



***PID AFS 2012-002
Affected System Impact Study
150MW***

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Rev	Issue Date	Description of Revision	Revised By	Project Manager
0	5/24/12	Posting Affected System Impact Study	EC	BR
1	6/11/12	Replaced <i>Entergy</i> with <i>Cleco</i> in 1. Introduction -first paragraph	EC	Br
2	6/13/12	Edited 1. Introduction to include short circuit and stability study language	EC	BC

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1. Introduction

This Affected System Impact Study is based on the Customer's requested 150MW interconnection on CLECO's transmission system located on the Coughlin - Plaisance 138kV transmission line. The proposed commercial operation date of the project is December 31, 2013. The objective of this study is to assess the reliability impact of the new facility on the Entergy transmission system. 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 Cleco's transmission system. If not, transmission improvements will be identified.

The 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. This Impact 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 Affected System Impact Study are for information only. Due to the proximity of the generator to the Entergy transmission system, Entergy must be identified as an Affected System for any transmission service request from the studied generator. Relay and protection issues were not a part of the scope of this Impact Study and will be evaluated in the Facilities Study which is a required next step in this Affected System Study process.

Due to the short circuit capability of the customer's proposed generator and the use of a nonsynchronous tie, the inclusion of short circuit and stability studies was not warranted for this interconnection request.

The proposed Generation Facility, CLECO Project # 120910-01, is a wind farm comprising of Type 4 wind turbines with a 34.5kV collector system. This facility is connected to the CLECO Transmission System via a 138/34.5 kV power transformer with a base rating of 110 MVA.

In Type 4 wind turbine design, the generator (permanent magnet synchronous generator) and the grid are separated by a power converter. The power converter is limited by the current-carrying capability of the power semiconductor used. The SC current contribution from a Type 4 wind turbine is limited to 110% of rated current (assuming temporary overload current is designed to be 110% rated) at the generator terminals. Actual current contribution to transmission faults from this facility is minimal. Therefore, a Short Circuit Analysis is not required for this proposed facility as a part of this affected system study.

Additionally, based on the results of the stability study performed by CLECO for this project and results of the stability study for PID-255 (connected to Entergy Transmission System between Vatican and East Opelousas 138 kV stations) performed by ICT/Entergy, it was determined there was no need to perform an additional stability analysis as a part of this affected system study.

2. Load Flow Analysis

2.1 Model Information

The load flow analysis was performed based on the projected 2016 summer peak load flow model. Approved future transmission projects in the 2012 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 2016 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-AFS-2012-002 generation interconnection point was modeled on the Coughlin – Plaisance 138kV transmission line in CLECO's transmission system. These associated facilities were then modeled in the case to build a revised case for the load flow analysis. Transfers were simulated between five (5) control areas and Entergy using the requesting generator as the source and adjacent control area as sink.

The following upgrades were included in the base case on CLECO's transmission system:

- Coughlin – Plaisance 138kV line upgraded to 360MVA
- Add 2nd transformer, Cocodrie – Coughlin 230/138kV
- Close the normally open Guidry – West Fork 138kV line
- Open the normally closed Guidry – Veazie 138kV line

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.

2.2 Load Flow Analysis

2.2.1 Load Flow Analysis:

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.

2.2.2 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).

B) Under Contingencies

- The MVA flow through any facility should not exceed 95% Rate A.

2.3 Analysis Results

Summary of the analysis results are documented in following table for each scenario.

Table 2.3.1: Summary of Results for PID 286 – 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
AEPW	American Electric Power West	2016	-356	-1918	-419	-17
CLEC	CLECO	2016	-304	-64	-255	-20
EAI	Entergy Arkansas	2016	-402	-52	-464	-53
EES	Entergy LA., TX., and N.O.	2016	-771	-492	-500	-16
EMI	Entergy Mississippi	2016	-707	-4394	-526	-849

TABLE 2.3.2: DETAILS OF SCENARIO 1 RESULTS: (WITHOUT FUTURE PROJECTS AND WITHOUT PENDING TRANSMISSION SERVICE & STUDY REQUEST)

Limiting Elements	Est. Cost	AEPW	CLECO	EAI	EES	EMI
Champagne - Plaisance (CLECO) 138kV*	15,750,000	X	X	X	X	X
East Leesville (CLECO) - Rodemacher 230kV (CLECO)	Other Ownership	X		X	X	X
International Paper - Mansfield 138kV (CLECO)	Other Ownership	X		X		X
International Paper - Wallake 138kV (CLECO)	Other Ownership	X		X		X
Plaisance (CLECO) - NAPOLWF (CLECO) 138kV	Other Ownership	X	X	X	X	X
Ringgold LA - Carroll (CLECO) 138kV-15.19	Other Ownership			X		
Ringgold LA - Sailes 115kV	13,800,000			X		
Ringgold LA 138/115kV transformer	5,600,000			X		
Vatican - Scott1 138kV	4,125,000				X	X
Vil Plat (CLECO) - West Fork (CLECO) 230kV	Other Ownership	X	X	X	X	X
Winnfield 230/115kV transformer	6,560,000	X		X	X	X
East Leesville (CLECO) - Rodemacher 230kV (CLECO)	Other Ownership	X		X	X	X
International Paper - Mansfield 138kV (CLECO)	Other Ownership	X		X		X

*Capacity required is above that created by the 2012 ICT Base Plan project BP-12-014

TABLE 2.3.3: DETAILS OF SCENARIO 2 RESULTS: (WITHOUT FUTURE PROJECTS AND WITH PENDING TRANSMISSION SERVICE & STUDY REQUEST)

