Impact Study of Limited Operation for Generator Interconnection

GEN-2011-012

May 2013
Generator Interconnection

SPP Southwest Power Pool

Executive Summary

<OMITTED TEXT> (Customer; GEN-2011-012) has requested a Limited Operation System Impact Study under the Southwest Power Pool Open Access Transmission Tariff (OATT) for 104.5 MW of wind generation to be interconnected into the Transmission System of Southwestern Public Service (SPS) in Sherman County, Texas. GEN-2011-012, under GIA Section 5.9, has requested this Limited Operation Interconnection Study (LOIS) to determine the impacts of interconnecting to the transmission system before all required Network Upgrades identified in the DISIS-2011-001 (or most recent iteration) Impact Study can be placed into service.

This LOIS addresses the effects of interconnecting the plant to the rest of the transmission system for the system topology and conditions as expected in January 2015. GEN-2011-012 is requesting the interconnection of thirty-eight (38) GE 2.75 MW wind turbine generators and associated facilities into a new substation on the 230kV line between the Hitchland and Moore County substations. For the typical LOIS, both a power flow and transient stability analysis are conducted. The LOIS assumes that only the higher queued projects listed within Table 1 of this study might go into service before the completion of all Network Upgrades identified within Table 2 of this report. If additional generation projects, listed within Table 3, with queue priority equal to or higher than the study project request rights to go into commercial operation before all Network Upgrades identified within Table 2 of this report are completed, this LOIS may need to be restudied to ensure that interconnection service remains for the GEN-2011-012 request.

Power flow analysis from this LOIS has determined that the GEN-2011-012 request can interconnect 104.5 MW of generation as an Energy Resource prior to the completion of the required Network Upgrades, listed within Table 2 of this report. **Should any other projects, other than those listed within Table 1 of this report, come into service an additional study may be required to determine if any limited operation service is available. It should be noted that although this LOIS analyzed many of the most probable contingencies, it is not an all-inclusive list that can account for every operational situation. Additionally, the generator may not be able to inject any power onto the Transmission System due to constraints that fall below the threshold of mitigation for a Generator Interconnection request. Because of this, it is likely that the Customer 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 LOIS has determined that the transmission system will remain stable for the sixty-eight (68) selected faults for the limited operation interconnection of GEN-2011-012 and will meet Low Voltage Ride Through (LVRT) requirements of FERC Order #661A.

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 must be requested on Southwest Power Pool's OASIS by the Customer.

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Purpose

<OMITTED TEXT> (Interconnection Customer) has requested a Limited Operation System Impact Study (LOIS) under the Southwest Power Pool (SPP) Open Access Transmission Tariff (OATT) for an interconnection request into the Transmission System of Oklahoma Gas & Electric (OKGE).

The purpose of this study is to evaluate the impacts of interconnecting GEN-2011-012 request of 104.5 MW comprised of thirty-eight (38) GE 2.75 MW wind turbine generators and associated facilities interconnecting into a new substation on the 230kV line between the Hitchland and Moore County substations in Sherman County, Texas. The Customer has requested this amount to be studied with Limited Operation Interconnection Service to commence on or around January of 2014.

Both power flow and transient stability analysis were conducted for this Limited Operation Interconnection Service. Limited Operation Studies are conducted under GIA Section 5.9.

The LOIS considers the Base Case as well as all Generating Facilities (and with respect to (b) below, any identified Network Upgrades associated with such higher queued interconnection) that, on the date the LOIS is commenced:

a) are directly interconnected to the Transmission System;
b) are interconnected to Affected Systems and may have an impact on the Interconnection Request;
c) have a pending higher queued Interconnection Request to interconnect to the Transmission System listed in Table 1; or
d) have no Queue Position but have executed an LGIA or requested that an unexecuted LGIA be filed with FERC.

Any changes to these assumptions, for example, one or more of the previously queued requests not included within this study execute an interconnection agreement and commencing commercial operation, may require a re-study of this LOIS at the expense of the Customer.

Nothing within this System Impact Study constitutes a request for transmission service or confers upon the Interconnection Customer any right to receive transmission service rights. Should the Customer require transmission service, those rights should be requested through SPP's Open Access Same-Time Information System (OASIS).

This LOIS study included prior queued generation interconnection requests. Those listed within Table 1 are the generation interconnection requests that are assumed to have rights to either full or partial interconnection service prior to the requested 1/2015 in-service of GEN-2011-012 for this LOIS. Also listed in Table 1 are both the amount of MWs of interconnection service expected at the effective time of this study and the total MWs requested of interconnection service, the fuel type, the point of interconnection (POI), and the current status of each particular prior queued request.

Table 1: Generation Requests Included within LOIS

Project	Total MW	Fuel Source	POI
GEN-2002-008	240.00	Wind	Hitchland 345kV
GEN-2002-009	80.00	Wind	Hansford 115kV
GEN-2003-020	160.00	Wind	Martin 115kV
GEN-2006-020S	18.90	Wind	DWS Frisco 115kV
GEN-2006-044	370.00	Wind	Hitchland 345kV
GEN-2007-046	199.50	Wind	Hitchland 115kV
GEN-2007-057	34.50	Wind	Moore County East 115kV
GEN-2008-047	300.00	Wind	Tap Hitchland - Woodward Ckt 1 (Beaver County) 345kV
GEN-2008-124T	42.00	Wind	TC-Keyes Texas County 69kV
GEN-2009-073T	48.00	Wind	TC-Eva Texas County 69kV
GEN-2010-014	358.80	Wind	Hitchland 345kV
GEN-2010-001	300.00	Wind	Tap Hitchland - Woodward Ckt 1 (Beaver County) 345kV
GEN-2011-012	104.50	Wind	Tap Moore County - Hitchland 345kV
All Interconnection requests up through DISIS-2010-002 in areas outside of the northern Texas Panhandle. Wind requests dispatched at lower nameplate (20% nameplate). Also included in the outside area are GEN-2011-007, GEN-2011-054 in the Woodward area			

This LOIS was required because the Customer is requesting interconnection prior to the completion of all of their required upgrades listed within the latest iteration of their Definitive Interconnection System Impact Study (DISIS-2011-001). Table 2 below lists the required upgrade projects for which this request has cost responsibility. GEN-2011-012 was included within the DISIS-2011-001 that was posted July 29, 2012. The cluster has been restudied a number of times since the original posting. These reports can be located here at the following GI Study URL: http://sppoasis.spp.org/documents/swpp/transmission/GenStudies.cfm?YearType=2011_Impact_Studies.

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

Upgrade Project	Type	Description	Status
Beaver County - Buckner 345kV	Most recent iteration of DISIS 2011-001.	Build DISIS 2011-001	Current Estimated In-Service date of 5/19/2014
Tatonga - Matthewson 345kV CKT 2	Most recent iteration of DISIS 2011-001.	Build DISIS 2011-001	Current Estimated In-Service date of 3/1/2021
Cimarron – Matthewson 245kV CKT 2	Most recent iteration of DISIS 2011-001.	Build DISIS 2011-001	Current Estimated In-Service date of 3/1/2021

The following transmission upgrades were included although they are not yet in service. These network upgrades are scheduled to be placed in service by January 1, 2015.

Table 2A: Upgrade Projects included but not yet in service

Upgrade Project	Type	Description	Status
Border – Woodward 345kV	Most recent iteration of DISIS 2011-002. Previous Network Upgrade not responsibility of Customer but required to support full interconnection.	Build Priority Project	Current Estimated In-Service date of 6/30/2014
Beaver – Woodward 345kV Dbl CKT	Most recent iteration of DISIS 2011-001. Previous Network Upgrade not responsibility of Customer but required to support full interconnection.	Build Priority Project	Current Estimated In-Service date of 6/30/2014
Hitchland – Beaver 345kV Dbl CKT	Most recent iteration of DISIS 2011-001. Previous Network Upgrade not responsibility of Customer but required to support full interconnection.	Build Priority Project	Current Estimated In-Service date of 6/30/2014
Clark – Thistle 345kV Dbl CKT	Most recent iteration of DISIS 2011-001. Previous Network Upgrade not responsibility of Customer but required to support full interconnection.	Build Priority Project	Current Estimated In-Service date of 12/31/2014
Hitchland 345/230kV Autotransformer CKT 2	Most recent iteration of DISIS 2011-001. Previous Network Upgrade not responsibility of Customer but required to support full interconnection.	Build Priority Project	Current Estimated In-Service date of 6/30/2014
Spearville – Clark 345kV Dbl CKT	Most recent iteration of DISIS 2011-001. Previous Network Upgrade not responsibility of Customer but required to support full interconnection.	Build Priority Project	Current Estimated In-Service date of 12/31/2014
Thistle – Wichita 345kV Dbl CKT	Most recent iteration of DISIS 2011-001. Previous Network Upgrade not responsibility of Customer but required to support full interconnection.	Build Priority Project	Current Estimated In-Service date of 12/31/2014
Thistle – Woodward 345kV Dbl CKT	Most recent iteration of DISIS 2011-001. Previous Network Upgrade not responsibility of Customer but required to support full interconnection.	Build Priority Project	Current Estimated In-Service date of 12/31/2014
TUCO Interchange 345/230/13.2kV Autotransformer CKT 2	Most recent iteration of DISIS 2011-001. Previous Network Upgrade not responsibility of Customer but required to support full interconnection.	Build Balanced Portfolio project	Current Estimated In-Service date of
Woodward 345/138/13.8kV Autotransformer CKT 2	Most recent iteration of DISIS 2011-001. Previous Network Upgrade not responsibility of Customer but required to support full interconnection.	Build Balanced Portfolio project	Current Estimated In-Service date of 5/19/2014

Any changes to these assumptions, for example, one or more of the previously queued requests not included within this study execute an interconnection agreement and commencing commercial operation, may require a re-study of this LOIS at the expense of the Customer. The higher or equally queued projects that were not included in this study are listed in Table 3. While this list is not all inclusive it is a list of the most probable and affecting prior queued requests that were not

included within this LOIS, either because no request for an LOIS has been made or the request is on suspension, etc.

