System Impact Study
PID 255
250.5MW Plant

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Contents

Executive Summary

This System Impact Study is the second step of the interconnection process and is based on the PID 255 request for interconnection on Entergy's transmission system to the new Colton138kV substation located on the Vatican - East Opelousas 138kV transmission line. This report is organized in four sections; Energy Resource Interconnection Service (ERIS), Network Resource Interconnection Service (NRIS), Short Circuit/Breaker Rating Analysis, and Stability Study.

Requestor for PID 255 requested ERIS/NRIS service. PID 255 will be a new generation unit. The study evaluates connection of 250.5MW to the Entergy Transmission System. The ERIS load flow study was performed on the latest available 2013 Summer Peak Case, using PSS/E and PSS/MUST software by Siemens Power Technologies International (Siemens-PTI). The NRIS load flow study was performed on the 2012- 2016 Winter Peak and 2013 - 2017 Summer Peak models with construction plan projects. The short circuit study was performed on the Entergy system short circuit model using ASPEN software. The proposed in-service date for ERIS/NRIS is January 6, 2013.

Results of the System Impact Study indicated that under ERIS/NRIS the additional generation due to PID 255 generator **does not** cause an increase in short circuit current such that they exceed the fault interrupting capability of the high voltage circuit breakers within the vicinity of the PID 255 plant with priors and without priors. Results also indicated that the system is stable following all simulated three-phase normally cleared and stuck breaker faults. No dynamic voltage problems were noted. Therefore, estimated upgrade costs under ERIS with and without priors is $0.

The estimated cost of interconnection facilities is $7.5 Million; which covers the cost of the construction of a new 3-element 138kV ring bus substation at the Customer's point of interconnection. The estimated costs of the interconnection facilities are planning estimates only. Detailed cost estimates, accelerated costs, and solutions for any identified limiting elements will be provided in the Facilities Study.

Due to the near proximity of the project to Central Louisiana Electric Company(CLECO) and Lafayette Utililites System(LUS) these two areas have been identified as affected systems. The customer will need to satisfy the requirements deemed necessary by CLECO and LUS.

Estimated ERIS Project Planning Upgrade Cost

Estimated cost With Priors*	Estimated cost Without Priors*
$0	$0

*The costs of the upgrades are planning estimates only. Detailed cost estimates and solutions will be provided in the Facilities Study.

Estimated NRIS Project Planning Upgrade Cost

Limiting Element	Planning Estimate for Upgrade*
Beaver Creek 115/138kV phase shifter transformer	TBD
Big Three - Sabine 230kV	33,300,000
Bonin - Cecelia 138kV	11,760,000
Carroll 230/138kV transformer (CLECO)	Other Ownership

Limiting Element	Planning Estimate for Upgrade*
Champagne - East Opelousas 138kV	4,620,000
China Bulk - Sabine 230kV	32,400,000
Conway - Wyandotte 138kV	4,023,600
East Leesville - Rodemacher 230kV (CLECO)	Other Ownership
East Opelousas - Colton Road 138kV	2,520,000
Hartburg - Inland Orange 230kV - Supplemental Upgrade	287,746
Inland - McLewis 230kV - Supplemental Upgrade	738,640
Judice - Scott1 138kV	6,720,000
Moril - Cecelia 138kV	21,000,000
PPG - Verdine 230kV	1,800,000
Semere - Scott2 138kV	13,440,000
Vatican - Colton Road 138kV	10,080,000

Energy Resource Interconnection Service

1. Introduction

This Energy Resource Interconnection Service (ERIS) is based on the Customer's request for 250.5MW interconnection on Entergy's transmission system between the Vatican and East Opelousas 138kV substations located at Colton 138kV substation. The proposed commercial operation date of the project is January 6, 2013. The objective of this study is to assess the reliability impact of the new facility on the Entergy transmission system as well as its effects on the system's existing short circuit current capability. It is also intended to determine whether the transmission system meets standards established by NERC Reliability Standards and Entergy's planning guidelines when the plant is connected to Entergy's transmission system. If not, transmission improvements will be identified.

The System Impact Study process required a load flow analysis to determine if the existing transmission lines are adequate to handle the full output from the plant for simulated transfers to adjacent control areas. A short circuit analysis is performed to determine if the generation would cause the available fault current to surpass the fault duty of existing equipment within the Entergy transmission system. A transient stability analysis was also conducted to determine if the project would cause a stability problem on the Entergy system
This ERIS System Impact Study Study was based on information provided by the Customer and assumptions made by Entergy's Independent Coordinator of Transmission (ICT) planning group and Entergy's Transmission Technical System Planning group. All supplied information and assumptions are documented in this report. If the actual equipment installed is different from the supplied information or the assumptions made, the results outlined in this report are subject to change.

The load flow results from the ERIS study are for information only. ERIS does not in and of itself convey any transmission service.

2. Short circuit Analysis/Breaker Rating Analysis

2.1 Model Information

The short circuit analysis was performed on the Entergy system short circuit model using ASPEN software. This model includes all generators interconnected to the Entergy system or interconnected to an adjacent system and having an impact on this interconnection request, IPP's with signed IOAs, and approved future transmission projects on the Entergy transmission system.

2.2 Short Circuit Analysis

The method used to determine if any short circuit problems would be caused by the addition of the PID 255 generation is as follows:

Three-phase and single-phase to ground faults were simulated on the Entergy base case short circuit model and the worst case short circuit level was determined at each station. The PID 255 generator was then modeled in the base case to generate a revised short circuit model. The base case short circuit results were then compared with the results from the revised model to identify any breakers that were under-rated as a result of additional short circuit contribution from PID 255 generation. Any breakers identified to be upgraded through this comparison are mandatory upgrades.

2.3 Analysis Results

The results of the short circuit analysis indicated that the additional generation due to PID 255 generation caused no increase in short circuit current such that they exceeded the fault interrupting capability of the high voltage circuit breakers within the vicinity of the PID 255 plant **with and without priors**. The priors included are: 221, 231, 238, 240, 244, 247, 250, 251, and 252.

2.4 Problem Resolution

As a result of the short circuit analysis findings, no resolution was required.

3. Load Flow Analysis

3.1 Model Information

The load flow analysis was performed based on the projected 2013 Summer Peak load flow model. Approved future transmission projects in the 2011-2013 ICT Base Plan were used in the models for scenarios three and four. These upgrades can be found on Entergy's OASIS web page http://www.oatioasis.com/EES/EESDocs/Disclaimer.html

The loads were scaled based on the forecasted loads for the year. All firm power transactions between Entergy and its neighboring control areas were modeled for the year 2013 excluding short-term firm transactions on the same transmission interface. An economic dispatch was carried out on Entergy generating units after the scaling of load and modeling of transactions. The PID 255 generation interconnection point was modeled on the existing Vatican - East Opelousas 138kV transmission line at the new Colton Road substation. These associated facilities were then modeled in the case to build a revised case for the load flow analysis. Transfers were simulated between thirteen (13) control areas and Entergy using the requesting generator as the source and adjacent control area as sink.

This study considered the following four scenarios:

Scenario No.	Approved Future Transmission Projects	Pending Transmission Service & Study Requests
1	Not Included	Not Included
2	Not Included	Included
3	Included	Not Included
4	Included	Included

The generator step-up transformers, generators, and interconnecting lines were modeled according to the information provided by the customer.

3.2 Load Flow Analysis

3.2.1 Load Flow Analysis:

The load flow analysis was performed as a DC analysis using PSS/E and PSS/MUST software by Power Technologies Incorporated (PTI). A Transmission Reliability Margin (TRM) value that effectively reduced line ratings by 5% was used in the model. With the above assumptions implemented, the First Contingency Incremental Transfer Capability (FCITC) values are calculated. The FCITC depends on various factors; the system load, generation dispatch, scheduled maintenance of equipment, and the configuration of the interconnected system and the power flows in effect among the interconnected systems. The FCITC is also dependent on previously confirmed firm reservations on the interface. The details of each scenario list each limiting element, the contingency for the limiting element, and the Available Transfer Capacity (ATC). The ATC is equal to the FCITC.

3.2.2 Performance Criteria

The criteria for overload violations are as follows:

A) With All Lines in Service

- The MVA flow in any branch should not exceed Rate A (normal rating).
- Voltage should be greater than 0.95pu.

B) Under Contingencies

- The MVA flow through any facility should not exceed Rate A.
- Voltage should be greater than 0.92pu.

3.2.3 Power Factor Consideration / Criteria

FERC Order 661A describes the power factor design requirements for wind and solar generation plants. A wind or solar generation facility's reactive power requirements are based on the aggregate of all units that feed into a single point on the transmission system. The Transmission Provider's System Impact Study is needed to demonstrate that a specific power factor requirement is necessary to ensure safety or reliability.

There were no voltage limitations identified.

3.3 Analysis Results

It was determined there are no Entergy Transmission System upgrades required for this ERIS request. Summary of the analysis results are documented in Table 3.3.1 for each scenario. Detailed results for each of the thirteen (13) studied interfaces for Scenarios 1, 2, 3 and 4 are included in Tables 3.3.2 - 3.3.5.

Table 3.3.1: Summary of Results for PID 255 – ERIS Load Flow Study

Interface		Summer Peak Case Used	FCITC Available for Scenario 1	FCITC Available for Scenario 2	FCITC Available for Scenario 3	FCITC Available for Scenario 4
AECI	Associated Electric Cooperative, Inc.	2013	-1585	-1453	-1014	-967
AEPW	American Electric Power West	2013	-1894	-1828	-592	-805
AMRN	Ameren Transmission	2013	-1517	-1391	-1063	-958
CLEC	CLECO	2013	-55	71	-174	-346
EES	Entergy	2013	-784	-1053	-774	-1132
EMDE	Empire District Electric Co	2013	-1653	-1516	-903	-403
LAFA	Lafayette Utilities System	2013	-157	-247	-177	-350
LAGN	Louisiana Generating, LLC	2013	-186	64	-265	-317
LEPA	Louisiana Energy & Power Authority	2013	-572	-1751	-374	-1135
OKGE	Oklahoma Gas & Electric Company	2013	-1732	-1589	-792	-354
SMEPA	South Mississippi Electric Power Assoc.	2013	-719	-1088	* -709	-866
SOCO	Southern Company	2013	-1315	-1120	-1358	-917
SPA	Southwest Power Administration	2013	-1658	-1521	-947	-423
TVA	Tennessee Valley Authority	2013	-1408	-1291	-1234	-940

4. Facilities at the Point of Interconnection

The Interconnection Customer's designated Point of Interconnection (POI) is a new 138kV substation that will be constructed and cut-in on Entergy's Vatican - East Opelousas 138kV transmission line. The interconnection customer is responsible for constructing all facilities needed to deliver generation to the POI. The estimated cost for a 138kV, 3-element ring bus configuration substation is $7.5 Million. This cost is based on parametric estimating techniques for a "typical" site. Cost may significantly change based on specific project parameters that are not known at this time. Costs specific to this interconnection will be developed during the Facility Study.

TABLE 3.3.2: DETAILS OF SCENARIO 1 RESULTS: (WITHOUT FUTURE PROJECTS AND WITHOUT PENDING TRANSMISSION SERVICE & STUDY REQUEST)

Limiting Elements	Est. Cost	AECI	AEPW	AMRN	CLECO	EES	EMDE	LAFA	LAGN	LEPA	OKGE	SMEPA	SOCO	SPA	TVA
Beaver Creek 115/138kV phase shifter transformer	TBD	X	X	X		X	X				X	X	X	X	X
Bonin - Cecelia 138kV	11,760,000									X					
Carroll 230/138kV transformer (CLECO)	Other Ownership	X	X	X		X	X				X	X	X	X	X
Champagne - East Opelousas 138kV	4,620,000	X	X	X	X	X	X		X		X	X	X	X	X
Conroe 1 - Conroe 2 138kV	TBD		X												
Conway - Wyandotte 138kV	4,023,600	X	X	X	X	X	X	X	X		X	X	X	X	X
East Leesville - Rodemacher 230kV (CLECO)	Other Ownership	X	X	X		X	X		X		X	X	X	X	X
East Opelousas - Colton Road 138kV	2,520,000	X	X	X	X	X	X	X	X		X	X	X	X	X
Flander - Segura 138kV (CLECO)	Other Ownership									X					
Florence - South Jackson 115kV - Supplemental Upgrade	Committed to by Others											X			
French Settlement - Sorrento 230kV	7,200,000	X	X	X	X	X	X				X	X	X	X	X
Habetz - Richard 138kV	Included in 2011 ICT Base Plan							X							
International Paper - Mansfield 138kV (CLECO)	Other Ownership	X	X	X			X				X		X	X	X
International Paper - Wallake 138kV (CLECO)	Other Ownership	X	X	X			X				X		X	X	X
Judice - Scott1 138kV	6,720,000	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Meaux - Abbeville 138kV	5,880,000									X					

Limiting Elements	Est. Cost	AECI	AEPW	AMRN	CLECO	EES	EMDE	LAFA	LAGN	LEPA	OKGE	SMEPA	SOCO	SPA	TVA
Moril - Cecelia 138kV	21,000,000									X					
Pleasant Hill 500/161kV transformer	Included in 2011 ICT Base Plan													X	
Ray Braswell - Baxter Wilson 500kV - Supplemental Upgrade	Committed to by Others									X		X			
Ray Braswell 500/115kV transformer 1	TBD											X			
Ray Braswell 500/230kV transformer ckt2 - Supplemental Upgrade	Committed to by Others											X			
Toledo - Leesville (CLECO) 138kV	Included in 2011 ICT Base Plan	X	X	X		X	X				X	X	X	X	X
Toledo - VP Tap 138kV	Included in 2011 ICT Base Plan	X	X	X		X	X				X	X	X	X	X
Vatican - Colton Road 138kV	10,080,000	X	X	X	X	X	X	X	X		X	X	X	X	X

TABLE 3.3.3: DETAILS OF SCENARIO 2 RESULTS: (WITHOUT FUTURE PROJECTS AND WITH PENDING TRANSMISSION SERVICE & STUDY REQUEST)

Limiting Elements	Est. Cost	AECI	AEPW	AMRN	CLECO	EES	EMDE	LAFA	LAGN	LEPA	OKGE	SMEPA	SOCO	SPA	TVA
Airline - Vignes 230kV - Supplemental Upgrade	TBD									X					
Beaver Creek 115/138kV phase shifter transformer	TBD	X	X	X		X	X				X	X	X	X	X
Bonin - Cecelia 138kV	11,760,000									X					
Carroll 230/138kV transformer (CLECO)	Other Ownership	X	X	X		X	X				X	X	X	X	X
Champagne - East Opelousas 138kV	4,200,000	X	X	X	X	X	X		X		X	X	X	X	X
Coly - Vignes 230kV - Supplemental Upgrade	Committed to by Others									X					
Cypress 500/138kV transformer 1	18,770,000		X			X									
East Opelousas - Colton Road 138kV	2,520,000	X	X	X	X	X	X	X	X		X	X	X	X	X
Flander - Acadian 230kV (LAFA)	Other Ownership							X							
Flander - Segura 138kV (CLECO)	Other Ownership									X					
Florence - South Jackson 115kV - Supplemental Upgrade	Committed to by Others											X			
French Settlement - Sorrento 230kV	7,200,000	X	X	X			X				X	X	X	X	X
Habetz - Richard 138kV	Included in 2011 ICT Base Plan							X							

Limiting Elements	Est. Cost	AECI	AEPW	AMRN	CLECO	EES	EMDE	LAFA	LAGN	LEPA	OKGE	SMEPA	SOCO	SPA	TVA
Hartburg - Inland Orange 230kV - Supplemental Upgrade	Committed to by Others		X			X									
Inland - McLewis 230kV - Supplemental Upgrade	Committed to by Others		X			X									
International Paper - Mansfield 138kV (CLECO)	Other Ownership	X	X	X			X				X		X	X	X
International Paper - Wallake 138kV (CLECO)	Other Ownership	X	X	X			X				X		X	X	X
Jackson Miami - Jackson Monument Street 115kV	2,520,000											X			
Jackson Miami - Rex Brown 115kV	1,680,000											X			
Judice - Meaux 138kV	8,400,000									X					
Judice - Scott1 138kV	6,720,000	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Meaux - Abbeville 138kV	5,880,000									X					
Moril - Cecelia 138kV	21,000,000									X					
Morton - Pelahatchie 115kV - Supplemental Upgrade	Committed to by Others											X			
Pleasant Hill 500/161kV transformer	Included in 2011 ICT Base Plan													X	
Ray Braswell - Baxter Wilson 500kV - Supplemental Upgrade	Committed to by Others									X		X			
Toledo - VP Tap 138kV	Included in 2011 ICT Base Plan	X	X	X			X				X			X	X

Limiting Elements	Est. Cost	AECI	AEPW	AMRN	CLECO	EES	EMDE	LAFA	LAGN	LEPA	OKGE	SMEPA	SOCO	SPA	TVA
Vatican - Colton Road 138kV	10,080,000	X	X	X	X	X	X	X	X		X	X	X	X	X

TABLE 3.3.4: DETAILS OF SCENARIO 3 RESULTS: (WITH FUTURE PROJECTS AND WITHOUT PENDING TRANSMISSION SERVICE & STUDY REQUEST)

Limiting Element	Est. Cost	AECI	AEPW	AMRN	CLECO	EES	EMDE	LAFA	LAGN	LEPA	OKGE	SMEPA	SOCO	SPA	TVA
Acadian - Bonin 230kV (LAFA)	Other Ownership							X							
Beaver Creek 115/138kV phase shifter transformer	TBD	X	X	X		X	X				X	X	X	X	X
Bonin - Cecelia 138kV	11,760,000									X					
Carroll 230/138kV transformer (CLECO)	Other Ownership	X	X	X		X	X				X	X	X	X	X
Champagne - East Opelousas 138kV	4,200,000	X	X	X	X	X	X		X		X	X	X	X	X
Conroe 1 - Conroe 2 138kV	TBD		X												
Conway - Wyandotte 138kV	4,023,600	X	X	X		X	X		X		X	X	X	X	X
East Leesville - Rodemacher 230kV (CLECO)	Other Ownership	X	X	X		X	X		X		X	X	X	X	X
East Opelousas - Colton Road 138kV	2,520,000	X	X	X	X	X	X	X	X		X	X	X	X	X
Flander - Acadian 230kV (LAFA)	Other Ownership							X							
Flander (CLECO) - Youngsville 138kV	Other Ownership									X					
Florence - South Jackson 115kV - Supplemental Upgrade	Committed to by Others											X			
International Paper - Mansfield 138kV (CLECO)	Other Ownership	X	X	X			X				X		X	X	X
International Paper - Wallake 138kV (CLECO)	Other Ownership	X	X	X			X				X		X	X	X
Judice - Scott1 138kV	6,720,000									X					
Meaux - Abbeville 138kV	5,880,000							X		X					

Limiting Element	Est. Cost	AECI	AEPW	AMRN	CLECO	EES	EMDE	LAFA	LAGN	LEPA	OKGE	SMEPA	SOCO	SPA	TVA
Moril - Cecelia 138kV	21,000,000	X	X	X	X	X	X		X	X	X	X	X	X	X
Ray Braswell - Baxter Wilson 500kV - Supplemental Upgrade	Committed to by Others											X			
Ray Braswell 500/230kV transformer ckt2 - Supplemental Upgrade	Committed to by Others											X			
Semere - Scott2 138kV	13,440,000	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Vatican - Colton Road 138kV	10,080,000	X	X	X	X	X	X	X	X		X	X	X	X	X
Youngsville - Segura (CLECO) 138kV	Other Ownership									X					

TABLE 3.3.5: DETAILS OF SCENARIO 4 RESULTS: (WITH FUTURE PROJECTS AND WITH PENDING TRANSMISSION SERVICE & STUDY REQUEST)

Limiting Element	Est. Cost	AECI	AEPW	AMRN	CLECO	EES	EMDE	LAFA	LAGN	LEPA	OKGE	SMEPA	SOCO	SPA	TVA
Acadian - Bonin 230kV (LAFA)	Other Ownership							X							
Beaver Creek 115/138kV phase shifter transformer	TBD	X	X	X		X	X				X	X	X	X	X
Bonin - Cecelia 138kV	11,760,000									X					
Carroll 230/138kV transformer (CLECO)	Other Ownership	X	X	X		X	X				X	X	X	X	X
Champagne - East Opelousas 138kV	4,200,000	X	X	X	X	X	X		X		X	X	X	X	X
Cypress 500/138kV transformer 1	18,770,000		X			X									
East Opelousas - Colton Road 138kV	2,520,000	X	X	X	X	X	X	X	X		X	X	X	X	X
Flander - Acadian 230kV (LAFA)	Other Ownership							X							
Flander (CLECO) - Youngsville 138kV	Other Ownership									X					
Florence - South Jackson 115kV - Supplemental Upgrade	Committed to by Others											X			
Hartburg - Inland Orange 230kV - Supplemental Upgrade	Committed to by Others					X									
Helbig - McLewis 230kV	Committed to by Others					X									

Limiting Element	Est. Cost	AECI	AEPW	AMRN	CLECO	EES	EMDE	LAFA	LAGN	LEPA	OKGE	SMEPA	SOCO	SPA	TVA
Inland - McLewis 230kV - Supplemental Upgrade	TBD					X									
International Paper - Mansfield 138kV (CLECO)	Other Ownership	X	X	X			X				X		X	X	X
International Paper - Wallake 138kV (CLECO)	Other Ownership	X	X	X			X				X		X	X	X
Jackson Miami - Rex Brown 115kV	1,680,000											X			
Judice - Scott1 138kV	6,720,000	X	X	X		X	X	X	X	X	X	X	X	X	X
Leblanc - Abbeville 138kV	5,880,000									X					
Meaux - Abbeville 138kV	5,880,000							X		X					
Moril - Cecelia 138kV	21,000,000	X	X	X	X	X	X		X	X	X	X	X	X	X
Morton - Pelahatchie 115kV - Supplemental Upgrade	Committed to by Others											X			
Ray Braswell - Baxter Wilson 500kV - Supplemental Upgrade	Committed to by Others									X		X			
Semere - Scott2 138kV	13,440,000	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Vatican - Colton Road 138kV	10,080,000	X	X	X	X	X	X	X	X		X	X	X	X	X
Youngsville - Segura (CLECO) 138kV	Other Ownership									X					

Network Resource Interconnection Service

5. Introduction

A Network Resource Interconnection Services (NRIS) study was requested to serve 250.5MW of Entergy network load. The expected in service date for this NRIS generator is January 6, 2013. The tests were performed with only confirmed transmission reservations and existing network generators and with transmission service requests in study mode.

Two tests were performed, a deliverability to generation test and a deliverability to load test. The deliverability to generation (DFAX) test ensures that the addition of this generator will not impair the deliverability of existing network resources and units already designated as NRIS while serving network load. The deliverability to load test determines if the tested generator will reduce the import capability level to certain load pockets (Amite South, WOTAB and Western Region) on the Entergy system. A more detailed description for these two tests is described in Appendix H.

It is understood that the NRIS status provides the Interconnection Customer with the capability to deliver the output of the Generating Facility into the Transmission System. NRIS in and of itself does not convey any right to deliver electricity to any specific customer or Point of Delivery.

6. Analysis

6.1 Models

The models used for this analysis were 2012W-2017S.

The following modifications were made to the base cases to reflect the latest information available:

- Non-Firm IPPs within the local region of the study generator were turned off and other non-firm IPPs outside the local area were increased to make up the difference.
- Confirmed firm transmission reservations were modeled for the year 2013.
- Approved transmission reliability upgrades for 2011 - 2013 were included in the base case. These upgrades can be found at Entergy's OASIS web page http://www.oatioasis.com/EES/EESDocs/Disclaimer.html under approved future projects.

6.2 Contingencies and Monitored Elements

Single contingency analyses on Entergy's transmission facilities (including tie lines) 115kV and above were considered. All transmission facilities on Entergy transmission system above 100kV were monitored.

7. Generation used for the transfer

The Customer's generators were used as the source for the deliverability to generation test.

8. Results

8.1 Deliverability to Generation (DFAX) Test

The deliverability to generation (DFAX) test ensures that the addition of this generator will not impair the deliverability of existing network resources and units already designated as NRIS while serving network load. A more detailed description for these two tests is described in Appendix I.

8.2 Constraints

Study Case	Study Case with Priors
Ameila Bulk - Bevil 230kV	Ameila Bulk - Bevil 230kV
	Amelia Bulk - Helbig 230kV
Beaver Creek 115/138kV phase shifter transformer	Beaver Creek 115/138kV phase shifter transformer
Bevil - Cypress 230kV	Bevil - Cypress 230kV
	Big Three - Sabine 230kV
	Bonin - Cecelia 138kV
Carroll 230/138kV transformer (CLECO)	Carroll 230/138kV transformer (CLECO)
Champagne - East Opelousas 138kV	Champagne - East Opelousas 138kV
China Bulk - Sabine 230kV	
Conway - Wyandotte 138kV	
Cypress 500/138kV transformer 1	Cypress 500/138kV transformer 1
Cypress 500/230kV transformer	Cypress 500/230kV transformer
East Leesville - Rodemacher 230kV (CLECO)	East Leesville - Rodemacher 230kV (CLECO)
East Opelousas - Colton Road 138kV	East Opelousas - Colton Road 138kV
Hartburg - Inland Orange 230kV	Hartburg - Inland Orange 230kV
Hartburg - Inland Orange 230kV - Supplemental Upgrade	Hartburg - Inland Orange 230kV - Supplemental Upgrade
Hartburg 500/230kV transformer 1	Hartburg 500/230kV transformer 1
Helbig - McLewis 230kV	Helbig - McLewis 230kV
Inland - McLewis 230kV	Inland - McLewis 230kV
Inland - McLewis 230kV - Supplemental Upgrade	Inland - McLewis 230kV - Supplemental Upgrade
Judice - Scott1 138kV	Judice - Scott1 138kV
Moril - Cecelia 138kV	Moril - Cecelia 138kV
	PPG - Verdine 230kV
Roy S. Nelson 500/230kV auto	Roy S. Nelson 500/230kV auto
	Roy S. Nelson - Verdine 230kV
Semere - Scott2 138kV	Semere - Scott2 138kV
Vatican - Colton Road 138kV	Vatican - Colton Road 138kV

8.3 DFAX Study Case Results

Year	Limiting Element	Contingency Element	ATC (MW)
1/1/2013 – 1/1/2014	Carroll 230/138kV transformer (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-774
	Moril - Cecelia 138kV	Flander (CLECO) - Youngsville 138kV	-507
	Moril - Cecelia 138kV	Youngsville - Segura (CLECO) 138kV	-285
	East Leesville - Rodemacher 230kV (CLECO)	Colfax - Rodemacher 230kV	-215
	Semere - Scott2 138kV	Bonin - Cecelia 138kV	-147
	Beaver Creek 115/138kV phase shifter transformer	Colfax - Rodemacher 230kV	-117
	East Leesville - Rodemacher 230kV (CLECO)	Colfax - Montgomery 230kV	3
	Beaver Creek 115/138kV phase shifter transformer	Colfax - Montgomery 230kV	31
	Moril - Cecelia 138kV	Meaux - Abbeville 138kV	127
	Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	217
	East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	217
	Conway - Wyandotte 138kV	T300/331 - Willow Glen 138kV	223
	Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	226
	Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	226
	Conway - Wyandotte 138kV	Oak Grove - T300/331 138kV	234
	Vatican - Colton Road 138kV	Webre - Wells 500kV	244
1/1/2014– 1/1/2015	Hartburg - Inland Orange 230kV - Supplemental Upgrade	Cypress - Hartburg 500kV	-2379
	Inland - McLewis 230kV - Supplemental Upgrade	Cypress - Hartburg 500kV	-1905
	Helbig - McLewis 230kV	Cypress - Hartburg 500kV	-1650
	Bevil - Cypress 230kV	Hartburg 500/230kV transformer 1	-1553
	Bevil - Cypress 230kV	Hartburg - Inland Orange 230kV	-1546
	Bevil - Cypress 230kV	Inland - McLewis 230kV	-1240
	Ameila Bulk - Bevil 230kV	Hartburg 500/230kV transformer 1	-1233
	Ameila Bulk - Bevil 230kV	Hartburg - Inland Orange 230kV	-1227
	Bevil - Cypress 230kV	Helbig - McLewis 230kV	-1078
	Cypress 500/138kV transformer 1	Cypress 500/230kV transformer	-979
	Ameila Bulk - Bevil 230kV	Inland - McLewis 230kV	-911
	Carroll 230/138kV transformer (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-813
	Ameila Bulk - Bevil 230kV	Helbig - McLewis 230kV	-745
	Roy S. Nelson 500/230kV auto	Cypress - Hartburg 500kV	-729
	Moril - Cecelia 138kV	Flander (CLECO) - Youngsville 138kV	-540
	Hartburg - Inland Orange 230kV	Cypress - Hartburg 500kV	-533
	Moril - Cecelia 138kV	Youngsville - Segura (CLECO) 138kV	-318
	East Leesville - Rodemacher 230kV (CLECO)	Colfax - Rodemacher 230kV	-310
	Hartburg 500/230kV transformer 1	Cypress - Hartburg 500kV	-277
	Semere - Scott2 138kV	Bonin - Cecelia 138kV	-190
	Beaver Creek 115/138kV phase shifter transformer	Colfax - Rodemacher 230kV	-163

