SPP Southwest Power Pool

Impact Re-Study For Generation Interconnection Request GEN-2006-037N1

SPP Generation Interconnection

(#GEN-2006-037N1)

July 2011

Executive Summary

<OMITTED TEXT> (Customer) has requested an Impact Re-Study under the Southwest Power Pool Open Access Transmission Tariff (OATT) for interconnection of 75.0 MW of wind generation within the balancing authority of Nebraska Public Power District (NPPD) in Custer County, Nebraska. Customer has requested this Impact Study to determine the impacts of modifying the interconnection configuration and generation technology of its generating facility. Impact Studies are conducted under GIP Section 4.4.

The wind generation facility was studied at 73.6 MW with forty-six (46) G.E. 1.6 MW wind turbine generators. This Impact study addresses the dynamic stability effects of interconnecting the plant to the rest of the NPPD transmission system. Two seasonal base cases were used in the study to analyze the stability impacts of the proposed generation facility. The cases studied were modified 2011 summer peak and 2011 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. Fifty (50) contingencies were identified for use in this study. The G.E. 1.6MW wind turbines were modeled using information provided by the Customer.

The results of this study show that the wind generation facility, studied as a 73.6MW project, and the transmission system remain stable for all contingencies studied. Also, GEN-2006-037N1 is found to be in compliance with FERC Order #661A. The requested changes by the Interconnection Customer are acceptable.

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.

1.0 Introduction

<OMITTED TEXT> (Customer) has requested an Impact Re-Study under the Southwest Power Pool Open Access Transmission Tariff (OATT) for interconnection of 75.0 MW of wind generation within the balancing authority of Nebraska Public Power District (NPPD) in Custer County, Nebraska. Customer has requested this Impact Study to determine the impacts of modifying the interconnection configuration and generation technology of its generating facility. Impact Studies are conducted under GIP Section 4.4.

This Impact study addresses the dynamic stability effects of interconnecting the plant to the rest of the NPPD transmission system. The wind generation facility was studied at 73.6 MW with forty-six (46) G.E. 1.6MW wind turbine generators. 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 2011 summer peak and 2011 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. Fifty (50) contingencies were identified for this study.

2.0 Purpose

The purpose of this Impact Study is to evaluate the impact of the proposed interconnection on the reliability of the Transmission System. The Impact Study 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 Impact Study 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 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 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 Impact Study constitutes a request for transmission service or confers upon the Interconnection Customer any right to receive transmission service.

3.0 Facilities

3.1 Generating Facility

The project was studied with forty-six (46) G.E. 1.6MW wind turbine generators. The wind generation facility was modeled as an equivalent wind turbine generator of 73.6 MW output. The wind turbine is connected to an equivalent 0.690/34.5KV generator step unit (GSU). The high side of the GSU is connected to the 34.5/115kV substation transformer. A 115kV transmission line connects the Customer's substation transformer and the GEN-2006-038N005 substation transformer to the POI.

3.2 Interconnection Facility

The Point of Interconnection will be at the Transmission Owners Broken Bow 115kV substation. Figure 1 shows the proposed POI. Figure 2 shows the Point of Interconnection equivalent bus interconnection.