Table 3: Higher or Equally Queued GI Requests not included within LOIS

Project	Total MW	Fuel	POI
GEN-2011-014	201.00	Wind	Tap Hitchland - Woodward Ckt 1 (Beaver County) 345kV
GEN-2011-021	299.00	Wind	Beaver County 345kV
GEN-2011-022	299.00	Wind	Hitchland 345kV
All other Interconnection Requests in DISIS-2011-001 outside of the northern Texas Panhandle			

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

Facilities

Generating Facility

GEN-2011-012 Interconnection Customer's request to interconnect a total of 104.5 MW is comprised of thirty-eight (38) GE 2.75 MW wind turbine generators and associated interconnection facilities.

Interconnection Facilities

The POI for GEN-2011-012 Interconnection Customer is at a new substation on the 230kV line between the Hitchland and Moore County substations in Sherman County, Texas. Figure 1 depicts the one-line diagram of the local transmission system including the POI as well as the power flow model representing the request.

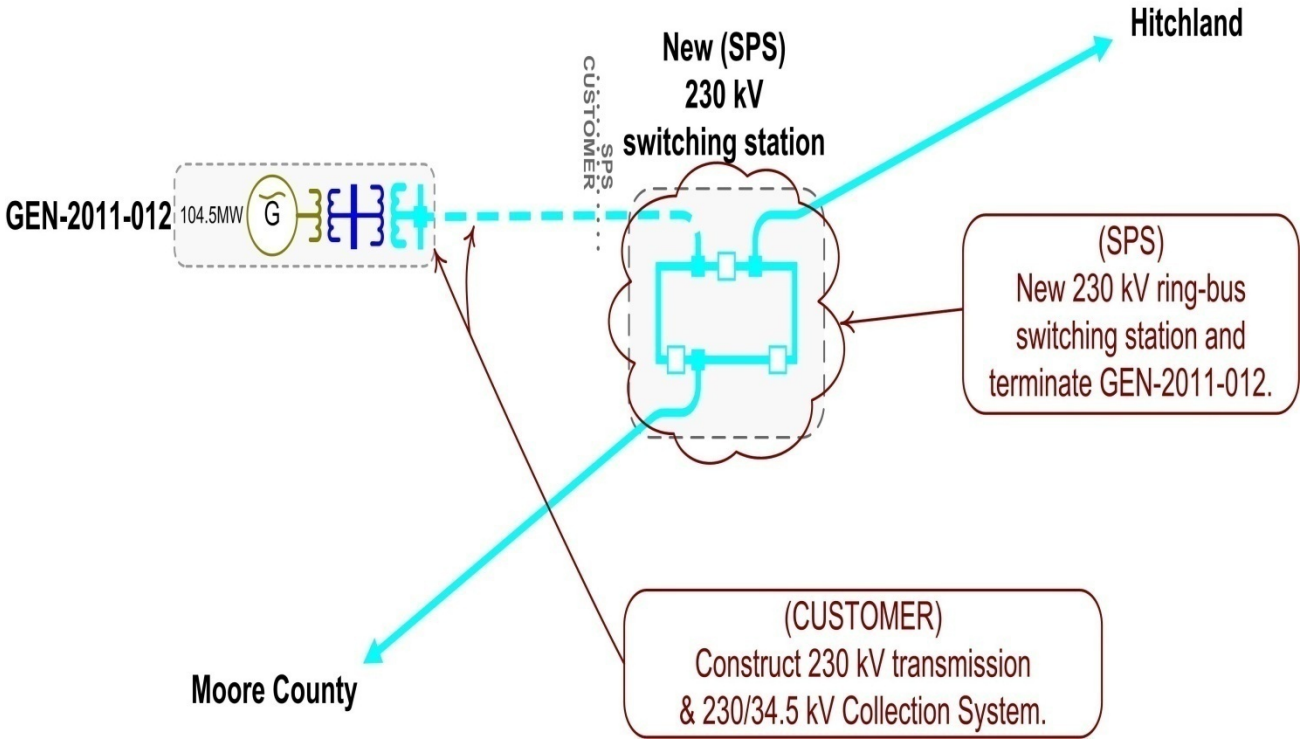

Figure 1: Proposed POI Configuration and Request Power Flow Model

Base Case Network Upgrades

The Network Upgrades included within the cases used for this LOIS study are those facilities that are a part of the SPP Transmission Expansion Plan or the Balanced Portfolio projects that have in-service dates prior to the GEN-2011-012 LOIS requested in-service date of January 2015. These facilities have an approved Notice to Construct (NTC), or are in construction stages and expected to be in-service at the effective time of this study. No other upgrades were included for this LOIS. If

for some reason, construction on these projects is delayed or discontinued, a restudy may be needed to determine the interconnection service availability of the Customer.

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 2012 series of transmission service request study models including the 2013 (spring, summer, and winter) seasonal models. To incorporate the Interconnection Customer's request, a re-dispatch of existing generation within SPP was performed with respect to the amount of the Customer's injection and the interconnecting Balancing Authority. This method allows the request to be studied as an Energy Resource (ERIS) Interconnection Request. For this LOIS, only the previous queued requests listed in Table 1 were assumed to be in-service.

Study Methodology and Criteria

The ACCC function of PSS/E is used to simulate contingencies, including single and multiple facility (i.e. breaker-to-breaker, etc.) outages, within all of the control areas of SPP and other control areas external to SPP and the resulting data analyzed. This satisfies the "more probable" contingency testing criteria mandated by NERC and the SPP criteria.

The contingency set includes all SPP control area branches and ties 69kV and above, first tier Non-SPP control area branches and ties 115 kV and above, any defined contingencies for these control areas, and generation unit outages for the SPP control areas with SPP reserve share program redispatch.

The monitor elements include all SPP control area branches, ties, and buses 69 kV and above, and all first tier Non-SPP control area branches and ties 69 kV and above. NERC Power Transfer Distribution Flowgates for SPP and first tier Non-SPP control area are monitored. Additional NERC Flowgates are monitored in second tier or greater Non-SPP control areas. Voltage monitoring was performed for SPP control area buses 69 kV and above.

Results

The LOIS ACCC analysis indicates that the Customer can interconnect generation into the SPS transmission system as requested before all required upgrades listed within the DISIS-2011-001 study can be placed into service. Should any other GI projects, other than those listed within Table 1 of this report, come into service an additional study may be required to determine if any limited operation service is available.

ACCC results for the LOIS can be found in Table 4, Table 5 and Appendix A below. Generator Interconnection Energy Resource analysis doesn't mitigate for those issues in which the affecting GI request has less than a 20% OTDF, Table 5 and Appendix A are provided for informational purposes only so that the Customer understands there may be operational conditions when they may be required to reduce their output to maintain system reliability.

Limited Operation and System Reliability

In no way does this study guarantee limited operation for all periods of time. It should be noted that although this LOIS 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 may be required to reduce their generation output to 0 MW under certain system conditions to allow system operators to maintain the reliability of the transmission network.

