previous*	Stable	Stable
46.	FLT_46_CROSBY3_LUBBOCKEST3_115kV_3PH	3 phase fault on the Crosby (525926) to Lubbock East (526298) 115kV line, near Crosby.	Stable	Stable
47.	FLT_47_CROSBY3_LUBBOCKEST3_115kV_1PH	*Single phase fault and sequence like previous*	Stable	Stable
48.	FLT_48_LUBBOCKEST3_LUBBOCKSTH3_115kV_3PH	3 phase fault on the Lubbock East (526298) to Lubbock South (526268) 115kV line, near Lubbock East.	Stable	Stable
49.	FLT_49_LUBBOCKEST3_LUBBOCKSTH3_115kV_1PH	*Single phase fault and sequence like previous*	Stable	Stable
50.	FLT_50_LUBBOCKEST3_LUBBOCKEST6_115_230kV_3PH	3 phase fault on the Lubbock East (526298) 115kV to Lubbock East (526299) 230kV transformer, near Lubbock East 115kV.	Stable	Stable
51.	FLT_51_LUBBOCKEST3_LUBBOCKEST6_115_230kV_1PH	*Single phase fault and sequence like previous*	Stable	Stable
52.	FLT_52_PLSNTHILL3_ECLOVIS3_115kV_3PH	3 phase fault on the Pleasant Hill (524768) to East Clovis (524773) 115kV line, near Pleasant Hill.	Stable	Stable

Cont. No.	Cont. Name	Description	2011 Summer	2011 Winter
53.	FLT_53_PLSNTHILL3_ECLOVIS3_115kV_1PH	*Single phase fault and sequence like previous*	Stable	Stable
54.	FLT_54_PLSNTHILL3_NCLOVISTP3_115kV_3PH	3 phase fault on the Pleasant Hill (524768) to North Clovis (524777) 115kV line, near Pleasant Hill.	Stable	Stable
55.	FLT_55_PLSNTHILL3_NCLOVISTP3_115kV_1PH	*Single phase fault and sequence like previous*	Stable	Stable
56.	FLT_56_PLSNTHILL3_FEHOLLAND3_115kV_3PH	3 phase fault on the Pleasant Hill (524768) to F. E. Holland (524831) 115kV line, near Pleasant Hill.	Stable	Stable
57.	FLT_57_PLSNTHILL3_FEHOLLAND3_115kV_1PH	*Single phase fault and sequence like previous*	Stable	Stable
58.	FLT_58_PLSNTHILL3_PLSNTHILL6_115_230kV_3PH	3 phase fault on the Pleasant Hill (524768) 115kV to Pleasant Hill (524770) 230kV transformer, near Pleasant Hill 115kV.	Stable	Stable
59.	FLT_59_OASIS6_SNJUANTAP6_230kV_3PH	3 phase fault on the Oasis (524875) to San Juan Tap (524885) 230kV line, near Oasis.	Stable	Stable
60.	FLT_60_OASIS6_SNJUANTAP6_230kV_1PH	*Single phase fault and sequence like previous*	Stable	Stable
61.	FLT_61_OASIS6_OASIS3_230_115kV_3PH	3 phase fault on the Oasis (524875) 230kV to Oasis (524874) 115kV transformer, near Oasis 230kV.	Stable	Stable
62.	FLT_62_OASIS6_OASIS3_230_115kV_1PH	*Single phase fault and sequence like previous*	Stable	Stable
63.	FLT_63_OASIS6_SW4K336_230kV_3PH	3 phase fault on the Oasis (524875) to SWK336 (524915) 230kV line, near Oasis.	Stable	Stable
64.	FLT_64_OASIS6_SW4K336_230kV_1PH	*Single phase fault and sequence like previous*	Stable	Stable
65.	FLT_65_LELOVINGTON3_LEACNTY3_115kV_3PH	3 phase fault on the L.E. Lovington (528334) to Lea County (527848) 115kV line, near L.E. Lovington.	Stable	Stable
66.	FLT_66_LELOVINGTON3_LEACNTY3_115kV_1PH	*Single phase fault and sequence like previous*	Stable	Stable
67.	FLT_67_LELOVINGTON3_LEWAITS3_115kV_3PH	3 phase fault on the L.E. Lovington (528334) to L.E. Waits (528325) 115kV line, near L.E. Lovington.	Stable	Stable
68.	FLT_68_LELOVINGTON3_LEWAITS3_115kV_1PH	*Single phase fault and sequence like previous*	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 6.