Year	Limiting Element	Contingency Element	ATC (MW)
	East Leesville - Rodemacher 230kV (CLECO)	Colfax - Montgomery 230kV	-91
	Cypress 500/230kV transformer	Cypress 500/138kV transformer 1	-69
	Inland - McLewis 230kV	Cypress - Hartburg 500kV	-20
	Beaver Creek 115/138kV phase shifter transformer	Colfax - Montgomery 230kV	-14
	Conway - Wyandotte 138kV	T300/331 - Willow Glen 138kV	73
	Conway - Wyandotte 138kV	Oak Grove - T300/331 138kV	85
	Moril - Cecelia 138kV	Meaux - Abbeville 138kV	111
	Judice - Scott1 138kV	Meaux - SELLRD (CLECO) 230kV	129
	Judice - Scott1 138kV	Meaux 230/138kV transformer 1	151
	Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	217
	East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	217
	Vatican - Colton Road 138kV	Cocodrie - Vil Plat 230kV	226
	Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	226
	Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	226
	Vatican - Colton Road 138kV	Webre - Wells 500kV	235
	Vatican - Colton Road 138kV	Vil Plat - West Fork 230kV	237
	Vatican - Colton Road 138kV	Champagne - Krotz Spring 138kV	247
	Vatican - Colton Road 138kV	Wells (CLECO) - West Fork (CLECO) 230kV	250
1/1/2015–1/1/2016	Hartburg - Inland Orange 230kV - Supplemental Upgrade	Cypress - Hartburg 500kV	-1940
	Inland - McLewis 230kV - Supplemental Upgrade	Cypress - Hartburg 500kV	-1474
	Helbig - McLewis 230kV	Cypress - Hartburg 500kV	-1204
	Bevil - Cypress 230kV	Hartburg 500/230kV transformer 1	-1071
	Bevil - Cypress 230kV	Hartburg - Inland Orange 230kV	-1065
	Carroll 230/138kV transformer (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-881
	Bevil - Cypress 230kV	Inland - McLewis 230kV	-765
	Ameila Bulk - Bevil 230kV	Hartburg 500/230kV transformer 1	-704
	Ameila Bulk - Bevil 230kV	Hartburg - Inland Orange 230kV	-698
	Cypress 500/138kV transformer 1	Cypress 500/230kV transformer	-683
	Bevil - Cypress 230kV	Helbig - McLewis 230kV	-593
	East Leesville - Rodemacher 230kV (CLECO)	Colfax - Rodemacher 230kV	-500
	Moril - Cecelia 138kV	Flander (CLECO) - Youngsville 138kV	-499
	Ameila Bulk - Bevil 230kV	Inland - McLewis 230kV	-387
	East Leesville - Rodemacher 230kV (CLECO)	Colfax - Montgomery 230kV	-281
	Moril - Cecelia 138kV	Youngsville - Segura (CLECO) 138kV	-276
	Ameila Bulk - Bevil 230kV	Helbig - McLewis 230kV	-210
	Semere - Scott2 138kV	Bonin - Cecelia 138kV	-199
	Beaver Creek 115/138kV phase shifter transformer	Colfax - Rodemacher 230kV	-168
	Hartburg - Inland Orange 230kV	Cypress - Hartburg 500kV	-139
	Beaver Creek 115/138kV phase shifter transformer	Colfax - Montgomery 230kV	-19

Year	Limiting Element	Contingency Element	ATC (MW)
	Judice - Scott1 138kV	Meaux - SELLRD (CLECO) 230kV	-14
	Judice - Scott1 138kV	Meaux 230/138kV transformer 1	10
	Conway - Wyandotte 138kV	T300/331 - Willow Glen 138kV	47
	Conway - Wyandotte 138kV	Oak Grove - T300/331 138kV	58
	Hartburg 500/230kV transformer 1	Cypress - Hartburg 500kV	112
	Moril - Cecelia 138kV	Meaux - Abbeville 138kV	142
	Vatican - Colton Road 138kV	Webre - Wells 500kV	209
	Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	217
	East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	217
	Cypress 500/230kV transformer	Cypress 500/138kV transformer 1	219
	Roy S. Nelson 500/230kV auto	Cypress - Hartburg 500kV	222
	Vatican - Colton Road 138kV	Cocodrie - Vil Plat 230kV	226
	Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	226
	Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	226
	Vatican - Colton Road 138kV	Vil Plat - West Fork 230kV	236
	Vatican - Colton Road 138kV	Champagne - Krotz Spring 138kV	244
	Vatican - Colton Road 138kV	Wells (CLECO) - West Fork (CLECO) 230kV	250
1/1/2016–1/1/2017	Carroll 230/138kV transformer (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-658
	East Leesville - Rodemacher 230kV (CLECO)	Colfax - Rodemacher 230kV	-620
	Moril - Cecelia 138kV	Flander (CLECO) - Youngsville 138kV	-574
	Hartburg - Inland Orange 230kV - Supplemental Upgrade	Cypress - Hartburg 500kV	-541
	East Leesville - Rodemacher 230kV (CLECO)	Colfax - Montgomery 230kV	-393
	Moril - Cecelia 138kV	Youngsville - Segura (CLECO) 138kV	-351
	Semere - Scott2 138kV	Bonin - Cecelia 138kV	-290
	Judice - Scott1 138kV	Meaux - SELLRD (CLECO) 230kV	-173
	Judice - Scott1 138kV	Meaux 230/138kV transformer 1	-149
	Inland - McLewis 230kV - Supplemental Upgrade	Cypress - Hartburg 500kV	-61
	Beaver Creek 115/138kV phase shifter transformer	Colfax - Rodemacher 230kV	-56
	Cypress 500/138kV transformer 1	Cypress 500/230kV transformer	6
	Conway - Wyandotte 138kV	T300/331 - Willow Glen 138kV	25
	Conway - Wyandotte 138kV	Oak Grove - T300/331 138kV	36
	Moril - Cecelia 138kV	Meaux - Abbeville 138kV	70
	Beaver Creek 115/138kV phase shifter transformer	Colfax - Montgomery 230kV	99
	Helbig - McLewis 230kV	Cypress - Hartburg 500kV	172
	Semere - Scott2 138kV	Flander (CLECO) - Youngsville 138kV	199
	Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	218
	East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	218
	Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	227
	Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	227
	Vatican - Colton Road 138kV	Webre - Wells 500kV	227

Year	Limiting Element	Contingency Element	ATC (MW)
	Vatican - Colton Road 138kV	Cocodrie - Vil Plat 230kV	228
	Vatican - Colton Road 138kV	Vil Plat - West Fork 230kV	239
	Vatican - Colton Road 138kV	Champagne - Krotz Spring 138kV	242
1/1/2017–1/1/2018	Hartburg - Inland Orange 230kV - Supplemental Upgrade	Cypress - Hartburg 500kV	-932
	Carroll 230/138kV transformer (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-805
	East Leesville - Rodemacher 230kV (CLECO)	Colfax - Rodemacher 230kV	-741
	East Leesville - Rodemacher 230kV (CLECO)	Colfax - Montgomery 230kV	-513
	Moril - Cecelia 138kV	Flander (CLECO) - Youngsville 138kV	-505
	Cypress 500/138kV transformer 1	Cypress 500/230kV transformer	-502
	Inland - McLewis 230kV - Supplemental Upgrade	Cypress - Hartburg 500kV	-467
	Semere - Scott2 138kV	Bonin - Cecelia 138kV	-299
	Moril - Cecelia 138kV	Youngsville - Segura (CLECO) 138kV	-281
	Judice - Scott1 138kV	Meaux - SELLRD (CLECO) 230kV	-272
	Judice - Scott1 138kV	Meaux 230/138kV transformer 1	-245
	Beaver Creek 115/138kV phase shifter transformer	Colfax - Rodemacher 230kV	-197
	Helbig - McLewis 230kV	Cypress - Hartburg 500kV	-185
	China Bulk - Sabine 230kV	Amelia Bulk - China Bulk 230kV	-178
	Beaver Creek 115/138kV phase shifter transformer	Colfax - Montgomery 230kV	-42
	Moril - Cecelia 138kV	Meaux - Abbeville 138kV	123
	Conway - Wyandotte 138kV	T300/331 - Willow Glen 138kV	156
	Conway - Wyandotte 138kV	Oak Grove - T300/331 138kV	168
	Semere - Scott2 138kV	Flander (CLECO) - Youngsville 138kV	194
	Vatican - Colton Road 138kV	Webre - Wells 500kV	212
	Vatican - Colton Road 138kV	Cocodrie - Vil Plat 230kV	217
	Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	218
	East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	218
	Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	227
	Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	227
	Vatican - Colton Road 138kV	Vil Plat - West Fork 230kV	227
	Vatican - Colton Road 138kV	Wells (CLECO) - West Fork (CLECO) 230kV	241
	Vatican - Colton Road 138kV	Champagne - Krotz Spring 138kV	247

8.4 DFAX Study Case with Priors Results

Year	Limiting Element	Contingency Element	ATC (MW)
1/1/2013 – 1/1/2014	Hartburg - Inland Orange 230kV - Supplemental Upgrade	Cypress - Hartburg 500kV	-1132
	Moril - Cecelia 138kV	Flander (CLECO) - Youngsville 138kV	-875
	Moril - Cecelia 138kV	Youngsville - Segura (CLECO) 138kV	-657
	Inland - McLewis 230kV - Supplemental Upgrade	Cypress - Hartburg 500kV	-628
	Cypress 500/138kV transformer 1	Cypress 500/230kV transformer	-536
	Semere - Scott2 138kV	Bonin - Cecelia 138kV	-292
	Helbig - McLewis 230kV	Cypress - Hartburg 500kV	-241
	Moril - Cecelia 138kV	Meaux - Abbeville 138kV	-126
	Carroll 230/138kV transformer (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	95
	Judice - Scott1 138kV	Meaux - SELLRD (CLECO) 230kV	135
	Judice - Scott1 138kV	Meaux 230/138kV transformer 1	159
	Moril - Cecelia 138kV	Leblanc - Abbyville 138kV	163
	Semere - Scott2 138kV	Flander (CLECO) - Youngsville 138kV	184
	Beaver Creek 115/138kV phase shifter transformer	Colfax - Rodemacher 230kV	209
	Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	217
	East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	217
	Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	226
	Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	226
	Vatican - Colton Road 138kV	Cocodrie (CLECO) - Vil Plat (CLECO) 230kV	238
1/1/2014 – 1/1/2015	Hartburg - Inland Orange 230kV - Supplemental Upgrade	Cypress - Hartburg 500kV	-4402
	Inland - McLewis 230kV - Supplemental Upgrade	Cypress - Hartburg 500kV	-3970
	Bevil - Cypress 230kV	Hartburg 500/230kV transformer 1	-3762
	Bevil - Cypress 230kV	Hartburg - Inland Orange 230kV	-3755
	Helbig - McLewis 230kV	Cypress - Hartburg 500kV	-3734
	Ameila Bulk - Bevil 230kV	Hartburg 500/230kV transformer 1	-3478
	Bevil - Cypress 230kV	Inland - McLewis 230kV	-3478
	Ameila Bulk - Bevil 230kV	Hartburg - Inland Orange 230kV	-3471
	Bevil - Cypress 230kV	Helbig - McLewis 230kV	-3328
	Ameila Bulk - Bevil 230kV	Inland - McLewis 230kV	-3185
	Ameila Bulk - Bevil 230kV	Helbig - McLewis 230kV	-3032
	Cypress 500/138kV transformer 1	Cypress 500/230kV transformer	-2840
	Hartburg - Inland Orange 230kV	Cypress - Hartburg 500kV	-2556
	Hartburg 500/230kV transformer 1	Cypress - Hartburg 500kV	-2300
	Inland - McLewis 230kV	Cypress - Hartburg 500kV	-2086
	PPG - Verdine 230kV	Carlyss - Roy S. Nelson 230kV	-2040
	Cypress 500/230kV transformer	Cypress 500/138kV transformer 1	-1960
	Roy S. Nelson - Verdine 230kV	Carlyss - Roy S. Nelson 230kV	-1930
	Moril - Cecelia 138kV	Flander (CLECO) - Youngsville 138kV	-910
	Bevil - Cypress 230kV	Cypress - Lumberton 138kV	-735

Year	Limiting Element	Contingency Element	ATC (MW)
	Moril - Cecelia 138kV	Youngsville - Segura (CLECO) 138kV	-691
	Bevil - Cypress 230kV	Kountze - Lumberton 138kV	-641
	Bevil - Cypress 230kV	Big Three - Carlyss 230kV	-551
	Bevil - Cypress 230kV	Big Three - Sabine 230kV	-461
	Roy S. Nelson 500/230kV auto	Cypress - Hartburg 500kV	-425
	Semere - Scott2 138kV	Bonin - Cecelia 138kV	-336
	Ameila Bulk - Bevil 230kV	Cypress - Lumberton 138kV	-310
	Hartburg - Inland Orange 230kV - Supplemental Upgrade	Bevil - Cypress 230kV	-289
	Big Three - Sabine 230kV	Cypress - Hartburg 500kV	-242
	Ameila Bulk - Bevil 230kV	Kountze - Lumberton 138kV	-213
	Ameila Bulk - Bevil 230kV	Big Three - Carlyss 230kV	-178
	Roy S. Nelson - Verdine 230kV	Cypress - Hartburg 500kV	-155
	Moril - Cecelia 138kV	Meaux - Abbeville 138kV	-143
	Hartburg - Inland Orange 230kV - Supplemental Upgrade	Ameila Bulk - Bevil 230kV	-142
	PPG - Verdine 230kV	Cypress - Hartburg 500kV	-136
	Bevil - Cypress 230kV	Cypress - Honey 138kV	-99
	Ameila Bulk - Bevil 230kV	Big Three - Sabine 230kV	-85
	Judice - Scott1 138kV	Meaux - SELLRD (CLECO) 230kV	27
	Carroll 230/138kV transformer (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	47
	Judice - Scott1 138kV	Meaux 230/138kV transformer 1	52
	Bevil - Cypress 230kV	Bragg - Honey 138kV	88
	Roy S. Nelson - Verdine 230kV	Moss Bluff - Roy S. Nelson 230kV	90
	Cypress 500/138kV transformer 1	Hartburg 500/230kV transformer 1	118
	Cypress 500/138kV transformer 1	Hartburg - Inland Orange 230kV	122
	PPG - Verdine 230kV	Moss Bluff - Roy S. Nelson 230kV	133
	Moril - Cecelia 138kV	Leblanc - Abbyville 138kV	149
	Semere - Scott2 138kV	Flander (CLECO) - Youngsville 138kV	155
	Beaver Creek 115/138kV phase shifter transformer	Colfax - Rodemacher 230kV	171
	Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	217
	East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	217
	Semere - Scott2 138kV	Youngsville - Segura (CLECO) 138kV	225
	Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	226
	Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	226
	Vatican - Colton Road 138kV	Cocodrie - Vil Plat 230kV	228
	Vatican - Colton Road 138kV	Champagne - Krotz Spring 138kV	238
	Vatican - Colton Road 138kV	Vil Plat - West Fork 230kV	239
1/1/2015 – 1/1/2016	Hartburg - Inland Orange 230kV - Supplemental Upgrade	Cypress - Hartburg 500kV	-4154
	Inland - McLewis 230kV - Supplemental Upgrade	Cypress - Hartburg 500kV	-3732
	Bevil - Cypress 230kV	Hartburg 500/230kV transformer 1	-3521
	Bevil - Cypress 230kV	Hartburg - Inland Orange 230kV	-3515
	Helbig - McLewis 230kV	Cypress - Hartburg 500kV	-3484

Year	Limiting Element	Contingency Element	ATC (MW)
	Bevil - Cypress 230kV	Inland - McLewis 230kV	-3245
	Ameila Bulk - Bevil 230kV	Hartburg 500/230kV transformer 1	-3198
	Ameila Bulk - Bevil 230kV	Hartburg - Inland Orange 230kV	-3192
	Bevil - Cypress 230kV	Helbig - McLewis 230kV	-3089
	Ameila Bulk - Bevil 230kV	Inland - McLewis 230kV	-2913
	Ameila Bulk - Bevil 230kV	Helbig - McLewis 230kV	-2751
	Cypress 500/138kV transformer 1	Cypress 500/230kV transformer	-2669
	Hartburg - Inland Orange 230kV	Cypress - Hartburg 500kV	-2353
	PPG - Verdine 230kV	Carlyss - Roy S. Nelson 230kV	-2295
	Roy S. Nelson - Verdine 230kV	Carlyss - Roy S. Nelson 230kV	-2170
	Hartburg 500/230kV transformer 1	Cypress - Hartburg 500kV	-2102
	Inland - McLewis 230kV	Cypress - Hartburg 500kV	-1895
	Cypress 500/230kV transformer	Cypress 500/138kV transformer 1	-1807
	Moril - Cecelia 138kV	Flander (CLECO) - Youngsville 138kV	-642
	Bevil - Cypress 230kV	Cypress - Lumberton 138kV	-574
	Bevil - Cypress 230kV	Kountze - Lumberton 138kV	-471
	PPG - Verdine 230kV	Cypress - Hartburg 500kV	-436
	Roy S. Nelson - Verdine 230kV	Cypress - Hartburg 500kV	-433
	Moril - Cecelia 138kV	Youngsville - Segura (CLECO) 138kV	-420
	Bevil - Cypress 230kV	Big Three - Carlyss 230kV	-347
	Roy S. Nelson - Verdine 230kV	Moss Bluff - Roy S. Nelson 230kV	-277
	PPG - Verdine 230kV	Moss Bluff - Roy S. Nelson 230kV	-267
	Bevil - Cypress 230kV	Big Three - Sabine 230kV	-263
	Semere - Scott2 138kV	Bonin - Cecelia 138kV	-247
	East Leesville - Rodemacher 230kV (CLECO)	Colfax - Rodemacher 230kV	-146
	Hartburg - Inland Orange 230kV - Supplemental Upgrade	Bevil - Cypress 230kV	-120
	Ameila Bulk - Bevil 230kV	Cypress - Lumberton 138kV	-94
	Judice - Scott1 138kV	Meaux - SELLRD (CLECO) 230kV	-81
	Judice - Scott1 138kV	Meaux 230/138kV transformer 1	-57
	Carroll 230/138kV transformer (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	7
	Bevil - Cypress 230kV	Cypress - Honey 138kV	9
	Ameila Bulk - Bevil 230kV	Kountze - Lumberton 138kV	14
	Roy S. Nelson 500/230kV auto	Cypress - Hartburg 500kV	40
	Hartburg - Inland Orange 230kV - Supplemental Upgrade	Ameila Bulk - Bevil 230kV	46
	Moril - Cecelia 138kV	Meaux - Abbeville 138kV	47
	Beaver Creek 115/138kV phase shifter transformer	Colfax - Rodemacher 230kV	73
	Ameila Bulk - Bevil 230kV	Big Three - Carlyss 230kV	77
	Big Three - Sabine 230kV	Cypress - Hartburg 500kV	84
	East Leesville - Rodemacher 230kV (CLECO)	Colfax - Montgomery 230kV	85
	Amelia Bulk - Helbig 230kV	Cypress - Hartburg 500kV	138
	Ameila Bulk - Bevil 230kV	Big Three - Sabine 230kV	164

Year	Limiting Element	Contingency Element	ATC (MW)
	Bevil - Cypress 230kV	Bragg - Honey 138kV	194
	Bonin - Cecelia 138kV	Scott2 - Scott1 138kV Bypass Breaker	205
	Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	217
	East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	217
	Vatican - Colton Road 138kV	Cocodrie - Vil Plat 230kV	225
	Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	226
	Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	226
	Cypress 500/138kV transformer 1	Hartburg 500/230kV transformer 1	230
	Beaver Creek 115/138kV phase shifter transformer	Colfax - Montgomery 230kV	231
	Vatican - Colton Road 138kV	Champagne - Krotz Spring 138kV	234
	Cypress 500/138kV transformer 1	Hartburg - Inland Orange 230kV	234
	Vatican - Colton Road 138kV	Vil Plat - West Fork 230kV	236
	Vatican - Colton Road 138kV	Krotz Spring - Line 642 Tap 138kV	248
	Vatican - Colton Road 138kV	Wells (CLECO) - West Fork (CLECO) 230kV	249
1/1/2016 – 1/1/2017	Hartburg - Inland Orange 230kV - Supplemental Upgrade	Cypress - Hartburg 500kV	-3312
	Inland - McLewis 230kV - Supplemental Upgrade	Cypress - Hartburg 500kV	-2887
	Helbig - McLewis 230kV	Cypress - Hartburg 500kV	-2677
	Cypress 500/138kV transformer 1	Cypress 500/230kV transformer	-2084
	Bevil - Cypress 230kV	Hartburg 500/230kV transformer 1	-1751
	Bevil - Cypress 230kV	Hartburg - Inland Orange 230kV	-1746
	PPG - Verdine 230kV	Carlyss - Roy S. Nelson 230kV	-1685
	Roy S. Nelson - Verdine 230kV	Carlyss - Roy S. Nelson 230kV	-1599
	Hartburg - Inland Orange 230kV	Cypress - Hartburg 500kV	-1495
	Bevil - Cypress 230kV	Inland - McLewis 230kV	-1462
	Ameila Bulk - Bevil 230kV	Hartburg 500/230kV transformer 1	-1447
	Ameila Bulk - Bevil 230kV	Hartburg - Inland Orange 230kV	-1443
	Bevil - Cypress 230kV	Helbig - McLewis 230kV	-1324
	Cypress 500/230kV transformer	Cypress 500/138kV transformer 1	-1281
	Hartburg 500/230kV transformer 1	Cypress - Hartburg 500kV	-1241
	Ameila Bulk - Bevil 230kV	Inland - McLewis 230kV	-1150
	Inland - McLewis 230kV	Cypress - Hartburg 500kV	-1034
	Ameila Bulk - Bevil 230kV	Helbig - McLewis 230kV	-1009
	Judice - Scott1 138kV	Meaux - SELLRD (CLECO) 230kV	-220
	Judice - Scott1 138kV	Meaux 230/138kV transformer 1	-196
	Semere - Scott2 138kV	Bonin - Cecelia 138kV	-132
	Moril - Cecelia 138kV	Flander (CLECO) - Youngsville 138kV	-39
	Roy S. Nelson - Verdine 230kV	Cypress - Hartburg 500kV	85
	PPG - Verdine 230kV	Cypress - Hartburg 500kV	122
	Roy S. Nelson - Verdine 230kV	Moss Bluff - Roy S. Nelson 230kV	180
	Bonin - Cecelia 138kV	Scott2 - Scott1 138kV Bypass Breaker	180
	Moril - Cecelia 138kV	Youngsville - Segura (CLECO) 138kV	184
	Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	218

Year	Limiting Element	Contingency Element	ATC (MW)
	East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	218
	Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	227
	Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	227
	Vatican - Colton Road 138kV	Cocodrie - Vil Plat 230kV	230
	PPG - Verdine 230kV	Moss Bluff - Roy S. Nelson 230kV	231
	Vatican - Colton Road 138kV	Champagne - Krotz Spring 138kV	234
	Vatican - Colton Road 138kV	Vil Plat - West Fork 230kV	241
	Vatican - Colton Road 138kV	Krotz Spring - Line 642 Tap 138kV	249
1/1/2017 – 1/1/2018	Hartburg - Inland Orange 230kV - Supplemental Upgrade	Cypress - Hartburg 500kV	-3974
	Inland - McLewis 230kV - Supplemental Upgrade	Cypress - Hartburg 500kV	-3567
	Helbig - McLewis 230kV	Cypress - Hartburg 500kV	-3318
	Cypress 500/138kV transformer 1	Cypress 500/230kV transformer	-2775
	Bevil - Cypress 230kV	Hartburg 500/230kV transformer 1	-2495
	Bevil - Cypress 230kV	Hartburg - Inland Orange 230kV	-2490
	Bevil - Cypress 230kV	Inland - McLewis 230kV	-2220
	Hartburg - Inland Orange 230kV	Cypress - Hartburg 500kV	-2201
	Ameila Bulk - Bevil 230kV	Hartburg 500/230kV transformer 1	-2125
	Ameila Bulk - Bevil 230kV	Hartburg - Inland Orange 230kV	-2120
	Bevil - Cypress 230kV	Helbig - McLewis 230kV	-2057
	Cypress 500/230kV transformer	Cypress 500/138kV transformer 1	-1988
	Hartburg 500/230kV transformer 1	Cypress - Hartburg 500kV	-1953
	PPG - Verdine 230kV	Carlyss - Roy S. Nelson 230kV	-1905
	Ameila Bulk - Bevil 230kV	Inland - McLewis 230kV	-1840
	Roy S. Nelson - Verdine 230kV	Carlyss - Roy S. Nelson 230kV	-1808
	Inland - McLewis 230kV	Cypress - Hartburg 500kV	-1761
	Ameila Bulk - Bevil 230kV	Helbig - McLewis 230kV	-1671
	Moril - Cecelia 138kV	Flander (CLECO) - Youngsville 138kV	-868
	Moril - Cecelia 138kV	Youngsville - Segura (CLECO) 138kV	-647
	Semere - Scott2 138kV	Bonin - Cecelia 138kV	-434
	Judice - Scott1 138kV	Meaux - SELLRD (CLECO) 230kV	-312
	Judice - Scott1 138kV	Meaux 230/138kV transformer 1	-285
	Roy S. Nelson - Verdine 230kV	Cypress - Hartburg 500kV	-196
	PPG - Verdine 230kV	Cypress - Hartburg 500kV	-181
	Moril - Cecelia 138kV	Meaux - Abbeville 138kV	-125
	East Leesville - Rodemacher 230kV (CLECO)	Colfax - Rodemacher 230kV	-83
	Amelia Bulk - Helbig 230kV	Cypress - Hartburg 500kV	-81
	Roy S. Nelson - Verdine 230kV	Moss Bluff - Roy S. Nelson 230kV	-10
	PPG - Verdine 230kV	Moss Bluff - Roy S. Nelson 230kV	24
	Semere - Scott2 138kV	Flander (CLECO) - Youngsville 138kV	73
	Beaver Creek 115/138kV phase shifter transformer	Colfax - Rodemacher 230kV	118
	Semere - Scott2 138kV	Youngsville - Segura (CLECO) 138kV	143
	East Leesville - Rodemacher 230kV (CLECO)	Colfax - Montgomery 230kV	156

Year	Limiting Element	Contingency Element	ATC (MW)
	Moril - Cecelia 138kV	Leblanc - Abbyville 138kV	177
	Semere - Scott2 138kV	Meaux - Abbeville 138kV	189
	Vatican - Colton Road 138kV	Cocodrie - Vil Plat 230kV	217
	Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	218
	East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	218
	Bonin - Cecelia 138kV	Scott2 - Scott1 138kV Bypass Breaker	219
	Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	227
	Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	227
	Vatican - Colton Road 138kV	Vil Plat - West Fork 230kV	228
	Vatican - Colton Road 138kV	Champagne - Krotz Spring 138kV	239
	Vatican - Colton Road 138kV	Wells (CLECO) - West Fork (CLECO) 230kV	241
	Carroll 230/138kV transformer (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	243
	Roy S. Nelson 500/230kV auto	Cypress - Hartburg 500kV	245

8.5 Deliverability to Load Test

The deliverability to load test determines if the tested generator will reduce the import capability level to certain load pockets (Amite South, WOTAB and Western Region) on the Entergy system. A more detailed description for these two tests is described in Appendix I.

A. Amite South: Passed

B. WOTAB: Passed

C. Western Region: Passed

9. Required Upgrades for NRIS

9.1 Preliminary Estimates of Direct Assignment of Facilities and Network Upgrades

Limiting Element	Planning Estimate for Upgrade*
Beaver Creek 115/138kV phase shifter transformer	TBD
Big Three - Sabine 230kV	33,300,000
Bonin - Cecelia 138kV	11,760,000
Carroll 230/138kV transformer (CLECO)	Other Ownership
Champagne - East Opelousas 138kV	4,620,000
China Bulk - Sabine 230kV	32,400,000
Conway - Wyandotte 138kV	4,023,600
East Leesville - Rodemacher 230kV (CLECO)	Other Ownership
East Opelousas - Colton Road 138kV	2,520,000
Hartburg - Inland Orange 230kV - Supplemental Upgrade	287,746

Limiting Element	Planning Estimate for Upgrade*
Inland - McLewis 230kV - Supplemental Upgrade	738,640
Judice - Scott1 138kV	6,720,000
Moril - Cecelia 138kV	21,000,000
PPG - Verdine 230kV	1,800,000
Semere - Scott2 138kV	13,440,000
Vatican - Colton Road 138kV	10,080,000

*The costs of the upgrades are planning estimates only. Detailed cost estimates, accelerated costs and solutions for the limiting elements will be provided in the facilities study.

Stability Study

10. Executive Summary

The purpose of this report is to present the results of the stability analysis performed to evaluate the impact of the proposed PID 255 project on the Entergy's system dynamic performance.

The PID 255 consists in a generation interconnection of 251.2MW of wind generation, which will interconnect to the Entergy grid at the Colton Road 138kV substation through a 11-mile Gen-Tie. The Customer submitted their request for 250.5MW. Changes in output parameters of the selected turbine models increased theMW output per turbine from 1.5MW to 1.6MW. Using the newMW output per turbine, the study was performed modeling 157 turbines to most closely match theMW amount of the Customer's request without studying less than the 250.5MW. A review of the study findings found no material impact with the use of 251.2MW as the facility output as compared to 250.5MW.

Stability models for the PID 255 interconnection request were added to the Entergy's 2014 Summer Peak dynamic database, based on the technical documentation provided by the developer.

The stability analysis was performed to determine the ability of the proposed generation facility to remain on line and within applicable planning standards following system disturbances. Three possible types of system faults were considered for the simulations:

- Three-phase faults with stuck breaker
- Three-phase normally cleared faults
- Single-line to ground faults with stuck breaker

Based on the Entergy study criteria, if the system is unstable following a three-phase stuck breaker fault and line outages, the simulation is then repeated assuming two distinct conditions for the same line outages: 1) three-phase fault with normal clearing and 2) single-phase stuck breaker fault.

Three-phase faults with stuck breaker (Faults 25 to 35 listed in Table 3-3) were simulated. The stability analysis demonstrates that:

- The PID 255 proposed project, stayed on line following any of the contingencies tested.
- Evangeline generation units 6 and 7 lose synchronism under certain contingencies (Faults 25 and 31 listed in Table 3-3)
- Bonin generation units 2 and 3 lose synchronism under certain contingencies (Faults 32, 33, 34 and 35 listed in Table 3-3)
- No violations in the voltage dip criteria were verified in any of the simulations performed

A sensitivity analysis was performed to verify if PID 255 has any influence on the poor dynamic system performance under the critical contingencies mentioned in Section 4. The results demonstrate that PID 255 has no influence and does not cause the Evangeline or the Bonin units to go unstable under the contingencies tested. The sensitivity results also indicate that the cause for the instability is the clearing time considered for the Cocodrie 230kV substation, as well as for the Coughlin and Bonin substations.