Table 4: Interconnection Constraints for Mitigation of GEN-2011-012 LOIS @ 104.5MW

Season	Dispatch Group	Flow	Monitored Element	RATEA (MVA)	RATEB (MVA)	TDF	TC% LOADING	Max MW Available	Contingency
All	02G11_012		None					104.5	
All	2		None					104.5	

Table 5: Additional Constraints of GEN-2011-012 LOIS @ 104.5MW Not for Mitigation

Season	Dispatch Group	Flow	Monitored Element	RATEA (MVA)	RATEB (MVA)	TDF	TC% LOADING	Contingency
13SP	00G11_012	'FROM->TO'	'HARPER - MILAN TAP 138KV CKT 1'	95.6	95.6	0.03837	105.473	'DBL-WICH-THI'
13WP	00G11_012	'FROM->TO'	'HARPER - MILAN TAP 138KV CKT 1'	95.6	95.6	0.03988	105.1162	'DBL-WICH-THI'
18WP	00G11_012	'FROM->TO'	'HARPER - MILAN TAP 138KV CKT 1'	95.6	95.6	0.03856	102.1179	'DBL-WICH-THI'
23SP	00G11_012	'FROM->TO'	'HITCHLAND INTERCHANGE (H TP80148301) 230/115/13.2KV TRANSFORMER CKT 1'	250	250	0.03137	104.0122	'HITCHLAND INTERCHANGE - OCHILTREE 230KV CKT 1'
23SP	00G11_012	'FROM->TO'	'HITCHLAND INTERCHANGE (H TP80148301) 230/115/13.2KV TRANSFORMER CKT 1'	250	250	0.03137	108.3014	'HITCHLAND INTERCHANGE - OCHILTREE 230KV CKT 1'
23SP	00G11_012	'FROM->TO'	'HITCHLAND INTERCHANGE (H TP80148301) 230/115/13.2KV TRANSFORMER CKT 1'	250	250	0.03137	104.1815	'OCHILTREE (H TP80219401) 230/115/13.2KV TRANSFORMER CKT 1'
23SP	00G11_012	'FROM->TO'	'HITCHLAND INTERCHANGE (H TP80148301) 230/115/13.2KV TRANSFORMER CKT 1'	250	250	0.03137	108.5309	'OCHILTREE (H TP80219401) 230/115/13.2KV TRANSFORMER CKT 1'
23SP	00G11_012	'FROM->TO'	'HITCHLAND INTERCHANGE (H TP80148301) 230/115/13.2KV TRANSFORMER CKT 1'	250	250	0.08682	100.3993	'SPP-SWPS-K31'
13SP	0	'FROM->TO'	'HARPER - MILAN TAP 138KV CKT 1'	95.6	95.6	0.0384	101.2211	'DBL-WICH-THI'
13WP	0	'FROM->TO'	'HARPER - MILAN TAP 138KV CKT 1'	95.6	95.6	0.0399	100.9482	'DBL-WICH-THI'
23SP	0	'FROM->TO'	'HITCHLAND INTERCHANGE (H TP80148301) 230/115/13.2KV TRANSFORMER CKT 1'	250	250	0.03135	103.6495	'HITCHLAND INTERCHANGE - OCHILTREE 230KV CKT 1'
23SP	0	'FROM->TO'	'HITCHLAND INTERCHANGE (H TP80148301) 230/115/13.2KV TRANSFORMER CKT 1'	250	250	0.03135	107.9598	'HITCHLAND INTERCHANGE - OCHILTREE 230KV CKT 1'
23SP	0	'FROM->TO'	'HITCHLAND INTERCHANGE (H TP80148301) 230/115/13.2KV TRANSFORMER CKT 1'	250	250	0.03135	103.8524	'OCHILTREE (H TP80219401) 230/115/13.2KV TRANSFORMER CKT 1'
23SP	0	'FROM->TO'	'HITCHLAND INTERCHANGE (H TP80148301) 230/115/13.2KV TRANSFORMER CKT 1'	250	250	0.03135	108.232	'OCHILTREE (H TP80219401) 230/115/13.2KV TRANSFORMER CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	148.1078	'BASE CASE'
13G	02ALL	'FROM->TO'	'SPSSPPTIESB1'	620	620	0.31805	117.9687	'BASE CASE'
13G	02ALL	'FROM->TO'	'SPSSPPTIESC'	620	620	0.31805	117.9687	'BASE CASE'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03856	126.3784	'LYDIA - VALLIANT 345KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03915	126.4512	'DELAWARE - NORTHEAST STATION 345KV CKT 1'

Season	Dispatch Group	Flow	Monitored Element	RATEA (MVA)	RATEB (MVA)	TDF	TC% LOADING	Contingency
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03677	122.7456	'CLINTON AIR FORCE BASE TAP - ELK CITY 138KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03677	122.9717	'CLINTON AIR FORCE BASE TAP - HOBART JUNCTION 138KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.04463	154.6723	'LAWTON EASTSIDE - OKLAUNION 345KV CKT 1'
13G	02ALL	'FROM->TO'	'ELK CITY 230KV (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1'	287	287	0.07017	105.8691	'LAWTON EASTSIDE - OKLAUNION 345KV CKT 1'
13G	02ALL	'FROM->TO'	'ELK CITY 230KV (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1'	287	287	0.07017	104.7399	'LAWTON EASTSIDE - OKLAUNION 345KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.04463	142.1941	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03619	121.8454	'CLINTON JUNCTION - ELK CITY 138KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03947	123.6214	'ELK CITY - RED HILLS WIND 138KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03819	126.5337	'WEATHERFORD JCT. - WEATHERFORD SOUTHEAST 138KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.04992	158.258	'ELK CITY 230KV - SWEETWATER 230KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.04992	128.7472	'STATELINE INTERCHANGE - SWEETWATER 230KV CKT &1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.04017	133.7224	'HUNTERS7 345.00 - WOODRING 345KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03767	125.9492	'KNOBHILL - SALINE 69KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03767	126.3204	'HELENA TAP - SALINE 69KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03922	126.7426	'NEWKIRK4 - PECKHAM TAP 138KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03212	109.3112	'CLEO CORNER - GLASS MOUNTAIN 138KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03067	112.0176	'CLEO CORNER - MEN TAP 138KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.04439	148.0751	'WOODWARD - WOODWARD 69KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	124.8	'CENT 4 138.00 - WOODWARD 138KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03503	115.6627	'WOODWARD - WOODWARD EHV 138KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03817	125.9566	'WOODWARD - WOODWARD EHV 138KV CKT 2'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.04752	156.9548	'DEWEY - IODINE 138KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.0365	120.1262	'DEWEY - SOUTHARD 138KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03924	134.2831	'DEWEY - TALOGA 138KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03212	108.299	'GLASS MOUNTAIN - MOORELAND 138KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03067	112.9263	'IMO TAP - MEN TAP 138KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.0388	126.2261	'ALVA - KNOBHILL 69KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.0372	119.3445	'KNOBHILL - MOORELAND 138KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.04752	157.9789	'IODINE - WOODWARD EHV 138KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.0365	121.81	'EL RENO - ROMAN NOSE 138KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.0365	121.1702	'ROMAN NOSE - SOUTHARD 138KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03949	132.1338	'CIMARRON - NORTHWEST 345KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.06052	187.8763	'NORTHWEST - TATONGA7 345.00 345KV CKT 1'

Season	Dispatch Group	Flow	Monitored Element	RATEA (MVA)	RATEB (MVA)	TDF	TC% LOADING	Contingency
13G	02ALL	'FROM->TO'	'FPL SWITCH - MOORELAND 138KV CKT 1'	268	287	0.06052	107.4159	'NORTHWEST - TATONGA7 345.00 345KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.06052	172.5075	'TATONGA7 345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03115	118.5264	'Hitchland Interchange - WOODWARD DISTRICT EHV 345KV CKT 2'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.04459	141.357	'THISTLE7 345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.04459	141.357	'THISTLE7 345.00 - WOODWARD DISTRICT EHV 345KV CKT 2'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	120.5	'G07-62 345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03115	112.3748	'BEAVER CO 345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
13G	02ALL	'FROM->TO'	'ELK CITY 230KV (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1'	287	287	0.07129	100.3839	'BEAVER CO 345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	126.1	'KEENAN4 - WOODWARD EHV 138KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	124.5	'G08-29 138.00 - WOODWARD EHV 138KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.04017	132.1507	'HUNTERS7 345.00 - VIOLA 7 345.00 345KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	134.9	'FPL SWITCH - OKLA WIND ENERGY CENTER 138KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03362	110.3926	'CEDARDALE - MOORELAND 138KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03362	110.9856	'CEDARDALE - OKEENE 138KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.035	119.0963	'DOVER SW - OKEENE 138KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.04007	130.8332	'FARGO JCT - FT SUPPLY 69KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	132.8	'FT SUPPLY - SLEEPING BEAR 138KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03735	123.5926	'MOORELAND - TALOGA 138KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03997	119.5233	'MOORELAND - NINE MILE 138KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03997	119.941	'MOREWOOD SW - NINE MILE 138KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03835	126.6852	'OKEENE - WATONGA SW 69KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.04007	131.7798	'FARGO JCT - WOODWARD 69KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.0405	131.2119	'CARTER JCT - WOODWARD 69KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.04668	141.5672	'FINNEY SWITCHING STATION - Hitchland Interchange 345KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	123.5	'G10-14 345.00 - Hitchland Interchange 345KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03115	123.6967	'BEAVER CO 345.00 - Hitchland Interchange 345KV CKT 1'