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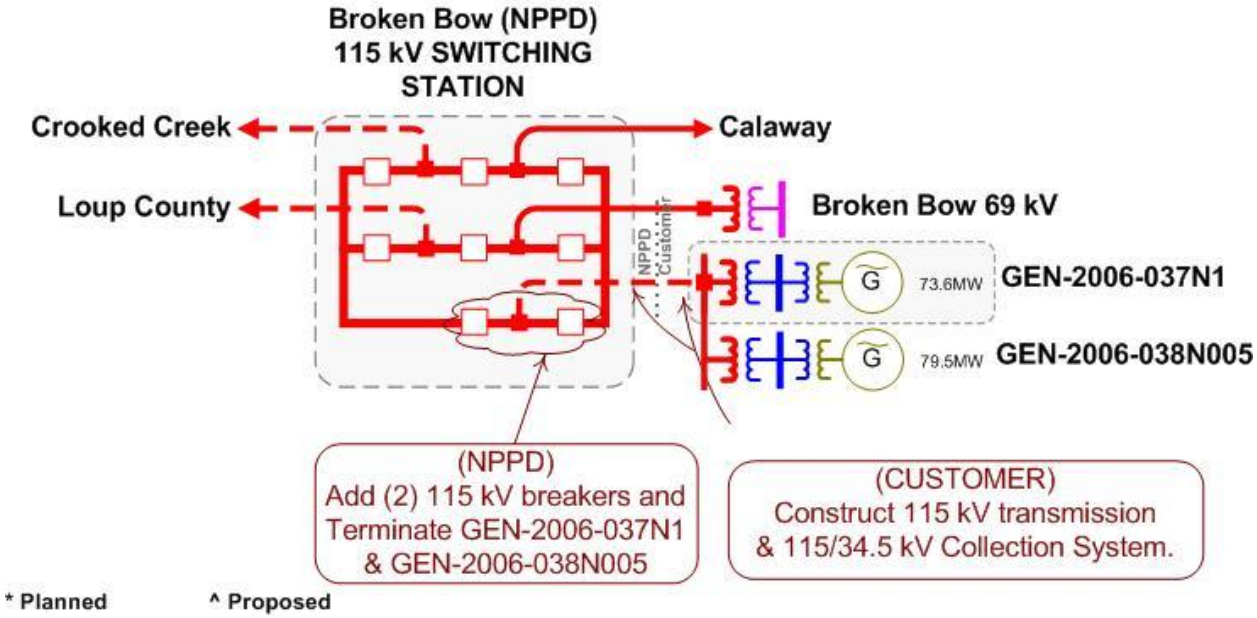

Figure 1: GEN-2006-037N1 Facility and Proposed Interconnection Configuration

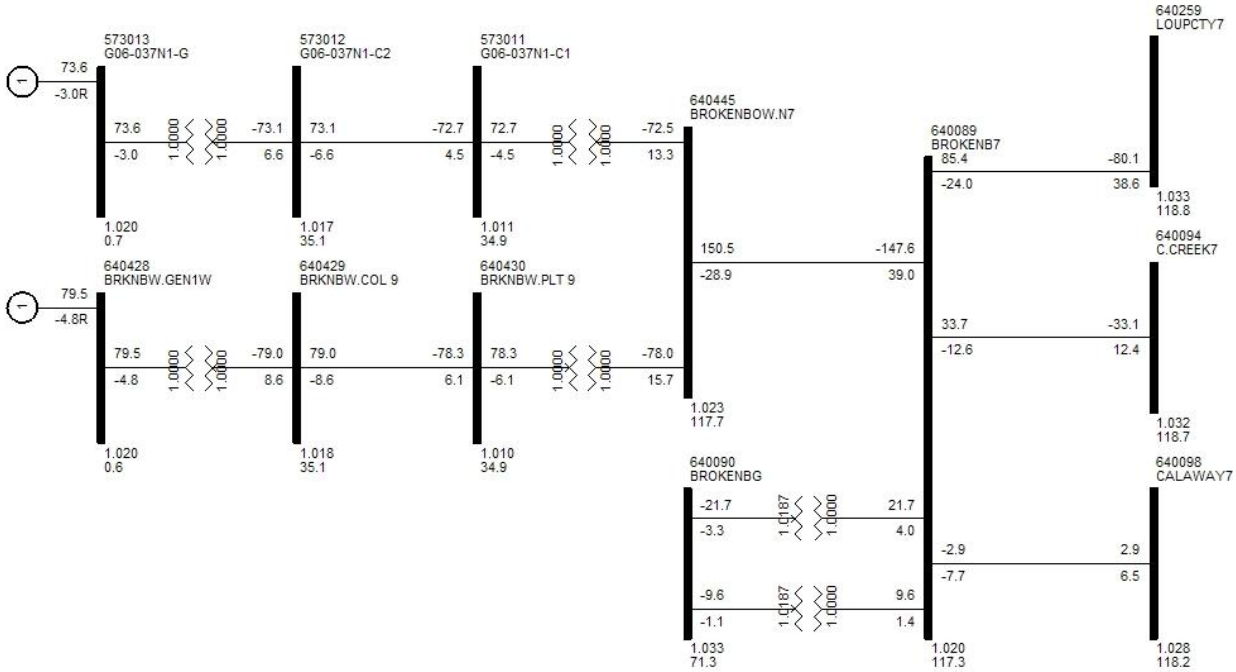

Figure 2: GEN-2006-037N1 Bus Interconnection

4.0 Stability Analysis

4.1 Model Preparation

The base cases used for this analysis were equivalent to the DISIS-2009-001 study models and contained all higher queued and equally queued projects to the GEN-2006-037N1 project. In addition, lower queued projects were included to ensure there were no adverse affects to those lower queued projects.