The LVRT tests performed show that the PID 255 wind project meets the FERC Order 661A requirements for low voltage ride through and voltage recovery to pre-fault conditions.

The general conclusion drawn is that the PID 255 project **does not** cause detrimental impact on the Entergy system, in terms of dynamic performance. Therefore PID 255 project is able to deliver its full power output to the Entergy transmission system without compromising the system reliability. *Stability Plots (Appendix C) referenced in this section are posted at a separate link.*

11. Final conclusions

Stability models for the PID 255 interconnection request were added to the dynamic database, based on the technical documentation provided by the developer. Three-phase faults with stuck breaker (Faults 25 to 35 listed in Table 3-3) were simulated.

The stability simulation results show system instability for Faults 25, 31, 32, 33, 34 and 35. In order to determine if the PID 255 project was the cause for the system to go unstable, two different sensitivity analyses were performed. In the first one, a base case without the PID 255 project modeled was created and the simulations were re-processed. The results show the same poor dynamic behavior, demonstrating that the PID 255 project has no influence on the dynamic system performance under these contingencies. In the second sensitivity analysis, PID 255 is at fullMW output. The critical faults were re-processed considering reduction on the delayed clearing time in steps of 1 cycle, until the units could remain in synchronism. The simulation results obtained indicate that the generators in the monitored areas were stable and remained in synchronism following all simulated three-phase with stuck breaker faults. No voltage criteria violations were verified following these events.

The sensitivity results also indicate that the cause for the instability is the clearing time considered for the Cocodrie 230kV substation, as well as for the Coughlin and Bonin substations.

The General conclusion is that the instabilities identified in the system following system outages are not related to the PID 255 project, which does not cause any detrimental impact on the Entergy system, in terms of dynamic performance, for the conditions and contingencies tested.

Three-phase faults were simulated with fault applied time of 9 cycles. The results show that the voltages recover without triggering the WTG low voltage protection. The electrical power of the WTG units returns to the pre-fault condition after the transient period, which demonstrates that no trips occur for the conditions and contingencies tested.

12. Stability Analysis

The study considered the 2014 Summer Peak power flow case with the required interconnection generation request modeled as described in Section 12.2.1. The base case also contains all the significant previous queued projects in the interconnection queue.

The monitored areas in this study are shown in Table 12-1.

Table 12-1: Areas of Interest

Area Number	Area Name
351	EES
332	LAGN
502	CELE

12.1 Stability Analysis Methodology

12.1.1 Stability Simulations

The dynamic simulations were performed using the PSS®E version 30.3.3 with the latest stability database provided by SPP. Three-phase faults with delayed clearing in the neighborhood of PID 255 Point of interconnection were simulated. Any adverse impact on the system stability was documented and further investigated with appropriate solutions to determine whether a static or dynamic VAR device is required or not.

The system performance was evaluated in terms of its the ability, for a given initial operating condition, to regain a state of operating equilibrium after being subjected to a physical disturbance.

In addition to criteria for the stability of the machines, Entergy has evaluation criteria for the transient voltage dip as follows:

1) For three-phase fault or single-line-ground (SLG) fault with normal clearing resulting in the loss of a single component or even single outage without fault:
    - Not to exceed 20% for more than 20 cycles at any bus
    - Not to exceed 25% at any load bus
    - Not to exceed 30% at any non-load bus
2) For three-phase faults with normal clearing resulting in loss of two or more components (generator, transmission circuit or transformer), and SLG fault with delayed clearing resulting in loss of one or more components:
    - Not to exceed 20% for more than 40 cycles at any bus
    - Not to exceed 30% at any bus

Notes:

- The time period on which the transient voltage dip is accounted for excludes the duration of the fault.
- The transient voltage dip criteria are not applicable for three-phase stuck-breaker faults unless the determined impact is extremely widespread.

12.1.2 Disturbances for Stability Analysis

Three different system faults were considered for the simulations:

a) Three-phase faults with stuck breaker

b) Three-phase normally cleared faults

c) Single-line to ground faults with stuck breaker

If system presents unstable behavior or poor dynamic performance following a three-phase stuck breaker fault, the simulation is repeated assuming both three-phase fault with normal clearing and a single-phase to ground fault with stuck breaker.

The disturbances evaluated are listed in the following Table 12-2 and Table 12-3 for tree phase faults, normal clearing and three-phase faults and stuck breaker conditions, respectively.

Figure 12-1 to Figure 12-7 shows the substation single line breaker diagrams with indication where the faults are applied for the stability simulations.

Table 12-2: Contingencies Considered for the PID 255 Stability Analysis – Three- Phase Faults with Normal Clearing

Fault #	Line on which Fault occurs	Fault Location (For Simulation)	Fault Type	Fault Clearing (Cycles)		Stuck Breaker	Breaker Clearing		Tripped Facilities
				Primary	Back -up		Primary	Back-up	
FAULT_1	Champagne - Cleco Plaisance 138kV line	Champagne 138kV	3 Phase	6	-	None	17225 (Champagne), X8029 (Cleco Plaisance)	None	Champagne - Cleco Plaisance 138kV line
FAULT_2	Champagne - Krotz Springs 138kV line	Champagne 138kV	3 Phase	6	-	None	17310(Champagne), 18225 (Krotz Springs)	None	Champagne - Krotz Springs 138kV line
FAULT_3	Champagne - East Opelousas 138kV line	Champagne 138kV	3 Phase	6	-	None	17230 (Champagne), 37335 (East Opelousas)	None	Champagne - East Opelousas 138kV line
FAULT_4	Colton Road - Vatican 138kV line	Colton Road 138kV	3 Phase	6	-	None	Colton Road and Vatican Breakers	None	East Opelousas - Colton Road 138kV line, Colton Road - Vatican 138kV line, and Vatican - Scott 138kV line ckt 1
FAULT_5	East Opelousas - Colton Road 138kV line	East Opelousas 138kV	3 Phase	6	-	None	Colton Road Breaker 37330 (East Opelousas)	None	East Opelousas - Colton Road 138kV line, Colton Road - Vatican 138kV line, and Vatican - Scott 138kV line ckt 1
FAULT_6	Scott - Richard 138kV line	Scott 138kV	3 Phase	6	-	None	8825 (Scott) and 27140, 27145 (Richard)	None	Scott - Richard 138kV line
FAULT_7	Scott - N Crowley138kV line Ckt 1	Scott 138kV	3 Phase	6	-	None	8835 (Scott), 27165, 37390 (Richard)	None	Scott - Sctnc_Rx 138kV line Ckt 1, Sctnc_Rx -N Crowley (Lagen) 138kV line, N Crowley - Richard 138kV line

Fault #	Line on which Fault occurs	Fault Location (For Simulation)	Fault Type	Fault Clearing (Cycles)		Stuck Breaker	Breaker Clearing		Tripped Facilities
				Primary	Back -up		Primary	Back-up	
FAULT_8	Scott - Doc Bonin 138kV line	Scott 138kV	3 Phase	6	-	None	8840 (Scott), 2011,2007 (Doc Bonin)	None	Scott - Doc Bonin 138kV line
FAULT_9	Scott - Judice (Lagen) 138kV line	Scott 138kV	3 Phase	6	-	None	17105 (Scott), 18420 (Judice)	None	Scott - Judice 138kV line
FAULT_10	Plaisance - Coughlin 138kV line	Plaisance 138kV	3 Phase	6	-	none	8014 (Coughlin), 8028 (Plaisance)	None	Plaisance - Coughlin 138kV line
FAULT_11	Coughlin - Marksville 138kV line	Coughlin 138kV	3 Phase	6	-	None	8015 (Coughlin), Marksville breaker (s)	None	Coughlin - Marksville 138kV line
FAULT_12	Coughlin - Cocodrie 138/230kV transformer	Coughlin 138kV	3 Phase	6	-	None	8009, 8115 (Coughlin), 9304, 9316, 9331 (Cocodrie)	None	Coughlin - Cocodrie 138/230kV transformer
FAULT_13	Coughlin 138kV - Evangeline Unit 7	Coughlin 138kV	3 Phase	6	-	None	8007 (Coughlin)	None	Coughlin 138kV - Evangeline Unit 7
FAULT_14	Cocodrie - Forest Hill 230kV line	Cocodrie 230kV	3 Phase	6	-	None	9304, 9312 (Cocodrie), Forest hill breaker (s)	NOne	Cocodrie - Forest Hill 230kV line
FAULT_15	Cocodrie 230kV - Evangeline Unit 6	Cocodrie 230kV	3 Phase	6	-	None	9308, 9319 (cocodrie)	None	Cocodrie 230kV - Evangeline Unit 6
FAULT_16	Cocodrie - Rodemacher 230kV line	Cocodrie 230kV	3 Phase	6	-	None	9328, 9316 (cocodrie), Rodemacher breaker (s)	None	Cocodrie - Rodemacher 230kV line

Fault #	Line on which Fault occurs	Fault Location (For Simulation)	Fault Type	Fault Clearing (Cycles)		Stuck Breaker	Breaker Clearing		Tripped Facilities
				Primary	Back -up		Primary	Back-up	
FAULT_17	Cocodrie - Ville Plate 230kV line	Cocodrie 230kV	3 Phase	6	-	None	9331, 9308 (cocodrie), Ville Plate breaker (s)	None	Cocodrie - Ville Plate 230kV line
FAULT_18	Doc Bonin 138kV - Doc Bonin unit 3	Doc Bonin 138kV	3 Phase	6	-	None	2016, 2013, 2028 (Doc Bonin)	None	Doc Bonin 138kV - Doc Bonin unit 3
FAULT_19	Doc Bonin - Cecilia 138kV line	Doc Bonin 138kV	3 Phase	6	-	None	2003, 2007 (Doc Bonin), Cecilia breaker (s)	None	Doc Bonin - Cecilia 138kV line
FAULT_20	Doc Bonin - Scott 138kV line	Doc Bonin 138kV	3 Phase	6	-	None	8840 (Scott), 2011,2007 (Doc Bonin)	None	Doc Bonin - Scott 138kV line
FAULT_21	Doc Bonin 138/230kV transformer T4 ckt 1	Doc Bonin 138kV	3 Phase	6	-	none	2011, 2038, 2035, 2132, 2133, 2436, 2415 (Doc Bonin)	none	Doc Bonin 138/230kV transformer T4 ckt 1
FAULT_22	Doc Bonin 69kV - Doc Bonin unit 2	Doc Bonin 69kV	3 Phase	6	-	None	1476 (Doc Bonin)	None	Doc Bonin 69kV - Doc Bonin unit 2
FAULT_23	Doc Bonin - St. George 69kV line	Doc Bonin 69kV	3 Phase	6	-	None	1662, 1464 (Doc Bonin), St. George breaker (s)	None	Doc Bonin - St. George 69kV line
FAULT_24	Doc Bonin - Gilman 69kV line	Doc Bonin 69kV	3 Phase	6	-	None	1462, 1663 (Doc Bonin), Gilman breaker (s)	None	Doc Bonin - Gilman 69kV line

Table 12-3: Contingencies Considered for the PID 255 Stability Analysis – Three-phase Faults with Delayed Clearing

Fault #	Line on which Fault occurs	Fault Location (For Simulation)	Fault Type	Fault Clearing (Cycles)		Stuck Breaker	Breaker Clearing		Tripped Facilities
				Primary	Back -up		Primary	Back-up	
FAULT_25	Cocodrie - Ville Plate 230kV line	Cocodrie 230kV	3 Phase SB	6	9	9331 (Cocodrie)	9308 (cocodrie), Ville Platte breaker (s)	9316, 9304 (cocodrie),8009 (Coughlin)	Cocodrie - Ville Plate 230kV line and Cocodrie 230kV - Coughlin 138kV transformer
FAULT_26	Champagne - East Opelousas 138kV line	Opelousas 138kV	3 Phase SB	6	9	17230 (Champagne)	37335 (East Opelousas)	17225, 17215, 17220,17310,761F (Champange)	Champagne - East Opelousas 138kV line, Champagne - Cleco Plaisance 138kV line, Champagne - Krotz Spring 138kV line)
FAULT_27	Champagne – Plaisance 138kV line	Plaisance 138kV	3 Phase SB	6	9	X8029 (Cleco Plaisance)	17225 (Champagne)	8035,8028,8033,8030, 8518, 8519, 8032, 8031 (Plaisance)	Champagne - Cleco Plaisance 138kV line, Cleco Plaisance - Guidry 138kV line (through Veazie), Cleco Plaisance - Coughlin 138kV line, Cleco Plaisance - Grand Praire La Gen., Cleco Plaisance - Spare, and Loads @ Plaisance
FAULT_28	Scott - Vatican 138kV line	Scott 138kV	3 Phase SB	6	9	17100 (Scott)	37330 (East Opelousa)	18550, 17365, 8830, 8825, 17095, 17105, Transformer # 1 break (Scott)	Vatican - Scott 138kV line ckt 1, Capacitor at Scott 138kV bus, Scott 138/13.8kV transformer # 3, Scott - Richard 138kV line, Scott-Semere-Cecelia 138kV, Scott transformer # 1 and Scott - Judice 138kV line
FAULT_29	Scott - Richard 138kV line	Scott 138kV	3 Phase SB	6	9	8835 (Scott)	27165, 37390 (Richard)	8820, 17370, 17095, 8840, 8820, transformer # 2 breaker (Scott)	Scott - Richard 138kV line, Scott 138/14.4kV transformer # 4, scott transformer # 2, Scott - Doc Bonin 138kV line, Scott-Scanlan-Acadia 138kV line

Fault #	Line on which Fault occurs	Fault Location (For Simulation)	Fault Type	Fault Clearing (Cycles)		Stuck Breaker	Breaker Clearing		Tripped Facilities
				Primary	Back -up		Primary	Back-up	
FAULT_30	Coughlin - Cocodrie 138/230kV transformer	Coughlin 138kV	3 Phase SB	6	9	8009 (Coughlin)	8115 (Coughlin), 9304, 9316, 9331 (Cocodrie)	8010,8007,8129, 8012, 8100, 8013, 8000 (Coughlin)	Coughlin - Cocodrie 138/230kV transformer, Evangeline Unit 7, Coughlin - Caney 138kV line Coughlin - Shady 138kV line Coughlin - Oaks 138kV line Coughlin - Manuel 138kV line
FAULT_31	Coughlin - Cocodrie 138/230kV transformer	Coughlin 138kV	3 Phase SB	6	9	8115 (Coughlin)	8009, 8115 (Coughlin), 9304, 9316, 9331 (Cocodrie)	8000,8015,8006,8014,8005,8003 (Coughlin)	Coughlin - Cocodrie 138/230kV transformer, Coughlin transformer #1, Evangeline Units 6 and 5 and Coughlin transformer # 2 Coughlin - Marksville 138kV line Coughlin - Plaisance 138kV line
FAULT_32	Doc Bonin - St. George 69kV line	Doc Bonin 69kV	3 Phase SB	6	9	1662 (Doc Bonin)	1464 (Doc Bonin), St. George breaker (s)	2016, 2041,1487 (Doc Bonin)	Doc Bonin - St. George 69kV line, Doc Bonin 138/69kV xfrmr # 6 Doc Bonin - Luke 138kV line
FAULT_33	Doc Bonin – Gilman 69kV line	Doc Bonin 69kV	3 Phase SB	6	9	1663 (Doc Bonin)	1462(Doc Bonin)	1601, 2028, 2032 (Doc Bonin)	Doc Bonin - Gilman 69kV line and Doc Bonin 138/69kV xfrmr # 7
FAULT_34	Doc Bonin – Cecilia 138kV line	Doc Bonin 138kV	3 Phase SB	6	9	2007 (Doc Bonin)	2003 (Doc Bonin), Cecilia breaker (s)	2011 (Doc Bonin)	Doc Bonin - Cecilia 138kV line and Doc Bonin - Scott 138kV line
FAULT_35	Doc Bonin – Scott 138kV line	Doc Bonin 138kV	3 Phase SB	6	9	2007 (Doc Bonin)	8840 (Scott), 2011(Doc Bonin)	2003 (Scott), Cecilia breaker(s)	Doc Bonin - Scott 138kV line and Doc Bonin - Cecilia 138kV line