Season	Dispatch Group	Flow	Monitored Element	RATEA (MVA)	RATEB (MVA)	TDF	TC% LOADING	Contingency
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.04992	155.4112	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.04466	146.7673	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	126.1698	'Graves Sub - STATELINE INTERCHANGE 115KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.04668	143.8338	'FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.04014	132.1862	'POST ROCK - SPEARVILLE 345KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.04012	131.7085	'BUCKNER7 345.00 - HOLCOMB 345KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.04059	132.0491	'MINGO - SETAB 345KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.04074	131.3958	'MINGO - RED WILLOW 345KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.04012	132.7355	'BUCKNER7 345.00 - SPEARVILLE 345KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.0405	131.8071	'BENTON - WICHITA 345KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.04265	138.4686	'THISTLE7 345.00 - WICHITA 345KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.04265	138.4686	'THISTLE7 345.00 - WICHITA 345KV CKT 2'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	122.7	'BEAVER CO 345.00 - G08-47 345.00 345KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	126.7	'G07-62 345.00 - G07-62-1 345.00 345KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	126.7	'G07-62 345.00 - G07-62-2 345.00 345KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	126.6	'G07-62 345.00 - G07-62-3 345.00 345KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	126.6	'G07-62 345.00 - G07-62-4 345.00 345KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	123.5	'G10-14 345.00 345/115KV TRANSFORMER CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	122.2	'BEAVER CO 345.00 - G10-01 345.00 345KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	125.9	'G06-44 115.00 - G06-44-3 115.00 115KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	130.8	'4OSAGEWIND 138.00 - 4REMNGTON 138.00 138KV CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.04992	158.2519	'ELK CITY 230KV (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03742	135.1579	'WOODRING (WOODRNG2) 345/138/13.8KV TRANSFORMER CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.04439	160.8351	'WOODWARD (WOODWRD2) 138/69/13.2KV TRANSFORMER CKT 1'

Season	Dispatch Group	Flow	Monitored Element	RATEA (MVA)	RATEB (MVA)	TDF	TC% LOADING	Contingency
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.0372	119.846	'KNOBHILL (KNOBHIL4) 138/69/13.2KV TRANSFORMER CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	131.1	'SOONER 138/22.0KV TRANSFORMER CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	124.2	'CENT 4 138.00 (CENTENNIAL) 138/34.5/9.96KV TRANSFORMER CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03581	120.9802	'WOODWARD DISTRICT EHV (WWDEHV) 345/138/13.8KV TRANSFORMER CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03582	120.3383	'WOODWARD DISTRICT EHV (WWDEHV-T2) 345/138/13.8KV TRANSFORMER CKT 2'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	126	'KEENAN4 (KEENAN1) 138/34.5/9.96KV TRANSFORMER CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	135.1	'OKLA WIND ENERGY CENTER (FPLWIND) 138/34.5/13.8KV TRANSFORMER CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	136.9	'MOORELAND 138/18.0KV TRANSFORMER CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	126.1667	'STATELINE INTERCHANGE (H TP80154301) 230/115/13.2KV TRANSFORMER CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	121.4	'TOLK STATION EAST 230/24.0KV TRANSFORMER CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	122.7	'G08-47 345.00 345/34.5KV TRANSFORMER CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	126.7	'G07-62-1 345.00 345/34.5KV TRANSFORMER CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	126.7	'G07-62-2 345.00 345/34.5KV TRANSFORMER CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	126.6	'G07-62-3 345.00 345/34.5KV TRANSFORMER CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	126.6	'G07-62-4 345.00 345/34.5KV TRANSFORMER CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	126.2	'G10-14 115.00 115/34.5KV TRANSFORMER CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	126.1	'G10-14 115.00 115/34.5KV TRANSFORMER CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	122.2	'G10-01 345.00 345/34.5KV TRANSFORMER CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	124.5	'G08-29 138.00 138/34.5KV TRANSFORMER CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	125.9	'G06-44-3 115.00 115/34.5KV TRANSFORMER CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	125.6	'SUB 3458 NEB CTY 345/18.0KV TRANSFORMER CKT 1'

Season	Dispatch Group	Flow	Monitored Element	RATEA (MVA)	RATEB (MVA)	TDF	TC% LOADING	Contingency
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	130.8	'4OSAGEWIND 138.00 138/34.5KV TRANSFORMER CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	126.6	'RAUN 345/22.0KV TRANSFORMER CKT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.0547	171.2045	'DBL-WICH-THI'
13G	02ALL	'TO->FROM'	'CLEARWATER - MILAN TAP 138KV CKT 1'	110	110	0.03219	128.6034	'DBL-WICH-THI'
13G	02ALL	'FROM->TO'	'FLATRDG3 - HARPER 138KV CKT 1'	95.6	95.6	0.03219	175.7824	'DBL-WICH-THI'
13G	02ALL	'FROM->TO'	'HARPER - MILAN TAP 138KV CKT 1'	95.6	95.6	0.03219	154.6425	'DBL-WICH-THI'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.06078	175.6278	'DBL-THIS-WWR'
13G	02ALL	'FROM->TO'	'FPL SWITCH - MOORELAND 138KV CKT 1'	268	287	0.06078	100.6402	'DBL-THIS-WWR'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03855	126.369	'SPP-AEPW-01'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.04463	144.8066	'SPP-AEPW-32'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	128.7473	'NC1_GEN-NEBRASKA CITY 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.04455	142.1474	'SPP-SWPS-01'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.04992	158.258	'SPP-SWPS-02A'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.05006	156.7179	'SPP-SWPS-03'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.04668	141.618	'SPP-SWPS-05'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	130.8619	'GEN509416 1-TURK GENERATION'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	134.3812	'GEN514805 1-SOONER UNIT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	132.1606	'GEN514806 1-SOONER UNIT 2'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	130.9095	'GEN515226 1-MUSKOGEE 6G'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	126.4236	'GEN515365 1-CENT 21 34.500'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	126.547	'GEN515393 1-OGEWND2G'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	134.3251	'GEN515787 1-OKLA WIND ENERGY CENTER'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	133.0801	'GEN520922 1-SLEEPING BEAR'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	131.0595	'GEN520947 1-HUGO1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	137.6686	'GEN520997 1-MORLND2'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	124.824	'GEN523103 1-NOBLE_WND 3115.00'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	126.5469	'GEN523195 1-Hansford County Switch Station'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	123.3274	'GEN523971 1-HARRINGTON GEN #1 24 KV'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	123.3233	'GEN523972 1-HARRINGTON GEN #2 24 KV'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	123.3323	'GEN523973 1-HARRINGTON GEN #3 24 KV'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	125.5845	'GEN525494 1-PLANT X GEN #4 20 KV'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	121.2997	'GEN525561 1-TOLK GEN #1 24 KV'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	119.5183	'GEN525562 1-TOLK GEN #2 24 KV'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	124.4387	'GEN526331 1-JONES GEN #1 22 KV'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	124.4372	'GEN526332 1-JONES GEN #2 21 KV'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	126.0204	'GEN527161 1-MUSTANG GEN #1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	126.0205	'GEN527162 1-MUSTANG GEN #2'

Season	Dispatch Group	Flow	Monitored Element	RATEA (MVA)	RATEB (MVA)	TDF	TC% LOADING	Contingency
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	125.4324	'GEN527882 1-CUNNINGHAM GEN #2 20 KV'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	125.9431	'GEN527901 1-HOBBS PLANT #1 (CT)'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	125.9624	'GEN527902 1-HOBBS PLANT #2 (CT)'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	124.6079	'GEN527903 1-HOBBS PLANT #3 (ST)'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	121.8384	'GEN531447 1-HOLCOMB GENERATOR'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	125.0645	'GEN532651 1-JEFFREY ENERGY CENTER UNIT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	125.0647	'GEN532652 1-JEFFREY ENERGY CENTER UNIT 2'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	125.0643	'GEN532653 1-JEFFREY ENERGY CENTER UNIT 3'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	124.4178	'GEN532751 1-WOLF CREEK GENERATING STATION UNIT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	126.2017	'GEN542957 1-IATAN UNIT #1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	125.4164	'GEN542962 2-IATAN UNIT #2'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	116.8189	'GEN560121 1-G08-47 0.5750'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	122.8023	'GEN560256 1-G10-14-1 0.6900'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	122.6488	'GEN560257 1-G10-14-2 0.6900'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	122.448	'GEN560286 1-G10-01-1WTG 0.6900'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	122.448	'GEN560287 1-G10-01-2WTG 0.6900'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	122.9883	'GEN560371 1-G07-46 0.6900'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	124.8657	'GEN560429 1-G08-29 0.6400'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	124.3621	'GEN560585 1-G06-44-2 0.6000'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	122.5253	'GEN560586 1-G06-44-3 0.6000'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	125.7258	'GEN562049 1-G11_012_3 0.6900'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	124.7183	'GEN640009 1-COOPER NUCLEAR STATION'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	124.6939	'GEN640010 1-GERALD GENTLEMAN STATION UNIT 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	124.7967	'GEN640011 2-GERALD GENTLEMAN STATION UNIT 2'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	126.0193	'GEN645001 1-FORT CALHOUN 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	125.4235	'GEN645011 1-NEBRASKA CITY 1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	125.0831	'GEN645012 2-NEBRASKA CITY 2'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	126.0429	'GEN659103 1-ANTELOPE VALLEY UNIT1'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	126.0429	'GEN659107 2-ANTELOPE VALLEY UNIT2'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	126.7052	'GEN659111 2-LELAND OLDS UNIT2'
13G	02ALL	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03903	122.7	'GEN659118 1-LARAMIE RIVER UNIT1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	130.6203	'BASE CASE'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03864	111.3507	'LYDIA - VALLIANT 345KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	111.5585	'EASTDC - WELSH 345KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03923	111.2275	'DELAWARE - NORTHEAST STATION 345KV CKT 1'