The wind generation from the study customer and the previously queued customers were dispatched into the SPP footprint. The Group 9 and Group 10 projects in the Nebraska area are listed in Table 4.

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 1: Queued Projects Included in Impact Study

Project	MW
GEN-2003-021N	75
GEN-2004-005N	30
GEN-2006-020N	42
GEN-2006-037N1	75
GEN-2006-038N005	80
GEN-2006-038N019	80
GEN-2006-044N	40.5
GEN-2006-044N02	100.5
GEN-2007-011N08	81
GEN-2008-086N02	198
GEN-2010-010	100.5
GEN-2010-051	200
GEN-2011-027	120

4.2 Contingencies Simulated

Fifty (50) 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.	FLT01-3PH	3 phase fault on the Broken Bow (640089) to Crooked Creek (640094) 115kV line, near BrokenBow. a. Apply fault at the Broken Bow 115kV bus. b. Clear fault after 6.5 cycles by tripping the faulted line.

Cont. No.	Cont. Name	Description
2.	FLT02-3PH	3 phase fault on the Broken Bow (640089) to Callaway (640098) 115kV line, near Broken Bow. a. Apply fault at the Broken Bow 115kV bus. b. Clear fault after 6.5 cycles by tripping the faulted line and the Callaway 115 kV bus.
3.	FLT03-3PH	3 phase fault on the Broken Bow (640089) to Loup City (640259) 115kV line, near Broken Bow. a. Apply fault at the Broken Bow 115kV bus. b. Clear fault after 6.5 cycles by tripping the faulted line.
4.	FLT04-3PH	3 phase fault on the North Loup (640284) to Loup City (640259) 115kV line, near Loup City a. Apply fault at the Loup City 115kV bus. b. Clear fault after 6.5 cycles by tripping the faulted line.
5.	FLT05-3PH	3 phase fault on the St Libory Jct (640353) to Loup City (640259) 115kV line, near Loup City a. Apply fault at the Loup City 115kV bus. b. Clear fault after 6.5 cycles by tripping the faulted line and the St. Libory and St. Paul 115 kV buses.
6.	FLT06-3PH	3 phase fault on the Maxwell (640267) to Thedford (640381) 115kV line, near Maxwell. a. Apply fault at the Maxwell 115kV bus. b. Clear fault after 6.5 cycles by tripping the faulted line.
7.	FLT07-3PH	3 phase fault on the Crooked Creek (640093) to North Platte (640286) 230kV line, near Crooked Creek. a. Apply fault at the Crooked Creek 230kV bus. b. Clear fault after 6.0 cycles by tripping the faulted line.
8.	FLT08-3PH	3 phase fault on the Crooked Creek (640093) to Riverdale (640330) 230kV line, near Crooked Creek. a. Apply fault at the Crooked Creek 230kV bus. b. Clear fault after 6.0 cycles by tripping the faulted line.
9.	FLT09-3PH	3 phase fault on the St. Francis (640351) to Mission (652482) 115kV line, near Mission. a. Apply fault at the Mission 115kV bus. b. Clear fault after 6.5 cycles by tripping the faulted line.
10.	FLT10-3PH	3 phase fault on the Harmony (640210) to St. Francis (640351) 115kV line, near St. Francis. a. Apply fault at the St. Francis115kV bus. b. Clear fault after 6.5 cycles by tripping the faulted Valentine – Harmony – St. Francis 115 kV line.
11.	FLT11-3PH	3 phase fault on the Harmony (640210) to Valentine (640392) 115kV line, near Valentine. a. Apply fault at the Harmony 115kV bus. b. Clear fault after 6.5 cycles by tripping the faulted Valentine – Harmony – St. Francis 115 kV line.
12.	FLT12-3PH	3 phase fault on the Ainsworth (640051) to Valentine (640392) 115kV line, near Valentine. a. Apply fault at the Valentine 115kV bus. b. Clear fault after 6.5 cycles by tripping the faulted line.