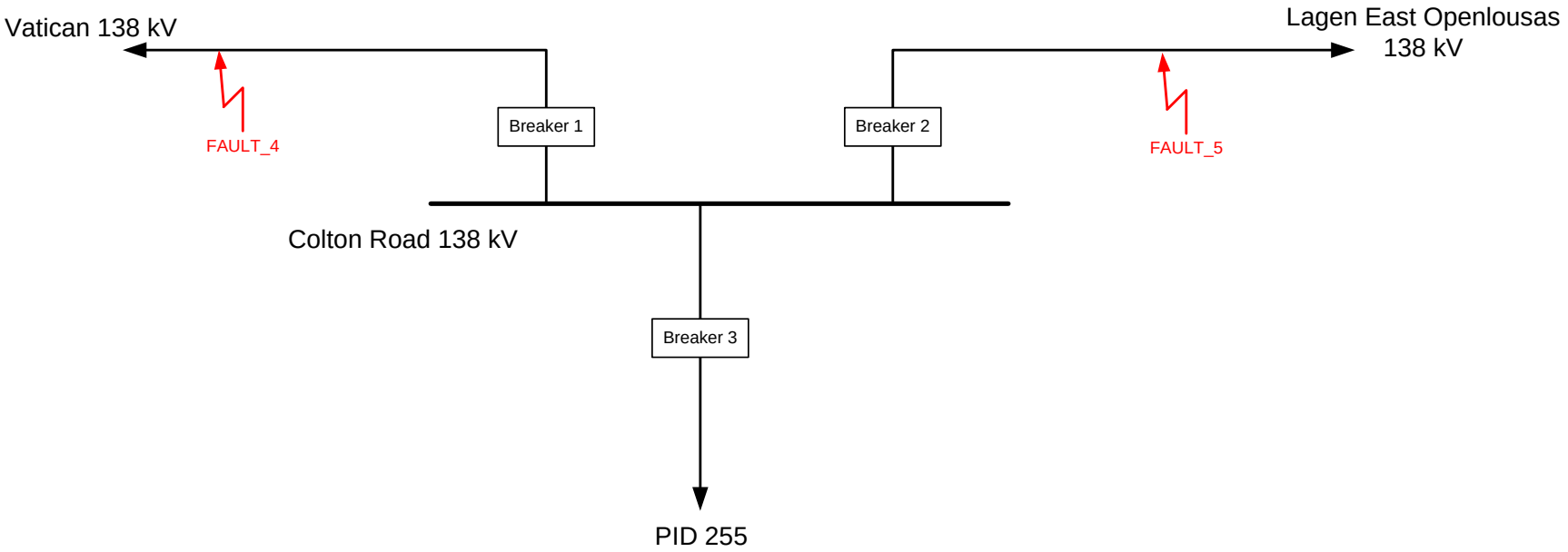

Figure 12-1: Single Line Breaker Diagram of the Colton Road 138kV Substation

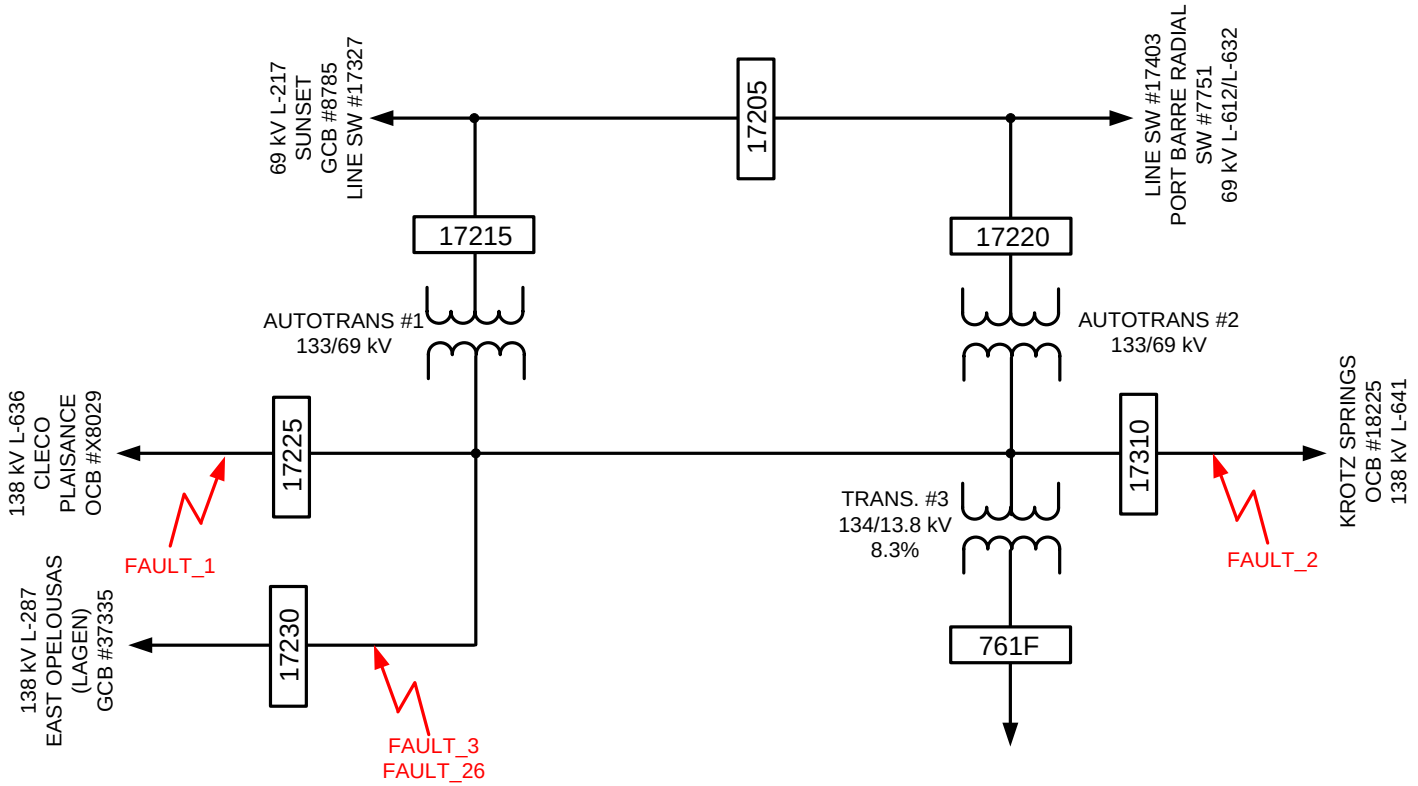

Figure 12-2: Single Line Breaker Diagram of the Champagne 138kV Substation

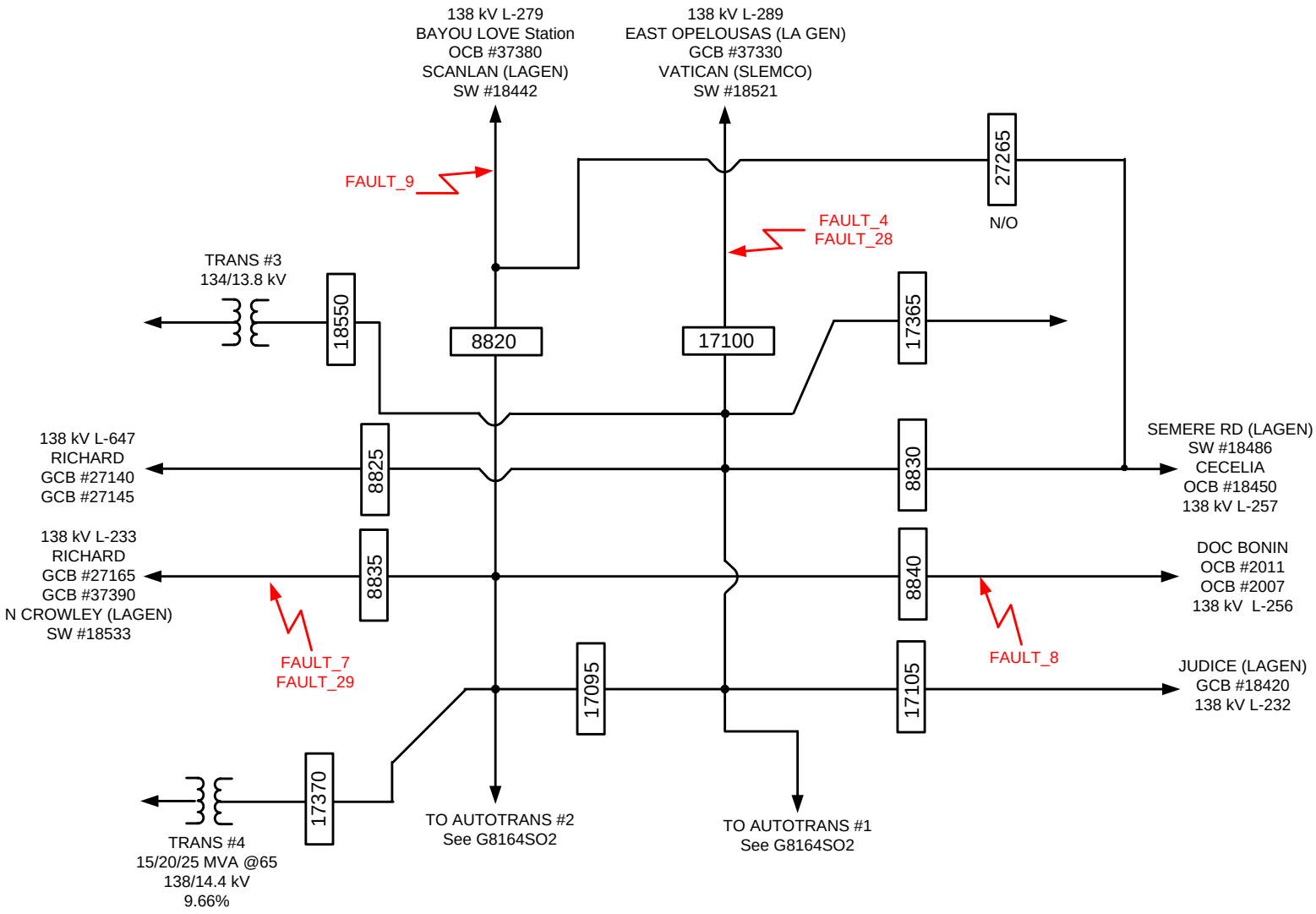

Figure 12-3: Single Line Breaker Diagram of the Scott 138kV Substation

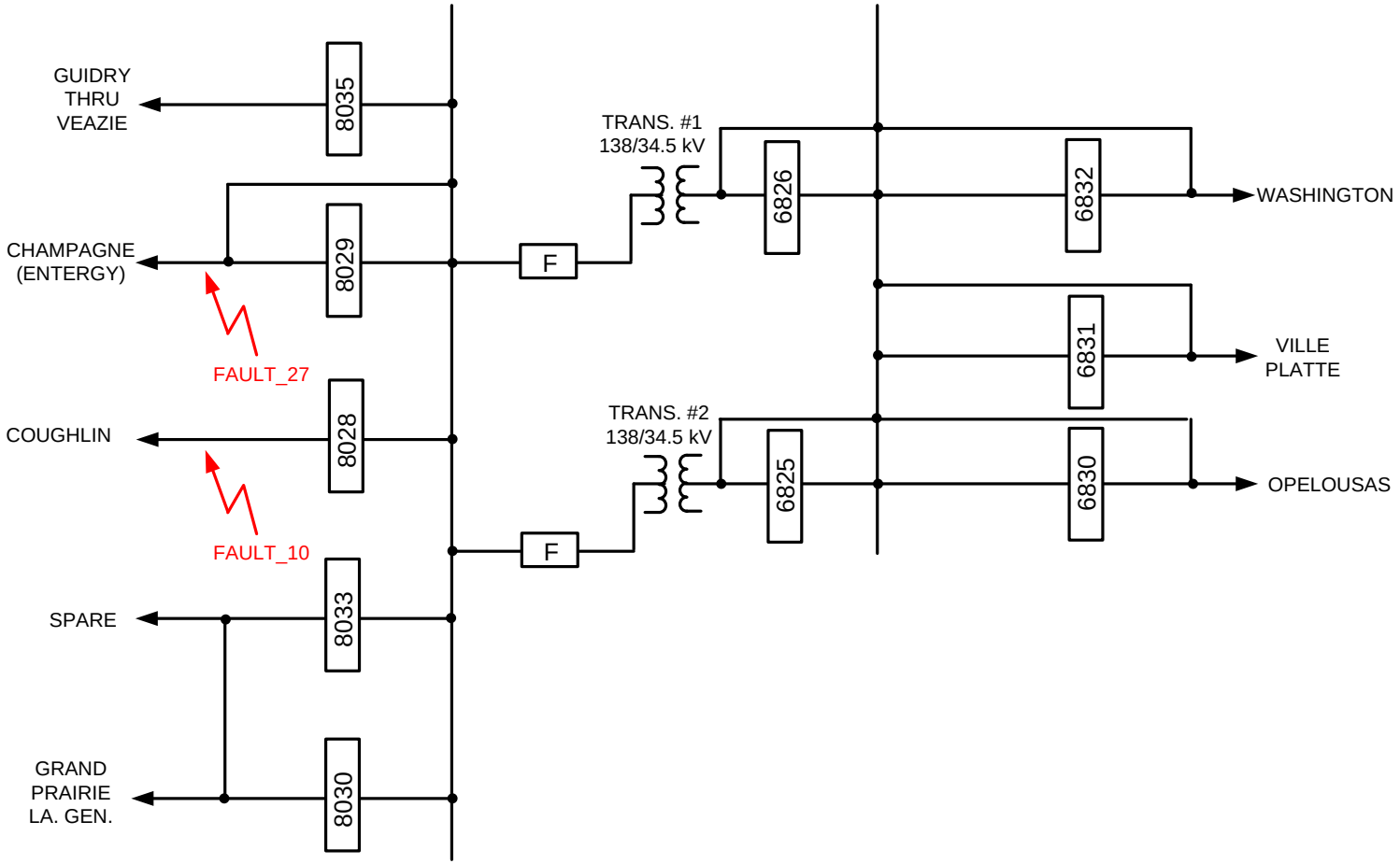

Figure 12-4: Single Line Breaker Diagram of the Plaisance 138kV Substation

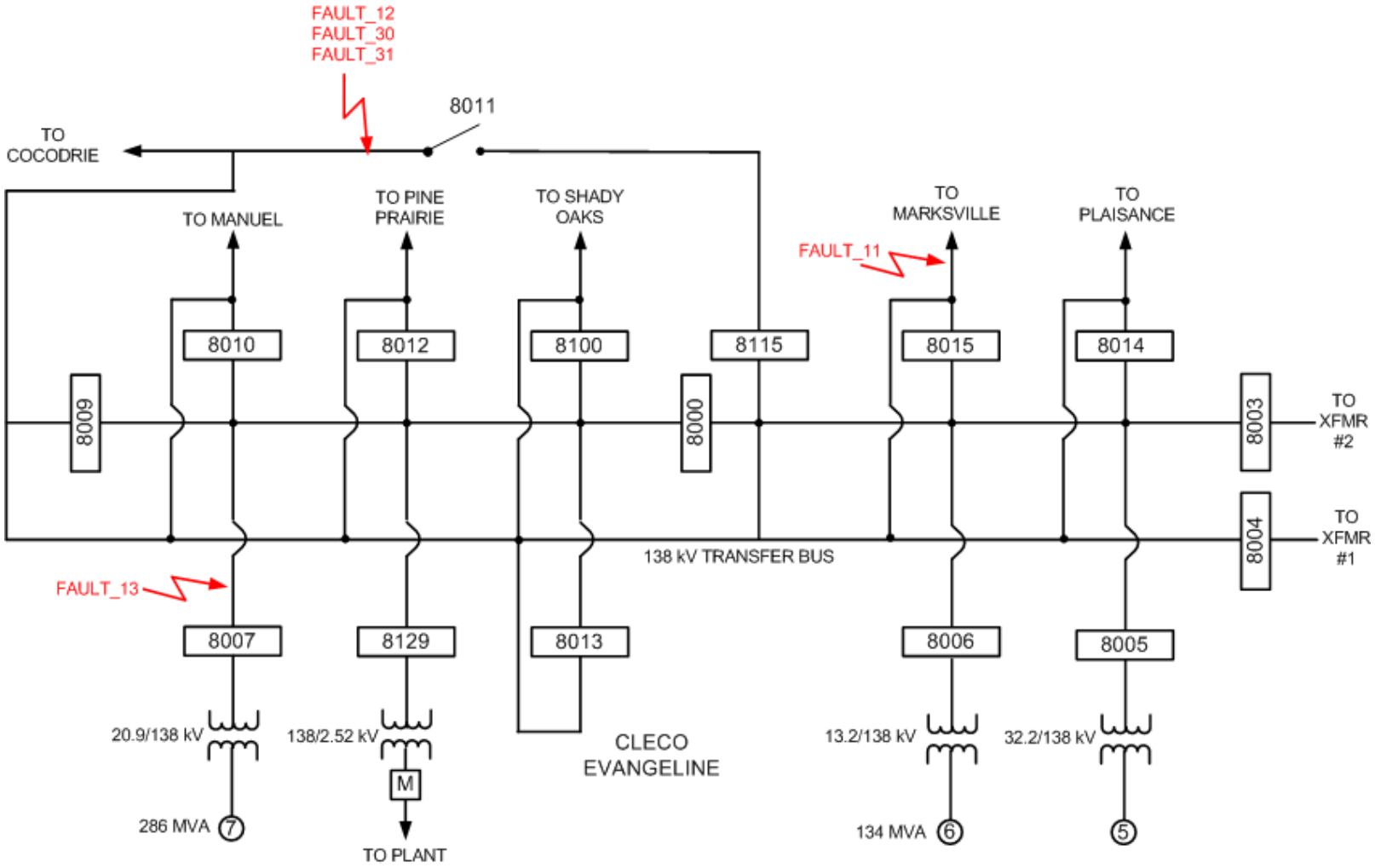

Figure 12-5: Single Line Breaker Diagram of the Coughlin 138kV Substation

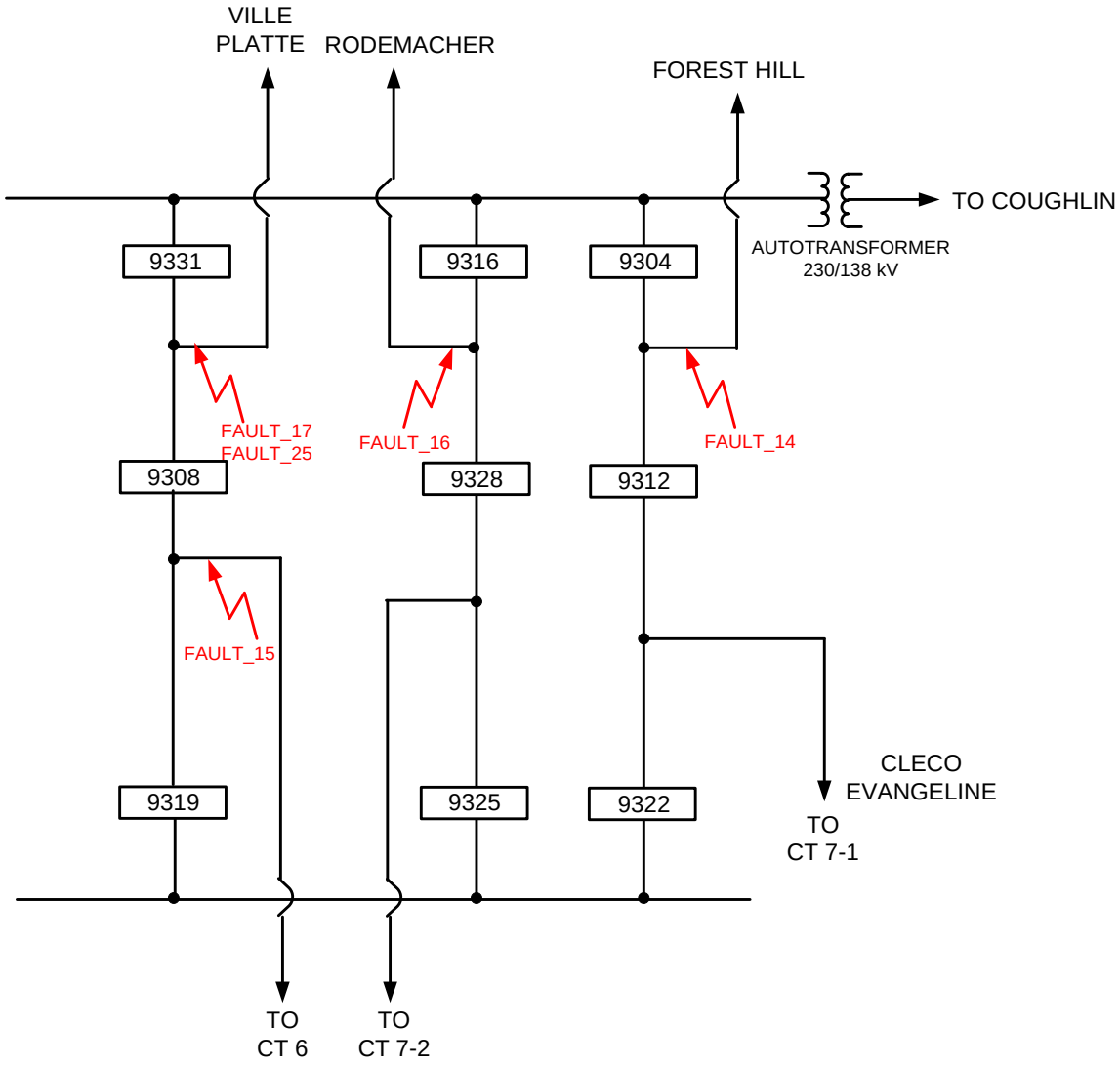

Figure 12-6: Single Line Breaker Diagram of the Cocodrie 138kV Substation

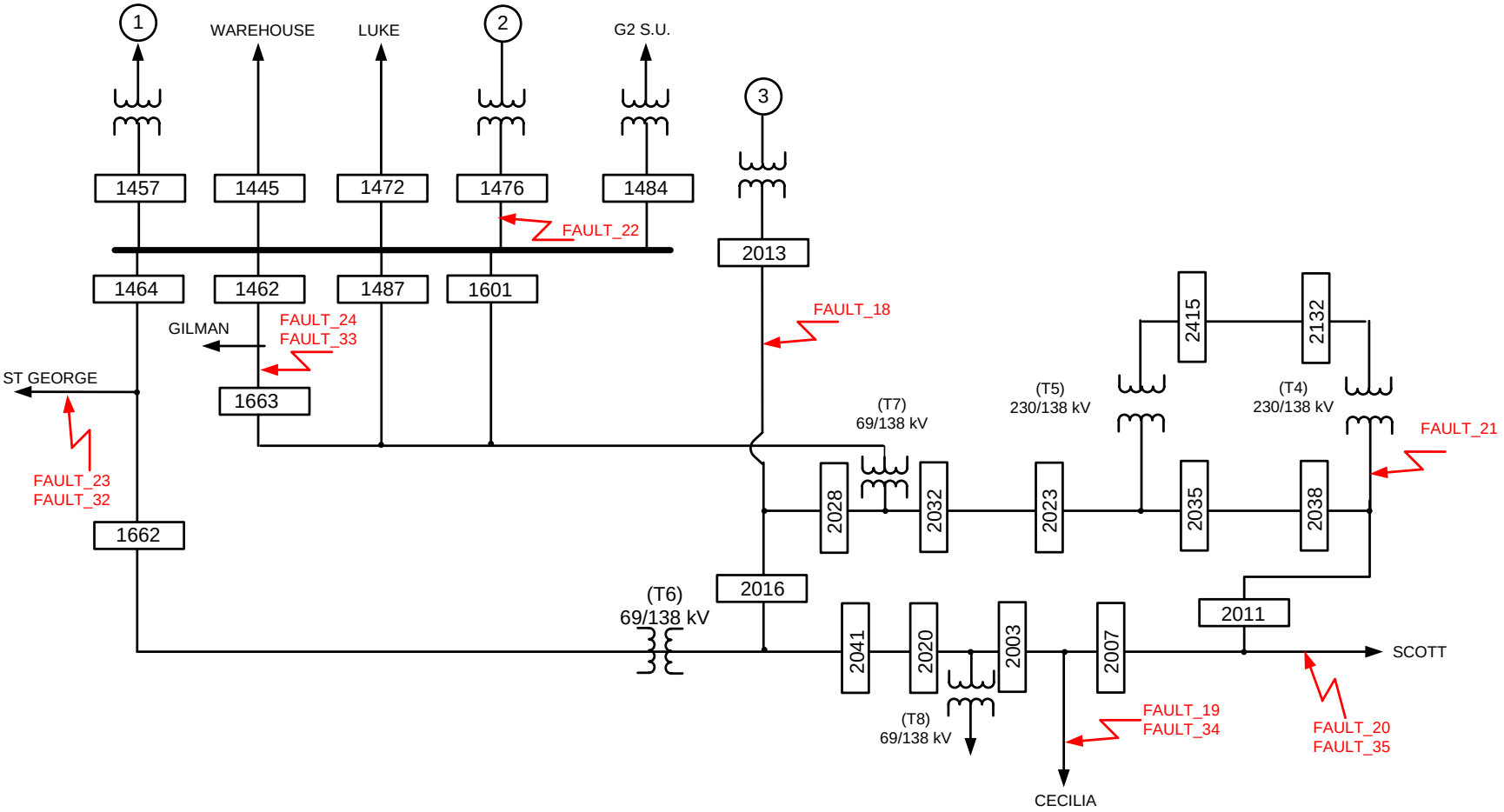

Figure 12-7: Single Line Breaker Diagram of the Bonin 138kV Substation

12.2 Study Model Development

The study has considered the 2014 Summer Peak load flow model with the PID 255 project modeled and dispatched at fullMW capacity. The base case also contains significant previous queued generation projects in the interconnection queue.

12.2.1 Power Flow Case

The PID 255 consists in a wind generation interconnection of 251.2MW. Table 12-4 presents the size of the generation project, the type of the wind turbine, the reactive capability of the lumped Wind Turbine Generators (WTG), the project's point of interconnection, as well as the PSS®E bus number in the load flow model.

Table 12-4: Details of the PID 255 Interconnection Request

Request	Size	Manufacturer/ Model	Number of WTGs	Total Reactive Capability of Project		Point of Interconnection	Bus Number
				Max (Mvar)	Min (Mvar)		
PID 255	251.2MW	GE 1.6MW xle	157	123.25	-123.25	Colton Road kV Substation	335454

The wind farm site is located 11 miles from the Point of Interconnection (POI), which is the Colton Road 138kV substation. The wind farm is connected to the POI through a 138kV Gen-Tie, which line parameters are presented in Table 12-5 in per unit on 100 MVA base.

Table 12-5: kV Line Parameters for PID 255 Gen-Tie

Per Unit on 100 MVA Base				
Transmission Line	Line Length (mi)	R+	X+	B+
PID 255 Gen-Tie 138kV	6.0	0.00979	0.03899	0.0173

Figure 12-8 presents the surrounding area of the PID 255 point of interconnection. The single line diagram show the line flows and voltage profile for the summer peak scenario, on which the study is based.

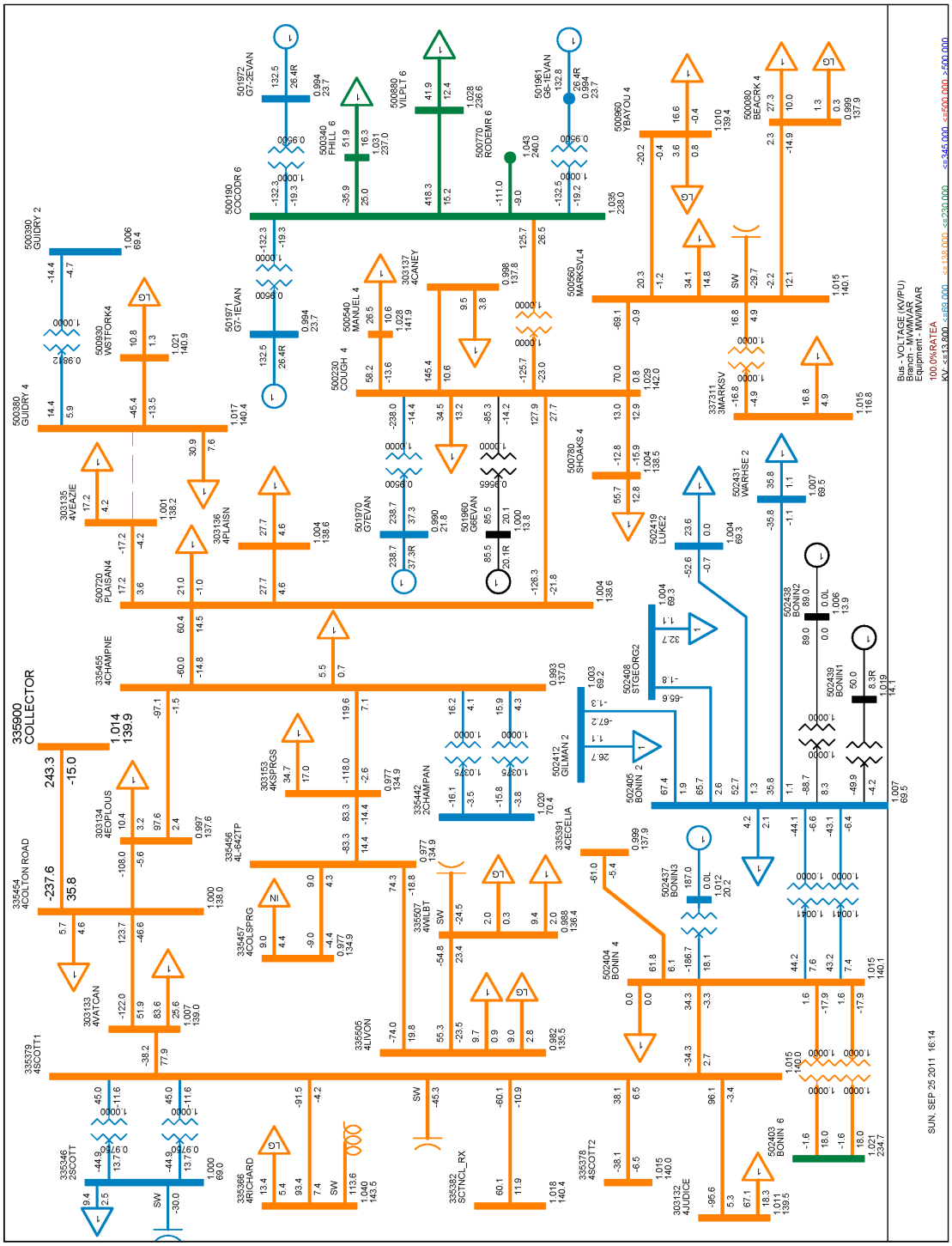

Figure12-8: PID 255 Interconnection Surrounding Area

Figure A-1 in Appendix A present the PSS®E raw data file, as well as a single line diagram showing the PID 255 project modeling detail and impedance data for the gen-tie and step-up transformer.

12.2.2 Stability Database

The transient stability analysis was performed using the data provided by SPP. Stability models for the PID 255 interconnection request were added to the dynamic database, based on the technical documentation provided by the developer.

The PSS®E models output list is shown in Appendix B, documenting the stability models and parameters for the PID 255 project.

12.3 Transient Stability Analysis

12.3.1 System Faults Followed by Line Outages

Three-phase faults with stuck breaker (Faults 25 to 35 listed on Table 12-6) were simulated. System voltages, as well as rotor angles of nearby synchronous machines were monitored in order to verify if the system maintained synchronism following fault clearing and line outages. Table 12-6 summarizes the results obtained from the stability simulations for the PID 255 impact evaluation.

Table 12-6: Results Obtained – PID 255 Stability Analysis

Contingency	Dynamic System Performance
FAULT_25	System Not Stable. Evangeline 6 Generation Unit 1 (bus # 501961) Loses synchronism, leading to instability
FAULT_26	System Stable. Acceptable damping and voltage recovery. Sustained Low Voltage at 69kV
FAULT_27	System Stable. Acceptable damping and voltage recovery
FAULT_28	System Stable. Acceptable damping and voltage recovery
FAULT_29	System Stable. Acceptable damping and voltage recovery
FAULT_30	System Stable. Acceptable damping and voltage recovery
FAULT_31	System not stable. Evangeline 7 Generation Unit (bus # 501970) loses synchronism, leading to instability
FAULT_32	System stable, but Bonin 2 Generation Unit (bus # 501438) loses synchronism. Acceptable damping and voltage recovery
FAULT_33	System stable, but Bonin 2 Generation Unit (bus # 501438) loses synchronism. Acceptable damping and voltage recovery
FAULT_34	System stable, but Bonin 2 (bus # 501438) and Bonin 3 (bus # 501437) Generation Units lose synchronism. Acceptable damping and voltage recovery

Contingency	Dynamic System Performance
FAULT_35	System stable, but Bonin 2 (bus # 501438) and Bonin 3 (bus # 501437) Generation Units lose synchronism. Acceptable damping and voltage recovery

It is important to note that Fault 26 causes sustained low voltages at the Champagne 138kV bus and all 69kV substations connected to this substation. This is due to the fact that Fault 26 trips all 138kV lines associated with the Champagne substation. The power supply for all the 69kV buses (radial path) between Champagne and Scott comes from the latter, leading to the low voltages, without further consequences to the system dynamic behavior.

Fault 31 causes the Evangeline 7 Generation Unit to lose synchronism. The total fault applied time including the delayed clearing is 15 cycles, which causes the generator to accelerate beyond the point that it could return by the action of the machine's synchronizing torque.

The same phenomenon is verified for the Bonin Units 2 and 3 under Fault 32, 33, 34 and 35. However, in these cases the Bonin units going unstable does not compromise the system dynamic performance, as the other generators in the area remain in synchronism.

A sensitivity analysis is performed in the next sub-sections to determine the influence of the PID 255 project on the unstable system behavior.

Stability plots of the contingencies evaluated are presented in Appendix C.

12.3.2 Sensitivity Analysis: Three-phase Faults with Stuck Breaker – "without " PID 255 Modeled

A base case without the PID 255 was prepared to verify if the faults, followed by the line outages still cause the system to be unstable. The system was redispatched by increasing the generation at the local slack bus (#337653). Faults 25, 31, 32, 33, 34 and 35 were re-processed. The results are listed in Table 12-7. The simulations present exactly the same system poor dynamic performance when PID 255 is not modeled, demonstrating that PID 255 does not cause the Evangeline and /or the Bonin units to go unstable under the contingencies tested.

Stability plots of the contingencies evaluated are presented in Appendix C.

Table 12-7: Results Obtained – Sensitivity Analysis "without " PID 255 Modeled

Contingency	Dynamic System Performance
FAULT_25	System Not Stable. Evangeline 6 Generation Unit 1 (bus # 501961) Loses synchronism, leading to instability
FAULT_31	System not stable. Evangeline 7 Generation Unit (bus # 501970) loses synchronism, leading to instability
FAULT_32	System stable, but Bonin 2 Generation Unit (bus # 501438) loses synchronism. Acceptable damping and voltage recovery

Contingency	Dynamic System Performance
FAULT_33	System stable, but Bonin 2 Generation Unit (bus # 501438) loses synchronism. Acceptable damping and voltage recovery
FAULT_34	System stable, but Bonin 2 (bus # 501438) and Bonin 3 (bus # 501437) Generation Units lose synchronism. Acceptable damping and voltage recovery
FAULT_35	System stable, but Bonin 2 (bus # 501438) and Bonin 3 (bus # 501437) Generation Units lose synchronism. Acceptable damping and voltage recovery

12.3.3 Sensitivity Analysis: Three-phase Faults with Stuck Breaker – Reduction in the Delayed Clearing Time

Faults 25, 31, 32, 33, 34 and 35 were re-processed reducing one cycle in the delayed clearing time in steps, until the units that were going unstable could remain in synchronism. The results are listed in Table 12-8. The simulations present a well behaved performance under the contingencies tested, that is, all synchronous generators remained in synchronism following the disturbances. Acceptable damping and voltage recovery was observed.

Table 12-8: Results Obtained – Sensitivity Analysis Reduction in the Delayed Clearing Time

Contingency	Normal Clearing (Cycles)	Delayed Clearing (Cycles)	Dynamic System Performance
FAULT_25	*6*	*7*	System Stable. Acceptable damping and voltage recovery
FAULT_31	*6*	*3*	System Stable. Acceptable damping and voltage recovery
FAULT_32	*6*	*6*	System Stable. Acceptable damping and voltage recovery
FAULT_33	*6*	*6*	System Stable. Acceptable damping and voltage recovery
FAULT_34	*6*	*5*	System Stable. Acceptable damping and voltage recovery
FAULT_35	*6*	*5*	System Stable. Acceptable damping and voltage recovery

Stability plots of the contingencies evaluated are presented in Appendix C. The sensitivity analyses demonstrate that the PID 255 project has no influence in the poor dynamic system performance under the critical contingencies above mentioned. Therefore there is no need to perform the simulations FLT1 to FLT24 listed in Table 3-2, as they represent less severe conditions.

12.3.4 Low Voltage Ride Through (LVRT)

LVRT tests were perform to determine the ability of the PID 255 wind project to meet FERC Order 661A (low voltage ride through and wind farm recovery to pre-fault voltage) without additional reactive support.

Faults 4 and 5 listed in Table 12-2 were simulated with fault applied time of 9 cycles. Figure 12-9 shows, for both simulations, the voltage at the POI. Figure 12-10, in turn, shows the electrical power of the two equivalent units that represent PID 255 in this stability analysis. It can be seen that the voltage at the POI recovers without triggering the WTG low voltage protection. The electrical power of the WTG units returns to the pre-fault condition after the transient period, which demonstrates that no trips occur for the conditions and contingencies tested.

Stability plots of the Fault 4 and Fault 5 are also presented in Appendix C.

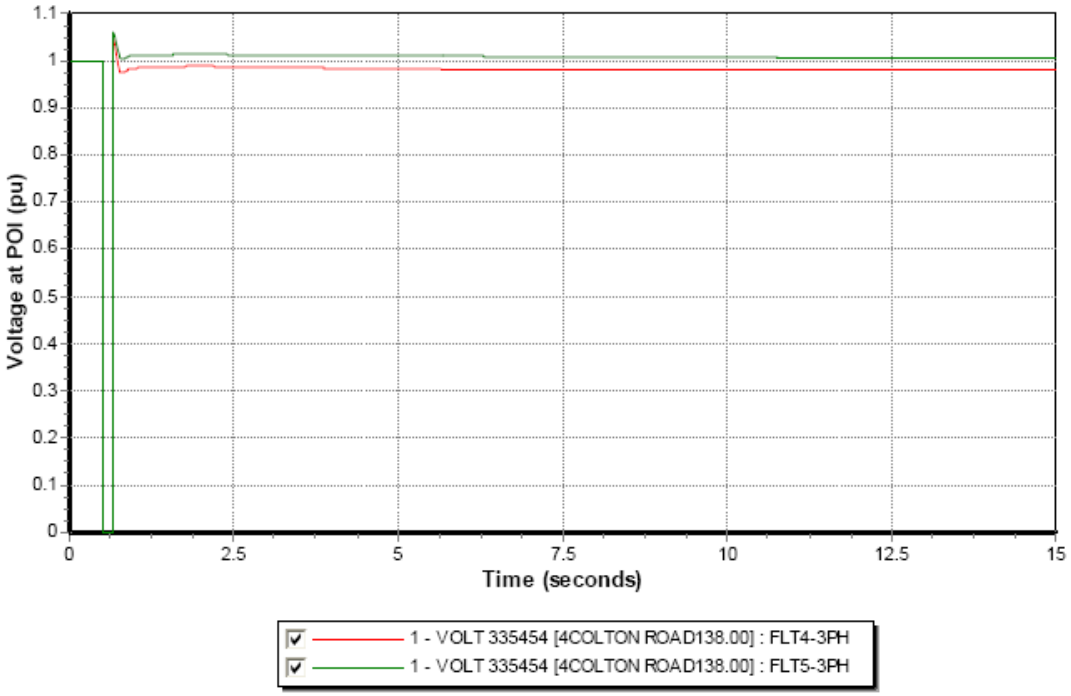

Figure 12-9: Post-Disturbance Voltage at the POI

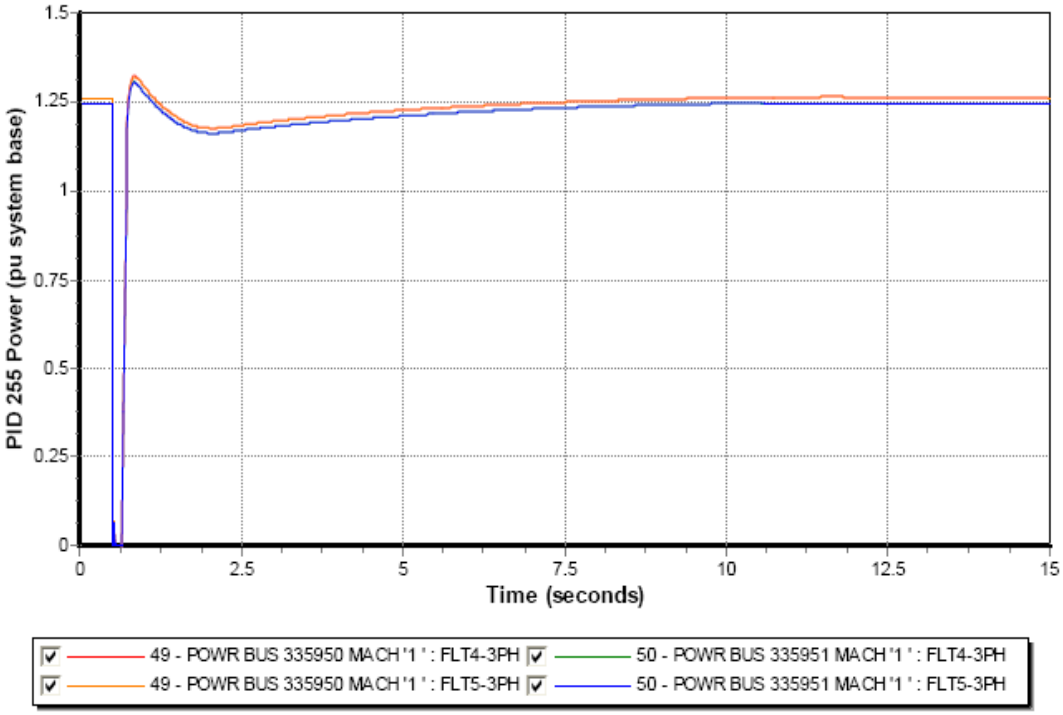

Figure 12-10: PID 255 WTG Power Output

APPENDIX A: Data Provided by the Customer

Attachment A to Appendix 1
Interconnection Request

LARGE GENERATING FACILITY DATA

UNIT RATINGS

kVA 167 x 1.5MW Wind Turbines °F _____ Voltage 690 V
Power Factor +/- 0.9
Speed (RPM) 1440 Connection (e.g. Wye) Wye-grounded
Short Circuit Ratio N/A Frequency, Hertz 60
Stator Amperes at Rated kVA N/A Field Volts N/A
Max Turbine MW 1.5 °F N/A
See attached single line diagram and GE Document "Technical Documentation Wind Turbine Generator Systems GE 1.5-60Hz"

COMBINED TURBINE-GENERATOR-EXCITER INERTIA DATA

Inertia Constant, H = N/A kW sec/kVA
Moment-of-Inertia, WR^2 = N/A lb. ft.^{2}

REACTANCE DATA (PER UNIT-RATED KVA)

		DIRECT AXIS		QUADRATURE AXIS
Synchronous – saturated	X_{dv}	N/A	X_{qv}	N/A
Synchronous – unsaturated	X_{di}	N/A	X_{qi}	N/A
Transient – saturated	X'_{dv}	N/A	X'_{qv}	N/A
Transient – unsaturated	X'_{di}	N/A	X'_{qi}	N/A
Subtransient – saturated	X''_{dv}	N/A	X''_{qv}	N/A
Subtransient – unsaturated	X''_{di}	N/A	X''_{qi}	N/A
Negative Sequence – saturated	$X2_v$	N/A		
Negative Sequence – unsaturated	$X2_i$	N/A		
Zero Sequence – saturated	$X0_v$	N/A		
Zero Sequence – unsaturated	$X0_i$	N/A		
Leakage Reactance	Xl_m	N/A		

FIELD TIME CONSTANT DATA (SEC)

Open Circuit	T'_{do}	N/A	T'_{qo}	N/A
Three-Phase Short Circuit Transient	T'_{d3}	N/A	T'_{q}	N/A
Line to Line Short Circuit Transient	T'_{d2}	N/A		
Line to Neutral Short Circuit Transient	T'_{d1}	N/A		
Short Circuit Subtransient	T''_{d}	N/A	T''_{q}	N/A
Open Circuit Subtransient	T''_{do}	N/A	T''_{qo}	N/A

ARMATURE TIME CONSTANT DATA (SEC)

Three Phase Short Circuit	T_{a3}	N/A
Line to Line Short Circuit	T_{a2}	N/A
Line to Neutral Short Circuit	T_{a1}	N/A

NOTE: If requested information is not applicable, indicate by marking "N/A."