Season	Dispatch Group	Flow	Monitored Element	RATEA (MVA)	RATEB (MVA)	TDF	TC% LOADING	Contingency
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03684	108.2471	'CLINTON AIR FORCE BASE TAP - ELK CITY 138KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03684	108.473	'CLINTON AIR FORCE BASE TAP - HOBART JUNCTION 138KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.04479	134.1749	'LAWTON EASTSIDE - OKLAUNION 345KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.04479	123.521	'OKLAUNION - TUCO INTERCHANGE 345KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03626	107.5415	'CLINTON JUNCTION - ELK CITY 138KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03958	108.2558	'ELK CITY - RED HILLS WIND 138KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03827	111.5836	'WEATHERFORD JCT. - WEATHERFORD SOUTHEAST 138KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.05008	139.0043	'ELK CITY 230KV - SWEETWATER 230KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.05008	113.5455	'STATELINE INTERCHANGE - SWEETWATER 230KV CKT &1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.04024	118.3999	'HUNTERS7 345.00 - WOODRING 345KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03775	111.1134	'KNOBHILL - SALINE 69KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03775	111.4837	'HELENA TAP - SALINE 69KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.04449	130.7862	'WOODWARD - WOODWARD 69KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	109.5	'CENT 4 138.00 - WOODWARD 138KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03511	102.1016	'WOODWARD - WOODWARD EHV 138KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03825	111.1088	'WOODWARD - WOODWARD EHV 138KV CKT 2'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.04763	138.596	'DEWEY - IODINE 138KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03658	105.6867	'DEWEY - SOUTHARD 138KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03933	118.4682	'DEWEY - TALOGA 138KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03072	100.2069	'IMO TAP - MEN TAP 138KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03888	111.2262	'ALVA - KNOBHILL 69KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03727	104.9371	'KNOBHILL - MOORELAND 138KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.04763	139.6224	'IODINE - WOODWARD EHV 138KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.0393	111.5946	'CRESWELL - MIDLTNT4 138.00 138KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03658	107.367	'EL RENO - ROMAN NOSE 138KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03658	106.7224	'ROMAN NOSE - SOUTHARD 138KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03957	116.8182	'CIMARRON - NORTHWEST 345KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.06067	166.7938	'NORTHWEST - TATONGA7 345.00 345KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.06067	149.7675	'TATONGA7 345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03916	115.9227	'BORDER 7345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03122	105.1998	'Hitchland Interchange - WOODWARD DISTRICT EHV 345KV CKT 2'

Season	Dispatch Group	Flow	Monitored Element	RATEA (MVA)	RATEB (MVA)	TDF	TC% LOADING	Contingency
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.04471	123.517	'THISTLE7 345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.04471	123.517	'THISTLE7 345.00 - WOODWARD DISTRICT EHV 345KV CKT 2'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	104.9	'G07-62 345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03122	100	'BEAVER CO 345.00 - WOODWARD DISTRICT EHV 345KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	110.7	'KEENAN4 - WOODWARD EHV 138KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	109.2	'G08-29 138.00 - WOODWARD EHV 138KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03916	116.1127	'BORDER 7345.00 - TUCO INTERCHANGE 345KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.04024	116.818	'HUNTERS7 345.00 - VIOLA 7 345.00 345KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	119.7	'FPL SWITCH - OKLA WIND ENERGY CENTER 138KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03506	104.9839	'DOVER SW - OKEENE 138KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03902	115.532	'FAIRVIEW - OKEENE 69KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	117.6	'FT SUPPLY - SLEEPING BEAR 138KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03743	108.5498	'MOORELAND - TALOGA 138KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.0401	104.1885	'MOORELAND - NINE MILE 138KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.0401	104.5606	'MOREWOOD SW - NINE MILE 138KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.04016	116.1843	'FARGO JCT - WOODWARD 69KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.0468	120.8053	'FINNEY SWITCHING STATION - Hitchland Interchange 345KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	109.4	'G10-14 345.00 - Hitchland Interchange 345KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03122	109.2266	'BEAVER CO 345.00 - Hitchland Interchange 345KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.05008	135.9385	'GRAPEVINE INTERCHANGE - STATELINE INTERCHANGE 230KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.04479	129.219	'GRAPEVINE INTERCHANGE - NICHOLS STATION 230KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	111.0632	'Graves Sub - STATELINE INTERCHANGE 115KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.0468	122.6304	'FINNEY SWITCHING STATION - HOLCOMB 345KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.04023	116.3884	'POST ROCK - SPEARVILLE 345KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.04068	115.996	'MINGO - SETAB 345KV CKT 1'

Season	Dispatch Group	Flow	Monitored Element	RATEA (MVA)	RATEB (MVA)	TDF	TC% LOADING	Contingency
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.04021	116.6135	'BUCKNER7 345.00 - SPEARVILLE 345KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.04059	116.1788	'BENTON - WICHITA 345KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.04276	121.7502	'THISTLE7 345.00 - WICHITA 345KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.04276	121.7502	'THISTLE7 345.00 - WICHITA 345KV CKT 2'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	108.8	'BEAVER CO 345.00 - G08-47 345.00 345KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	111.5	'G07-62 345.00 - G07-62-1 345.00 345KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	111.5	'G07-62 345.00 - G07-62-2 345.00 345KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	111.4	'G07-62 345.00 - G07-62-3 345.00 345KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	111.4	'G07-62 345.00 - G07-62-4 345.00 345KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	109.4	'G10-14 345.00 345/115KV TRANSFORMER CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	108.3	'BEAVER CO 345.00 - G10-01 345.00 345KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	111.4	'G06-44 115.00 - G06-44-3 115.00 115KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	115.6	'4OSAGEWIND 138.00 - 4REMNGTON 138.00 138KV CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.05008	138.9684	'ELK CITY 230KV (ELKCTY-6) 230/138/13.8KV TRANSFORMER CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.0375	120.5693	'WOODRING (WOODRNG2) 345/138/13.8KV TRANSFORMER CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.04449	143.4968	'WOODWARD (WOODWRD2) 138/69/13.2KV TRANSFORMER CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03727	105.4345	'KNOBHILL (KNOBHIL4) 138/69/13.2KV TRANSFORMER CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	116	'SOONER 138/22.0KV TRANSFORMER CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	109.1	'CENT 4 138.00 (CENTENNIAL) 138/34.5/9.96KV TRANSFORMER CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03589	107.1334	'WOODWARD DISTRICT EHV (WWDEHV) 345/138/13.8KV TRANSFORMER CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.0359	106.4904	'WOODWARD DISTRICT EHV (WWDEHV-T2) 345/138/13.8KV TRANSFORMER CKT 2'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	110.7	'KEENAN4 (KEENAN1) 138/34.5/9.96KV TRANSFORMER CKT 1'