Limiting Elements	Est. Cost	AEPW	CLECO	EAI	EES	EMI
Champagne - Plaisance (CLECO) 138kV*	15,750,000	X	X	X	X	X
Keo - West Memphis EHV 500kV	7,000,000					X
Keo - White Bluff 500kV	2,900,000	X				X
Mabelvale - Sheridan 500kV	5,600,000	X				X
Vatican - Scott1 138kV	Included in 2012 ICT BP				X	X

*Capacity required is above that created by the 2012 ICT Base Plan project BP-12-014

TABLE 2.3.4: DETAILS OF SCENARIO 3 RESULTS: (WITH FUTURE PROJECTS AND WITHOUT PENDING TRANSMISSION SERVICE & STUDY REQUEST)

Limiting Elements	Est. Cost	AEPW	CLECO	EAI	EES	EMI
Champagne - Plaisance (CLECO) 138kV*	15,750,000	X	X	X	X	X
East Leesville (CLECO) - Rodemacher 230kV (CLECO)	Other Ownership	X		X	X	X
International Paper - Mansfield 138kV (CLECO)	Other Ownership	X		X		X
International Paper - Wallake 138kV (CLECO)	Other Ownership	X		X		X
Leesville 230/138kV transformer (CLECO)	Other Ownership	X		X	X	X
Plaisance (CLECO) - NAPOLWF (CLECO) 138kV	Other Ownership	X	X	X	X	X
Ringgold LA 138/115kV transformer	5,600,000			X		
Vil Plat (CLECO) - West Fork (CLECO) 230kV	Other Ownership	X		X	X	X
Winnfield 230/115kV transformer	6,560,000	X		X	X	X

*Capacity required is above that created by the 2012 ICT Base Plan project BP-12-014

TABLE 2.3.5: DETAILS OF SCENARIO 4 RESULTS: (WITH FUTURE PROJECTS AND WITH PENDING TRANSMISSION SERVICE & STUDY REQUEST)

Limiting Elements	Est. Cost	AEPW	CLECO	EAI	EES	EMI
Champagne - Plaisance (CLECO) 138kV*	15,750,000	X	X	X	X	X
Keo - West Memphis EHV 500kV	570,000					X
Keo - White Bluff 500kV	2,900,000	X				X

*Capacity required is above that created by the 2012 ICT Base Plan project BP-12-014

APPENDIX A: Prior Generation Interconnection and Transmission 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
74846159	AEPM	65	1/1/2015	1/1/2020
75206836	ETEC	125	1/1/2015	2/1/2020
SPP 75108838	Tenaska Power Services	6	8/1/2011	6/1/2014
SPP 75108845	Tenaska Power Services	44	8/1/2011	6/1/2014
SPP 75191922	AEP	70-73	8/1/2011	6/1/2014
SPP 75197442	AECC	170	8/1/2011	6/1/2014
SPP 75113025	Tenaska Power Services	12	8/1/2011	1/1/2017
76234876	Entergy Services (SPO)	1	6/1/2012	6/1/2042
76234879	Entergy Services (SPO)	194	6/1/2012	6/1/2042
76234904	Entergy Services (SPO)	1	6/1/2012	6/1/2042
76234916	Entergy Services (SPO)	140	6/1/2012	6/1/2042
76234922	Entergy Services (SPO)	1	5/1/2013	5/1/2042
76234951	Entergy Services (SPO)	5	5/1/2013	5/1/2042
76234980	Entergy Services (SPO)	1	1/1/2014	1/1/2043
76234993 76235000 76235003	Entergy Services (SPO)	475	1/1/2014	1/1/2043
76235101	NRG Power Marketing	450	1/1/2014	1/1/2024
76238089	Entergy Services (SPO)	20	1/1/2014	1/1/2043
76360751	NRG Power Marketing	1	1/1/2014	1/1/2020
76360754	NRG Power Marketing	103	1/1/2014	1/1/2020
76360758	NRG Power Marketing	1	1/1/2014	1/1/2020
76360762	NRG Power Marketing	206	1/1/2014	1/1/2020
76523750	SRMP	180	6/1/2012	6/1/2018
76523753	SRMP	30	6/1/2012	6/1/2018
76523754	EWOM	45	6/1/2012	6/1/2016
76525269	Entegra Power (PUPP)	515	5/1/2013	5/1/2018
76525276	Entegra Power (PUPP)	515	5/1/2015	5/1/2020
76572960	Cargill Power Markets	101	7/1/2013	7/1/2023
76572966	Cargill Power Markets	200	1/1/2014	1/1/2024
76572967	Cargill Power Markets	200	1/1/2014	1/1/2024
76572969	Cargill Power Markets	100	1/1/2014	1/1/2024
76582319	Cargill Power Markets	200	6/1/2013	6/1/2033
76583976	Arkansas Electric Cooperative Corp (AECC)	660	9/1/2012	9/1/2017
76583995	Arkansas Electric Cooperative Corp (AECC)	200	9/1/2012	9/1/2017
76600643	Horizon Wind	100	3/1/2014	3/1/2019
76611184	NRG Power Marketing	1	6/1/2012	6/1/2019
76611182	NRG Power Marketing	25	6/1/2012	6/1/2019
76617645	Entegra Power (PUPP)	515	1/1/2016	1/1/2021
76617646	Entegra Power (PUPP)	515	1/1/2016	1/1/2021