Cont. No.	Cont. Name	Description
13.	FLT14-3PH	3 phase fault on the Ainsworth Wind (640050) to Calamus (640096) 115kV line, near Ainsworth Wind. a. Apply fault at the Ainsworth Wind 115kV bus. b. Clear fault after 6.5 cycles by tripping the faulted line.
14.	FLT15-3PH	3 phase fault on the Ainsworth (640051) to Stuart (640367) 115kV line, near Ainsworth. a. Apply fault at the Ainsworth 115kVbus. b. Clear fault after 6.5 cycles by tripping the faulted Ainsworth-Stuart-Atkinson-Emmet-O'Neill 115 kV line.
15.	FLT16-3PH	3 phase fault on the O'Neill (640305) to Spencer (640349) 115kV line, near O'Neill. a. Apply fault at the O'Neill 115kVbus. b. Clear fault after 6.5 cycles by tripping the faulted line.
16.	FLT17-3PH	3 phase fault on the Hartington (640212) to Gavins (652511) 115kV line, near Hartington. a. Apply fault at the Hartington 115kV bus. b. Clear fault after 6.5 cycles by tripping the faulted line.
17.	FLT18-3PH	3 phase fault on the Shell Creek (640343) to Kelly (640133) 230kV line, near Kelly a. Apply fault at the Kelly 230kV bus. b. Clear fault after 6.0 cycles by tripping the faulted line.
18.	FLT19-3PH	3 phase fault on the Columbus West (640131) to Kelly (640133) 230kV line, near Kelly a. Apply fault at the Kelly 230kV bus. b. Clear fault after 6.0 cycles by tripping the faulted line.
19.	FLT20-3PH	3 phase fault on the East Columbus (640126) to Kelly (640133) 230kV line, near Kelly a. Apply fault at the Kelly 230kV bus. b. Clear fault after 6.0 cycles by tripping the faulted line.
20.	FLT21-3PH	3 phase fault on the GEN-2008-086N02 (570886) to Kelly (640133) 230kV line, near GEN- 2008-086N02 a. Apply fault at the GEN-2008086N02 230V bus. b. Clear fault after 6.0 cycles by tripping the faulted line.
21.	FLT22-3PH	3 phase fault on the GEN-2008-086N02 (570886) to Fort Randall (652509) 230kV line, near GEN-2008-086N02 a. Apply fault at the GEN-2008086N02 230V bus. b. Clear fault after 6.0 cycles by tripping the faulted line.
22.	FLT23-3PH	3 phase fault on the Fort Randall (652509) to Fort Thompson (652507) 230kV line, near Fort Randall a. Apply fault at the Fort Randall 230V bus. b. Clear fault after 6.0 cycles by tripping the faulted line.
23.	FLT24-3PH	3 phase fault on the Fort Randall (652509) to Utica Jct (652526) 230kV line, near Fort Randall a. Apply fault at the Fort Randall 230V bus. b. Clear fault after 6.0 cycles by tripping the faulted line.
24.	FLT25-3PH	3 phase fault on the Fort Randall (652509) to Lake Platt (652516) 230kV line, near Fort Randall a. Apply fault at the Fort Randal 230V bus. b. Clear fault after 6.0 cycles by tripping the faulted line.