Season	Dispatch Group	Flow	Monitored Element	RATEA (MVA)	RATEB (MVA)	TDF	TC% LOADING	Contingency
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	119.9	'OKLA WIND ENERGY CENTER (FPLWIND) 138/34.5/13.8KV TRANSFORMER CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	123.2	'MOORELAND 138/18.0KV TRANSFORMER CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	111.0623	'STATELINE INTERCHANGE (H TP80154301) 230/115/13.2KV TRANSFORMER CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	107.2	'TOLK STATION EAST 230/24.0KV TRANSFORMER CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	108.8	'G08-47 345.00 345/34.5KV TRANSFORMER CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	111.5	'G07-62-1 345.00 345/34.5KV TRANSFORMER CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	111.5	'G07-62-2 345.00 345/34.5KV TRANSFORMER CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	111.4	'G07-62-3 345.00 345/34.5KV TRANSFORMER CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	111.4	'G07-62-4 345.00 345/34.5KV TRANSFORMER CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	111.4	'G10-14 115.00 115/34.5KV TRANSFORMER CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	108.3	'G10-01 345.00 345/34.5KV TRANSFORMER CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	109.2	'G08-29 138.00 138/34.5KV TRANSFORMER CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	111.4	'G06-44-3 115.00 115/34.5KV TRANSFORMER CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	110.3	'SUB 3458 NEB CTY 345/18.0KV TRANSFORMER CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	115.6	'4OSAGEWIND 138.00 138/34.5KV TRANSFORMER CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	111.4	'RAUN 345/22.0KV TRANSFORMER CKT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.05487	149.2128	'DBL-WICH-THI'
13G	02G11_012	'TO->FROM'	'CLEARWATER - MILAN TAP 138KV CKT 1'	110	110	0.03237	115.2252	'DBL-WICH-THI'
13G	02G11_012	'FROM->TO'	'FLATRDG3 - HARPER 138KV CKT 1'	95.6	95.6	0.03237	155.2298	'DBL-WICH-THI'
13G	02G11_012	'FROM->TO'	'HARPER - MILAN TAP 138KV CKT 1'	95.6	95.6	0.03237	139.255	'DBL-WICH-THI'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.06101	150.6199	'DBL-THIS-WWR'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03863	111.3437	'SPP-AEPW-01'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.04479	126.1057	'SPP-AEPW-32'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	113.5458	'NC1_GEN-NEBRASKA CITY 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.04471	123.4881	'SPP-SWPS-01'

Season	Dispatch Group	Flow	Monitored Element	RATEA (MVA)	RATEB (MVA)	TDF	TC% LOADING	Contingency
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.05008	139.0043	'SPP-SWPS-02A'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.05022	137.0538	'SPP-SWPS-03'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.0468	120.8471	'SPP-SWPS-05'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	115.6751	'GEN509403 1-PIRKEY GENERATION'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	115.7596	'GEN509416 1-TURK GENERATION'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	119.3701	'GEN514805 1-SOONER UNIT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	117.0895	'GEN514806 1-SOONER UNIT 2'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	115.7904	'GEN515226 1-MUSKOGEE 6G'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	111.0609	'GEN515365 1-CENT 21 34.500'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	111.2908	'GEN515393 1-OGEWND2G'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	119.1166	'GEN515787 1-OKLA WIND ENERGY CENTER'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	117.8756	'GEN520922 1-SLEEPING BEAR'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	115.9432	'GEN520947 1-HUGO1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	123.9581	'GEN520997 1-MORLND2'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	110.4662	'GEN523103 1-NOBLE_WND 3115.00'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	108.4952	'GEN523971 1-HARRINGTON GEN #1 24 KV'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	108.4918	'GEN523972 1-HARRINGTON GEN #2 24 KV'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	108.4974	'GEN523973 1-HARRINGTON GEN #3 24 KV'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	110.591	'GEN525494 1-PLANT X GEN #4 20 KV'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	107.1846	'GEN525561 1-TOLK GEN #1 24 KV'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	104.8507	'GEN525562 1-TOLK GEN #2 24 KV'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	109.5249	'GEN526331 1-JONES GEN #1 22 KV'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	109.5235	'GEN526332 1-JONES GEN #2 21 KV'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	111.0016	'GEN527161 1-MUSTANG GEN #1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	111.0016	'GEN527162 1-MUSTANG GEN #2'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	110.4503	'GEN527882 1-CUNNINGHAM GEN #2 20 KV'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	110.9298	'GEN527901 1-HOBBS PLANT #1 (CT)'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	110.9479	'GEN527902 1-HOBBS PLANT #2 (CT)'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	109.6746	'GEN527903 1-HOBBS PLANT #3 (ST)'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	106.576	'GEN531447 1-HOLCOMB GENERATOR'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	109.9024	'GEN532651 1-JEFFREY ENERGY CENTER UNIT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	109.902	'GEN532652 1-JEFFREY ENERGY CENTER UNIT 2'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	109.9016	'GEN532653 1-JEFFREY ENERGY CENTER UNIT 3'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	109.3817	'GEN532751 1-WOLF CREEK GENERATING STATION UNIT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	111.0563	'GEN542957 1-IATAN UNIT #1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	110.2913	'GEN542962 2-IATAN UNIT #2'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	104.3485	'GEN560121 1-G08-47 0.5750'

Season	Dispatch Group	Flow	Monitored Element	RATEA (MVA)	RATEB (MVA)	TDF	TC% LOADING	Contingency
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	108.9288	'GEN560256 1-G10-14-1 0.6900'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	108.8057	'GEN560257 1-G10-14-2 0.6900'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	108.6722	'GEN560286 1-G10-01-1WTG 0.6900'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	108.6722	'GEN560287 1-G10-01-2WTG 0.6900'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	109.0996	'GEN560371 1-G07-46 0.6900'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	109.5844	'GEN560429 1-G08-29 0.6400'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	110.1756	'GEN560585 1-G06-44-2 0.6000'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	108.7485	'GEN560586 1-G06-44-3 0.6000'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	110.6462	'GEN562049 1-G11_012_3 0.6900'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	109.6071	'GEN640009 1-COOPER NUCLEAR STATION'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	109.5398	'GEN640010 1-GERALD GENTLEMAN STATION UNIT 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	109.6375	'GEN640011 2-GERALD GENTLEMAN STATION UNIT 2'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	110.8803	'GEN645001 1-FORT CALHOUN 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	110.2958	'GEN645011 1-NEBRASKA CITY 1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	109.9627	'GEN645012 2-NEBRASKA CITY 2'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	110.9481	'GEN659103 1-ANTELOPE VALLEY UNIT1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	110.9481	'GEN659107 2-ANTELOPE VALLEY UNIT2'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	107.6349	'GEN659118 1-LARAMIE RIVER UNIT1'
13G	02G11_012	'TO->FROM'	'FPL SWITCH - WOODWARD 138KV CKT 1'	133	153	0.03912	115.6726	'GEN337911 1-ARKANSAS NUCLEAR ONE UNIT #2'

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 2012 series of Model Development Working Group (MDWG) dynamic study models including the 2015 summer and 2014 winter 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 sixty-eight (68) contingencies were identified for the Limited Operation scenario for use in this study. These faults are listed within Table 6. These contingencies included three-phase faults and single-phase line faults at locations defined by SPP. Single-phase line faults were simulated by applying fault impedance to the positive sequence network at the fault location to represent the effect of the negative and zero sequence networks on the positive sequence network. The fault impedance was computed to give a positive sequence voltage at the specified fault location of approximately 60% of pre-fault voltage. This method is in agreement with SPP current practice.

With exception to 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. after an additional twenty (20) cycles, re-close the previous facility back into the fault
4. continue fault for five (5) additional cycles
5. trip the faulted facility and remove the fault

Transformer faults are typically only performed for three-phase faults, unless otherwise noted. Additionally the sequence of events for a transformer is to 1) apply a three-phase fault for five (5) cycles and 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 for Limited Operation