APPENDIX B: Details of Scenario 1 - 2016

AEPW

Limiting Element	Contingency Element	ATC
East Leesville (CLECO) - Rodemacher 230kV (CLECO)	Colfax (CLECO) - Rodemacher 230kV	-356
East Leesville (CLECO) - Rodemacher 230kV (CLECO)	Colfax (CLECO) - Montgomery 230kV	-253
Champagne - Plaisance (CLECO) 138kV	Cocodrie (CLECO) - Vil Plat (CLECO) 230kV	-252
International Paper - Mansfield 138kV (CLECO)	Dolet Hills (CLECO) - S.W. Shreevport 345kV (CLECO)	-244
Champagne - Plaisance (CLECO) 138kV	Vil Plat (CLECO) - West Fork (CLECO) 230kV	-220
Champagne - Plaisance (CLECO) 138kV	West Fork - Wells 230kV	-170
Champagne - Plaisance (CLECO) 138kV	Vatican - Scott1 138kV	-119
International Paper - Wallake 138kV (CLECO)	Dolet Hills (CLECO) - S.W. Shreevport 345kV (CLECO)	-89
Champagne - Plaisance (CLECO) 138kV	Colfax (CLECO) - Rodemacher 230kV	-58
Champagne - Plaisance (CLECO) 138kV	Colfax (CLECO) - Montgomery 230kV	-48
Plaisance (CLECO) - NAPOLWF (CLECO) 138kV	Cocodrie (CLECO) - Vil Plat (CLECO) 230kV	-17
Vil Plat (CLECO) - West Fork (CLECO) 230kV	Colfax (CLECO) - Rodemacher 230kV	-14
Champagne - Plaisance (CLECO) 138kV	Dolet Hills (CLECO) - S.W. Shreevport 345kV (CLECO)	10
Champagne - Plaisance (CLECO) 138kV	Riverbend - Fancy Point 230kV	13
Plaisance (CLECO) - NAPOLWF (CLECO) 138kV	Vil Plat (CLECO) - West Fork (CLECO) 230kV	15
Winnfield 230/115kV transformer	Clarence (CLECO) - Montgomery 230kV	18
Vil Plat (CLECO) - West Fork (CLECO) 230kV	Colfax (CLECO) - Montgomery 230kV	33
Plaisance (CLECO) - NAPOLWF (CLECO) 138kV	West Fork - Wells 230kV	65
Champagne - Plaisance (CLECO) 138kV	Base Case	114
Vil Plat (CLECO) - West Fork (CLECO) 230kV	Plaisance (CLECO) - NAPOLWF (CLECO) 138kV	148

CLECO

Limiting Element	Contingency Element	ATC
Champagne - Plaisance (CLECO) 138kV	Cocodrie (CLECO) - Vil Plat (CLECO) 230kV	-304
Champagne - Plaisance (CLECO) 138kV	Vil Plat (CLECO) - West Fork (CLECO) 230kV	-265
Champagne - Plaisance (CLECO) 138kV	West Fork - Wells 230kV	-205
Champagne - Plaisance (CLECO) 138kV	Vatican - Scott1 138kV	-141
Champagne - Plaisance (CLECO) 138kV	Colfax (CLECO) - Rodemacher 230kV	-69
Champagne - Plaisance (CLECO) 138kV	Colfax (CLECO) - Montgomery 230kV	-57
Vil Plat (CLECO) - West Fork (CLECO) 230kV	Colfax (CLECO) - Rodemacher 230kV	-43
Plaisance (CLECO) - NAPOLWF (CLECO) 138kV	Cocodrie (CLECO) - Vil Plat (CLECO) 230kV	-20
Champagne - Plaisance (CLECO) 138kV	Dolet Hills (CLECO) - S.W. Shreevport 345kV	12

Limiting Element	Contingency Element	ATC
	(CLECO)	
Champagne - Plaisance (CLECO) 138kV	Riverbend - Fancy Point 230kV	15
Plaisance (CLECO) - NAPOLWF (CLECO) 138kV	Vil Plat (CLECO) - West Fork (CLECO) 230kV	18
Plaisance (CLECO) - NAPOLWF (CLECO) 138kV	West Fork - Wells 230kV	78
Vil Plat (CLECO) - West Fork (CLECO) 230kV	Colfax (CLECO) - Montgomery 230kV	100
Champagne - Plaisance (CLECO) 138kV	Base Case	128