Cont. No.	Cont. Name	Description
25.	FLT26-3PH	3 phase fault on the Fort Randall (652509) to Sioux City (652565) 230kV line, near Fort Randall a. Apply fault at the Fort Randal 230V bus. b. Clear fault after 6.0 cycles by tripping the faulted line.
26.	FLT27-3PH	3 phase fault on the Kelly 230/115 kV auto at the 115kV (640134) a. Apply fault at the Kelly 115kV bus. b. Clear fault after 5.5 cycles by tripping autotransformer.
27.	FLT28-3PH	3 phase fault on the Clearwater (640113) to Neligh (640293) 115kV line, near Neligh. a. Apply fault at the Neligh 115kVbus. b. Clear fault after 6.5 cycles by tripping the faulted Neligh-Clearwater-O'Neill 115 kV line.
28.	FLT29-3PH	3 phase fault on the County Line (640115) to Neligh (640293) 115kV line, near Neligh. a. Apply fault at the Neligh 115kVbus. b. Clear fault after 6.5 cycles by tripping the faulted Neligh - CountyLine - BattleCreek - NorthNorfolk 115 kV line.
29.	FLT30-3PH	3 phase fault on the Creighton (640149) to Neligh (640293) 115kV line, near Neligh. a. Apply fault at the Neligh 115kVbus. b. Clear fault after 6.5 cycles by tripping the faulted line.
30.	FLT31-3PH	3 phase fault on the Maxwell (640267) to North Platte (640287) 115kV line, near Maxwell. a. Apply fault at the Maxwell 115kV bus. b. Clear fault after 6.5 cycles by tripping the faulted line.
31.	FLT32-3PH	3 phase fault on the North Platte (640287) 23/115kV auto. a. Apply fault at the North Platte 115kV bus. b. Clear fault after 5.5 cycles by tripping the faulted line.
32.	FLT33-3PH	3 phase fault on the North Platte (640286) to GGS (640184) 230kV line ckt 1, near North Platte. a. Apply fault at the North Platte 230kV bus. b. Clear fault after 6.0 cycles by tripping the faulted line.
33.	FLT34-3PH	3 phase fault on the GGS (640183) to Sweetwater (640374) 345kV line ckt 1, near GGS. a. Apply fault at the GGS 345kV bus. b. Clear fault after 4.5 cycles by tripping the faulted line.
34.	FLT35-3PH	3 phase fault on the GGS (640183) to Red Willow (640325) 345kV line, near GGS. a. Apply fault at the GGS 345kV bus. b. Clear fault after 4.5 cycles by tripping the faulted line.
35.	FLT36-3PH	3 phase fault on the Bloomfield (640084) to Creighton (640149) 115kV line, near Bloomfield. a. Apply fault at the Bloomfield 115kV bus. b. Clear fault after 6.5 cycles by tripping the faulted line.
36.	FLT37-1PH	SLG fault on Bloomfield – Gavins Point 115 kV line, near Bloomfield. Stuck breaker at Gavins. a. Apply fault at Bloomfield 115 kV bus. b. Clear Bloomfield end of line at 5.5 cycles. Leave fault on end of open-ended line from Gavins Point. c. Clear Gavins Point 115 kV bus and fault at 18.0 cycles.

Cont. No.	Cont. Name	Description
37.	FLT38-1PH	SLG fault on Creighton – Neligh 115 kV line, near Creighton. Stuck breaker at Creighton. a. Apply fault at Creighton 115 kV bus. b. Clear Neligh end of line at 6.5 cycles. Leave fault on open-ended line from Creighton. c. Clear Creighton 115 kV bus and fault at 18.0 cycles.
38.	FLT39-1PH	SLG fault on Gavins Point – Hartington 115 kV line, near Gavins Point. Stuck breaker at Gavins Point. a. Apply fault at Gavins Point 115 kV bus. b. Clear Hartington end of line at 6.5 cycles. Leave fault on open-ended line from Gavins Point. c. Clear Gavins Point 115 kV bus and fault at 18.0 cycles.
39.	FLT40-1PH	SLG fault on Neligh-County Line, near Neligh. Stuck PCB at Neligh. a. Apply fault at Neligh 115 kV bus. b. Clear North Norfolk end of Neligh-CountyLine-BattleCreek-NorthNorfolk 115 kV line at 6.5 cycles. Leave fault on open-ended line. c. Clear Neligh 115 kV bus and fault at 18.0 cycles.
40.	FLT41-1PH	SLG fault on Albion-Genoa 115 kV line near Albion. Stuck PCB at Albion. a. Apply fault on Albion 115 kV bus. b. Clear Genoa end of Albion-Genoa 115 kV line at 6.5 cycles. Leave fault on open-ended line. c. Clear Albion 115 kV bus and fault at 18.0 cycles.
41.	FLT42-1PH	SLG fault on Kelly – Columbus West 230 kV line. Stuck PCB at Kelly. a. Apply fault on Kelly 230 kV bus. b. Clear Columbus West end of line at 6.0 cycles. Leave fault on open-ended line. c. Clear Kelly 230 kV bus and fault at 14.5 cycles.
42.	FLT43-3PH	3PH fault on Spirit Mound – Manning 115 kV line with prior outage of Gavins Point – Yankton Junction 115 kV. a. Prior Outage: Gavins Point – Yankton Junction 115 kV line b. Apply 3PH fault on Manning115 kV bus. c. Clear fault after 6.5 cycles and trip faulted Spirit Mound – Manning 115 kV line.
43.	FLT45-3PH	3 phase fault on the Bloomfield (640084) to Gavins (652511) 115kV line, near Bloomfield. a. Apply fault at the Bloomfield 115kV bus. b. Clear fault after 6.5 cycles by tripping the faulted line.
44.	FLT46-3PH	3 phase fault on the Hartington (640212) to Gavins (652511) 115kV line, near Hartington. a. Apply fault at the Gavins Point 115kV bus. b. Clear fault after 6.5 cycles by tripping the faulted line.
45.	FLT47-3PH	3 phase fault on the Yankton (652532) to Gavins (652511) 115kV line, near Yankton. a. Apply fault at the Yankton 115kV bus. b. Clear fault after 6.5 cycles by tripping the faulted line.
46.	FLT48-3PH	3 phase fault on the Yankton Jct (660006) to Gavins (652511) 115kV line, near Yankton Jct a. Apply fault at the Yankton Jct 115kV bus. b. Clear fault after 6.5 cycles by tripping the faulted line.