	Contingency Number and Name	Description
1	FLT_01_G1112tap_Hitchland_230kV_3PH	*3-Phase fault on the GEN 2011-012 tap –Hitchland 230kV line near the GEN 2011-012 tap 230kV bus.*
2	FLT_02_G1112tap_Hitchland_230kV_1PH	*Single-phase fault similar to previous fault.*
3	FLT_03_G1112tap_MooreCNTY_230kV_3PH	*3-Phase fault on the GEN 2011-012 tap –Moore County 230kV line near the GEN 2011-012 tap 230kV bus.*
4	FLT_04_G1112tap_MooreCNTY_230kV_1PH	*Single-phase fault similar to previous fault.*
5	FLT_05_MooreCNTY_PotterCo6_230kV_3PH	*3-Phase fault on the Moore County –Potter County 230kV line near the Moore County 230kV bus.*
6	FLT_06_MooreCNTY_PotterCo6_230kV_1PH	*Single-phase fault similar to previous fault.*
7	FLT_07_MooreCNTY_MooreE_230_115kV_3PH	*3-Phase fault on the Moore County – Moore East 230kV line near the Moore County 230kV bus.*
8	FLT_08_MooreCNTY_MooreE_230_115kV_1PH	*Single-phase fault similar to previous fault.*
9	FLT_09_PotterCo6_HARRNGEST6_230kV_3PH	*3-Phase fault on the Potter County – Harrington East 230kV line near the Potter County 230kV bus.*
10	FLT_10_PotterCo6_HARRNGEST6_230kV_1PH	*Single-phase fault similar to previous fault.*
11	FLT_11_PotterCo6_Cherry6_230kV_3PH	*3-Phase fault on the Potter County – Cherry 230kV line near the Potter County 230kV bus.*
12	FLT_12_PotterCo6_Cherry6_230kV_1PH	*Single-phase fault similar to previous fault.*
13	FLT_13_PotterCo6_BUSHLAND6_230kV_3PH	*3-Phase fault on the Potter County – Bushland 230kV line near the Potter County 230kV bus.*
14	FLT_14_PotterCo6_BUSHLAND6_230kV_1PH	*Single-phase fault similar to previous fault.*
15	FLT_15_PotterCo6_SRANDALLCO_230kV_3PH	*3-Phase fault on the Potter County – South Randall 230kV line near the Potter County 230kV bus.*
16	FLT_16_PotterCo6_SRANDALLCO_230kV_1PH	*Single-phase fault similar to previous fault.*
17	FLT_17_PotterCo6_POTTERCO3_230_115kV_3PH	*3-Phase fault on the Potter County 230kV/115kV circuit 1 transformer near the Potter County 230kV bus.*
18	FLT_18_PotterCo6_POTTERCO3_230_115kV_1PH	*Single-phase fault similar to previous fault.*
19	FLT_19_PotterCo6_POTTERCO7_230_345kV_3PH	*3-Phase fault on the Potter County 345kV/230kV circuit 1 transformer near the Potter County 230kV bus.*
20	FLT_20_PotterCo6_POTTERCO7_230_345kV_1PH	*Single-phase fault similar to previous fault.*
21	FLT_21_HARRNGEST6_PRINGLE6_230kV_3PH	*3-Phase fault on the Harrington East – Pringle 230kV line near the Harrington East 230kV bus.*
22	FLT_22_HARRNGEST6_PRINGLE6_230kV_1PH	*Single-phase fault similar to previous fault.*
23	FLT_23_HARRNGEST6_RANDALL6_230kV_3PH	*3-Phase fault on the Harrington East –Randall 230kV line near the Harrington East 230kV bus.*
24	FLT_24_HARRNGEST6_RANDALL6_230kV_1PH	*Single-phase fault similar to previous fault.*
25	FLT_25_HARRNGMID6_RANDALL6_230kV_3PH	*3-Phase fault on the Harrington Mid –Randall 230kV line near the Harrington Mid 230kV bus.*
26	FLT_26_HARRNGMID6_RANDALL6_230kV_1PH	*Single-phase fault similar to previous fault.*
27	FLT_27_HARRNGMID6_NICHOLS6_230kV_3PH	*3-Phase fault on the Harrington Mid –Nichols 230kV line near the Harrington Mid 230kV bus.*
28	FLT_28_HARRNGMID6_NICHOLS6_230kV_1PH	*Single-phase fault similar to previous fault.*
29	FLT_29_HARRNGWST6_Cherry6_230kV_3PH	*3-Phase fault on the Harrington West –Cherry 230kV line near the Harrington West 230kV bus.*
30	FLT_30_HARRNGWST6_Cherry6_230kV_1PH	*Single-phase fault similar to previous fault.*
31	FLT_31_HARRNGWST6_NICHOLS6_230kV_3PH	*3-Phase fault on the Harrington West –Nichols 230kV line near the Harrington West 230kV bus.*
32	FLT_32_HARRNGWST6_NICHOLS6_230kV_1PH	*Single-phase fault similar to previous fault.*
33	FLT_33_Cherry6_HARRNGWST6_230kV_3PH	*3-Phase fault on the Harrington West –Cherry 230kV line near the Cherry 230kV bus.*
34	FLT_34_Cherry6_HARRNGWST6_230kV_1PH	*Single-phase fault similar to previous fault.*
35	FLT_35_Cherry6_Cherry3_230_115kV_3PH	*3-Phase fault on the Cherry 230kV/115kV circuit 1 transformer near the Cherry 230kV bus.*
36	FLT_36_Cherry6_Cherry3_230_115kV_1PH	*Single-phase fault similar to previous fault.*
37	FLT_37_BUSHLAND6_BUFFALO_230kV_3PH	*3-Phase fault on the Bushland –Buffalo 230kV line near the Bushland 230kV bus.*

	Contingency Number and Name	Description
38	FLT_38_BUSHLAND6_BUFFALO_230kV_1PH	*Single-phase fault similar to previous fault.*
39	FLT_39_BUSHLAND6_BUSHLAND3_230_115kV_3PH	*3-Phase fault on the Bushland 230kV/115kV circuit 1 transformer near the Bushland 230kV bus..*
40	FLT_40_BUSHLAND6_BUSHLAND3_230_115kV_1PH	*Single-phase fault similar to previous fault.*
41	FLT_41_SRANDALLCO_PLANTX_230kV_3PH	*3-Phase fault on the South Randall –Plant X 230kV line near the South Randall 230kV bus.*
42	FLT_42_SRANDALLCO_PLANTX_230kV_1PH	*Single-phase fault similar to previous fault.*
43	FLT_43_POTTERCO7_HITCHLAND7_345kV_3PH	*3-Phase fault on the Potter County –Hitchland 345kV line near the Potter County 345kV bus.*
44	FLT_44_POTTERCO7_HITCHLAND7_345kV_1PH	*Single-phase fault similar to previous fault.*
45	FLT_45_HITCHLAND7_FINNEY7_345kV_3PH	*3-Phase fault on the Hitchland –Finney 345kV line near the Hitchland 345kV bus.*
46	FLT_46_HITCHLAND7_FINNEY7_345kV_1PH	*Single-phase fault similar to previous fault.*
47	FLT_47_HITCHLAND7_BEAVER_345kV_3PH	*3-Phase fault on the Hitchland –Beaver 345kV circuit 1 line near the Hitchland 345kV bus.*
48	FLT_48_HITCHLAND7_BEAVER_345kV_1PH	*Single-phase fault similar to previous fault.*
49	FLT_49_HITCHLAND7_BEAVER_345kV_3PH	*3-Phase fault on the Hitchland –Beaver 345kV circuit 2 line near the Hitchland 345kV bus.*
50	FLT_50_HITCHLAND7_BEAVER_345kV_1PH	*Single-phase fault similar to previous fault.*
51	FLT_51_HITCHLAND7_POTTERCO7_345kV_3PH	*3-Phase fault on the Potter County –Hitchland 345kV line near the Hitchland 345kV bus.*
52	FLT_52_HITCHLAND7_POTTERCO7_345kV_1PH	*Single-phase fault similar to previous fault.*
53	FLT_53_Hitchland6_OCHILTREE6_230kV_3PH	*3-Phase fault on the Hitchland –Ochiltree 230kV line near the Hitchland 230kV bus.*
54	FLT_54_Hitchland6_OCHILTREE6_230kV_1PH	*Single-phase fault similar to previous fault.*
55	FLT_55_Hitchland6_HITCHLAND3_230_115kV_3PH	*3-Phase fault on the Hitchland 230kV/115kV circuit 1 transformer near the Hitchland 230kV bus..*
56	FLT_56_Hitchland6_HITCHLAND3_230_115kV_1PH	*Single-phase fault similar to previous fault.*
57	FLT_57_Hitchland6_HITCHLAND7_230_345kV_3PH	*3-Phase fault on the Hitchland 345kV/230kV circuit 1 transformer near the Hitchland 230kV bus..*
58	FLT_58_Hitchland6_HITCHLAND7_230_345kV_1PH	*Single-phase fault similar to previous fault.*
59	FLT_59_Hitchland6_HITCHLAND7_230_345kV_3PH	*3-Phase fault on the Hitchland 345kV/230kV circuit 2 transformer near the Hitchland 230kV bus..*
60	FLT_60_Hitchland6_HITCHLAND7_230_345kV_1PH	*Single-phase fault similar to previous fault.*
61	FLT_61_OCHILTREE6_OCHILTREE3_230_115kV_3PH	*3-Phase fault on the Ochiltree 230kV/115kV circuit 1 transformer near the Ochiltree 230kV bus..*
62	FLT_62_OCHILTREE6_OCHILTREE3_230_115kV_1PH	*Single-phase fault similar to previous fault.*
63	FLT_63_FINNEY7_HOLCOMB_345kV_3PH	*3-Phase fault on the Finney – Holcomb 345kV line near the Finney 345kV bus.*
64	FLT_64_FINNEY7_HOLCOMB_345kV_1PH	*Single-phase fault similar to previous fault.*
65	FLT_65_BEAVER_WWRDEHV7_345kV_3PH	*3-Phase fault on the Beaver –Woodward 345kV circuit 1 line near the Beaver 345kV bus.*
66	FLT_66_BEAVER_WWRDEHV7_345kV_1PH	*Single-phase fault similar to previous fault.*
67	FLT_67_BEAVER_WWRDEHV7_345kV_3PH	*3-Phase fault on the Beaver –Woodward 345kV circuit 2 line near the Beaver 345kV bus.*
68	FLT_68_BEAVER_WWRDEHV7_345kV_1PH	*Single-phase fault similar to previous fault.*