EAI

Limiting Element	Contingency Element	ATC
International Paper - Mansfield 138kV (CLECO)	Dolet Hills (CLECO) - S.W. Shreevport 345kV (CLECO)	-402
East Leesville (CLECO) - Rodemacher 230kV (CLECO)	Colfax (CLECO) - Rodemacher 230kV	-394
East Leesville (CLECO) - Rodemacher 230kV (CLECO)	Colfax (CLECO) - Montgomery 230kV	-280
Champagne - Plaisance (CLECO) 138kV	Cocodrie (CLECO) - Vil Plat (CLECO) 230kV	-246
Champagne - Plaisance (CLECO) 138kV	Vil Plat (CLECO) - West Fork (CLECO) 230kV	-214
Ringgold LA 138/115kV transformer	Dolet Hills (CLECO) - S.W. Shreevport 345kV (CLECO)	-208
Champagne - Plaisance (CLECO) 138kV	West Fork - Wells 230kV	-166
International Paper - Wallake 138kV (CLECO)	Dolet Hills (CLECO) - S.W. Shreevport 345kV (CLECO)	-146
Champagne - Plaisance (CLECO) 138kV	Vatican - Scott1 138kV	-117
Champagne - Plaisance (CLECO) 138kV	Colfax (CLECO) - Rodemacher 230kV	-58
Champagne - Plaisance (CLECO) 138kV	Colfax (CLECO) - Montgomery 230kV	-47
Plaisance (CLECO) - NAPOLWF (CLECO) 138kV	Cocodrie (CLECO) - Vil Plat (CLECO) 230kV	-17
Vil Plat (CLECO) - West Fork (CLECO) 230kV	Colfax (CLECO) - Rodemacher 230kV	-14
Champagne - Plaisance (CLECO) 138kV	Dolet Hills (CLECO) - S.W. Shreevport 345kV (CLECO)	10
Champagne - Plaisance (CLECO) 138kV	Riverbend - Fancy Point 230kV	13
Plaisance (CLECO) - NAPOLWF (CLECO) 138kV	Vil Plat (CLECO) - West Fork (CLECO) 230kV	15
Winnfield 230/115kV transformer	Clarence (CLECO) - Montgomery 230kV	18
Vil Plat (CLECO) - West Fork (CLECO) 230kV	Colfax (CLECO) - Montgomery 230kV	32
Plaisance (CLECO) - NAPOLWF (CLECO) 138kV	West Fork - Wells 230kV	63
Ringgold LA - Sailes 115kV	Dolet Hills (CLECO) - S.W. Shreevport 345kV (CLECO)	107
Champagne - Plaisance (CLECO) 138kV	Base Case	112
Ringgold LA - Carroll (CLECO) 138kV	Dolet Hills (CLECO) - S.W. Shreevport 345kV (CLECO)	126
Vil Plat (CLECO) - West Fork (CLECO) 230kV	Plaisance (CLECO) - NAPOLWF (CLECO) 138kV	141

EES

Limiting Element	Contingency Element	ATC
Vatican - Scott1 138kV	Plaisance (CLECO) - NAPOLWF (CLECO) 138kV	-771
East Leesville (CLECO) - Rodemacher 230kV (CLECO)	Colfax (CLECO) - Rodemacher 230kV	-420
East Leesville (CLECO) - Rodemacher 230kV (CLECO)	Colfax (CLECO) - Montgomery 230kV	-298
Champagne - Plaisance (CLECO) 138kV	Cocodrie (CLECO) - Vil Plat (CLECO) 230kV	-235
Champagne - Plaisance (CLECO) 138kV	Vil Plat (CLECO) - West Fork (CLECO) 230kV	-205
Champagne - Plaisance (CLECO) 138kV	West Fork - Wells 230kV	-159
Champagne - Plaisance (CLECO) 138kV	Vatican - Scott1 138kV	-112
Champagne - Plaisance (CLECO) 138kV	Colfax (CLECO) - Rodemacher 230kV	-57
Champagne - Plaisance (CLECO) 138kV	Colfax (CLECO) - Montgomery 230kV	-47
Plaisance (CLECO) - NAPOLWF (CLECO) 138kV	Cocodrie (CLECO) - Vil Plat (CLECO) 230kV	-16
Vil Plat (CLECO) - West Fork (CLECO) 230kV	Colfax (CLECO) - Rodemacher 230kV	-13
Champagne - Plaisance (CLECO) 138kV	Dolet Hills (CLECO) - S.W. Shreevport 345kV (CLECO)	10
Champagne - Plaisance (CLECO) 138kV	Riverbend - Fancy Point 230kV	13
Plaisance (CLECO) - NAPOLWF (CLECO) 138kV	Vil Plat (CLECO) - West Fork (CLECO) 230kV	14
Winnfield 230/115kV transformer	Clarence (CLECO) - Montgomery 230kV	27
Vil Plat (CLECO) - West Fork (CLECO) 230kV	Colfax (CLECO) - Montgomery 230kV	31
Plaisance (CLECO) - NAPOLWF (CLECO) 138kV	West Fork - Wells 230kV	60
Champagne - Plaisance (CLECO) 138kV	Base Case	109
Vil Plat (CLECO) - West Fork (CLECO) 230kV	Plaisance (CLECO) - NAPOLWF (CLECO) 138kV	129

EMI

Limiting Element	Contingency Element	ATC
Vatican - Scott1 138kV	Plaisance (CLECO) - NAPOLWF (CLECO) 138kV	-707
International Paper - Mansfield 138kV (CLECO)	Dolet Hills (CLECO) - S.W. Shreevport 345kV (CLECO)	-528
East Leesville (CLECO) - Rodemacher 230kV (CLECO)	Colfax (CLECO) - Rodemacher 230kV	-443
East Leesville (CLECO) - Rodemacher 230kV (CLECO)	Colfax (CLECO) - Montgomery 230kV	-314
Champagne - Plaisance (CLECO) 138kV	Cocodrie (CLECO) - Vil Plat (CLECO) 230kV	-237
Champagne - Plaisance (CLECO) 138kV	Vil Plat (CLECO) - West Fork (CLECO) 230kV	-207
International Paper - Wallake 138kV (CLECO)	Dolet Hills (CLECO) - S.W. Shreevport 345kV (CLECO)	-192
Champagne - Plaisance (CLECO) 138kV	West Fork - Wells 230kV	-161