Cont. No.	Cont. Name	Description
47.	FLT49-3PH	3 phase fault on the Spirit Mound (659121) to Manning (652517) 115 kV line, near Spirit Mound. a. Apply fault at the Spirit Mound 115 kV bus (652517). b. Clear fault after 6.5 cycles by tripping the faulted line.
48.	FLT50-3PH	3PH fault on Broken Bow – Loup City 115 kV line with prior outage of Broken Bow – Callaway 115 kV. a. Prior Outage: Broken Bow – Callaway 115 kV line b. Apply 3PH fault on Broken Bow 115 kV bus. c. Clear fault after 6.5 cycles and trip faulted Broken Bow – Loup City 115 kV line.
49.	FLT51-3PH	3PH fault on Gavins Point – Bloomfield 115 kV line with prior outage of Neligh – County Line 115 kV. a. Prior Outage: Neligh – County Line 115 kV b. Apply 3PH fault on Bloomfield 115 kV bus. c. Clear fault after 6.5 cycles and trip faulted Gavins Point – Bloomfield 115 kV line.
50.	FLT52-3PH	3PH fault on Albion - Petersburg 115 kV line with prior outage of Neligh – County Line 115 kV. a. Prior Outage: Neligh – County Line 115 kV b. Apply 3PH fault on Petersburg 115 kV bus. c. Clear fault after 6.5 cycles and trip faulted Albion – Petersburg 115 kV line.

4.3 Results

Results of the stability analysis are summarized in Table 3. The results indicate that for all contingencies studied the transmission system remains stable.