MW CAPABILITY AND PLANT CONFIGURATION
LARGE GENERATING FACILITY DATA

ARMATURE WINDING RESISTANCE DATA (PER UNIT)

Positive	R_1	N/A
Negative	R_2	N/A
Zero	R_0	N/A

Rotor Short Time Thermal Capacity I_2^2t = N/A
Field Current at Rated kVA, Armature Voltage and PF = N/A amps
Field Current at Rated kVA and Armature Voltage, 0 PF = N/A amps
Three Phase Armature Winding Capacitance = N/A microfarad
Field Winding Resistance = N/A ohms N/A °C
Armature Winding Resistance (Per Phase) = N/A ohms _____ °C

CURVES

Provide Saturation, Vee, Reactive Capability, Capacity Temperature Correction curves.
Designate normal and emergency Hydrogen Pressure operating range for multiple curves.

GENERATOR STEP-UP TRANSFORMER DATA RATINGS (2 Transformers needed for Project)

Capacity Self-cooled/ Maximum Nameplate
84/112/140 / OA/FA/FA kVA

Voltage Ratio(Generator Side/System side/Tertiary)
34.5 / 138 / 13.8 kV

Winding Connections (Low V/High V/Tertiary V (Delta or Wye))
Wye Grounded / Wye Grounded / Buried Delta Tertiary

Fixed Taps Available 5 tap positions, step 2.5% +5% -5%

Present Tap Setting Central Tap

IMPEDANCE

Positive Z_1 (on self-cooled kVA rating) 9 % 40 X/R

Zero Z_0 (on self-cooled kVA rating) 6.7 % 40 X/R

Issued by: Randall Helmick
Vice President, Transmission

Effective: July 13, 2007

Issued on: July 13, 2007

EXCITATION SYSTEM DATA

Identify appropriate IEEE model block diagram of excitation system and power system stabilizer (PSS) for computer representation in power system stability simulations and the corresponding excitation system and PSS constants for use in the model.

GOVERNOR SYSTEM DATA

Identify appropriate IEEE model block diagram of governor system for computer representation in power system stability simulations and the corresponding governor system constants for use in the model.

WIND GENERATORS

Number of generators to be interconnected pursuant to this Interconnection Request:
167 x 1.5 MW GE Wind Turbines

Elevation: 60ft ____ Single Phase X Three Phase

Inverter manufacturer, model name, number, and version:
GE

List of adjustable setpoints for the protective equipment or software:
TBD

Note: A completed General Electric Company Power Systems Load Flow (PSLF) data sheet or other compatible formats, such as IEEE and PTI power flow models, must be supplied with the Interconnection Request. If other data sheets are more appropriate to the proposed device, then they shall be provided and discussed at Scoping Meeting.

INDUCTION GENERATORS

(*) Field Volts: N/A
(*) Field Amperes: N/A
(*) Motoring Power (kW): N/A
(*) Neutral Grounding Resistor (If Applicable): N/A
(*) I_2^2t or K (Heating Time Constant): N/A
(*) Rotor Resistance: N/A
(*) Stator Resistance: N/A
(*) Stator Reactance: N/A
(*) Rotor Reactance: N/A
(*) Magnetizing Reactance: N/A
(*) Short Circuit Reactance: N/A
(*) Exciting Current: N/A
(*) Temperature Rise: N/A
(*) Frame Size: N/A
(*) Design Letter: N/A
(*) Reactive Power Required In Vars (No Load): N/A
(*) Reactive Power Required In Vars (Full Load): N/A
(*) Total Rotating Inertia, H: N/A Per Unit on KVA Base

Note: Please consult Transmission Provider prior to submitting the Interconnection Request to determine if the information designated by (*) is required

APPENDIX A
SAMPLE DATA REQUEST FOR WIND POWER PLANTS

1. One-line Diagram. This should be similar to Figure 1 below.

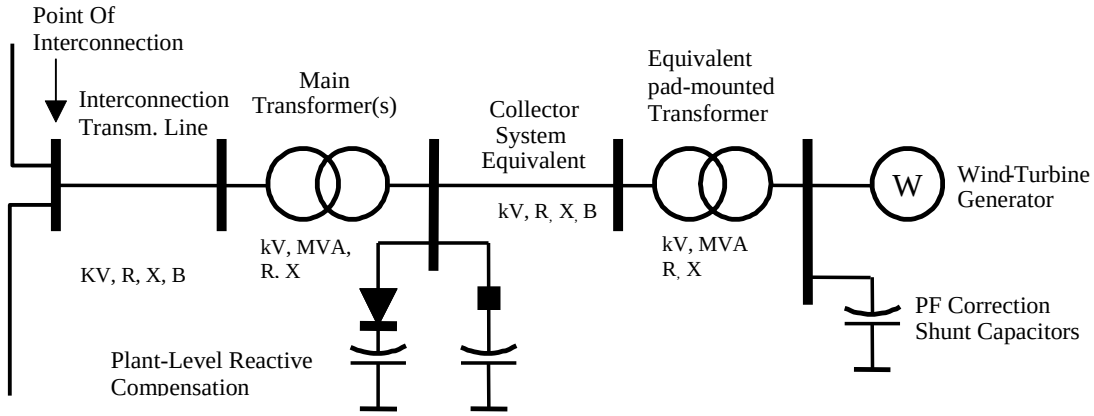

Figure A-1. Single-machine representation one-line diagram

2. Interconnection Transmission Line.

- Line voltage = 138 kV
- R = _____ ohm or 0.00979 pu on 100 MVA and line kV base (positive sequence)
- X = _____ ohm or 0.03899 pu on 100 MVA and line kV base (positive sequence)
- B = _____ uF or 0.0173 pu on 100 MVA and line kV base

3. Station Transformer. (NOTE: If there are multiple transformers, data for each transformer should be provided) 2 Transformers Required

- Rating (ONAN/FA/FA): 84 / 112 / 140 MVA
- Nominal Voltage for each winding (Low /High /Tertiary): 34.5 / 138 / 13.8 kV
- Winding Connections: Wye GND / Wye GND / Buried Delta (Delta, Wye, Wye grounded)
- Available taps: 5 Fixed+/-2.5% ea. (indicated fixed or ULTC), operating Tap: Central
- Positive sequence Z: 9 %, 40 X/R on transformer self-cooled (ONAN) MVA
- Zero sequence Z: 7 %, 40 X/R on transformer self-cooled (ONAN) MVA

4. Collector System Equivalent Model. This can be found by applying the equivalencing methodology described in Section 3.4; otherwise, typical values can be used. (PER GSU)

- Collector system voltage = 34.5 kV
- R = _____ ohm or 0.02 pu on 100 MVA and collector kV base
- X = _____ ohm or 0.03 pu on 100 MVA and collector kV base
- B = _____ mF or 0.05 pu on 100 MVA and collector kV base
- Attach a one-line diagram of the collector layout.

It is also acceptable to provide a complete collector system description similar to Figure 4 of the Power Flow Modeling Guide.

5. Wind-turbine Generator (WTG) Pad-Mounted Transformer. Note: These are typically two-winding air-cooled transformers. If the proposed project contains different types or sizes of pad-mounted transformers, please provide data for each type.

- Rating: 2.0 MVA
- Nominal voltage for each winding (Low /High): 0.690 / 34.5 kV
- Winding Connections: Wye GND/ Delta (Delta, Wye, Wye grounded)
- Available taps: 5 +/-2.5% (please indicated fixed or ULTC), Operating Tap: Central
- Positive sequence impedance (Z1) 5.75 %, 7.5 X/R on transformer self-cooled MVA
- Zero sequence impedance (Z0) 5.75 %, 7.5 X/R on transformer self-cooled MVA

6. WTG Powerflow Data. Proposed projects may include one or more WTG Types (See NOTE 1 below). Please provide the following information for each:

- Number of WTGs: 157
- Nameplate rating (each WTG): 1.6 MW
- WTG Manufacturer and Model: GE 1.6MW
- WTG Type: Type 3

For Type 1 or Type 2 WTGs:

- Uncompensated power factor at full load: _____
- Power factor correction capacitors at full load: _____Mvar
- Number of shunt stages and size _____
- Please attach capability curve describing reactive power or power factor range from 0 to full output, including the effect of shunt compensation.

For Type 3 and Type 3 WTGs:

- Maximum under-excited power factor at full load: 0.90
- Maximum under-excited power factor at full load: 0.90
- Control mode: Voltage Control (voltage control, fixed power factor) (See Note 7.2)
- Please attach capability curve describing reactive power or power factor range from 0 to full output. See attached Data Sheet

NOTE 7.1: WTG Type can be one of the following:

- Type 1 – Squirrel-cage induction generator
- Type 2 – Wound rotor induction machine with variable rotor resistance
- Type 3 – Doubly-fed asynchronous generator
- Type 4 – Full converter interface

NOTE 7.2: Type 1 and Type 2 WTGs typically operate on **fixed power factor** mode for a wide range of output level, aided by turbine-side power factor correction capacitors (shunt compensation). With a suitable plant-level controller, Type 3 and Type 4 WTGs may be capable of dynamically varying power factor to contribute to **voltage control** mode operation, if required by the utility. However, this feature is not always available due to commercial and other reasons. The data requested must reflect the WTG capability that can be used in practice. Please consult with the manufacturer when in doubt. The interconnection study will determine the voltage control requirements for the project. Plant-level reactive compensation requirements are engineered to meet specific requirements. WTG reactive capability data described above could significantly impact study results and plant-level reactive compensation requirements.

7. Wind Farm Reactive Power Compensation. Provide the following information for wind farm-level reactive compensation, if applicable:

- Individual shunt capacitor and size of each: _____X_____ MVA
- Dynamic reactive control device, (SVC, STATCOM): _____
- Control range _____ Mvar (lead and lag)
- Control mode (line drop, voltage droop, voltage control): _____
- Regulation point _____
- Describe the overall reactive power control strategy:
  _____

8. Wind-turbine Generator (WTG) Dynamic Data. Model and parameter data required for transient stability analysis is specific to each WTG make and model. The dynamic models must be in an approved WECC format, or in a PSSE or PSLF format that is acceptable to the transmission provider. We strongly suggest that the manufacturers provide this information.

See Section 11.2 "Wind Turbine Dynamic Modeling" of the attached document "Technical Documentation Wind Turbine Generator Systems GE 1.6XLE-60Hz"

- Library model name: _____
- Model type (standard library or user-written): _____
- Model access (proprietary or non-proprietary): _____
- Attach full model description and parameter data

APPENDIX B: Power Flow and Stability Data

Power Flow Data

```
1,   100.00        / PSS/E-30.3    THU, SEP 08 2011  13:53


335454,'4COLTON ROAD', 138.0000,1,     0.000,     0.000, 351, 111,1.00000,  -1.9228,   1
335900,'COLLECTOR   ', 138.0000,1,     0.000,     0.000, 351, 111,1.00921,   3.6074,   1
335910,'CLT-1A      ',  34.5000,1,     0.000,     0.000, 351, 111,1.00671,  11.0362,   1
335911,'CLT-1B      ',  34.5000,1,     0.000,     0.000, 351, 111,1.03174,  13.0671,   1
335920,'CLT-2A      ',  34.5000,1,     0.000,     0.000, 351, 111,1.00723,  10.9407,   1
335921,'CLT-2B      ',  34.5000,1,     0.000,     0.000, 351, 111,1.03202,  12.9418,   1
335950,'PID255_WTG1 ',   0.6900,2,     0.000,     0.000, 351, 111,1.03927,  15.5169,   1
335951,'PID255_WTG2 ',   0.6900,2,     0.000,     0.000, 351, 111,1.03941,  15.3287,   1
0 / END OF BUS DATA, BEGIN LOAD DATA
335454,'1 ',1, 351, 111,     5.700,     4.571,     0.000,     0.000,     0.000,     0.000,   1
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0.00000,   0.00000,1.00000,1,  100.0,   126.400,     5.925,   1,1.0000
335951,'1 ',   124.800,     7.228,    60.450,   -60.450,1.00000,335454,   138.840,   0.00000,   0.80000,
0.00000,   0.00000,1.00000,1,  100.0,   124.800,     5.850,   1,1.0000
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0.00000,1,  12.35,   1,1.0000
303134,-335454,'1 ',   0.00201,   0.00808,   0.00329,  225.00,  225.00,    0.00,  0.00000,  0.00000,  0.00000,
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335454, 335900,'1 ',   0.00979,   0.03899,   0.01730,    0.00,    0.00,    0.00,  0.00000,  0.00000,  0.00000,
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335910, 335911,'1 ',   0.02000,   0.03000,   0.05000,    0.00,    0.00,    0.00,  0.00000,  0.00000,  0.00000,
0.00000,1,   0.00,   1,1.0000
335920, 335921,'1 ',   0.02000,   0.03000,   0.05000,    0.00,    0.00,    0.00,  0.00000,  0.00000,  0.00000,
0.00000,1,   0.00,   1,1.0000
0 / END OF BRANCH DATA, BEGIN TRANSFORMER DATA
335900,335910,     0,'1 ',1,2,1,   0.00000,   0.00000,2,'            ',1,   1,1.0000
  0.00225,   0.08997,    84.00
1.00000,   0.000,   0.000,   140.00,   140.00,   140.00, 0,      0, 1.05000, 0.95000, 1.05000, 0.95000,   5, 0,
0.00000, 0.00000
1.00000,   0.000
335900,335920,     0,'1 ',1,2,1,   0.00000,   0.00000,2,'            ',1,   1,1.0000
  0.00225,   0.08997,    84.00
1.00000,   0.000,   0.000,   140.00,   140.00,   140.00, 0,      0, 1.05000, 0.95000, 1.05000, 0.95000,   5, 0,
0.00000, 0.00000
1.00000,   0.000
335911,335950,     0,'1 ',1,2,1,   0.00000,   0.00000,2,'            ',1,   1,1.0000
  0.00760,   0.05700,   156.00
1.00000,   0.000,   0.000,   156.00,   156.00,   156.00, 0,      0, 1.05000, 0.95000, 1.05000, 0.95000,   5, 0,
0.00000, 0.00000
1.00000,   0.000
335921,335951,     0,'1 ',1,2,1,   0.00000,   0.00000,2,'            ',1,   1,1.0000
  0.00760,   0.05700,   158.00
1.00000,   0.000,   0.000,   158.00,   158.00,   158.00, 0,      0, 1.05000, 0.95000, 1.05000, 0.95000,   5, 0,
0.00000, 0.00000
1.00000,   0.000
0 / END OF TRANSFORMER DATA, BEGIN AREA DATA
 351,337653,   125.900,    10.000,'EES         '
```

0 / END OF AREA DATA, BEGIN TWO-TERMINAL DC DATA
0 / END OF TWO-TERMINAL DC DATA, BEGIN VSC DC LINE DATA
0 / END OF VSC DC LINE DATA, BEGIN SWITCHED SHUNT DATA
0 / END OF SWITCHED SHUNT DATA, BEGIN IMPEDANCE CORRECTION DATA
0 / END OF IMPEDANCE CORRECTION DATA, BEGIN MULTI-TERMINAL DC DATA
0 / END OF MULTI-TERMINAL DC DATA, BEGIN MULTI-SECTION LINE DATA
0 / END OF MULTI-SECTION LINE DATA, BEGIN ZONE DATA
 111,'GSLLAF   '
0 / END OF ZONE DATA, BEGIN INTER-AREA TRANSFER DATA
0 / END OF INTER-AREA TRANSFER DATA, BEGIN OWNER DATA
  1,'DEFAULT   '
0 / END OF OWNER DATA, BEGIN FACTS DEVICE DATA
0 / END OF FACTS DEVICE DATA

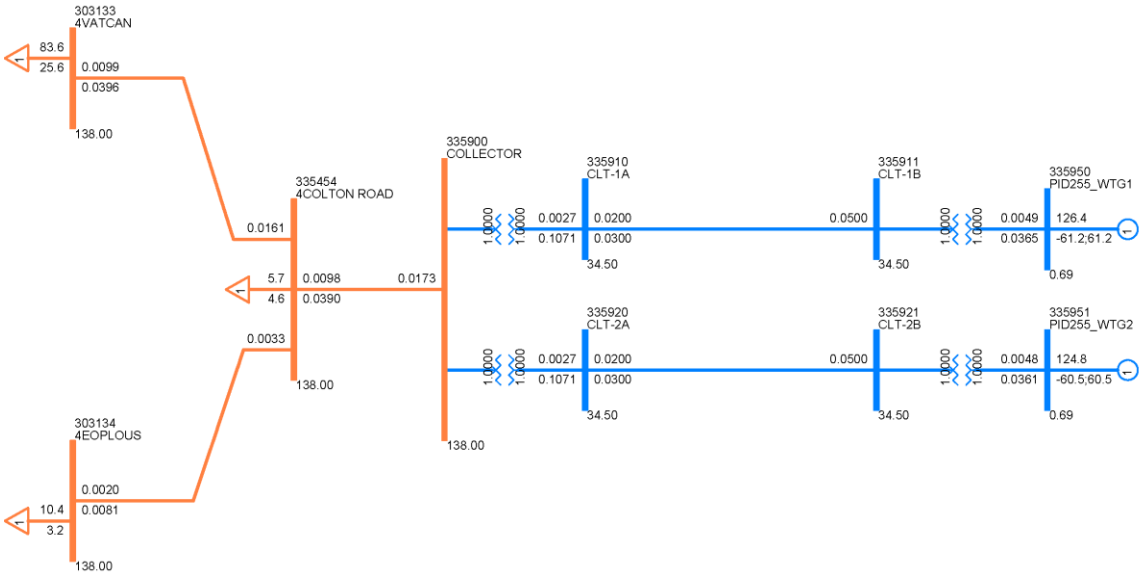

Figure A-1 – PID 255 Modeling Detail

Dynamics Data

```
335950 'USRMDL' 1  'GEWTG2'  1 1 4 18 3 5
       0  79        0       0
        1.6000      0.80000      0.50000      0.90000       1.2200       1.2000
        2.0000      0.40000      0.80000       10.000      0.20000E-01   0.0000
        0.0000      0.50000      0.16700      0.90000      0.92500       0.0000    /
 335950 'USRMDL' 1  'GEWTE2'  4 0 12 67 18 9
         335950        0            0            1            0             0
            0        0            0            1            0             1
       0.15000       18.000       5.0000       0.0000       0.0000      0.50000E-01   3.0000
       0.60000       1.1200      0.40000E-01  0.43600     -0.43600       1.1000      0.20000E-01
       0.45000          -0.45000            60.000           0.10000           0.90000
        1.1000           40.000           0.50000           1.4500          0.50000E-01
       0.50000E-01         1.0000           0.15000          0.96000          0.99600
        1.0040           1.0400           1.0000           0.95000          0.95000
       0.40000           1.0000           0.20000           1.0000           0.25000
       -1.0000           14.0000           25.000           3.0000          -0.90000
        8.0000           0.2000           10.000           1.0000           1.7000
        1.12            1.2500           5.0000           0.0000           0.0000
        0.000           0.25000E-02         1.0000           5.5000           0.10000
       -1.0000           0.10000           0.0000           0.10000          -0.10000
       0.70000           0.12000          -0.12000    /
 335950 'USRMDL' 1  'GEWTT1'        5    0    1    5    4    3   0
         4.6300        0.0000        0.0000        1.8800        2.3000    /
 0 'USRMDL'  0 'GEWGC1' 8    0    3    6    0    4
         335950       '1 ' 0
         9999.0        5.0000        30.000        9999.0        9999.0
         30.000    /
 0 'USRMDL'  0 'GEWTA1'       8    0    3    9    1    4
         335950       '1 '   0
         20.000        0.0000        27.000       -4.0000        0.0000        1.2250
         35.250        72.000        1200.0    /
 0 'USRMDL'  0 'GEWTP1'       8    0    3    10    3    3
         335950       '1 '   0
        0.30000        150.00        25.000        3.0000        30.000
        -4.0000        27.000       -10.000        10.000        1.0000    /
/
 0 'USRMDL'  0 'GEWPLT' 8  0  2  0  0  17          335950       '1 '     /
/
    0 'USRMDL'  0  'VTGTPA' 0 2 6 4 0 1
      335950    335950  '1 '       0 0 0
        0.15000       5.0000      0.20000      0.80000E-01/
    0 'USRMDL'  0  'VTGTPA' 0 2 6 4 0 1
      335950    335950  '1 '       0 0 0
        0.30000       5.0000      0.70000      0.80000E-01/
    0 'USRMDL'  0  'VTGTPA' 0 2 6 4 0 1
      335950    335950  '1 '       0 0 0
        0.50000       5.0000      1.20000      0.80000E-01/
    0 'USRMDL'  0  'VTGTPA' 0 2 6 4 0 1
      335950    335950  '1 '       0 0 0
        0.75000       5.0000      1.9000       0.80000E-01/
    0 'USRMDL'  0  'VTGTPA' 0 2 6 4 0 1
      335950    335950  '1 '       0 0 0
        0.00000       1.1000       1.000       0.80000E-01/
    0 'USRMDL'  0  'VTGTPA' 0 2 6 4 0 1
```

```
      335950    335950  '1 '       0 0 0
       0.00000       1.1500       0.1000      0.80000E-01/
/
0 'USRMDL'  0 'FRQTPA' 0 2 6 4 0 1 335950 335950 '1'   0 0 0 56.5 62.5  1.0 0.08 /
/
/
 335951 'USRMDL' 1  'GEWTG2'  1 1 4 18 3 5
        0  78         0        0
        1.6000      0.80000      0.50000      0.90000       1.2200       1.2000
        2.0000      0.40000      0.80000       10.000      0.20000E-01   0.0000
        0.0000      0.50000      0.16700      0.90000      0.92500       0.0000    /
 335951 'USRMDL' 1  'GEWTE2'  4 0 12 67 18 9
         335951         0              0              1              0              0
            0         0              0              1              0              1
        0.15000       18.000       5.0000       0.0000       0.0000      0.50000E-01   3.0000
        0.60000       1.1200      0.40000E-01  0.43600     -0.43600       1.1000      0.20000E-01
        0.45000          -0.45000             60.000           0.10000           0.90000
         1.1000            40.000           0.50000           1.4500          0.50000E-01
        0.50000E-01         1.0000           0.15000          0.96000           0.99600
         1.0040           1.0400           1.0000           0.95000           0.95000
        0.40000           1.0000           0.20000           1.0000           0.25000
        -1.0000           14.0000            25.000           3.0000          -0.90000
         8.0000           0.2000           10.000           1.0000           1.7000
         1.12            1.2500           5.0000           0.0000           0.0000
         0.000          0.25000E-02         1.0000           5.5000           0.10000
        -1.0000           0.10000           0.0000           0.10000          -0.10000
        0.70000           0.12000          -0.12000    /
 335951 'USRMDL' 1  'GEWTT1'        5    0    1    5    4    3    0
         4.6300        0.0000        0.0000        1.8800        2.3000    /
 0 'USRMDL'  0 'GEWGC1' 8    0    3    6    0    4
         335951       '1 ' 0
         9999.0        5.0000        30.000        9999.0        9999.0
         30.000    /
 0 'USRMDL'  0 'GEWTA1'       8    0    3    9    1    4
         335951       '1 '   0
         20.000        0.0000        27.000       -4.0000        0.0000        1.2250
         35.250        72.000        1200.0    /
 0 'USRMDL'  0 'GEWTP1'       8    0    3    10    3    3
         335951       '1 '   0
        0.30000        150.00        25.000        3.0000        30.000
        -4.0000        27.000       -10.000        10.000        1.0000    /
/
 0 'USRMDL'  0 'GEWPLT' 8  0  2  0  0  17          335951       '1 '     /
/
    0 'USRMDL'  0  'VTGTPA' 0 2 6 4 0 1
      335951    335951  '1 '       0 0 0
       0.15000       5.0000      0.20000      0.80000E-01/
    0 'USRMDL'  0  'VTGTPA' 0 2 6 4 0 1
      335951    335951  '1 '       0 0 0
       0.30000       5.0000      0.70000      0.80000E-01/
    0 'USRMDL'  0  'VTGTPA' 0 2 6 4 0 1
      335951    335951  '1 '       0 0 0
       0.50000       5.0000      1.20000      0.80000E-01/
    0 'USRMDL'  0  'VTGTPA' 0 2 6 4 0 1
      335951    335951  '1 '       0 0 0
       0.75000       5.0000       1.9000      0.80000E-01/
```

```
    0 'USRMDL'  0  'VTGTPA' 0 2 6 4 0 1
      335951    335951  '1 '       0 0 0
        0.00000       1.1000       1.000      0.80000E-01/
    0 'USRMDL'  0  'VTGTPA' 0 2 6 4 0 1
      335951    335951  '1 '       0 0 0
        0.00000       1.1500       0.1000     0.80000E-01/
/
 0 'USRMDL'  0 'FRQTPA' 0 2 6 4 0 1 335951 335951 '1'   0 0 0 56.5 62.5  1.0 0.08 /
```

PSS®E Output List

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PLANT MODELS

REPORT FOR ALL MODELS BUS 335950 [PID255_WTG1 0.6900] MODELS

```
 ** GEWTG2 **  BUS X-- NAME --X   BASEKV MC  C O N S     S T A T E S       VAR        ICON
         335950    PID255_WT 0.6900 1   47404-47421   20989-20991     152-156       80-83

  PRATE       XEQ    VLVPL1    VLVPL2    GLVPL2   VHVRCR2
  1.6000      0.8    0.5000    0.9000    1.2200    1.2000

  CURHVRCR2 VLVACR1   VLVACR2   RIp_LVPL   T_LVPL     LVPL1V
  2.0000    0.4000    0.8000   10.0000    0.0200    0.0000


  LVPL1P   LVPL2V    LVPL2P    LVPL3V     LVPL3P     XLVPL
  0.0000    0.5000    0.1670    0.9000    0.9250    0.0000


 NUMBER OF AGGREGATED ORIGINAL WT UNITS:   79
 WT UNITS USE DFIGs


 ** GEWTE2 OF GEWTG **  BUS X-- NAME --X BASEKV MC       C O N S       S T A T E S     VAR
ICON
                 335950 PID255_WTG1  0.6900 1  112484-112550  45707-45724    4388-4396     4553-4564
  TFV      KPV       KIV       RC        XC        TFP       KPP
  0.1500   18.0000    5.0000    0.0000    0.0000    0.0500    3.0000
  KIP      PMX       PMN       QMX       QMN       IPMAX     TRV
  0.6000    1.1200    0.0400    0.4360   -0.4360    1.1000    0.0200

  RPMX      RPMN      T_POWER   KQi       VMINCL    VMAXCL    kVi
  0.4500   -0.4500   60.0000    0.1000    0.9000    1.1000   40.0000

  XIQmin    XIQmax    Tv        Tp        Fn        TPav
  0.5000    1.4500    0.0500    0.0500    1.0000    0.1500

  FRa       FRb       FRc       FRd
  0.9600    0.9960    1.0040    1.0400

  PFRa      PFRb      PFRc      PFRd
  1.0000    0.9500    0.9500    0.4000

  PFRmax    PFRmin    TW        T_LVPL    V_LVPL
```

1.0000 0.2000 1.0000 0.2500 -1.0000

SPDW1 SPDWMX SPDWMN SPD_LOW WTTHRES
14.0000 25.0000 3.0000 -0.9000 8.0000

EBST KDBR Pdbr_MAX
0.2000 10.0000 1.0000

ImaxTD Iphl Iqhl TIpqd Kqd Xqd Kwi
1.7000 1.1200 1.2500 5.0000 0.0000 0.0000 0.0000

dbwi Tipwi Twowi urIwi drIwi Pmxwi Pmnwi
0.0025 1.0000 5.5000 0.1000 -1.0000 0.1000 0.0000

Vermx Vermn Vfrz QmxZP QmnZP
0.1000 -0.1000 0.7000 0.1200 -0.1200

Remote controlled Bus # 335950
VARFLG = 1 PFAFLG = 0
APCFLG = 0 FRFLG = 0
PQFLAG = 0 WindFREE Enabling Bit = 1
Q Droop Branch FROM Bus= 0 TO Bus = 0 ID = 1

** GEWTT1 ** BUS X-- NAME --X BASEKV MC C O N S S T A T E S V A R S ICON
335950 PID255_WT 0.6900 1 152529-152533 59444-59447 13077-13079 5113