Limiting Element	Contingency Element	ATC
Champagne - Plaisance (CLECO) 138kV	Vatican - Scott1 138kV	-112
Champagne - Plaisance (CLECO) 138kV	Colfax (CLECO) - Rodemacher 230kV	-57
Champagne - Plaisance (CLECO) 138kV	Colfax (CLECO) - Montgomery 230kV	-47
Plaisance (CLECO) - NAPOLWF (CLECO) 138kV	Cocodrie (CLECO) - Vil Plat (CLECO) 230kV	-16
Vil Plat (CLECO) - West Fork (CLECO) 230kV	Colfax (CLECO) - Rodemacher 230kV	-13
Champagne - Plaisance (CLECO) 138kV	Dolet Hills (CLECO) - S.W. Shreevport 345kV (CLECO)	10
Champagne - Plaisance (CLECO) 138kV	Riverbend - Fancy Point 230kV	13
Plaisance (CLECO) - NAPOLWF (CLECO) 138kV	Vil Plat (CLECO) - West Fork (CLECO) 230kV	14
Winnfield 230/115kV transformer	Clarence (CLECO) - Montgomery 230kV	21
Vil Plat (CLECO) - West Fork (CLECO) 230kV	Colfax (CLECO) - Montgomery 230kV	31
Plaisance (CLECO) - NAPOLWF (CLECO) 138kV	West Fork - Wells 230kV	61
Champagne - Plaisance (CLECO) 138kV	Base Case	109
Vil Plat (CLECO) - West Fork (CLECO) 230kV	Plaisance (CLECO) - NAPOLWF (CLECO) 138kV	133

APPENDIX C: Details of Scenario 2 - 2016

AEPW

Limiting Element	Contingency Element	ATC
Mabelvale - Sheridan 500kV	Keo - White Bluff 500kV	-
Champagne - Plaisance (CLECO) 138kV	Cocodrie (CLECO) - Vil Plat (CLECO) 230kV	-53
Keo - White Bluff 500kV	Mabelvale - Sheridan 500kV	-23
Champagne - Plaisance (CLECO) 138kV	Vil Plat (CLECO) - West Fork (CLECO) 230kV	-21
Champagne - Plaisance (CLECO) 138kV	Vatican - Scott1 138kV	14
Champagne - Plaisance (CLECO) 138kV	West Fork - Wells 230kV	28
Champagne - Plaisance (CLECO) 138kV	Colfax (CLECO) - Rodemacher 230kV	125
Champagne - Plaisance (CLECO) 138kV	Riverbend - Fancy Point 230kV	131
Champagne - Plaisance (CLECO) 138kV	Colfax (CLECO) - Montgomery 230kV	136
Champagne - Plaisance (CLECO) 138kV	Roy S. Nelson - Richard 500kV	149

CLECO

Limiting Element	Contingency Element	ATC
Champagne - Plaisance (CLECO) 138kV	Cocodrie (CLECO) - Vil Plat (CLECO) 230kV	-64
Champagne - Plaisance (CLECO) 138kV	Vil Plat (CLECO) - West Fork (CLECO) 230kV	-26
Champagne - Plaisance (CLECO) 138kV	Vatican - Scott1 138kV	16
Champagne - Plaisance (CLECO) 138kV	West Fork - Wells 230kV	34
Champagne - Plaisance (CLECO) 138kV	Riverbend - Fancy Point 230kV	148
Champagne - Plaisance (CLECO) 138kV	Colfax (CLECO) - Rodemacher 230kV	149

EAI

Limiting Element	Contingency Element	ATC
Champagne - Plaisance (CLECO) 138kV	Cocodrie (CLECO) - Vil Plat (CLECO) 230kV	-52
Champagne - Plaisance (CLECO) 138kV	Vil Plat (CLECO) - West Fork (CLECO) 230kV	-21
Champagne - Plaisance (CLECO) 138kV	Vatican - Scott1 138kV	13
Champagne - Plaisance (CLECO) 138kV	West Fork - Wells 230kV	28
Champagne - Plaisance (CLECO) 138kV	Colfax (CLECO) - Rodemacher 230kV	124
Champagne - Plaisance (CLECO) 138kV	Riverbend - Fancy Point 230kV	129
Champagne - Plaisance (CLECO) 138kV	Colfax (CLECO) - Montgomery 230kV	135
Champagne - Plaisance (CLECO) 138kV	Roy S. Nelson - Richard 500kV	147

EES

Limiting Element	Contingency Element	ATC
Vatican - Scott1 138kV	Plaisance (CLECO) - NAPOLWF (CLECO) 138kV	-492
Champagne - Plaisance (CLECO)	Cocodrie (CLECO) - Vil Plat (CLECO) 230kV	-50

Limiting Element	Contingency Element	ATC
138kV		
Champagne - Plaisance (CLECO) 138kV	Vil Plat (CLECO) - West Fork (CLECO) 230kV	-20
Champagne - Plaisance (CLECO) 138kV	Vatican - Scott1 138kV	13
Champagne - Plaisance (CLECO) 138kV	West Fork - Wells 230kV	26
Champagne - Plaisance (CLECO) 138kV	Colfax (CLECO) - Rodemacher 230kV	122
Champagne - Plaisance (CLECO) 138kV	Riverbend - Fancy Point 230kV	126
Champagne - Plaisance (CLECO) 138kV	Colfax (CLECO) - Montgomery 230kV	133
Champagne - Plaisance (CLECO) 138kV	Roy S. Nelson - Richard 500kV	141