Table 3: Results of Simulated Contingencies

Cont. No.	Cont. Name	Description	2011 Summer	2011 Winter
1.	FLT01-3PH	3 phase fault on the Broken Bow (640089) to Crooked Creek (640094) 115kV line, near BrokenBow.	Stable	Stable
2.	FLT02-3PH	3 phase fault on the Broken Bow (640089) to Callaway (640098) 115kV line, near Broken Bow.	Stable	Stable
3.	FLT03-3PH	3 phase fault on the Broken Bow (640089) to Loup City (640259) 115kV line, near Broken Bow.	Stable	Stable
4.	FLT04-3PH	3 phase fault on the North Loup (640284) to Loup City (640259) 115kV line, near Loup City	Stable	Stable
5.	FLT05-3PH	3 phase fault on the St Libory Jct (640353) to Loup City (640259) 115kV line, near Loup City	Stable	Stable
6.	FLT06-3PH	3 phase fault on the Maxwell (640267) to Thedford (640381) 115kV line, near Maxwell.	Stable	Stable
7.	FLT07-3PH	3 phase fault on the Crooked Creek (640093) to North Platte (640286) 230kV line, near Crooked Creek.	Stable	Stable
8.	FLT08-3PH	3 phase fault on the Crooked Creek (640093) to Riverdale (640330) 230kV line, near Crooked Creek.	Stable	Stable
9.	FLT09-3PH	3 phase fault on the St. Francis (640351) to Mission (652482) 115kV line, near Mission.	Stable	Stable
10.	FLT10-3PH	3 phase fault on the Harmony (640210) to St. Francis (640351) 115kV line, near St. Francis.	Stable	Stable
11.	FLT11-3PH	3 phase fault on the Harmony (640210) to Valentine (640392) 115kV line, near Valentine.	Stable	Stable
12.	FLT12-3PH	3 phase fault on the Ainsworth (640051) to Valentine (640392) 115kV line, near Valentine.	Stable	Stable
13.	FLT14-3PH	3 phase fault on the Ainsworth Wind (640050) to Calamus (640096) 115kV line, near Ainsworth Wind.	Stable	Stable
14.	FLT15-3PH	3 phase fault on the Ainsworth (640051) to Stuart (640367) 115kV line, near Ainsworth.	Stable	Stable
15.	FLT16-3PH	3 phase fault on the O'Neill (640305) to Spencer (640349) 115kV line, near O'Neill.	Stable	Stable
16.	FLT17-3PH	3 phase fault on the Hartington (640212) to Gavins (652511) 115kV line, near Hartington.	Stable	Stable
17.	FLT18-3PH	3 phase fault on the Shell Creek (640343) to Kelly (640133) 230kV line, near Kelly	Stable	Stable
18.	FLT19-3PH	3 phase fault on the Columbus West (640131) to Kelly (640133) 230kV line, near Kelly	Stable	Stable
19.	FLT20-3PH	3 phase fault on the East Columbus (640126) to Kelly (640133) 230kV line, near Kelly	Stable	Stable
20.	FLT21-3PH	3 phase fault on the GEN-2008-086N02 (570886) to Kelly (640133) 230kV line, near GEN- 2008-086N02	Stable	Stable

Cont. No.	Cont. Name	Description	2011 Summer	2011 Winter
21.	FLT22-3PH	3 phase fault on the GEN-2008-086N02 (570886) to Fort Randall (652509) 230kV line, near GEN-2008-086N02	Stable	Stable
22.	FLT23-3PH	3 phase fault on the Fort Randall (652509) to Fort Thompson (652507) 230kV line, near Fort Randall	Stable	Stable
23.	FLT24-3PH	3 phase fault on the Fort Randall (652509) to Utica Jct (652526) 230kV line, near Fort Randall	Stable	Stable
24.	FLT25-3PH	3 phase fault on the Fort Randall (652509) to Lake Platt (652516) 230kV line, near Fort Randall	Stable	Stable
25.	FLT26-3PH	3 phase fault on the Fort Randall (652509) to Sioux City (652565) 230kV line, near Fort Randall	Stable	Stable
26.	FLT27-3PH	3 phase fault on the Kelly 230/115 kV auto at the 115kV (640134)	Stable	Stable
27.	FLT28-3PH	3 phase fault on the Clearwater (640113) to Neligh (640293) 115kV line, near Neligh.	Stable	Stable
28.	FLT29-3PH	3 phase fault on the County Line (640115) to Neligh (640293) 115kV line, near Neligh.	Stable	Stable
29.	FLT30-3PH	3 phase fault on the Creighton (640149) to Neligh (640293) 115kV line, near Neligh.	Stable	Stable
30.	FLT31-3PH	3 phase fault on the Maxwell (640267) to North Platte (640287) 115kV line, near Maxwell.	Stable	Stable
31.	FLT32-3PH	3 phase fault on the North Platte (640287) 23/115kV auto.	Stable	Stable
32.	FLT33-3PH	3 phase fault on the North Platte (640286) to GGS (640184) 230kV line ckt 1, near North Platte.	Stable	Stable
33.	FLT34-3PH	3 phase fault on the GGS (640183) to Sweetwater (640374) 345kV line ckt 1, near GGS.	Stable	Stable
34.	FLT35-3PH	3 phase fault on the GGS (640183) to Red Willow (640325) 345kV line, near GGS.	Stable	Stable
35.	FLT36-3PH	3 phase fault on the Bloomfield (640084) to Creighton (640149) 115kV line, near Bloomfield.	Stable	Stable
36.	FLT37-1PH	SLG fault on Bloomfield – Gavins Point 115 kV line, near Bloomfield. Stuck breaker at Gavins.	Stable	Stable
37.	FLT38-1PH	SLG fault on Creighton – Neligh 115 kV line, near Creighton. Stuck breaker at Creighton.	Stable	Stable
38.	FLT39-1PH	SLG fault on Gavins Point – Hartington 115 kV line, near Gavins Point. Stuck breaker at Gavins Point.	Stable	Stable
39.	FLT40-1PH	SLG fault on Neligh-County Line, near Neligh. Stuck PCB at Neligh.	Stable	Stable
40.	FLT41-1PH	SLG fault on Albion-Genoa 115 kV line near Albion. Stuck PCB at Albion.	Stable	Stable
41.	FLT42-1PH	SLG fault on Kelly – Columbus West 230 kV line. Stuck PCB at Kelly.	Stable	Stable