H DAMP Htfrac Freq1 DSHAFT
4.6300 0.0000 0.0000 1.8800 2.3000

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PLANT MODELS

REPORT FOR ALL MODELS BUS 335951 [PID255_WTG2 0.6900] MODELS

** GEWTG2 ** BUS X-- NAME --X BASEKV MC C O N S S T A T E S VAR ICON
335951 PID255_WT 0.6900 1 47422-47439 20992-20994 157-161 84-87

PRATE XEQ VLVPL1 VLVPL2 GLVPL2 VHVRCR2
1.6000 0.8 0.5000 0.9000 1.2200 1.2000

CURHVRCR2 VLVACR1 VLVACR2 RIp_LVPL T_LVPL LVPL1V
2.0000 0.4000 0.8000 10.0000 0.0200 0.0000

LVPL1P LVPL2V LVPL2P LVPL3V LVPL3P XLVPL
0.0000 0.5000 0.1670 0.9000 0.9250 0.0000

NUMBER OF AGGREGATED ORIGINAL WT UNITS: 78
WT UNITS USE DFIGs

** GEWTE2 OF GEWTG ** BUS X-- NAME --X BASEKV MC C O N S S T A T E S VAR ICON
335951 PID255_WTG2 0.6900 1 112551-112617 45725-45742 4397-4405 4565-4576

TFV KPV KIV RC XC TFP KPP
0.1500 18.0000 5.0000 0.0000 0.0000 0.0500 3.0000

KIP PMX PMN QMX QMN IPMAX TRV
0.6000 1.1200 0.0400 0.4360 -0.4360 1.1000 0.0200

RPMX RPMN T_POWER KQi VMINCL VMAXCL kVi
0.4500 -0.4500 60.0000 0.1000 0.9000 1.1000 40.0000

XIQmin XIQmax Tv Tp Fn TPav
0.5000 1.4500 0.0500 0.0500 1.0000 0.1500

FRa FRb FRc FRd
0.9600 0.9960 1.0040 1.0400

PFRa PFRb PFRc PFRd
1.0000 0.9500 0.9500 0.4000

PFRmax PFRmin TW T_LVPL V_LVPL
1.0000 0.2000 1.0000 0.2500 -1.0000

SPDW1 SPDWMX SPDWMN SPD_LOW WTTHRES
14.0000 25.0000 3.0000 -0.9000 8.0000

EBST KDBR Pdbr_MAX
0.2000 10.0000 1.0000

ImaxTD Iphl Iqhl TIpqd Kqd Xqd Kwi

```
 1.7000    1.1200    1.2500    5.0000    0.0000    0.0000    0.0000

 dbwi      Tipwi     Twowi     urIwi     drIwi     Pmxwi     Pmnwi
 0.0025    1.0000    5.5000    0.1000   -1.0000    0.1000    0.0000

 Vermx     Vermn     Vfrz      QmxZP     QmnZP
 0.1000   -0.1000    0.7000    0.1200   -0.1200

Remote controlled Bus #    335951
          VARFLG =  1 PFAFLG =  0
          APCFLG =  0 FRFLG =  0
          PQFLAG =  0 WindFREE Enabling Bit = 1
Q Droop Branch FROM Bus=       0  TO Bus =       0  ID =  1


** GEWTT1 **  BUS X-- NAME --X BASEKV MC    C O N S     S T A T E S     V A R S      ICON
        335951    PID255_WT 0.6900 1  152534-152538  59448-59451   13080-13082    5114

   H         DAMP        Htfrac      Freq1      DSHAFT
  4.6300      0.0000      0.0000      1.8800      2.3000


CONEC MODELS

REPORT FOR ALL MODELS                BUS 335950 [PID255_WTG1 0.6900] MODELS

 ** WGUSTD ** BUS X-- NAME --X     BASEKV MC    C O N S       V A R S       ICONS
        335950     PID255_WTG1  0.6900 1  154252-154257  14296-14299    6803-6805

 T1G         TG       MAXG       T1R       T2R       MAXR
 9999.000     5.000    30.000  9999.000  9999.000    30.000
          Wind generator Bus # 335950
          Wind Generator ID       1


 ** GEWTA1 for GEWTG **      BUS X-- NAME --X BASEKV MC    C O N S       STATE        VAR
ICON
                335950 PID255_WTG1  0.6900 1  154258-154266   59486-59486   14300-14303    6806-
6808

   Lambda_Max      Lambda_Min   PITCH_MAX    PITCH_MIN      Ta         RHO
    20.0000       0.0000      27.0000      -4.0000       0.0000       1.2250

    Radius      GB_RATIO       SYNCHR
    35.2500      72.0000       1200.0000

          Wind Generator Bus # 335950
          Wind Generator ID       1

 ** GEWTP1 for GEWTG **  BUS X-- NAME --X BASEKV MC    C O N S       STATE        VAR
ICON
                335950 PID255_WTG1  0.6900 1  154267-154276   59487-59489   14304-14306    6809-
6811
      Tp          Kpp       Kip          Kpc          Kic
     0.3000     150.0000      25.0000       3.0000      30.0000
      TetaMin   TetaMax   RTetaMin   RTetaMax    PMX
```

-4.0000 27.0000 -10.0000 10.0000 1.0000

Wind Generator Bus # 335950
Wind Generator ID 1

** GEWPLT ** BUS X-- NAME --X BASEKV MC V A R S ICONS
335950 PID255_WTG1 0.69001 14307-14323 6812-6813

Wind generator Bus # 335950
Wind Generator ID 1

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CONEC MODELS

REPORT FOR ALL MODELS BUS 335951 [PID255_WTG2 0.6900] MODELS

** WGUSTD ** BUS X-- NAME --X BASEKV MC C O N S V A R S ICONS
335951 PID255_WTG2 0.6900 1 154277-154282 14324-14327 6814-6816

T1G TG MAXG T1R T2R MAXR
9999.000 5.000 30.000 9999.000 9999.000 30.000
Wind generator Bus # 335951
Wind Generator ID 1

** GEWTA1 for GEWTG ** BUS X-- NAME --X BASEKV MC C O N S STATE VAR ICON
335951 PID255_WTG2 0.6900 1 154283-154291 59490-59490 14328-14331 6817-6819

Lambda_Max Lambda_Min PITCH_MAX PITCH_MIN Ta RHO
20.0000 0.0000 27.0000 -4.0000 0.0000 1.2250

Radius GB_RATIO SYNCHR
35.2500 72.0000 1200.0000

Wind Generator Bus # 335951
Wind Generator ID 1

** GEWTP1 for GEWTG ** BUS X-- NAME --X BASEKV MC C O N S STATE VAR ICON
335951 PID255_WTG2 0.6900 1 154292-154301 59491-59493 14332-14334 6820-6822

Tp Kpp Kip Kpc Kic
0.3000 150.0000 25.0000 3.0000 30.0000
TetaMin TetaMax RTetaMin RTetaMax PMX
-4.0000 27.0000 -10.0000 10.0000 1.0000

Wind Generator Bus # 335951
Wind Generator ID 1

** GEWPLT ** BUS X-- NAME --X BASEKV MC V A R S ICONS
335951 PID255_WTG2 0.69001 14335-14351 6823-6824

Wind generator Bus # 335951
Wind Generator ID 1

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CONET MODELS

REPORT FOR ALL MODELS BUS 335950 [PID255_WTG1 0.6900] MODELS

*** CALL VTGTPA(7131,154484, 0, 14417) ***

BUS NAME BSKV GENR BUS NAME BSKV ID
335950 PID255_W.690 335950 PID255_W.690 1

I C O N S C O N S V A R
7131-7136 154484-154487 14417

VLO VUP PICKUP TB
0.150 5.000 0.200 0.080

*** CALL VTGTPA(7137,154488, 0, 14418) ***

BUS NAME BSKV GENR BUS NAME BSKV ID
335950 PID255_W.690 335950 PID255_W.690 1

I C O N S C O N S V A R
7137-7142 154488-154491 14418

VLO VUP PICKUP TB
0.300 5.000 0.700 0.080

*** CALL VTGTPA(7143,154492, 0, 14419) ***

BUS NAME BSKV GENR BUS NAME BSKV ID
335950 PID255_W.690 335950 PID255_W.690 1

I C O N S C O N S V A R
7143-7148 154492-154495 14419

VLO VUP PICKUP TB
0.500 5.000 1.200 0.080

*** CALL VTGTPA(7149,154496, 0, 14420) ***

BUS NAME BSKV GENR BUS NAME BSKV ID
335950 PID255_W.690 335950 PID255_W.690 1
I C O N S C O N S V A R
7149-7154 154496-154499 14420

VLO VUP PICKUP TB
0.750 5.000 1.900 0.080

*** CALL VTGTPA(7155,154500, 0, 14421) ***

BUS NAME BSKV GENR BUS NAME BSKV ID
335950 PID255_W.690 335950 PID255_W.690 1

I C O N S C O N S V A R
7155-7160 154500-154503 14421

VLO VUP PICKUP TB
0.000 1.100 1.000 0.080

*** CALL VTGTPA(7161,154504, 0, 14422) ***

BUS NAME BSKV GENR BUS NAME BSKV ID
335950 PID255_W.690 335950 PID255_W.690 1

I C O N S C O N S V A R
7161-7166 154504-154507 14422

VLO VUP PICKUP TB
0.000 1.150 0.100 0.080

*** CALL FRQTPA(7167,154508, 0, 14423) ***

BUS NAME BSKV GEN BUS NAME BSKV ID
335950 PID255_W .690 335950 PID255_W .690 1

I C O N S C O N S V A R
7167-7172 154508-154511 14423

FLO FUP PICKUP TB
56.500 62.500 1.000 0.080

CONET MODELS

REPORT FOR ALL MODELS BUS 335951 [PID255_WTG2 0.6900] MODELS

*** CALL VTGTPA(7173,154512, 0, 14424) ***

BUS NAME BSKV GENR BUS NAME BSKV ID
335951 PID255_W.690 335951 PID255_W.690 1
I C O N S C O N S V A R
7173-7178 154512-154515 14424

VLO VUP PICKUP TB
0.150 5.000 0.200 0.080

*** CALL VTGTPA(7179,154516, 0, 14425) ***

BUS NAME BSKV GENR BUS NAME BSKV ID
335951 PID255_W.690 335951 PID255_W.690 1

I C O N S C O N S V A R
7179-7184 154516-154519 14425

VLO VUP PICKUP TB
0.300 5.000 0.700 0.080

*** CALL VTGTPA(7185,154520, 0, 14426) ***

BUS NAME BSKV GENR BUS NAME BSKV ID
335951 PID255_W.690 335951 PID255_W.690 1

I C O N S C O N S V A R
7185-7190 154520-154523 14426

VLO VUP PICKUP TB
0.500 5.000 1.200 0.080

*** CALL VTGTPA(7191,154524, 0, 14427) ***

BUS NAME BSKV GENR BUS NAME BSKV ID
335951 PID255_W.690 335951 PID255_W.690 1

I C O N S C O N S V A R
7191-7196 154524-154527 14427

VLO VUP PICKUP TB
0.750 5.000 1.900 0.080

*** CALL VTGTPA(7197,154528, 0, 14428) ***

BUS NAME BSKV GENR BUS NAME BSKV ID
335951 PID255_W.690 335951 PID255_W.690 1

I C O N S C O N S V A R
7197-7202 154528-154531 14428

VLO VUP PICKUP TB
0.000 1.100 1.000 0.080

*** CALL VTGTPA(7203,154532, 0, 14429) ***

BUS NAME BSKV GENR BUS NAME BSKV ID
335951 PID255_W.690 335951 PID255_W.690 1

I C O N S C O N S V A R
7203-7208 154532-154535 14429

VLO VUP PICKUP TB

0.000 1.150 0.100 0.080

*** CALL FRQTPA(7209,154536, 0, 14430) ***

BUS	NAME	BSKV	GEN BUS	NAME	BSKV	ID
335951	PID255_W	.690	335951	PID255_W	.690	1

I C O N S	C O N S	V A R
7209-7214	154536-154539	14430

FLO	FUP	PICKUP	TB
56.500	62.500	1.000	0.080

APPENDIX C: Plots for Stability Simulations

Plots will be posted in a separate posting titled *System Impact Study Report Stability Plots*.

The plots can be viewed at the following link:

http://www.oatioasis.com/EES/EESDocs/interconnection_studies_ICT.htm

APPENDIX D: Prior Generation Interconnection and Transsmission Service Requests in Study Models

Prior Generation Interconnection NRIS requests that were included in this study:

PID	Substation	MW	In Service Date
None			

Prior transmission service requests that were included in this study:

OASIS #		PSE	MW	Begin	End
74597193		NRG Power Marketing	300	1/1/2013	1/1/2018
74597198		NRG Power Marketing	300	1/1/2013	1/1/2018
74799834		Cargill Power Markets	101	7/1/2012	7/1/2017
74799836		Cargill Power Markets	101	7/1/2012	7/1/2017
74799837		Cargill Power Markets	101	7/1/2012	7/1/2017
74799848		Cargill Power Markets	101	7/1/2013	7/1/2018
74799851		Cargill Power Markets	101	7/1/2013	7/1/2018
74799853		Cargill Power Markets	101	7/1/2013	7/1/2018
74846159		AEPM	65	1/1/2015	1/1/2020
74899933		Entergy Services (SPO)	322	2/1/2011	2/1/2041
74899980		Entergy Services (SPO)	584	1/1/2015	1/1/2045
74899996		Entergy Services (SPO)	450	6/1/2012	6/1/2042
74900000		Entergy Services (SPO)	620	6/1/2012	6/1/2042
74900014		Entergy Services (SPO)	35	6/1/2012	6/1/2042
74900016		Entergy Services (SPO)	20	6/1/2012	6/1/2042

APPENDIX E: Details of Scenario 1 – 2014

AECI

Limiting Element	Contingency Element	ATC
French Settlement - Sorrento 230kV	Bogalusa - Franklin 500kV	-1585
French Settlement - Sorrento 230kV	Bogalusa - Adams Creek 500/230kV transformer	-1585
International Paper - Mansfield 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-980
International Paper - Wallake 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-502
Carroll 230/138kV transformer (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-468
French Settlement - Sorrento 230kV	Fairview - Gypsy 230kV	-233
French Settlement - Sorrento 230kV	Fairview - Madisonville 230kV	-213
Toledo - VP Tap 138kV	Colfax - Rodemacher 230kV	-177
East Leesville - Rodemacher 230kV (CLECO)	Colfax - Rodemacher 230kV	-142
Beaver Creek 115/138kV phase shifter transformer	Colfax - Rodemacher 230kV	-136
Toledo - VP Tap 138kV	Colfax - Montgomery 230kV	-45
Beaver Creek 115/138kV phase shifter transformer	Colfax - Montgomery 230kV	-26
French Settlement - Sorrento 230kV	Franklin - Mcknight 500kV	-19
East Leesville - Rodemacher 230kV (CLECO)	Colfax - Montgomery 230kV	44
Toledo - Leesville (CLECO) 138kV	Colfax - Rodemacher 230kV	67
French Settlement - Sorrento 230kV	Front Street - Michoud 230kV	71
Conway - Wyandotte 138kV	T300/331 - Willow Glen 138kV	118
Conway - Wyandotte 138kV	Oak Grove - T300/331 138kV	129
Judice - Scott1 138kV	Meaux - SELLRD (CLECO) 230kV	201
Toledo - Leesville (CLECO) 138kV	Colfax - Montgomery 230kV	204
Judice - Scott1 138kV	Meaux 230/138kV transformer 1	212
Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	219
East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	219
Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	230
Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	230

AEPW

Limiting Element	Contingency Element	ATC
French Settlement - Sorrento 230kV	Bogalusa - Adams Creek 500/230kV transformer	-1894
French Settlement - Sorrento 230kV	Bogalusa - Franklin 500kV	-1894
International Paper - Mansfield 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-561
Carroll 230/138kV transformer (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-340
International Paper - Wallake 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-287
French Settlement - Sorrento 230kV	Fairview - Gypsy 230kV	-269

French Settlement - Sorrento 230kV	Fairview - Madisonville 230kV	-247
Beaver Creek 115/138kV phase shifter transformer	Colfax - Rodemacher 230kV	-130
Toledo - VP Tap 138kV	Colfax - Rodemacher 230kV	-129
East Leesville - Rodemacher 230kV (CLECO)	Colfax - Rodemacher 230kV	-118
Toledo - VP Tap 138kV	Colfax - Montgomery 230kV	-33
Beaver Creek 115/138kV phase shifter transformer	Colfax - Montgomery 230kV	-25
French Settlement - Sorrento 230kV	Franklin - Mcknight 500kV	-21
East Leesville - Rodemacher 230kV (CLECO)	Colfax - Montgomery 230kV	37
Toledo - Leesville (CLECO) 138kV	Colfax - Rodemacher 230kV	51
French Settlement - Sorrento 230kV	Front Street - Michoud 230kV	82
Conroe 1 - Conroe 2 138kV	Oak Ridge - Porter 138kV	108
Conway - Wyandotte 138kV	T300/331 - Willow Glen 138kV	123
Conway - Wyandotte 138kV	Oak Grove - T300/331 138kV	134
Toledo - Leesville (CLECO) 138kV	Colfax - Montgomery 230kV	155
Judice - Scott1 138kV	Meaux - SELLRD (CLECO) 230kV	204
Judice - Scott1 138kV	Meaux 230/138kV transformer 1	215
East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	219
Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	219
Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	230
Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	230

AMRN

Limiting Element	**Contingency Element**	**ATC**
French Settlement - Sorrento 230kV	Bogalusa - Franklin 500kV	-1517
French Settlement - Sorrento 230kV	Bogalusa - Adams Creek 500/230kV transformer	-1517
International Paper - Mansfield 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-1028
International Paper - Wallake 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-526
Carroll 230/138kV transformer (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-485
French Settlement - Sorrento 230kV	Fairview - Gypsy 230kV	-227
French Settlement - Sorrento 230kV	Fairview - Madisonville 230kV	-208
Toledo - VP Tap 138kV	Colfax - Rodemacher 230kV	-183
East Leesville - Rodemacher 230kV (CLECO)	Colfax - Rodemacher 230kV	-145
Beaver Creek 115/138kV phase shifter transformer	Colfax - Rodemacher 230kV	-137
Toledo - VP Tap 138kV	Colfax - Montgomery 230kV	-47
Beaver Creek 115/138kV phase shifter transformer	Colfax - Montgomery 230kV	-27
French Settlement - Sorrento 230kV	Franklin - Mcknight 500kV	-18
East Leesville - Rodemacher 230kV (CLECO)	Colfax - Montgomery 230kV	45
French Settlement - Sorrento 230kV	Front Street - Michoud 230kV	69

Toledo - Leesville (CLECO) 138kV	Colfax - Rodemacher 230kV	69
Conway - Wyandotte 138kV	T300/331 - Willow Glen 138kV	117
Conway - Wyandotte 138kV	Oak Grove - T300/331 138kV	128
Judice - Scott1 138kV	Meaux - SELLRD (CLECO) 230kV	200
Toledo - Leesville (CLECO) 138kV	Colfax - Montgomery 230kV	210
Judice - Scott1 138kV	Meaux 230/138kV transformer 1	211
East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	219
Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	219
Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	230
Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	230

CLECO

Limiting Element	Contingency Element	ATC
French Settlement - Sorrento 230kV	Franklin - Mcknight 500kV	-55
Conway - Wyandotte 138kV	T300/331 - Willow Glen 138kV	157
Conway - Wyandotte 138kV	Oak Grove - T300/331 138kV	171
East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	219
Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	219
Judice - Scott1 138kV	Meaux - SELLRD (CLECO) 230kV	225
Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	230
Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	230
Judice - Scott1 138kV	Meaux 230/138kV transformer 1	238

EES

Limiting Element	Contingency Element	ATC
Carroll 230/138kV transformer (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-784
Toledo - VP Tap 138kV	Colfax - Rodemacher 230kV	-352
Beaver Creek 115/138kV phase shifter transformer	Colfax - Rodemacher 230kV	-178
East Leesville - Rodemacher 230kV (CLECO)	Colfax - Rodemacher 230kV	-154
Toledo - VP Tap 138kV	Colfax - Montgomery 230kV	-89
Beaver Creek 115/138kV phase shifter transformer	Colfax - Montgomery 230kV	-34
French Settlement - Sorrento 230kV	Franklin - Mcknight 500kV	-34
East Leesville - Rodemacher 230kV (CLECO)	Colfax - Montgomery 230kV	48
Toledo - Leesville (CLECO) 138kV	Colfax - Rodemacher 230kV	103
Conway - Wyandotte 138kV	T300/331 - Willow Glen 138kV	119
Conway - Wyandotte 138kV	Oak Grove - T300/331 138kV	129
Judice - Scott1 138kV	Meaux - SELLRD (CLECO) 230kV	183
Judice - Scott1 138kV	Meaux 230/138kV transformer 1	193
Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	219
East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	219
Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	230
Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	230

EMDE

Limiting Element	Contingency Element	ATC
French Settlement - Sorrento 230kV	Bogalusa - Adams Creek 500/230kV transformer	-1653
French Settlement - Sorrento 230kV	Bogalusa - Franklin 500kV	-1653
International Paper - Mansfield 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-868
International Paper - Wallake 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-444
Carroll 230/138kV transformer (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-437
French Settlement - Sorrento 230kV	Fairview - Gypsy 230kV	-241
French Settlement - Sorrento 230kV	Fairview - Madisonville 230kV	-221
Toledo - VP Tap 138kV	Colfax - Rodemacher 230kV	-165
East Leesville - Rodemacher 230kV (CLECO)	Colfax - Rodemacher 230kV	-137
Beaver Creek 115/138kV phase shifter transformer	Colfax - Rodemacher 230kV	-134
Toledo - VP Tap 138kV	Colfax - Montgomery 230kV	-42
Beaver Creek 115/138kV phase shifter transformer	Colfax - Montgomery 230kV	-26
French Settlement - Sorrento 230kV	Franklin - Mcknight 500kV	-19
East Leesville - Rodemacher 230kV (CLECO)	Colfax - Montgomery 230kV	43
Toledo - Leesville (CLECO) 138kV	Colfax - Rodemacher 230kV	63
French Settlement - Sorrento 230kV	Front Street - Michoud 230kV	73
Conway - Wyandotte 138kV	T300/331 - Willow Glen 138kV	119
Conway - Wyandotte 138kV	Oak Grove - T300/331 138kV	130
Toledo - Leesville (CLECO) 138kV	Colfax - Montgomery 230kV	192
Judice - Scott1 138kV	Meaux - SELLRD (CLECO) 230kV	201
Judice - Scott1 138kV	Meaux 230/138kV transformer 1	212
East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	219
Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	219
Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	230
Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	230

LAFA

Limiting Element	Contingency Element	ATC
Habetz - Richard 138kV	Acadian - Bonin 230kV (LAFA)	-157
Habetz - Richard 138kV	Flander - Acadian 230kV (LAFA)	-14
Conway - Wyandotte 138kV	T300/331 - Willow Glen 138kV	166
Conway - Wyandotte 138kV	Oak Grove - T300/331 138kV	181
Judice - Scott1 138kV	Meaux - SELLRD (CLECO) 230kV	213
East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	219
Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	219

LAGN

Limiting Element	Contingency Element	ATC
East Leesville - Rodemacher 230kV (CLECO)	Colfax - Rodemacher 230kV	-186
East Leesville - Rodemacher 230kV (CLECO)	Colfax - Montgomery 230kV	58
Conway - Wyandotte 138kV	T300/331 - Willow Glen 138kV	125
Conway - Wyandotte 138kV	Oak Grove - T300/331 138kV	136
Judice - Scott1 138kV	Meaux - SELLRD (CLECO) 230kV	202
Judice - Scott1 138kV	Meaux 230/138kV transformer 1	213
Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	219
East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	219
Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	230
Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	230

LEPA

Limiting Element	Contingency Element	ATC
Bonin - Cecelia 138kV	Colonial Academy - Richard 138kV	-572
Bonin - Cecelia 138kV	Acadia GSU - Colonial Academy 138kV	-472
Bonin - Cecelia 138kV	Acadia GSU - Scanlan 138kV	-407
Moril - Cecelia 138kV	Flander - Segura 138kV (CLECO)	-245
Ray Braswell - Baxter Wilson 500kV - Supplemental Upgrade	Franklin - Grand Gulf 500kV	-203
Meaux - Abbeville 138kV	Flander - Segura 138kV (CLECO)	-152
Bonin - Cecelia 138kV	Scanlan - Scott2 138kV	-101
Bonin - Cecelia 138kV	Semere - Scott2 138kV	-93
Bonin - Cecelia 138kV	Flander - Segura 138kV (CLECO)	-31
Moril - Cecelia 138kV	Meaux - Abbeville 138kV	17
Flander - Segura 138kV (CLECO)	Meaux - Abbeville 138kV	43
Judice - Scott1 138kV	Meaux - SELLRD (CLECO) 230kV	104
Judice - Scott1 138kV	Meaux 230/138kV transformer 1	109
Moril - Cecelia 138kV	Leblanc - Abbyville 138kV	144
Flander - Segura 138kV (CLECO)	Leblanc - Abbyville 138kV	201

OKGE

Limiting Element	Contingency Element	ATC
French Settlement - Sorrento 230kV	Bogalusa - Adams Creek 500/230kV transformer	-1732
French Settlement - Sorrento 230kV	Bogalusa - Franklin 500kV	-1732
International Paper - Mansfield 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-757
Carroll 230/138kV transformer (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-404
International Paper - Wallake 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-388
French Settlement - Sorrento 230kV	Fairview - Gypsy 230kV	-250
French Settlement - Sorrento 230kV	Fairview - Madisonville 230kV	-229
Toledo - VP Tap 138kV	Colfax - Rodemacher 230kV	-153
Beaver Creek 115/138kV phase shifter transformer	Colfax - Rodemacher 230kV	-133

Limiting Element	Contingency Element	ATC
East Leesville - Rodemacher 230kV (CLECO)	Colfax - Rodemacher 230kV	-131
Toledo - VP Tap 138kV	Colfax - Montgomery 230kV	-39
Beaver Creek 115/138kV phase shifter transformer	Colfax - Montgomery 230kV	-26
French Settlement - Sorrento 230kV	Franklin - Mcknight 500kV	-20
East Leesville - Rodemacher 230kV (CLECO)	Colfax - Montgomery 230kV	41
Toledo - Leesville (CLECO) 138kV	Colfax - Rodemacher 230kV	59
French Settlement - Sorrento 230kV	Front Street - Michoud 230kV	76
Conway - Wyandotte 138kV	T300/331 - Willow Glen 138kV	120
Conway - Wyandotte 138kV	Oak Grove - T300/331 138kV	131
Toledo - Leesville (CLECO) 138kV	Colfax - Montgomery 230kV	179
Judice - Scott1 138kV	Meaux - SELLRD (CLECO) 230kV	202
Judice - Scott1 138kV	Meaux 230/138kV transformer 1	213
East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	219
Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	219
Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	230
Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	230

SMEPA

Limiting Element	Contingency Element	ATC
Ray Braswell 500/230kV transformer ckt2 - Supplemental Upgrade	McAdams - Pickens 230kV	*
Ray Braswell 500/230kV transformer ckt2 - Supplemental Upgrade	Eldorado EHV - Sterlington 500kV	*
Ray Braswell 500/230kV transformer ckt2 - Supplemental Upgrade	Magee (TVA) - Creek (TVA) 161kV	*
Ray Braswell 500/230kV transformer ckt2 - Supplemental Upgrade	Colum (SMEPA) - SW Lonestar (SMEPA) 161kV	*
Ray Braswell 500/230kV transformer ckt2 - Supplemental Upgrade	Canton - Pickens 230kV	*
Ray Braswell 500/230kV transformer ckt2 - Supplemental Upgrade	Newton (SOCO) - Hoye Ave (SOCO) 115kV	*
Ray Braswell 500/230kV transformer ckt2 - Supplemental Upgrade	Hoye Ave (SOCO) - Esco Tap (SOCO) 115kV	*
Ray Braswell 500/230kV transformer ckt2 - Supplemental Upgrade	Esco Tap (SOCO) - Forest (SOCO) 115kV	*
Ray Braswell 500/230kV transformer ckt2 - Supplemental Upgrade	Forest (SOCO) - Forest Industrial (SOCO) 115kV	*
Ray Braswell 500/230kV transformer ckt2 - Supplemental Upgrade	Base Case	*
Carroll 230/138kV transformer (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-719
French Settlement - Sorrento 230kV	Bogalusa - Adams Creek 500/230kV transformer	-672
French Settlement - Sorrento 230kV	Bogalusa - Franklin 500kV	-672
Toledo - VP Tap 138kV	Colfax - Rodemacher 230kV	-271
East Leesville - Rodemacher 230kV (CLECO)	Colfax - Rodemacher 230kV	-185

Limiting Element	Contingency Element	ATC
Beaver Creek 115/138kV phase shifter transformer	Colfax - Rodemacher 230kV	-163
French Settlement - Sorrento 230kV	Fairview - Gypsy 230kV	-140
French Settlement - Sorrento 230kV	Fairview - Madisonville 230kV	-129
Ray Braswell - Baxter Wilson 500kV - Supplemental Upgrade	Franklin - Grand Gulf 500kV	-126
Toledo - VP Tap 138kV	Colfax - Montgomery 230kV	-69
Beaver Creek 115/138kV phase shifter transformer	Colfax - Montgomery 230kV	-31
French Settlement - Sorrento 230kV	Franklin - Mcknight 500kV	-15
French Settlement - Sorrento 230kV	Front Street - Michoud 230kV	42
East Leesville - Rodemacher 230kV (CLECO)	Colfax - Montgomery 230kV	58
Florence - South Jackson 115kV - Supplemental Upgrade	Bogalusa - Adams Creek 500/230kV transformer	67
Florence - South Jackson 115kV - Supplemental Upgrade	Bogalusa - Franklin 500kV	67
Toledo - Leesville (CLECO) 138kV	Colfax - Rodemacher 230kV	97
Conway - Wyandotte 138kV	T300/331 - Willow Glen 138kV	108
Conway - Wyandotte 138kV	Oak Grove - T300/331 138kV	118
Florence - South Jackson 115kV - Supplemental Upgrade	Choctaw MS (TVA) - Clay (TVA) 500kV	157
French Settlement - Sorrento 230kV	Front Street - Slidell 230kV	181
Judice - Scott1 138kV	Meaux - SELLRD (CLECO) 230kV	193
Judice - Scott1 138kV	Meaux 230/138kV transformer 1	203
East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	219
Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	219
Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	230
Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	230
Florence - South Jackson 115kV - Supplemental Upgrade	South Jackson - Pop Spring 115kV	235
Florence - South Jackson 115kV - Supplemental Upgrade	Angie - Adams Creek 230kV	240