EMI

Limiting Element	Contingency Element	ATC
Mabelvale - Sheridan 500kV	Keo - White Bluff 500kV	-4394
Keo - West Memphis EHV 500kV	Sansouci - Shelby TN (TVA) 500kV	-1032
Vatican - Scott1 138kV	Plaisance (CLECO) - NAPOLWF (CLECO) 138kV	-451
Champagne - Plaisance (CLECO) 138kV	Cocodrie (CLECO) - Vil Plat (CLECO) 230kV	-50
Keo - White Bluff 500kV	Mabelvale - Sheridan 500kV	-45
Champagne - Plaisance (CLECO) 138kV	Vil Plat (CLECO) - West Fork (CLECO) 230kV	-20
Champagne - Plaisance (CLECO) 138kV	Vatican - Scott1 138kV	13
Champagne - Plaisance (CLECO) 138kV	West Fork - Wells 230kV	27
Champagne - Plaisance (CLECO) 138kV	Colfax (CLECO) - Rodemacher 230kV	122
Champagne - Plaisance (CLECO) 138kV	Riverbend - Fancy Point 230kV	126
Champagne - Plaisance (CLECO) 138kV	Colfax (CLECO) - Montgomery 230kV	132
Champagne - Plaisance (CLECO) 138kV	Roy S. Nelson - Richard 500kV	141

APPENDIX D: Details of Scenario 3 - 2016

AEPW

Limiting Element	Contingency Element	ATC
East Leesville (CLECO) - Rodemacher 230kV (CLECO)	Colfax (CLECO) - Rodemacher 230kV	-419
East Leesville (CLECO) - Rodemacher 230kV (CLECO)	Colfax (CLECO) - Montgomery 230kV	-314
International Paper - Mansfield 138kV (CLECO)	Dolet Hills (CLECO) - S.W. Shreevport 345kV (CLECO)	-218
Champagne - Plaisance (CLECO) 138kV	Cocodrie (CLECO) - Vil Plat (CLECO) 230kV	-212
Champagne - Plaisance (CLECO) 138kV	Vil Plat (CLECO) - West Fork (CLECO) 230kV	-181
Champagne - Plaisance (CLECO) 138kV	West Fork - Wells 230kV	-133
International Paper - Wallake 138kV (CLECO)	Dolet Hills (CLECO) - S.W. Shreevport 345kV (CLECO)	-62
Champagne - Plaisance (CLECO) 138kV	Colfax (CLECO) - Rodemacher 230kV	-40
Champagne - Plaisance (CLECO) 138kV	Colfax (CLECO) - Montgomery 230kV	-30
Plaisance (CLECO) - NAPOLWF (CLECO) 138kV	Cocodrie (CLECO) - Vil Plat (CLECO) 230kV	20
Champagne - Plaisance (CLECO) 138kV	Dolet Hills (CLECO) - S.W. Shreevport 345kV (CLECO)	27
Champagne - Plaisance (CLECO) 138kV	Riverbend - Fancy Point 230kV	31
Champagne - Plaisance (CLECO) 138kV	Coughlin (CLECO) - Manuel (CLECO) 138kV	34
Plaisance (CLECO) - NAPOLWF (CLECO) 138kV	Vil Plat (CLECO) - West Fork (CLECO) 230kV	51
Vil Plat (CLECO) - West Fork (CLECO) 230kV	Colfax (CLECO) - Rodemacher 230kV	55
Winnfield 230/115kV transformer	Clarence (CLECO) - Montgomery 230kV	58
Plaisance (CLECO) - NAPOLWF (CLECO) 138kV	West Fork - Wells 230kV	99
Vil Plat (CLECO) - West Fork (CLECO) 230kV	Colfax (CLECO) - Montgomery 230kV	101
Leesville 230/138kV transformer (CLECO)	Colfax (CLECO) - Rodemacher 230kV	115
Champagne - Plaisance (CLECO) 138kV	Base Case	129

CLECO

Limiting Element	Contingency Element	ATC
Champagne - Plaisance (CLECO) 138kV	Cocodrie (CLECO) - Vil Plat (CLECO) 230kV	-255
Champagne - Plaisance (CLECO) 138kV	Vil Plat (CLECO) - West Fork (CLECO) 230kV	-218
Champagne - Plaisance (CLECO) 138kV	West Fork - Wells 230kV	-160
Champagne - Plaisance (CLECO) 138kV	Colfax (CLECO) - Rodemacher 230kV	-47
Champagne - Plaisance (CLECO) 138kV	Colfax (CLECO) - Montgomery 230kV	-35
Plaisance (CLECO) - NAPOLWF (CLECO) 138kV	Cocodrie (CLECO) - Vil Plat (CLECO) 230kV	24
Champagne - Plaisance (CLECO) 138kV	Dolet Hills (CLECO) - S.W. Shreevport 345kV (CLECO)	32

Limiting Element	Contingency Element	ATC
Champagne - Plaisance (CLECO) 138kV	Riverbend - Fancy Point 230kV	34
Champagne - Plaisance (CLECO) 138kV	Coughlin (CLECO) - Manuel (CLECO) 138kV	39
Plaisance (CLECO) - NAPOLWF (CLECO) 138kV	Vil Plat (CLECO) - West Fork (CLECO) 230kV	61
Plaisance (CLECO) - NAPOLWF (CLECO) 138kV	West Fork - Wells 230kV	119
Champagne - Plaisance (CLECO) 138kV	Base Case	144