Cont. No.	Cont. Name	Description	2011 Summer	2011 Winter
42.	FLT43-3PH	3PH fault on Spirit Mound – Manning 115 kV line with prior outage of Gavins Point – Yankton Junction 115 kV.	Stable	Stable
43.	FLT45-3PH	3 phase fault on the Bloomfield (640084) to Gavins (652511) 115kV line, near Bloomfield.	Stable	Stable
44.	FLT46-3PH	3 phase fault on the Hartington (640212) to Gavins (652511) 115kV line, near Hartington.	Stable	Stable
45.	FLT47-3PH	3 phase fault on the Yankton (652532) to Gavins (652511) 115kV line, near Yankton.	Stable	Stable
46.	FLT48-3PH	3 phase fault on the Yankton Jct (660006) to Gavins (652511) 115kV line, near Yankton Jct	Stable	Stable
47.	FLT49-3PH	3 phase fault on the Spirit Mound (659121) to Manning (652517) 115 kV line, near Spirit Mound.	Stable	Stable
48.	FLT50-3PH	3PH fault on Broken Bow – Loup City 115 kV line with prior outage of Broken Bow – Callaway 115 kV.	Stable	Stable
49.	FLT51-3PH	3PH fault on Gavins Point – Bloomfield 115 kV line with prior outage of Neligh – County Line 115 kV.	Stable	Stable
50.	FLT52-3PH	3PH fault on Albion - Petersburg 115 kV line with prior outage of Neligh – County Line 115 kV.	Stable	Stable

4.4 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.

Three fault contingencies were developed to verify that the wind farm will remain on line when the POI voltage is drawn down to 0.0 pu. These contingencies are shown in Table 4.

Table 4: LVRT Fault Contingencies

Cont. Name	Description
FLT01-3PH	3 phase fault on the Broken Bow (640089) to Crooked Creek (640094) 115kV line, near BrokenBow. a. Apply fault at the Broken Bow 115kV bus. b. Clear fault after 6.5 cycles by tripping the faulted line.
FLT02-3PH	3 phase fault on the Broken Bow (640089) to Callaway (640098) 115kV line, near Broken Bow. a. Apply fault at the Broken Bow 115kV bus. b. Clear fault after 6.5 cycles by tripping the faulted line and the Callaway 115 kV bus.

Cont. Name	Description
FLT03-3PH	3 phase fault on the Broken Bow (640089) to Loup City (640259) 115kV line, near Broken Bow. a. Apply fault at the Broken Bow 115kV bus. b. Clear fault after 6.5 cycles by tripping the faulted line.

The project wind farm remained online for the fault contingencies described in this section and for all the fault contingencies described in section 6.2. GEN-2006-037N1 is found to be in compliance with FERC Order #661A.

5.0 Conclusion

<OMITTED TEXT> (Customer) has requested an Impact Study for limited interconnection service of 75.0 MW of wind generation within the balancing authority of Nebraska Public Power District (NPPD) in Custer County, Nebraska, in accordance with GIP Section 4.4. in the SPP OATT.

The results of this study show that the wind generation facility, studied as a 73.6MW project, and the transmission system remain stable for all contingencies studied. Also, GEN-2006-037N1 is found to be in compliance with FERC Order #661A. The requested changes by the Interconnection Customer are acceptable.

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.