Results

Results of the stability analysis are summarized in Table 7. These results are valid for GEN-2011-054 interconnecting with a generation amount up to 104.5 MW

Table 7: Fault Analysis Results for Limited Operation

	Contingency Number and Name	2015SP	2014WP
1	FLT_01_G1112tap_Hitchland_230kV_3PH	Stable	Stable
2	FLT_02_G1112tap_Hitchland_230kV_1PH	Stable	Stable
3	FLT_03_G1112tap_MooreCNTY_230kV_3PH	Stable	Stable
4	FLT_04_G1112tap_MooreCNTY_230kV_1PH	Stable	Stable
5	FLT_05_MooreCNTY_PotterCo6_230kV_3PH	Stable	Stable
6	FLT_06_MooreCNTY_PotterCo6_230kV_1PH	Stable	Stable
7	FLT_07_MooreCNTY_MooreE_230_115kV_3PH	Stable	Stable
8	FLT_08_MooreCNTY_MooreE_230_115kV_1PH	Stable	Stable
9	FLT_09_PotterCo6_HARRNGEST6_230kV_3PH	Stable	Stable
10	FLT_10_PotterCo6_HARRNGEST6_230kV_1PH	Stable	Stable
11	FLT_11_PotterCo6_Cherry6_230kV_3PH	Stable	Stable
12	FLT_12_PotterCo6_Cherry6_230kV_1PH	Stable	Stable
13	FLT_13_PotterCo6_BUSHLAND6_230kV_3PH	Stable	Stable
14	FLT_14_PotterCo6_BUSHLAND6_230kV_1PH	Stable	Stable
15	FLT_15_PotterCo6_SRANDALLCO_230kV_3PH	Stable	Stable
16	FLT_16_PotterCo6_SRANDALLCO_230kV_1PH	Stable	Stable
17	FLT_17_PotterCo6_POTTERCO3_230_115kV_3PH	Stable	Stable
18	FLT_18_PotterCo6_POTTERCO3_230_115kV_1PH	Stable	Stable
19	FLT_19_PotterCo6_POTTERCO7_230_345kV_3PH	Stable	Stable
20	FLT_20_PotterCo6_POTTERCO7_230_345kV_1PH	Stable	Stable
21	FLT_21_HARRNGEST6_PRINGLE6_230kV_3PH	Stable	Stable
22	FLT_22_HARRNGEST6_PRINGLE6_230kV_1PH	Stable	Stable
23	FLT_23_HARRNGEST6_RANDALL6_230kV_3PH	Stable	Stable
24	FLT_24_HARRNGEST6_RANDALL6_230kV_1PH	Stable	Stable
25	FLT_25_HARRNGMID6_RANDALL6_230kV_3PH	Stable	Stable
26	FLT_26_HARRNGMID6_RANDALL6_230kV_1PH	Stable	Stable
27	FLT_27_HARRNGMID6_NICHOLS6_230kV_3PH	Stable	Stable
28	FLT_28_HARRNGMID6_NICHOLS6_230kV_1PH	Stable	Stable
29	FLT_29_HARRNGWST6_Cherry6_230kV_3PH	Stable	Stable
30	FLT_30_HARRNGWST6_Cherry6_230kV_1PH	Stable	Stable
31	FLT_31_HARRNGWST6_NICHOLS6_230kV_3PH	Stable	Stable
32	FLT_32_HARRNGWST6_NICHOLS6_230kV_1PH	Stable	Stable
33	FLT_33_Cherry6_HARRNGWST6_230kV_3PH	Stable	Stable
34	FLT_34_Cherry6_HARRNGWST6_230kV_1PH	Stable	Stable
35	FLT_35_Cherry6_Cherry3_230_115kV_3PH	Stable	Stable
36	FLT_36_Cherry6_Cherry3_230_115kV_1PH	Stable	Stable
37	FLT_37_BUSHLAND6_BUFFALO_230kV_3PH	Stable	Stable
38	FLT_38_BUSHLAND6_BUFFALO_230kV_1PH	Stable	Stable
39	FLT_39_BUSHLAND6_BUSHLAND3_230_115kV_3PH	Stable	Stable
40	FLT_40_BUSHLAND6_BUSHLAND3_230_115kV_1PH	Stable	Stable
41	FLT_41_SRANDALLCO_PLANTX_230kV_3PH	Stable	Stable
42	FLT_42_SRANDALLCO_PLANTX_230kV_1PH	Stable	Stable
43	FLT_43_POTTERCO7_HITCHLAND7_345kV_3PH	Stable	Stable
44	FLT_44_POTTERCO7_HITCHLAND7_345kV_1PH	Stable	Stable
45	FLT_45_HITCHLAND7_FINNEY7_345kV_3PH	Stable	Stable
46	FLT_46_HITCHLAND7_FINNEY7_345kV_1PH	Stable	Stable
47	FLT_47_HITCHLAND7_BEAVER_345kV_3PH	Stable	Stable
48	FLT_48_HITCHLAND7_BEAVER_345kV_1PH	Stable	Stable
49	FLT_49_HITCHLAND7_BEAVER_345kV_3PH	Stable	Stable
50	FLT_50_HITCHLAND7_BEAVER_345kV_1PH	Stable	Stable
51	FLT_51_HITCHLAND7_POTTERCO7_345kV_3PH	Stable	Stable
52	FLT_52_HITCHLAND7_POTTERCO7_345kV_1PH	Stable	Stable
53	FLT_53_Hitchland6_OCHILTREE6_230kV_3PH	Stable	Stable
54	FLT_54_Hitchland6_OCHILTREE6_230kV_1PH	Stable	Stable
55	FLT_55_Hitchland6_HITCHLAND3_230_115kV_3PH	Stable	Stable

	Contingency Number and Name	2015SP	2014WP
56	FLT_56_Hitchland6_HITCHLAND3_230_115kV_1PH	Stable	Stable
57	FLT_57_Hitchland6_HITCHLAND7_230_345kV_3PH	Stable	Stable
58	FLT_58_Hitchland6_HITCHLAND7_230_345kV_1PH	Stable	Stable
59	FLT_59_Hitchland6_HITCHLAND7_230_345kV_3PH	Stable	Stable
60	FLT_60_Hitchland6_HITCHLAND7_230_345kV_1PH	Stable	Stable
61	FLT_61_OCHILTREE6_OCHILTREE3_230_115kV_3PH	Stable	Stable
62	FLT_62_OCHILTREE6_OCHILTREE3_230_115kV_1PH	Stable	Stable
63	FLT_63_FINNEY7_HOLCOMB_345kV_3PH	Stable	Stable
64	FLT_64_FINNEY7_HOLCOMB_345kV_1PH	Stable	Stable
65	FLT_65_BEAVER_WWRDEHV7_345kV_3PH	Stable	Stable
66	FLT_66_BEAVER_WWRDEHV7_345kV_1PH	Stable	Stable
67	FLT_67_BEAVER_WWRDEHV7_345kV_3PH	Stable	Stable
68	FLT_68_BEAVER_WWRDEHV7_345kV_1PH	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_01_G1112tap_Hitchland_230kV_3PH	*3-Phase fault on the GEN 2011-012 tap –Hitchland 230kV line near the GEN 2011-012 tap 230kV bus.*
2	FLT_03_G1112tap_MooreCNTY_230kV_3PH	*3-Phase fault on the GEN 2011-012 tap –Moore County 230kV line near the GEN 2011-012 tap 230kV bus.*

The study and 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. GEN-2011-054 is found to be in compliance with FERC Order #661A.

Conclusion

<OMITTED TEXT> (Interconnection Customer, GEN-2011-012) has requested a Limited Operation System Impact Study under the Southwest Power Pool Open Access Transmission Tariff (OATT) for 104.5 MW of wind generation to be interconnected into a transmission facility of Southwestern Public Service (SPS) in Sherman County, Texas. The point of interconnection will be a new substation on the 230kV line between the Hitchland and Moore County substations in Sherman County, Texas. GEN-2011-012, under GIA Section 5.9, has requested this Limited Operation Interconnection Study (LOIS) to determine the impacts of interconnecting to the transmission system before all required Network Upgrades identified in the DISIS-2011-001 (or most recent iteration) Impact Study can be placed into service.

Power flow analysis from this LOIS has determined that the GEN-2011-012 request can interconnect prior to the completion of the required Network Upgrades, listed within Table 2 of this report.

Transient stability analysis indicates that with all with the power factor requirements stated in the DISIS-2011-001 study and with transmission topology as expected on January 1, 2015, the transmission system will remain stable for the contingencies listed within Table 6 with the addition of GEN-2011-012 generation. Additionally, GEN-2011-012 was found to be in compliance with FERC Order #661A when studied as listed within this report.

Any changes to these assumptions, for example, one or more of the previously queued requests not included within this study execute an interconnection agreement and commencing commercial operation, may require a re-study of this LOIS at the expense of the Customer.

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