EAI

Limiting Element	Contingency Element	ATC
East Leesville (CLECO) - Rodemacher 230kV (CLECO)	Colfax (CLECO) - Rodemacher 230kV	-464
International Paper - Mansfield 138kV (CLECO)	Dolet Hills (CLECO) - S.W. Shreevport 345kV (CLECO)	-360
East Leesville (CLECO) - Rodemacher 230kV (CLECO)	Colfax (CLECO) - Montgomery 230kV	-348
Champagne - Plaisance (CLECO) 138kV	Cocodrie (CLECO) - Vil Plat (CLECO) 230kV	-207
Champagne - Plaisance (CLECO) 138kV	Vil Plat (CLECO) - West Fork (CLECO) 230kV	-177
Ringgold LA 138/115kV transformer	Dolet Hills (CLECO) - S.W. Shreevport 345kV (CLECO)	-151
Champagne - Plaisance (CLECO) 138kV	West Fork - Wells 230kV	-130
International Paper - Wallake 138kV (CLECO)	Dolet Hills (CLECO) - S.W. Shreevport 345kV (CLECO)	-102
Champagne - Plaisance (CLECO) 138kV	Colfax (CLECO) - Rodemacher 230kV	-40
Champagne - Plaisance (CLECO) 138kV	Colfax (CLECO) - Montgomery 230kV	-29
Plaisance (CLECO) - NAPOLWF (CLECO) 138kV	Cocodrie (CLECO) - Vil Plat (CLECO) 230kV	20
Champagne - Plaisance (CLECO) 138kV	Dolet Hills (CLECO) - S.W. Shreevport 345kV (CLECO)	27
Champagne - Plaisance (CLECO) 138kV	Riverbend - Fancy Point 230kV	30
Champagne - Plaisance (CLECO) 138kV	Coughlin (CLECO) - Manuel (CLECO) 138kV	33
Plaisance (CLECO) - NAPOLWF (CLECO) 138kV	Vil Plat (CLECO) - West Fork (CLECO) 230kV	50
Vil Plat (CLECO) - West Fork (CLECO) 230kV	Colfax (CLECO) - Rodemacher 230kV	53
Winnfield 230/115kV transformer	Clarence (CLECO) - Montgomery 230kV	58
Plaisance (CLECO) - NAPOLWF (CLECO) 138kV	West Fork - Wells 230kV	96
Vil Plat (CLECO) - West Fork (CLECO) 230kV	Colfax (CLECO) - Montgomery 230kV	98
Champagne - Plaisance (CLECO) 138kV	Base Case	127
Leesville 230/138kV transformer (CLECO)	Colfax (CLECO) - Rodemacher 230kV	128

EES

Limiting Element	Contingency Element	ATC
East Leesville (CLECO) - Rodemacher 230kV (CLECO)	Colfax (CLECO) - Rodemacher 230kV	-500

Limiting Element	Contingency Element	ATC
East Leesville (CLECO) - Rodemacher 230kV (CLECO)	Colfax (CLECO) - Montgomery 230kV	-375
Champagne - Plaisance (CLECO) 138kV	Cocodrie (CLECO) - Vil Plat (CLECO) 230kV	-198
Champagne - Plaisance (CLECO) 138kV	Vil Plat (CLECO) - West Fork (CLECO) 230kV	-169
Champagne - Plaisance (CLECO) 138kV	West Fork - Wells 230kV	-124
Champagne - Plaisance (CLECO) 138kV	Colfax (CLECO) - Rodemacher 230kV	-39
Champagne - Plaisance (CLECO) 138kV	Colfax (CLECO) - Montgomery 230kV	-29
Plaisance (CLECO) - NAPOLWF (CLECO) 138kV	Cocodrie (CLECO) - Vil Plat (CLECO) 230kV	19
Champagne - Plaisance (CLECO) 138kV	Dolet Hills (CLECO) - S.W. Shreevport 345kV (CLECO)	26
Champagne - Plaisance (CLECO) 138kV	Riverbend - Fancy Point 230kV	29
Champagne - Plaisance (CLECO) 138kV	Coughlin (CLECO) - Manuel (CLECO) 138kV	32
Plaisance (CLECO) - NAPOLWF (CLECO) 138kV	Vil Plat (CLECO) - West Fork (CLECO) 230kV	48
Vil Plat (CLECO) - West Fork (CLECO) 230kV	Colfax (CLECO) - Rodemacher 230kV	52
Winnfield 230/115kV transformer	Clarence (CLECO) - Montgomery 230kV	88
Plaisance (CLECO) - NAPOLWF (CLECO) 138kV	West Fork - Wells 230kV	92
Vil Plat (CLECO) - West Fork (CLECO) 230kV	Colfax (CLECO) - Montgomery 230kV	95
Champagne - Plaisance (CLECO) 138kV	Base Case	123
Leesville 230/138kV transformer (CLECO)	Colfax (CLECO) - Rodemacher 230kV	138

EMI

Limiting Element	Contingency Element	ATC
East Leesville (CLECO) - Rodemacher 230kV (CLECO)	Colfax (CLECO) - Rodemacher 230kV	-526
International Paper - Mansfield 138kV (CLECO)	Dolet Hills (CLECO) - S.W. Shreevport 345kV (CLECO)	-475
East Leesville (CLECO) - Rodemacher 230kV (CLECO)	Colfax (CLECO) - Montgomery 230kV	-394
Champagne - Plaisance (CLECO) 138kV	Cocodrie (CLECO) - Vil Plat (CLECO) 230kV	-200
Champagne - Plaisance (CLECO) 138kV	Vil Plat (CLECO) - West Fork (CLECO) 230kV	-171
International Paper - Wallake 138kV (CLECO)	Dolet Hills (CLECO) - S.W. Shreevport 345kV (CLECO)	-134
Champagne - Plaisance (CLECO) 138kV	West Fork - Wells 230kV	-126
Champagne - Plaisance (CLECO) 138kV	Colfax (CLECO) - Rodemacher 230kV	-39
Champagne - Plaisance (CLECO) 138kV	Colfax (CLECO) - Montgomery 230kV	-29
Plaisance (CLECO) - NAPOLWF (CLECO) 138kV	Cocodrie (CLECO) - Vil Plat (CLECO) 230kV	19
Champagne - Plaisance (CLECO) 138kV	Dolet Hills (CLECO) - S.W. Shreevport 345kV (CLECO)	26
Champagne - Plaisance (CLECO) 138kV	Riverbend - Fancy Point 230kV	29
Champagne - Plaisance (CLECO) 138kV	Coughlin (CLECO) - Manuel (CLECO)	33