SOCO

Limiting Element	Contingency Element	ATC
International Paper - Mansfield 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-1315
French Settlement - Sorrento 230kV	Bogalusa - Adams Creek 500/230kV transformer	-1221
French Settlement - Sorrento 230kV	Bogalusa - Franklin 500kV	-1221
International Paper - Wallake 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-673
Carroll 230/138kV transformer (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-580
Toledo - VP Tap 138kV	Colfax - Rodemacher 230kV	-219
French Settlement - Sorrento 230kV	Fairview - Gypsy 230kV	-203
French Settlement - Sorrento 230kV	Fairview - Madisonville 230kV	-186
East Leesville - Rodemacher 230kV (CLECO)	Colfax - Rodemacher 230kV	-163

Limiting Element	Contingency Element	ATC
Beaver Creek 115/138kV phase shifter transformer	Colfax - Rodemacher 230kV	-148
Toledo - VP Tap 138kV	Colfax - Montgomery 230kV	-56
Beaver Creek 115/138kV phase shifter transformer	Colfax - Montgomery 230kV	-29
French Settlement - Sorrento 230kV	Franklin - Mcknight 500kV	-18
East Leesville - Rodemacher 230kV (CLECO)	Colfax - Montgomery 230kV	51
French Settlement - Sorrento 230kV	Front Street - Michoud 230kV	60
Toledo - Leesville (CLECO) 138kV	Colfax - Rodemacher 230kV	81
Conway - Wyandotte 138kV	T300/331 - Willow Glen 138kV	113
Conway - Wyandotte 138kV	Oak Grove - T300/331 138kV	124
Judice - Scott1 138kV	Meaux - SELLRD (CLECO) 230kV	197
Judice - Scott1 138kV	Meaux 230/138kV transformer 1	208
Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	219
East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	219
Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	230
Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	230
Toledo - Leesville (CLECO) 138kV	Colfax - Montgomery 230kV	246

SPA

Limiting Element	Contingency Element	ATC
French Settlement - Sorrento 230kV	Bogalusa - Franklin 500kV	-1658
French Settlement - Sorrento 230kV	Bogalusa - Adams Creek 500/230kV transformer	-1658
International Paper - Mansfield 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-913
International Paper - Wallake 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-468
Carroll 230/138kV transformer (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-446
French Settlement - Sorrento 230kV	Fairview - Gypsy 230kV	-240
French Settlement - Sorrento 230kV	Fairview - Madisonville 230kV	-220
Toledo - VP Tap 138kV	Colfax - Rodemacher 230kV	-169
East Leesville - Rodemacher 230kV (CLECO)	Colfax - Rodemacher 230kV	-138
Beaver Creek 115/138kV phase shifter transformer	Colfax - Rodemacher 230kV	-134
Toledo - VP Tap 138kV	Colfax - Montgomery 230kV	-43
Beaver Creek 115/138kV phase shifter transformer	Colfax - Montgomery 230kV	-26
French Settlement - Sorrento 230kV	Franklin - Mcknight 500kV	-19
East Leesville - Rodemacher 230kV (CLECO)	Colfax - Montgomery 230kV	43
Toledo - Leesville (CLECO) 138kV	Colfax - Rodemacher 230kV	64
French Settlement - Sorrento 230kV	Front Street - Michoud 230kV	73
Conway - Wyandotte 138kV	T300/331 - Willow Glen 138kV	119
Conway - Wyandotte 138kV	Oak Grove - T300/331 138kV	130
Pleasant Hill 500/161kV transformer	ANO 500/161/22kV 3 Winding	166

Limiting Element	Contingency Element	ATC
	Transformer	
Toledo - Leesville (CLECO) 138kV	Colfax - Montgomery 230kV	196
Judice - Scott1 138kV	Meaux - SELLRD (CLECO) 230kV	201
Judice - Scott1 138kV	Meaux 230/138kV transformer 1	212
Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	219
East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	219
Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	230
Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	230

TVA

Limiting Element	Contingency Element	ATC
French Settlement - Sorrento 230kV	Bogalusa - Franklin 500kV	-1408
French Settlement - Sorrento 230kV	Bogalusa - Adams Creek 500/230kV transformer	-1408
International Paper - Mansfield 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-1198
International Paper - Wallake 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-614
Carroll 230/138kV transformer (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-534
French Settlement - Sorrento 230kV	Fairview - Gypsy 230kV	-214
Toledo - VP Tap 138kV	Colfax - Rodemacher 230kV	-201
French Settlement - Sorrento 230kV	Fairview - Madisonville 230kV	-196
East Leesville - Rodemacher 230kV (CLECO)	Colfax - Rodemacher 230kV	-154
Beaver Creek 115/138kV phase shifter transformer	Colfax - Rodemacher 230kV	-141
Toledo - VP Tap 138kV	Colfax - Montgomery 230kV	-51
Beaver Creek 115/138kV phase shifter transformer	Colfax - Montgomery 230kV	-27
French Settlement - Sorrento 230kV	Franklin - Mcknight 500kV	-18
East Leesville - Rodemacher 230kV (CLECO)	Colfax - Montgomery 230kV	48
French Settlement - Sorrento 230kV	Front Street - Michoud 230kV	65
Toledo - Leesville (CLECO) 138kV	Colfax - Rodemacher 230kV	75
Conway - Wyandotte 138kV	T300/331 - Willow Glen 138kV	116
Conway - Wyandotte 138kV	Oak Grove - T300/331 138kV	126
Judice - Scott1 138kV	Meaux - SELLRD (CLECO) 230kV	199
Judice - Scott1 138kV	Meaux 230/138kV transformer 1	210
Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	219
East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	219
Toledo - Leesville (CLECO) 138kV	Colfax - Montgomery 230kV	228
Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	230
Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	230

APPENDIX F: Details of Scenario 2 – 2014

AECI

Limiting Element	Contingency Element	ATC
French Settlement - Sorrento 230kV	Bogalusa - Adams Creek 500/230kV transformer	-1453
French Settlement - Sorrento 230kV	Bogalusa - Franklin 500kV	-1453
International Paper - Mansfield 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-428
Carroll 230/138kV transformer (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	12
International Paper - Wallake 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	50
Judice - Scott1 138kV	Meaux - SELLRD (CLECO) 230kV	64
Judice - Scott1 138kV	Meaux 230/138kV transformer 1	75
Beaver Creek 115/138kV phase shifter transformer	Colfax - Rodemacher 230kV	93
Beaver Creek 115/138kV phase shifter transformer	Colfax - Montgomery 230kV	203
Toledo - VP Tap 138kV	Colfax - Rodemacher 230kV	203
East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	219
Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	219
Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	230
Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	230

AEPW

Limiting Element	Contingency Element	ATC
Hartburg - Inland Orange 230kV - Supplemental Upgrade	Cypress - Hartburg 500kV	-1828
Helbig - McLewis 230kV	Cypress - Hartburg 500kV	-1778
French Settlement - Sorrento 230kV	Bogalusa - Franklin 500kV	-1737
French Settlement - Sorrento 230kV	Bogalusa - Adams Creek 500/230kV transformer	-1737
Hartburg - Inland Orange 230kV	Cypress - Hartburg 500kV	-1703
Inland - McLewis 230kV - Supplemental Upgrade	Cypress - Hartburg 500kV	-1018
Cypress 500/138kV transformer 1	Cypress 500/230kV transformer	-442
International Paper - Mansfield 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-245
Carroll 230/138kV transformer (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	9
International Paper - Wallake 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	29
Judice - Scott1 138kV	Meaux - SELLRD (CLECO) 230kV	65
Judice - Scott1 138kV	Meaux 230/138kV transformer 1	76
Beaver Creek 115/138kV phase shifter transformer	Colfax - Rodemacher 230kV	90
Toledo - VP Tap 138kV	Colfax - Rodemacher 230kV	149
Beaver Creek 115/138kV phase shifter transformer	Colfax - Montgomery 230kV	195

Limiting Element	Contingency Element	ATC
East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	219
Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	219
Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	230
Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	230
Toledo - VP Tap 138kV	Colfax - Montgomery 230kV	245

AMRN

Limiting Element	Contingency Element	ATC
French Settlement - Sorrento 230kV	Bogalusa - Adams Creek 500/230kV transformer	-1391
French Settlement - Sorrento 230kV	Bogalusa - Franklin 500kV	-1391
International Paper - Mansfield 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-449
Carroll 230/138kV transformer (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	13
International Paper - Wallake 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	53
Judice - Scott1 138kV	Meaux - SELLRD (CLECO) 230kV	63
Judice - Scott1 138kV	Meaux 230/138kV transformer 1	74
Beaver Creek 115/138kV phase shifter transformer	Colfax - Rodemacher 230kV	94
Beaver Creek 115/138kV phase shifter transformer	Colfax - Montgomery 230kV	205
Toledo - VP Tap 138kV	Colfax - Rodemacher 230kV	210
Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	219
East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	219
Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	230
Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	230

CLECO

Limiting Element	Contingency Element	ATC
Judice - Scott1 138kV	Meaux - SELLRD (CLECO) 230kV	71
Judice - Scott1 138kV	Meaux 230/138kV transformer 1	84
Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	219
East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	219
Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	230
Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	230

EES

Limiting Element	Contingency Element	ATC
Helbig - McLewis 230kV	Cypress - Hartburg 500kV	-1053
Hartburg - Inland Orange 230kV - Supplemental Upgrade	Cypress - Hartburg 500kV	-1052
Hartburg - Inland Orange 230kV	Cypress - Hartburg 500kV	-980
Inland - McLewis 230kV - Supplemental Upgrade	Cypress - Hartburg 500kV	-595
Cypress 500/138kV transformer 1	Cypress 500/230kV transformer	-309

Limiting Element	Contingency Element	ATC
Carroll 230/138kV transformer (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	21
Judice - Scott1 138kV	Meaux - SELLRD (CLECO) 230kV	58
Judice - Scott1 138kV	Meaux 230/138kV transformer 1	68
Beaver Creek 115/138kV phase shifter transformer	Colfax - Rodemacher 230kV	122
Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	219
East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	219
Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	230
Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	230

EMDE

Limiting Element	Contingency Element	ATC
French Settlement - Sorrento 230kV	Bogalusa - Adams Creek 500/230kV transformer	-1516
French Settlement - Sorrento 230kV	Bogalusa - Franklin 500kV	-1516
International Paper - Mansfield 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-379
Carroll 230/138kV transformer (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	12
International Paper - Wallake 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	44
Judice - Scott1 138kV	Meaux - SELLRD (CLECO) 230kV	64
Judice - Scott1 138kV	Meaux 230/138kV transformer 1	75
Beaver Creek 115/138kV phase shifter transformer	Colfax - Rodemacher 230kV	92
Toledo - VP Tap 138kV	Colfax - Rodemacher 230kV	190
Beaver Creek 115/138kV phase shifter transformer	Colfax - Montgomery 230kV	200
East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	219
Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	219
Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	230
Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	230

LAFA

Limiting Element	Contingency Element	ATC
Habetz - Richard 138kV	Acadian - Bonin 230kV (LAFA)	-247
Habetz - Richard 138kV	Flander - Acadian 230kV (LAFA)	-105
Judice - Scott1 138kV	Meaux - SELLRD (CLECO) 230kV	68
Judice - Scott1 138kV	Meaux 230/138kV transformer 1	79
Flander - Acadian 230kV (LAFA)	Habetz - Richard 138kV	191
East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	219
Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	219

LAGN

Limiting Element	Contingency Element	ATC
Judice - Scott1 138kV	Meaux - SELLRD (CLECO) 230kV	64

Limiting Element	Contingency Element	ATC
Judice - Scott1 138kV	Meaux 230/138kV transformer 1	75
Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	219
East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	219
Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	230
Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	230

LEPA

Limiting Element	Contingency Element	ATC
Ray Braswell - Baxter Wilson 500kV - Supplemental Upgrade	Franklin - Grand Gulf 500kV	-1751
Bonin - Cecelia 138kV	Acadia GSU - Colonial Academy 138kV	-582
Bonin - Cecelia 138kV	Acadia GSU - Scanlan 138kV	-517
Moril - Cecelia 138kV	Flander - Segura 138kV (CLECO)	-389
Meaux - Abbeville 138kV	Flander - Segura 138kV (CLECO)	-287
Coly - Vignes 230kV - Supplemental Upgrade	A.A.C. - Polsky Carville 230kV	-248
Coly - Vignes 230kV - Supplemental Upgrade	A.A.C. - Licar 230kV	-225
Bonin - Cecelia 138kV	Scanlan - Scott2 138kV	-211
Bonin - Cecelia 138kV	Semere - Scott2 138kV	-203
Coly - Vignes 230kV - Supplemental Upgrade	Belle Helene - Licar 230kV	-144
Flander - Segura 138kV (CLECO)	Meaux - Abbeville 138kV	-121
Bonin - Cecelia 138kV	Flander - Segura 138kV (CLECO)	-118
Moril - Cecelia 138kV	Meaux - Abbeville 138kV	-110
Moril - Cecelia 138kV	Leblanc - Abbyville 138kV	18
Judice - Scott1 138kV	Meaux - SELLRD (CLECO) 230kV	33
Flander - Segura 138kV (CLECO)	Leblanc - Abbyville 138kV	37
Judice - Scott1 138kV	Meaux 230/138kV transformer 1	39
Coly - Vignes 230kV - Supplemental Upgrade	Belle Helene - Woodstock 230kV	116
Coly - Vignes 230kV - Supplemental Upgrade	Vulchlor - Woodstock 230kV	116
Airline - Vignes 230kV - Supplemental Upgrade	A.A.C. - Polsky Carville 230kV	137
Bonin - Cecelia 138kV	Meaux - Abbeville 138kV	148
Airline - Vignes 230kV - Supplemental Upgrade	A.A.C. - Licar 230kV	160
Moril - Cecelia 138kV	Acadian - Bonin 230kV (LAFA)	169
Flander - Segura 138kV (CLECO)	Meaux - SELLRD (CLECO) 230kV	173
Flander - Segura 138kV (CLECO)	Meaux 230/138kV transformer 1	176
Meaux - Abbeville 138kV	Acadian - Bonin 230kV (LAFA)	187
Flander - Segura 138kV (CLECO)	Moril - Cecelia 138kV	188
Judice - Meaux 138kV	Meaux - SELLRD (CLECO) 230kV	199

OKGE

Limiting Element	Contingency Element	ATC
French Settlement - Sorrento 230kV	Bogalusa - Franklin 500kV	-1589
French Settlement - Sorrento 230kV	Bogalusa - Adams Creek 500/230kV transformer	-1589
International Paper - Mansfield 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-331
Carroll 230/138kV transformer (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	11
International Paper - Wallake 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	39
Judice - Scott1 138kV	Meaux - SELLRD (CLECO) 230kV	64
Judice - Scott1 138kV	Meaux 230/138kV transformer 1	75
Beaver Creek 115/138kV phase shifter transformer	Colfax - Rodemacher 230kV	91
Toledo - VP Tap 138kV	Colfax - Rodemacher 230kV	176
Beaver Creek 115/138kV phase shifter transformer	Colfax - Montgomery 230kV	198
Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	219
East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	219
Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	230
Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	230

SMEPA

Limiting Element	Contingency Element	ATC
Ray Braswell - Baxter Wilson 500kV - Supplemental Upgrade	Franklin - Grand Gulf 500kV	-1088
French Settlement - Sorrento 230kV	Bogalusa - Adams Creek 500/230kV transformer	-616
French Settlement - Sorrento 230kV	Bogalusa - Franklin 500kV	-616
Jackson Miami - Rex Brown 115kV	South Jackson 230/115kV transformer 1	-259
Florence - South Jackson 115kV - Supplemental Upgrade	Bogalusa - Franklin 500kV	-240
Florence - South Jackson 115kV - Supplemental Upgrade	Bogalusa - Adams Creek 500/230kV transformer	-240
Florence - South Jackson 115kV - Supplemental Upgrade	Choctaw MS (TVA) - Clay (TVA) 500kV	-125
Florence - South Jackson 115kV - Supplemental Upgrade	South Jackson - Pop Spring 115kV	-43
Florence - South Jackson 115kV - Supplemental Upgrade	Franklin - Grand Gulf 500kV	-23
Florence - South Jackson 115kV - Supplemental Upgrade	Georgetown - Pop Spring 115kV	-22
Florence - South Jackson 115kV - Supplemental Upgrade	Georgetown - Silver Creek 115kV	-16
Florence - South Jackson 115kV - Supplemental Upgrade	Angie - Adams Creek 230kV	10
Florence - South Jackson 115kV - Supplemental Upgrade	Ellicott (SOCO) - BarryCC2 (SOCO) 230kV	16
Florence - South Jackson 115kV - Supplemental	Ellicott (SOCO) - BarryCC1 (SOCO)	16

Limiting Element	Contingency Element	ATC
Upgrade	230kV	
Carroll 230/138kV transformer (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	19
Jackson Miami - Jackson Monument Street 115kV	South Jackson 230/115kV transformer 1	54
Judice - Scott1 138kV	Meaux - SELLRD (CLECO) 230kV	61
Judice - Scott1 138kV	Meaux 230/138kV transformer 1	72
Beaver Creek 115/138kV phase shifter transformer	Colfax - Rodemacher 230kV	112
Florence - South Jackson 115kV - Supplemental Upgrade	Base Case	140
Morton - Pelahatchie 115kV - Supplemental Upgrade	Angie - Adams Creek 230kV	176
Morton - Pelahatchie 115kV - Supplemental Upgrade	Angie (SOCO) - Hattisburg SW (SOCO) 230kV	212
East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	219
Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	219
Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	230
Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	230
Beaver Creek 115/138kV phase shifter transformer	Colfax - Montgomery 230kV	243

SOCO

Limiting Element	Contingency Element	ATC
French Settlement - Sorrento 230kV	Bogalusa - Franklin 500kV	-1120
French Settlement - Sorrento 230kV	Bogalusa - Adams Creek 500/230kV transformer	-1120
International Paper - Mansfield 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-574
Carroll 230/138kV transformer (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	15
Judice - Scott1 138kV	Meaux - SELLRD (CLECO) 230kV	62
International Paper - Wallake 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	67
Judice - Scott1 138kV	Meaux 230/138kV transformer 1	73
Beaver Creek 115/138kV phase shifter transformer	Colfax - Rodemacher 230kV	102
East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	219
Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	219
Beaver Creek 115/138kV phase shifter transformer	Colfax - Montgomery 230kV	221
Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	230
Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	230

SPA

Limiting Element	Contingency Element	ATC
French Settlement - Sorrento 230kV	Bogalusa - Adams Creek 500/230kV transformer	-1521
French Settlement - Sorrento 230kV	Bogalusa - Franklin 500kV	-1521

Limiting Element	Contingency Element	ATC
International Paper - Mansfield 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-399
Carroll 230/138kV transformer (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	12
International Paper - Wallake 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	47
Judice - Scott1 138kV	Meaux - SELLRD (CLECO) 230kV	64
Judice - Scott1 138kV	Meaux 230/138kV transformer 1	75
Beaver Creek 115/138kV phase shifter transformer	Colfax - Rodemacher 230kV	92
Pleasant Hill 500/161kV transformer	ANO 500/161/22kV 3 Winding Transformer	158
Toledo - VP Tap 138kV	Colfax - Rodemacher 230kV	194
Beaver Creek 115/138kV phase shifter transformer	Colfax - Montgomery 230kV	200
Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	219
East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	219
Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	230
Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	230

TVA

Limiting Element	Contingency Element	ATC
French Settlement - Sorrento 230kV	Bogalusa - Franklin 500kV	-1291
French Settlement - Sorrento 230kV	Bogalusa - Adams Creek 500/230kV transformer	-1291
International Paper - Mansfield 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-523
Carroll 230/138kV transformer (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	14
International Paper - Wallake 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	61
Judice - Scott1 138kV	Meaux - SELLRD (CLECO) 230kV	63
Judice - Scott1 138kV	Meaux 230/138kV transformer 1	74
Beaver Creek 115/138kV phase shifter transformer	Colfax - Rodemacher 230kV	97
Beaver Creek 115/138kV phase shifter transformer	Colfax - Montgomery 230kV	210
Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	219
East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	219
Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	230
Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	230

APPENDIX G: Details of Scenario 3 – 2014

AECI

Limiting Element	Contingency Element	ATC
International Paper - Mansfield 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-1014
Moril - Cecelia 138kV	Flander (CLECO) - Youngsville 138kV	-560
International Paper - Wallake 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-515
Carroll 230/138kV transformer (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-451
Moril - Cecelia 138kV	Youngsville - Segura (CLECO) 138kV	-313
East Leesville - Rodemacher 230kV (CLECO)	Colfax - Rodemacher 230kV	-197
Semere - Scott2 138kV	Bonin - Cecelia 138kV	-156
Beaver Creek 115/138kV phase shifter transformer	Colfax - Rodemacher 230kV	-88
East Leesville - Rodemacher 230kV (CLECO)	Colfax - Montgomery 230kV	3
Beaver Creek 115/138kV phase shifter transformer	Colfax - Montgomery 230kV	24
Moril - Cecelia 138kV	Meaux - Abbeville 138kV	134
East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	220
Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	220
Conway - Wyandotte 138kV	T300/331 - Willow Glen 138kV	221
Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	230
Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	230
Conway - Wyandotte 138kV	Oak Grove - T300/331 138kV	231
Vatican - Colton Road 138kV	Webre - Wells 500kV	244

AEPW

Limiting Element	Contingency Element	ATC
International Paper - Mansfield 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-592
Carroll 230/138kV transformer (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-321
International Paper - Wallake 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-301
East Leesville - Rodemacher 230kV (CLECO)	Colfax - Rodemacher 230kV	-162
Semere - Scott2 138kV	Bonin - Cecelia 138kV	-159
Beaver Creek 115/138kV phase shifter transformer	Colfax - Rodemacher 230kV	-84
East Leesville - Rodemacher 230kV (CLECO)	Colfax - Montgomery 230kV	2
Beaver Creek 115/138kV phase shifter transformer	Colfax - Montgomery 230kV	23
Conroe 1 - Conroe 2 138kV	Oak Ridge - Porter 138kV	109
Moril - Cecelia 138kV	Meaux - Abbeville 138kV	139
Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	220
East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	220
Conway - Wyandotte 138kV	T300/331 - Willow Glen 138kV	229
Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	230

Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	230
Conway - Wyandotte 138kV	Oak Grove - T300/331 138kV	240
Vatican - Colton Road 138kV	Webre - Wells 500kV	240

AMRN

Limiting Element	Contingency Element	ATC
International Paper - Mansfield 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-1063
Moril - Cecelia 138kV	Flander (CLECO) - Youngsville 138kV	-555
International Paper - Wallake 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-540
Carroll 230/138kV transformer (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-468
Moril - Cecelia 138kV	Youngsville - Segura (CLECO) 138kV	-310
East Leesville - Rodemacher 230kV (CLECO)	Colfax - Rodemacher 230kV	-202
Semere - Scott2 138kV	Bonin - Cecelia 138kV	-155
Beaver Creek 115/138kV phase shifter transformer	Colfax - Rodemacher 230kV	-89
East Leesville - Rodemacher 230kV (CLECO)	Colfax - Montgomery 230kV	3
Beaver Creek 115/138kV phase shifter transformer	Colfax - Montgomery 230kV	24
Moril - Cecelia 138kV	Meaux - Abbeville 138kV	134
Conway - Wyandotte 138kV	T300/331 - Willow Glen 138kV	219
East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	220
Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	220
Conway - Wyandotte 138kV	Oak Grove - T300/331 138kV	230
Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	230
Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	230
Vatican - Colton Road 138kV	Webre - Wells 500kV	244

CLECO

Limiting Element	Contingency Element	ATC
Semere - Scott2 138kV	Bonin - Cecelia 138kV	-174
Moril - Cecelia 138kV	Meaux - Abbeville 138kV	161
Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	220
East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	220
Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	230
Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	230
Vatican - Colton Road 138kV	Webre - Wells 500kV	235

EES

Limiting Element	Contingency Element	ATC
Carroll 230/138kV transformer (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-774
Moril - Cecelia 138kV	Flander (CLECO) - Youngsville 138kV	-507
Moril - Cecelia 138kV	Youngsville - Segura (CLECO) 138kV	-285
East Leesville - Rodemacher 230kV (CLECO)	Colfax - Rodemacher 230kV	-215
Semere - Scott2 138kV	Bonin - Cecelia 138kV	-147

Limiting Element	Contingency Element	ATC
Beaver Creek 115/138kV phase shifter transformer	Colfax - Rodemacher 230kV	-117
East Leesville - Rodemacher 230kV (CLECO)	Colfax - Montgomery 230kV	3
Beaver Creek 115/138kV phase shifter transformer	Colfax - Montgomery 230kV	31
Moril - Cecelia 138kV	Meaux - Abbeville 138kV	127
Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	220
East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	220
Conway - Wyandotte 138kV	T300/331 - Willow Glen 138kV	223
Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	230
Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	230
Conway - Wyandotte 138kV	Oak Grove - T300/331 138kV	234
Vatican - Colton Road 138kV	Webre - Wells 500kV	244

EMDE

Limiting Element	Contingency Element	ATC
International Paper - Mansfield 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-903
International Paper - Wallake 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-459
Carroll 230/138kV transformer (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-419
East Leesville - Rodemacher 230kV (CLECO)	Colfax - Rodemacher 230kV	-189
Semere - Scott2 138kV	Bonin - Cecelia 138kV	-156
Beaver Creek 115/138kV phase shifter transformer	Colfax - Rodemacher 230kV	-87
East Leesville - Rodemacher 230kV (CLECO)	Colfax - Montgomery 230kV	3
Beaver Creek 115/138kV phase shifter transformer	Colfax - Montgomery 230kV	23
Moril - Cecelia 138kV	Meaux - Abbeville 138kV	135
East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	220
Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	220
Conway - Wyandotte 138kV	T300/331 - Willow Glen 138kV	223
Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	230
Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	230
Conway - Wyandotte 138kV	Oak Grove - T300/331 138kV	233
Vatican - Colton Road 138kV	Webre - Wells 500kV	243
International Paper - Mansfield 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-903
International Paper - Wallake 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-459

LAFA

Limiting Element	Contingency Element	ATC
Semere - Scott2 138kV	Bonin - Cecelia 138kV	-177
Flander - Acadian 230kV (LAFA)	Habetz - Richard 138kV	143
Meaux - Abbeville 138kV	Acadian - Bonin 230kV (LAFA)	151
Vatican - Colton Road 138kV	Webre - Wells 500kV	200

Limiting Element	Contingency Element	ATC
Acadian - Bonin 230kV (LAFA)	Habetz - Richard 138kV	215
Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	220
East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	220
Vatican - Colton Road 138kV	Cocodrie - Vil Plat 230kV	223

LAGN

Limiting Element	Contingency Element	ATC
East Leesville - Rodemacher 230kV (CLECO)	Colfax - Rodemacher 230kV	-265
Semere - Scott2 138kV	Bonin - Cecelia 138kV	-160
East Leesville - Rodemacher 230kV (CLECO)	Colfax - Montgomery 230kV	4
Moril - Cecelia 138kV	Meaux - Abbeville 138kV	139
Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	220
East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	220
Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	230
Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	230
Conway - Wyandotte 138kV	T300/331 - Willow Glen 138kV	233
Vatican - Colton Road 138kV	Webre - Wells 500kV	242
Conway - Wyandotte 138kV	Oak Grove - T300/331 138kV	245
Vatican - Colton Road 138kV	Cocodrie - Vil Plat 230kV	249

LEPA

Limiting Element	Contingency Element	ATC
Meaux - Abbeville 138kV	Flander (CLECO) - Youngsville 138kV	-374
Bonin - Cecelia 138kV	Flander (CLECO) - Youngsville 138kV	-307
Meaux - Abbeville 138kV	Youngsville - Segura (CLECO) 138kV	-284
Bonin - Cecelia 138kV	Youngsville - Segura (CLECO) 138kV	-169
Moril - Cecelia 138kV	Flander (CLECO) - Youngsville 138kV	-153
Flander (CLECO) - Youngsville 138kV	Meaux - Abbeville 138kV	-115
Bonin - Cecelia 138kV	Semere - Scott2 138kV	-103
Moril - Cecelia 138kV	Youngsville - Segura (CLECO) 138kV	-85
Semere - Scott2 138kV	Bonin - Cecelia 138kV	-78
Flander (CLECO) - Youngsville 138kV	Meaux - SELLRD (CLECO) 230kV	48
Moril - Cecelia 138kV	Meaux - Abbeville 138kV	49
Flander (CLECO) - Youngsville 138kV	Meaux 230/138kV transformer 1	55
Flander (CLECO) - Youngsville 138kV	Leblanc - Abbyville 138kV	65
Meaux - Abbeville 138kV	Acadian - Bonin 230kV (LAFA)	89
Youngsville - Segura (CLECO) 138kV	Meaux - Abbeville 138kV	117
Flander (CLECO) - Youngsville 138kV	Greenwood - Terrebone 115kV	138
Meaux - Abbeville 138kV	Greenwood - Terrebone 115kV	152
Judice - Scott1 138kV	Meaux - SELLRD (CLECO) 230kV	153
Moril - Cecelia 138kV	Leblanc - Abbyville 138kV	160
Judice - Scott1 138kV	Meaux 230/138kV transformer 1	165
Semere - Scott2 138kV	Flander (CLECO) - Youngsville 138kV	180