***Table 6**: Contingencies Evaluated*

Cont. Name	Description
FLT_02_G12001TAP_BORDEN6_230kV_3PH	3 phase fault on the GEN-2012-001 Tap (562089) to Borden (526830) 230kV line, near GEN-2012-001 Tap. a. Apply fault at GEN-2012-001 Tap 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT_04_G12001TAP_GRASSLAND6_230kV_3PH	3 phase fault on the GEN-2012-001 Tap (562089) to Grassland (526677) 230kV line, near GEN-2012-001 Tap. a. Apply fault at GEN-2012-001 Tap 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line. c. Wait 20 cycles, and then re-close the line in (b) back into the fault. d. Leave fault on for 5 cycles, then trip the line in (b) and remove fault.
FLT_09_JONESBUS26_LUBBCKSTH6_230kV_3PH	3 phase fault on the Jones Bus 2 (526338) to Lubbock South (526269) 230kV line, near Jones Bus 2. a. Apply fault at Jones Bus 2 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
FLT_11_JONESBUS16_JONESBUS26_230kV_3PH	3 phase fault on the Jones Bus 1 (526337) to Jones Bus 2 (526338) 230kV line, near Jones Bus 1. a. Apply fault at Jones Bus 1 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
FLT_20_MUSTANG6_SEAGRAVES3_230kV_3PH	3 phase fault on the Mustang (527149) to Seagraves (527276) 230kV line, near Mustang. a. Apply fault at Mustang 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
FLT_22_MUSTANG6_AMOCOWASSON6_230kV_3PH	3 phase fault on the Mustang (527149) to AMOCO Wasson (526784) 230kV line, near Mustang. a. Apply fault at Mustang 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
FLT_24_MUSTANG6_YOAKUM6_230kV_3PH	3 phase fault on the Mustang (527149) to Yoakum (526935) 230kV line, near Mustang. a. Apply fault at Mustang 230kV bus. b. Clear fault after 5 cycles by tripping the faulted line.
FLT_30_CROSBY3_FLOYDCNTY3_115kV_3PH	3 phase fault on the Crosby (525926) to Floyd County (525780) 115kV line, near Crosby. a. Apply fault at Crosby 115kV 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.
FLT_46_CROSBY3_LUBBOCKEST3_115kV_3PH	3 phase fault on the Crosby (525926) to Lubbock East (526298) 115kV line, near Crosby. a. Apply fault at Crosby 115kV 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.
FLT_52_PLSNTHILL3_ECLOVIS3_115kV_3PH	3 phase fault on the Pleasant Hill (524768) to East Clovis (524773) 115kV line, near Pleasant Hill. a. Apply fault at Pleasant Hill 115kV 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.

Cont. Name	Description
FLT_54_PLSNTHILL3_NCLOVISTP3_115kV_3PH	3 phase fault on the Pleasant Hill (524768) to North Clovis (524777) 115kV line, near Pleasant Hill. a. Apply fault at Pleasant Hill 115kV 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.
FLT_56_PLSNTHILL3_FEHOLLAND3_115kV_3PH	3 phase fault on the Pleasant Hill (524768) to F. E. Holland (524831) 115kV line, near Pleasant Hill. a. Apply fault at Pleasant Hill 115kV 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.
FLT_58_PLSNTHILL3_PLSNTHILL6_115_230kV_3PH	3 phase fault on the Pleasant Hill (524768) 115kV to Pleasant Hill (524770) 230kV transformer, near Pleasant Hill 115kV. a. Apply fault at Pleasant Hill 115kV bus. b. Clear fault after 5 cycles by tripping the faulted transformer.

The prior queued project wind farms remained online for the fault contingencies described in this section and for all the fault contingencies described in the Contingencies Simulated section. GEN-2011-045, GEN-2011-046, GEN-2011-048, ASGI-2011-004, and GEN-2012-001 are found to be in compliance with FERC Order #661A.

Conclusion

<OMITTED TEXT> (Customer) has requested a Limited and Interim Operation Impact Study for limited interconnection service of 488 MW of Combustion and Wind Turbine generation within the balancing authority of Southwestern Public Service (SPS) in Lubbock, Quay, Denver, Yoakum, and Crosby Counties, Texas, in accordance with section 5.9 and 11A of the Standard Generation Interconnection Procedures Agreement (GIA) in the SPP OATT.

Power flow analysis showed that the Customers Combustion and Wind Turbine facilities can interconnect 488 MW of Combustion and Wind Turbine generation. The interconnection requests were studied for Energy Resource Interconnection Service (ERIS) only in this LOIS.

The construction lead time to construct the substation or additions to Jones, Quay Co, Mustang, Pleasant Hill and GEN-2012-001 Tap substation will be determined by the Transmission Owner during the Facility Study. Any proposed in service date will be contingent upon the completion of the substation or additions.

The stability analysis results of this study show that with the addition of stabilizers on certain generating units in the SPS balancing authority and additional reactive support at the GEN-2012-001 34.5kV substation, the Combustion and Wind Turbine generation facility and the transmission system will remain stable for the studied contingencies. The cost of the addition of stabilizers will be determined in the Facility Study. Also, GEN-2011-045, GEN-2011-046, GEN-2011-048, ASGI-2011-004, and GEN-2012-001 are found to be in compliance with FERC Order #661A.

The projects listed in Table 4 are higher or equally queued projects that are not included in this analysis. If any of these projects come into service, this study will need to be re-performed to determine if any limited interconnection service is available.

The estimates do not include any costs associated with the deliverability of the energy to final customers. These costs are determined by separate studies if the Customer requests transmission service through Southwest Power Pool's OASIS. It should be noted that the models used for simulation do not contain all SPP transmission service.