Limiting Element	Contingency Element	ATC
	138kV	
Plaisance (CLECO) - NAPOLWF (CLECO) 138kV	Vil Plat (CLECO) - West Fork (CLECO) 230kV	48
Vil Plat (CLECO) - West Fork (CLECO) 230kV	Colfax (CLECO) - Rodemacher 230kV	51
Winnfield 230/115kV transformer	Clarence (CLECO) - Montgomery 230kV	66
Plaisance (CLECO) - NAPOLWF (CLECO) 138kV	West Fork - Wells 230kV	93
Vil Plat (CLECO) - West Fork (CLECO) 230kV	Colfax (CLECO) - Montgomery 230kV	94
Champagne - Plaisance (CLECO) 138kV	Base Case	124
Leesville 230/138kV transformer (CLECO)	Colfax (CLECO) - Rodemacher 230kV	145

APPENDIX E: Details of Scenario 4 - 2016

AEPW

Limiting Element	Contingency Element	ATC
Champagne - Plaisance (CLECO) 138kV	Cocodrie (CLECO) - Vil Plat (CLECO) 230kV	-17
Champagne - Plaisance (CLECO) 138kV	Vil Plat (CLECO) - West Fork (CLECO) 230kV	14
Keo - White Bluff 500kV	Mabelvale - Sheridan 500kV	15
Champagne - Plaisance (CLECO) 138kV	West Fork - Wells 230kV	62
Champagne - Plaisance (CLECO) 138kV	Colfax (CLECO) - Rodemacher 230kV	137
Champagne - Plaisance (CLECO) 138kV	Riverbend - Fancy Point 230kV	145
Champagne - Plaisance (CLECO) 138kV	Colfax (CLECO) - Montgomery 230kV	147

CLECO

Limiting Element	Contingency Element	ATC
Champagne - Plaisance (CLECO) 138kV	Cocodrie (CLECO) - Vil Plat (CLECO) 230kV	-20
Champagne - Plaisance (CLECO) 138kV	Vil Plat (CLECO) - West Fork (CLECO) 230kV	17
Champagne - Plaisance (CLECO) 138kV	West Fork - Wells 230kV	74

EAI

Limiting Element	Contingency Element	ATC
Champagne - Plaisance (CLECO) 138kV	Cocodrie (CLECO) - Vil Plat (CLECO) 230kV	-53
Champagne - Plaisance (CLECO) 138kV	Vil Plat (CLECO) - West Fork (CLECO) 230kV	-21
Champagne - Plaisance (CLECO) 138kV	Cocodrie (CLECO) - Vil Plat (CLECO) 230kV	-16
Champagne - Plaisance (CLECO) 138kV	Vil Plat (CLECO) - West Fork (CLECO) 230kV	14
Champagne - Plaisance (CLECO) 138kV	West Fork - Wells 230kV	60
Champagne - Plaisance (CLECO) 138kV	Colfax (CLECO) - Rodemacher 230kV	136
Champagne - Plaisance (CLECO) 138kV	Riverbend - Fancy Point 230kV	142
Champagne - Plaisance (CLECO) 138kV	Colfax (CLECO) - Montgomery 230kV	146

EES

Limiting Element	Contingency Element	ATC
Champagne - Plaisance (CLECO) 138kV	Cocodrie (CLECO) - Vil Plat (CLECO) 230kV	-16
Champagne - Plaisance (CLECO) 138kV	Vil Plat (CLECO) - West Fork (CLECO) 230kV	13
Champagne - Plaisance (CLECO) 138kV	West Fork - Wells 230kV	58
Champagne - Plaisance (CLECO) 138kV	Colfax (CLECO) - Rodemacher 230kV	134
Champagne - Plaisance (CLECO) 138kV	Riverbend - Fancy Point 230kV	138
Champagne - Plaisance (CLECO) 138kV	Colfax (CLECO) - Montgomery 230kV	144

EMI

Limiting Element	Contingency Element	ATC
Keo - West Memphis EHV 500kV	Sansouci - Shelby TN (TVA) 500kV	-849
Champagne - Plaisance (CLECO) 138kV	Cocodrie (CLECO) - Vil Plat (CLECO) 230kV	-16
Champagne - Plaisance (CLECO) 138kV	Vil Plat (CLECO) - West Fork (CLECO) 230kV	14
Keo - White Bluff 500kV	Mabelvale - Sheridan 500kV	31
Champagne - Plaisance (CLECO) 138kV	West Fork - Wells 230kV	58
Champagne - Plaisance (CLECO) 138kV	Colfax (CLECO) - Rodemacher 230kV	133
Champagne - Plaisance (CLECO) 138kV	Riverbend - Fancy Point 230kV	139
Champagne - Plaisance (CLECO) 138kV	Colfax (CLECO) - Montgomery 230kV	144