OKGE

Limiting Element	Contingency Element	ATC
International Paper - Mansfield 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-792
International Paper - Wallake 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-403
Carroll 230/138kV transformer (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-386
East Leesville - Rodemacher 230kV (CLECO)	Colfax - Rodemacher 230kV	-180
Semere - Scott2 138kV	Bonin - Cecelia 138kV	-157
Beaver Creek 115/138kV phase shifter transformer	Colfax - Rodemacher 230kV	-86
East Leesville - Rodemacher 230kV (CLECO)	Colfax - Montgomery 230kV	2
Beaver Creek 115/138kV phase shifter transformer	Colfax - Montgomery 230kV	23
Moril - Cecelia 138kV	Meaux - Abbeville 138kV	137
East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	220
Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	220
Conway - Wyandotte 138kV	T300/331 - Willow Glen 138kV	225
Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	230
Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	230
Conway - Wyandotte 138kV	Oak Grove - T300/331 138kV	235
Vatican - Colton Road 138kV	Webre - Wells 500kV	242

SMEPA

Limiting Element	Contingency Element	ATC
Ray Braswell 500/230kV transformer ckt2 - Supplemental Upgrade	McAdams - Pickens 230kV	*
Ray Braswell 500/230kV transformer ckt2 - Supplemental Upgrade	Eldorado EHV - Sterlington 500kV	*
Ray Braswell 500/230kV transformer ckt2 - Supplemental Upgrade	Magee (TVA) - Creek (TVA) 161kV	*
Ray Braswell 500/230kV transformer ckt2 - Supplemental Upgrade	Colum (SMEPA) - SW Lonestar (SMEPA) 161kV	*
Ray Braswell 500/230kV transformer ckt2 - Supplemental Upgrade	Canton - Pickens 230kV	*
Ray Braswell 500/230kV transformer ckt2 - Supplemental Upgrade	Newton (SOCO) - Hoye Ave (SOCO) 115kV	*
Ray Braswell 500/230kV transformer ckt2 - Supplemental Upgrade	Hoye Ave (SOCO) - Esco Tap (SOCO) 115kV	*
Ray Braswell 500/230kV transformer ckt2 - Supplemental Upgrade	Esco Tap (SOCO) - Forest (SOCO) 115kV	*
Ray Braswell 500/230kV transformer ckt2 - Supplemental Upgrade	Forest (SOCO) - Forest Industrial (SOCO) 115kV	*
Ray Braswell 500/230kV transformer ckt2 - Supplemental Upgrade	Base Case	*
Carroll 230/138kV transformer (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-709
Moril - Cecelia 138kV	Flander (CLECO) - Youngsville 138kV	-501
Moril - Cecelia 138kV	Youngsville - Segura (CLECO) 138kV	-280
East Leesville - Rodemacher 230kV (CLECO)	Colfax - Rodemacher 230kV	-267
Semere - Scott2 138kV	Bonin - Cecelia 138kV	-148
Beaver Creek 115/138kV phase shifter transformer	Colfax - Rodemacher 230kV	-107
East Leesville - Rodemacher 230kV (CLECO)	Colfax - Montgomery 230kV	4

Limiting Element	Contingency Element	ATC
Beaver Creek 115/138kV phase shifter transformer	Colfax - Montgomery 230kV	29
Florence - South Jackson 115kV - Supplemental Upgrade	Bogalusa - Adams Creek 500/230kV transformer	118
Florence - South Jackson 115kV - Supplemental Upgrade	Bogalusa - Franklin 500kV	118
Moril - Cecelia 138kV	Meaux - Abbeville 138kV	125
Florence - South Jackson 115kV - Supplemental Upgrade	Choctaw MS (TVA) - Clay (TVA) 500kV	162
Ray Braswell - Baxter Wilson 500kV - Supplemental Upgrade	Franklin - Grand Gulf 500kV	193
Conway - Wyandotte 138kV	T300/331 - Willow Glen 138kV	202
Conway - Wyandotte 138kV	Oak Grove - T300/331 138kV	212
Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	220
East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	220
Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	230
Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	230
Florence - South Jackson 115kV - Supplemental Upgrade	Angie - Adams Creek 230kV	240
Florence - South Jackson 115kV - Supplemental Upgrade	South Jackson - Pop Spring 115kV	249

SOCO

Limiting Element	Contingency Element	ATC
International Paper - Mansfield 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-1358
International Paper - Wallake 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-690
Carroll 230/138kV transformer (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-565
Moril - Cecelia 138kV	Flander (CLECO) - Youngsville 138kV	-531
Moril - Cecelia 138kV	Youngsville - Segura (CLECO) 138kV	-297
East Leesville - Rodemacher 230kV (CLECO)	Colfax - Rodemacher 230kV	-230
Semere - Scott2 138kV	Bonin - Cecelia 138kV	-152
Beaver Creek 115/138kV phase shifter transformer	Colfax - Rodemacher 230kV	-96
East Leesville - Rodemacher 230kV (CLECO)	Colfax - Montgomery 230kV	3
Beaver Creek 115/138kV phase shifter transformer	Colfax - Montgomery 230kV	26
Moril - Cecelia 138kV	Meaux - Abbeville 138kV	130
Conway - Wyandotte 138kV	T300/331 - Willow Glen 138kV	212
East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	220
Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	220
Conway - Wyandotte 138kV	Oak Grove - T300/331 138kV	222
Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	230
Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	230
Vatican - Colton Road 138kV	Webre - Wells 500kV	248
International Paper - Mansfield 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-1358

Limiting Element	Contingency Element	ATC
International Paper - Wallake 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-690

SPA

Limiting Element	Contingency Element	ATC
International Paper - Mansfield 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-947
International Paper - Wallake 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-481
Carroll 230/138kV transformer (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-430
East Leesville - Rodemacher 230kV (CLECO)	Colfax - Rodemacher 230kV	-191
Semere - Scott2 138kV	Bonin - Cecelia 138kV	-156
Beaver Creek 115/138kV phase shifter transformer	Colfax - Rodemacher 230kV	-87
East Leesville - Rodemacher 230kV (CLECO)	Colfax - Montgomery 230kV	3
Beaver Creek 115/138kV phase shifter transformer	Colfax - Montgomery 230kV	23
Moril - Cecelia 138kV	Meaux - Abbeville 138kV	135
Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	220
East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	220
Conway - Wyandotte 138kV	T300/331 - Willow Glen 138kV	222
Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	230
Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	230
Conway - Wyandotte 138kV	Oak Grove - T300/331 138kV	233
Vatican - Colton Road 138kV	Webre - Wells 500kV	243

TVA

Limiting Element	Contingency Element	ATC
International Paper - Mansfield 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-1234
International Paper - Wallake 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-627
Moril - Cecelia 138kV	Flander (CLECO) - Youngsville 138kV	-544
Carroll 230/138kV transformer (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-518
Moril - Cecelia 138kV	Youngsville - Segura (CLECO) 138kV	-304
East Leesville - Rodemacher 230kV (CLECO)	Colfax - Rodemacher 230kV	-216
Semere - Scott2 138kV	Bonin - Cecelia 138kV	-154
Beaver Creek 115/138kV phase shifter transformer	Colfax - Rodemacher 230kV	-92
East Leesville - Rodemacher 230kV (CLECO)	Colfax - Montgomery 230kV	3
Beaver Creek 115/138kV phase shifter transformer	Colfax - Montgomery 230kV	25
Moril - Cecelia 138kV	Meaux - Abbeville 138kV	132
Conway - Wyandotte 138kV	T300/331 - Willow Glen 138kV	216
East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	220
Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	220
Conway - Wyandotte 138kV	Oak Grove - T300/331 138kV	226
Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	230
Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	230
Vatican - Colton Road 138kV	Webre - Wells 500kV	246

APPENDIX H: Details of Scenario 4 – 2014

AECI

Limiting Element	Contingency Element	ATC
Moril - Cecelia 138kV	Flander (CLECO) - Youngsville 138kV	-967
Moril - Cecelia 138kV	Youngsville - Segura (CLECO) 138kV	-720
International Paper - Mansfield 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-453
Semere - Scott2 138kV	Bonin - Cecelia 138kV	-308
Moril - Cecelia 138kV	Meaux - Abbeville 138kV	-133
International Paper - Wallake 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	46
Carroll 230/138kV transformer (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	55
Judice - Scott1 138kV	Meaux - SELLRD (CLECO) 230kV	150
Beaver Creek 115/138kV phase shifter transformer	Colfax - Rodemacher 230kV	158
Moril - Cecelia 138kV	Leblanc - Abbyville 138kV	172
Judice - Scott1 138kV	Meaux 230/138kV transformer 1	176
Semere - Scott2 138kV	Flander (CLECO) - Youngsville 138kV	191
East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	220
Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	220
Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	230
Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	230

AEPW

Limiting Element	Contingency Element	ATC
Cypress 500/138kV transformer 1	Cypress 500/230kV transformer	-805
Semere - Scott2 138kV	Bonin - Cecelia 138kV	-316
International Paper - Mansfield 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-265
Moril - Cecelia 138kV	Meaux - Abbeville 138kV	-138
International Paper - Wallake 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	27
Carroll 230/138kV transformer (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	39
Beaver Creek 115/138kV phase shifter transformer	Colfax - Rodemacher 230kV	151
Judice - Scott1 138kV	Meaux - SELLRD (CLECO) 230kV	154
Moril - Cecelia 138kV	Leblanc - Abbyville 138kV	178
Judice - Scott1 138kV	Meaux 230/138kV transformer 1	181
Semere - Scott2 138kV	Flander (CLECO) - Youngsville 138kV	195
East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	220
Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	220
Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	230
Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	230

AMRN

Limiting Element	Contingency Element	ATC
Moril - Cecelia 138kV	Flander (CLECO) - Youngsville 138kV	-958
Moril - Cecelia 138kV	Youngsville - Segura (CLECO) 138kV	-714
International Paper - Mansfield 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-475
Semere - Scott2 138kV	Bonin - Cecelia 138kV	-307
Moril - Cecelia 138kV	Meaux - Abbeville 138kV	-132
International Paper - Wallake 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	48
Carroll 230/138kV transformer (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	57
Judice - Scott1 138kV	Meaux - SELLRD (CLECO) 230kV	149
Beaver Creek 115/138kV phase shifter transformer	Colfax - Rodemacher 230kV	160
Moril - Cecelia 138kV	Leblanc - Abbyville 138kV	171
Judice - Scott1 138kV	Meaux 230/138kV transformer 1	176
Semere - Scott2 138kV	Flander (CLECO) - Youngsville 138kV	190
Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	220
East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	220
Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	230
Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	230

CLECO

Limiting Element	Contingency Element	ATC
Semere - Scott2 138kV	Bonin - Cecelia 138kV	-346
Moril - Cecelia 138kV	Meaux - Abbeville 138kV	-160
Moril - Cecelia 138kV	Leblanc - Abbyville 138kV	207
Semere - Scott2 138kV	Flander (CLECO) - Youngsville 138kV	211
East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	220
Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	220
Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	230
Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	230

EES

Limiting Element	Contingency Element	ATC
Hartburg - Inland Orange 230kV - Supplemental Upgrade	Cypress - Hartburg 500kV	-1132
Moril - Cecelia 138kV	Flander (CLECO) - Youngsville 138kV	-875
Moril - Cecelia 138kV	Youngsville - Segura (CLECO) 138kV	-657
Inland - McLewis 230kV - Supplemental Upgrade	Cypress - Hartburg 500kV	-628
Cypress 500/138kV transformer 1	Cypress 500/230kV transformer	-536
Semere - Scott2 138kV	Bonin - Cecelia 138kV	-292
Helbig - McLewis 230kV	Cypress - Hartburg 500kV	-241
Moril - Cecelia 138kV	Meaux - Abbeville 138kV	-126
Carroll 230/138kV transformer (CLECO)	Dolet Hills - S.W. Shreevport 345kV	95

Limiting Element	Contingency Element	ATC
	(CLECO)	
Judice - Scott1 138kV	Meaux - SELLRD (CLECO) 230kV	135
Judice - Scott1 138kV	Meaux 230/138kV transformer 1	159
Moril - Cecelia 138kV	Leblanc - Abbyville 138kV	163
Semere - Scott2 138kV	Flander (CLECO) - Youngsville 138kV	184
Beaver Creek 115/138kV phase shifter transformer	Colfax - Rodemacher 230kV	209
Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	220
East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	220
Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	230
Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	230

EMDE

Limiting Element	Contingency Element	ATC
International Paper - Mansfield 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-403
Semere - Scott2 138kV	Bonin - Cecelia 138kV	-310
Moril - Cecelia 138kV	Meaux - Abbeville 138kV	-134
International Paper - Wallake 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	41
Carroll 230/138kV transformer (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	51
Judice - Scott1 138kV	Meaux - SELLRD (CLECO) 230kV	151
Beaver Creek 115/138kV phase shifter transformer	Colfax - Rodemacher 230kV	156
Moril - Cecelia 138kV	Leblanc - Abbyville 138kV	174
Judice - Scott1 138kV	Meaux 230/138kV transformer 1	177
Semere - Scott2 138kV	Flander (CLECO) - Youngsville 138kV	192
Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	220
East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	220
Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	230
Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	230

LAFA

Limiting Element	Contingency Element	ATC
Semere - Scott2 138kV	Bonin - Cecelia 138kV	-350
Meaux - Abbeville 138kV	Acadian - Bonin 230kV (LAFA)	-94
Flander - Acadian 230kV (LAFA)	Habetz - Richard 138kV	101
Meaux - Abbeville 138kV	Flander - Acadian 230kV (LAFA)	112
Judice - Scott1 138kV	Meaux - SELLRD (CLECO) 230kV	153
Semere - Scott2 138kV	Flander (CLECO) - Youngsville 138kV	155
Acadian - Bonin 230kV (LAFA)	Habetz - Richard 138kV	173
Judice - Scott1 138kV	Meaux 230/138kV transformer 1	180
Semere - Scott2 138kV	Youngsville - Segura (CLECO) 138kV	214
East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	220
Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	220

LAGN

Limiting Element	Contingency Element	ATC
Semere - Scott2 138kV	Bonin - Cecelia 138kV	-317
Moril - Cecelia 138kV	Meaux - Abbeville 138kV	-137
Judice - Scott1 138kV	Meaux - SELLRD (CLECO) 230kV	154
Moril - Cecelia 138kV	Leblanc - Abbyville 138kV	178
Judice - Scott1 138kV	Meaux 230/138kV transformer 1	182
Semere - Scott2 138kV	Flander (CLECO) - Youngsville 138kV	197
Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	220
East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	220
Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	230
Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	230

LEPA

Limiting Element	Contingency Element	ATC
Ray Braswell - Baxter Wilson 500kV - Supplemental Upgrade	Franklin - Grand Gulf 500kV	-1135
Meaux - Abbeville 138kV	Flander (CLECO) - Youngsville 138kV	-535
Bonin - Cecelia 138kV	Flander (CLECO) - Youngsville 138kV	-508
Meaux - Abbeville 138kV	Youngsville - Segura (CLECO) 138kV	-444
Bonin - Cecelia 138kV	Youngsville - Segura (CLECO) 138kV	-371
Flander (CLECO) - Youngsville 138kV	Meaux - Abbeville 138kV	-301
Moril - Cecelia 138kV	Flander (CLECO) - Youngsville 138kV	-264
Flander (CLECO) - Youngsville 138kV	Meaux - SELLRD (CLECO) 230kV	-221
Flander (CLECO) - Youngsville 138kV	Meaux 230/138kV transformer 1	-214
Bonin - Cecelia 138kV	Semere - Scott2 138kV	-208
Moril - Cecelia 138kV	Youngsville - Segura (CLECO) 138kV	-197
Semere - Scott2 138kV	Bonin - Cecelia 138kV	-155
Flander (CLECO) - Youngsville 138kV	Leblanc - Abbyville 138kV	-121
Youngsville - Segura (CLECO) 138kV	Meaux - Abbeville 138kV	-69
Meaux - Abbeville 138kV	Acadian - Bonin 230kV (LAFA)	-56
Moril - Cecelia 138kV	Meaux - Abbeville 138kV	-48
Moril - Cecelia 138kV	Leblanc - Abbyville 138kV	63
Meaux - Abbeville 138kV	Flander - Acadian 230kV (LAFA)	66
Judice - Scott1 138kV	Meaux - SELLRD (CLECO) 230kV	71
Judice - Scott1 138kV	Meaux 230/138kV transformer 1	83
Semere - Scott2 138kV	Flander (CLECO) - Youngsville 138kV	105
Youngsville - Segura (CLECO) 138kV	Leblanc - Abbyville 138kV	111
Meaux - Abbeville 138kV	Moril - Cecelia 138kV	121
Leblanc - Abbyville 138kV	Flander (CLECO) - Youngsville	131

Limiting Element	Contingency Element	ATC
	138kV	
Flander (CLECO) - Youngsville 138kV	Greenwood - Terrebone 115kV	133
Flander (CLECO) - Youngsville 138kV	Moril - Cecelia 138kV	143
Semere - Scott2 138kV	Youngsville - Segura (CLECO) 138kV	144
Meaux - Abbeville 138kV	Greenwood - Terrebone 115kV	149
Youngsville - Segura (CLECO) 138kV	Meaux - SELLRD (CLECO) 230kV	156
Youngsville - Segura (CLECO) 138kV	Meaux 230/138kV transformer 1	163
Semere - Scott2 138kV	Meaux - Abbeville 138kV	184
Bonin - Cecelia 138kV	Scott2 - Scott1 138kV Bypass Breaker	191

OKGE

Limiting Element	Contingency Element	ATC
International Paper - Mansfield 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-354
Semere - Scott2 138kV	Bonin - Cecelia 138kV	-312
Moril - Cecelia 138kV	Meaux - Abbeville 138kV	-135
International Paper - Wallake 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	36
Carroll 230/138kV transformer (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	47
Judice - Scott1 138kV	Meaux - SELLRD (CLECO) 230kV	152
Beaver Creek 115/138kV phase shifter transformer	Colfax - Rodemacher 230kV	154
Moril - Cecelia 138kV	Leblanc - Abbyville 138kV	175
Judice - Scott1 138kV	Meaux 230/138kV transformer 1	178
Semere - Scott2 138kV	Flander (CLECO) - Youngsville 138kV	193
East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	220
Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	220
Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	230
Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	230

SMEPA

Limiting Element	Contingency Element	ATC
Moril - Cecelia 138kV	Flander (CLECO) - Youngsville 138kV	-866
Ray Braswell - Baxter Wilson 500kV - Supplemental Upgrade	Franklin - Grand Gulf 500kV	-710
Moril - Cecelia 138kV	Youngsville - Segura (CLECO) 138kV	-645
Semere - Scott2 138kV	Bonin - Cecelia 138kV	-294
Florence - South Jackson 115kV - Supplemental Upgrade	Bogalusa - Adams Creek 500/230kV transformer	-188
Florence - South Jackson 115kV - Supplemental Upgrade	Bogalusa - Franklin 500kV	-188
Moril - Cecelia 138kV	Meaux - Abbeville 138kV	-124

Limiting Element	Contingency Element	ATC
Florence - South Jackson 115kV - Supplemental Upgrade	Choctaw MS (TVA) - Clay (TVA) 500kV	-120
Jackson Miami - Rex Brown 115kV	South Jackson 230/115kV transformer 1	-31
Florence - South Jackson 115kV - Supplemental Upgrade	South Jackson - Pop Spring 115kV	-30
Florence - South Jackson 115kV - Supplemental Upgrade	Franklin - Grand Gulf 500kV	-11
Florence - South Jackson 115kV - Supplemental Upgrade	Georgetown - Pop Spring 115kV	-9
Florence - South Jackson 115kV - Supplemental Upgrade	Georgetown - Silver Creek 115kV	-3
Florence - South Jackson 115kV - Supplemental Upgrade	Angie - Adams Creek 230kV	11
Florence - South Jackson 115kV - Supplemental Upgrade	Ellicott (SOCO) - BarryCC2 (SOCO) 230kV	27
Florence - South Jackson 115kV - Supplemental Upgrade	Ellicott (SOCO) - BarryCC1 (SOCO) 230kV	27
Carroll 230/138kV transformer (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	87
Judice - Scott1 138kV	Meaux - SELLRD (CLECO) 230kV	142
Florence - South Jackson 115kV - Supplemental Upgrade	Base Case	152
Moril - Cecelia 138kV	Leblanc - Abbyville 138kV	160
Judice - Scott1 138kV	Meaux 230/138kV transformer 1	167
Morton - Pelahatchie 115kV - Supplemental Upgrade	Angie - Adams Creek 230kV	170
Semere - Scott2 138kV	Flander (CLECO) - Youngsville 138kV	183
Beaver Creek 115/138kV phase shifter transformer	Colfax - Rodemacher 230kV	191
Morton - Pelahatchie 115kV - Supplemental Upgrade	Angie (SOCO) - Hattisburg SW (SOCO) 230kV	207
Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	220
East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	220
Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	230
Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	230

SOCO

Limiting Element	Contingency Element	ATC
Moril - Cecelia 138kV	Flander (CLECO) - Youngsville 138kV	-917
Moril - Cecelia 138kV	Youngsville - Segura (CLECO) 138kV	-683
International Paper - Mansfield 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-606
Semere - Scott2 138kV	Bonin - Cecelia 138kV	-301
Moril - Cecelia 138kV	Meaux - Abbeville 138kV	-128
International Paper - Wallake 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	62

Limiting Element	Contingency Element	ATC
Carroll 230/138kV transformer (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	69
Judice - Scott1 138kV	Meaux - SELLRD (CLECO) 230kV	146
Moril - Cecelia 138kV	Leblanc - Abbyville 138kV	166
Judice - Scott1 138kV	Meaux 230/138kV transformer 1	172
Beaver Creek 115/138kV phase shifter transformer	Colfax - Rodemacher 230kV	173
Semere - Scott2 138kV	Flander (CLECO) - Youngsville 138kV	187
Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	220
East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	220
Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	230
Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	230

SPA

Limiting Element	Contingency Element	ATC
International Paper - Mansfield 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-423
Semere - Scott2 138kV	Bonin - Cecelia 138kV	-310
Moril - Cecelia 138kV	Meaux - Abbeville 138kV	-134
International Paper - Wallake 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	43
Carroll 230/138kV transformer (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	53
Judice - Scott1 138kV	Meaux - SELLRD (CLECO) 230kV	151
Beaver Creek 115/138kV phase shifter transformer	Colfax - Rodemacher 230kV	156
Moril - Cecelia 138kV	Leblanc - Abbyville 138kV	174
Judice - Scott1 138kV	Meaux 230/138kV transformer 1	177
Semere - Scott2 138kV	Flander (CLECO) - Youngsville 138kV	192
Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	220
East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	220

TVA

Limiting Element	Contingency Element	ATC
Moril - Cecelia 138kV	Flander (CLECO) - Youngsville 138kV	-940
Moril - Cecelia 138kV	Youngsville - Segura (CLECO) 138kV	-700
International Paper - Mansfield 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	-551
Semere - Scott2 138kV	Bonin - Cecelia 138kV	-305
Moril - Cecelia 138kV	Meaux - Abbeville 138kV	-131
International Paper - Wallake 138kV (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	56
Carroll 230/138kV transformer (CLECO)	Dolet Hills - S.W. Shreevport 345kV (CLECO)	63
Judice - Scott1 138kV	Meaux - SELLRD (CLECO) 230kV	148
Beaver Creek 115/138kV phase shifter transformer	Colfax - Rodemacher 230kV	164
Moril - Cecelia 138kV	Leblanc - Abbyville 138kV	169

Limiting Element	Contingency Element	ATC
Judice - Scott1 138kV	Meaux 230/138kV transformer 1	174
Semere - Scott2 138kV	Flander (CLECO) - Youngsville 138kV	189
Vatican - Colton Road 138kV	East Opelousas - Colton Road 138kV	220
East Opelousas - Colton Road 138kV	Vatican - Colton Road 138kV	220
Vatican - Colton Road 138kV	Champagne - East Opelousas 138kV	230
Champagne - East Opelousas 138kV	Vatican - Colton Road 138kV	230

APPENDIX I: Deliverability Tests for Network Resource

Interconnection Service Resources

Overview

Entergy will develop a two-part deliverability test for customers (Interconnection Customers or Network Customers) seeking to qualify a Generator as an NRIS resource: (1) a test of deliverability "from generation", that is out of the Generator to the aggregate load connected to the Entergy Transmission system; and (2) a test of deliverability "to load" associated with sub-zones. This test will identify upgrades that are required to make the resource deliverable and to maintain that deliverability for a five year period.

The "From Generation" Test for Deliverability

In order for a Generator to be considered deliverable, it must be able to run at its maximum rated output without impairing the capability of the aggregate of previously qualified generating resources (whether qualified at the NRIS or NITS level) in the local area to support load on the system, taking into account potentially constrained transmission elements common to the Generator under test and other adjacent qualified resources. For purposes of this test, the resources displaced in order to determine if the Generator under test can run at maximum rated output should be resources located outside of the local area and having insignificant impact on the results. Existing Long-term Firm PTP Service commitments will also be maintained in this study procedure.

The "To Load" Test for Deliverability

The Generator under test running at its rated output cannot introduce flows on the system that would adversely affect the ability of the transmission system to serve load reliably in import-constrained sub-zones. Existing Long-term Firm PTP Service commitments will also be maintained in this study procedure.

Required Upgrades

Entergy will determine what upgrades, if any, will be required for an NRIS applicant to meet deliverability requirements pursuant to Appendix E.

Description of Deliverability Test

Each NRIS resource will be tested for deliverability at peak load conditions, and in such a manner that the resources it displaces in the test are ones that could continue to contribute to the resource adequacy of the control area in addition to the studied resources. The study will also determine if a unit applying for NRIS service impairs the reliability of load on the system by reducing the capability of the transmission system to deliver energy to load located in import-constrained sub-zones on the grid. Through the study, any transmission upgrades necessary for the unit to meet these tests will be identified.

Deliverability Test Procedure

The deliverability test for qualifying a generating unit as a NRIS resource is intended to ensure that 1) the generating resource being studied contributes to the reliability of the system as a whole by being able to, in conjunction with all other Network Resources on the system, deliver energy to the aggregate load on the transmission system, and 2) collectively all load on the system can still be reliably served with the inclusion of the generating resource being studied. The tests are conducted for "peak" conditions (both a summer peak and a winter peak) for each

year of the 5-year planning horizon commencing in the first year the new unit is scheduled to commence operations.

Deliverability of Generation

The intent of this test is to determine the deliverability of a NRIS resource to the aggregate load on the system. It is assumed in this test that all units previously qualified as NRIS and NITS resources are deliverable. In evaluating the incremental deliverability of a new resource, a test case is established. In the test case, all existing NRIS and NITS resources are dispatched at an expected level of generation (as modified by the DFAX list units as discussed below). Peak load withdrawals are also modeled as well as net imports and exports. The output from generating resources is then adjusted so as to "balance" overall load and generation. This sets the baseline for the test case in terms of total system injections and withdrawals.

Incremental to this test case, injections from the proposed new generation facility are then included, with reductions in other generation located outside of the local area made to maintain system balance.

Generator deliverability is then tested for each transmission facility. There are two steps to identify the transmission facilities to be studied and the pattern of generation on the system:

1) Identify the transmission facilities for which the generator being studied has a 3% or greater distribution factor.

2) For each such transmission facility, list all existing qualified NRIS and NITS resources having a 3% or greater distribution factor on that facility. This list of units is called the Distribution Factor or DFAX list.

For each transmission facility, the units on the DFAX list with the greatest impact are modeled as operating at 100% of their rated output in the DC load flow until, working down the DFAX list, a 20% probability of all units being available at full output is reached (e.g. for 15 generators with a Forced Outage Rate of 10%, the probability of all 15 being available at 100% of their rated output is 20.6%). Other NRIS and NITS resources on the system are modeled at a level sufficient to serve load and net interchange.

From this new baseline, if the addition of the generator being considered (coupled with the matching generation reduction on the system) results in overloads on a particular transmission facility being examined, then it is not "deliverable" under the test.

Deliverability to Load

The Entergy transmission system is divided into a number of import constrained sub-zones for which the import capability and reliability criteria will be examined for the purposes of testing a new NRIS resource. These sub-zones can be characterized as being areas on the Entergy transmission system for which transmission limitations restrict the import of energy necessary to supply load located in the sub-zone.

The transmission limitations will be defined by contingencies and transmission constraints on the system that are known to limit operations in each area, and the sub-zones will be defined by the generation and load busses that are impacted by the contingent transmission lines. These sub-zones may change over time as the topology of the transmission system changes or load grows in particular areas.

An acceptable level of import capability for each sub-zone will have been determined by Entergy Transmission based on their experience and modeling of joint transmission and

generating unit contingencies. Typically the acceptable level of transmission import capacity into the sub-zones will be that which is limited by first-contingency conditions on the transmission system when generating units within the sub-region are experiencing an abnormal level of outages and peak loads.

The “deliverability to load” test compares the available import capability to each sub-zone that is required for the maintaining of reliable service to load within the sub-zone both with and without the new NRIS resource operating at 100% of its rated output. If the new NRIS resource does not reduce the sub-zone import capability so as to reduce the reliability of load within the sub-zone to an unacceptable level, then the deliverability to load test for the unit is satisfied. This test is conducted for a 5-year planning cycle. When the new NRIS resource fails the test, then transmission upgrades will be identified that would allow the NRIS unit to operate without degrading the sub-zone reliability to below an acceptable level.

Other Modeling Assumptions

Modeling of Other Resources

Generating units outside the control of Entergy (including the network resources of others, and generating units in adjacent control areas) shall be modeled assuming “worst case” operation of the units – that is, a pattern of dispatch that reduces the sub-zone import capability, or impact the common limiting flowgates on the system to the greatest extent for the “from generation” deliverability test.

Must-run Units

Must-run units in the control area will be modeled as committed and operating at a level consistent with the must-run operating guidelines for the unit.

Base-line Transmission Model

The base-line transmission system will include all transmission upgrades approved and committed to by Entergy Transmission over the 5-year planning horizon. Transmission line ratings will be net of TRM and current CBM assumptions will be maintained.