

***Generation Interconnection
Feasibility Study Report***

For

***PJM Generation Interconnection Request
Queue Position AC2-079***

***Ivor - Oakridge 115kV
38 MW Capacity / 100 MW Energy***

October / 2017

Introduction

This Feasibility Study has been prepared in accordance with the PJM Open Access Transmission Tariff, 36.2, as well as the Feasibility Study Agreement between the Interconnection Customer (IC), and PJM Interconnection, LLC (PJM), Transmission Provider (TP). The Interconnected Transmission Owner (ITO) is Virginia Electric and Power Company (VEPCO).

Preface

The intent of the Feasibility Study is to determine a plan, with high level estimated cost and construction time estimates, to connect the subject generation to the PJM network at a location specified by the IC. The IC may request the interconnection of generation as a capacity resource or as an energy-only resource. As a requirement for interconnection, the IC may be responsible for the cost of constructing: (1) Direct Connections, which are new facilities and/or facilities upgrades needed to connect the generator to the PJM network, and (2) Network Upgrades, which are facility additions, or upgrades to existing facilities, that are needed to maintain the reliability of the PJM system.

In some instances a generator interconnection may not be responsible for 100% of the identified network upgrade cost because other transmission network uses, e.g. another generation interconnection, may also contribute to the need for the same network reinforcement. The possibility of sharing the reinforcement costs with other projects may be identified in the Feasibility Study, but the actual allocation will be deferred until the Impact Study is performed.

The Feasibility Study estimates do not include the feasibility, cost, or time required to obtain property rights and permits for construction of the required facilities. The IC is responsible for the right of way, real estate, and construction permit issues. For properties currently owned by ITO, the costs may be included in the study.

General

The IC has proposed a solar generating facility located in Isle of Wight County, Virginia. The installed facilities will have a total capability of 100 MW with 38 MW of this output being recognized by PJM as capacity. The proposed in-service date for this project is 12/31/2019.

This study does not imply an ITO commitment to this in-service date.

Point of Interconnection

AC2-079 will interconnect with the ITO transmission system at one of the following points of interconnection:

Option 1 AC2-079 will connect via a new three breaker ring bus switching station that connects on the Ivor - Oakridge 115kV line.

Option 2 AC2-079 will connect via a new three breaker ring bus switching station that connects on the Myrtle - Windsor 115kV line.

Cost Summary

The AC2-079 project will be responsible for the following costs:

Description	Total Cost
Attachment Facilities	\$ 1,550,000
Direct Connection Network Upgrades	\$ 5,500,000
Non Direct Connection Network Upgrades	\$ 800,000
Total Costs	\$ 7,850,000

In addition, the AC2-079 project may be responsible for a contribution to the following costs:

Description	Total Cost
New System Upgrades	\$ 64,960,000
Previously Identified Upgrades	\$ 17,500,000
Total Costs	\$ 82,460,000

Cost allocations for these upgrades will be provided in the System Impact Study Report.

System Reinforcement

Violation #	Upgrade Description	Upgrade Cost
1-6	Wreck and rebuild the Bell Avenue - Bakers Pond – Poe 115kV line #106 of 32.48 miles for a higher capacity since the overload exceeds the conductor rating. Estimated cost \$64,960,000 dollars and it is estimated to take 30-36 months to permit (VA CPCN Required), engineer and construct.	\$64,960,000
7	Replace the existing transformer at Elmont Substation with a larger unit. The estimated cost is \$17,500,000 and it is estimated to 24-30 months to engineer and construct.	\$17,500,000
Total Network Upgrades		\$82,460,000

Attachment Facilities

Generation Substation: Install metering and associated protection equipment. Estimated Cost \$550,000.

Transmission: Construct approximately one span of 115 kV Attachment line between the generation substation and a new AC2-079 Switching Station. The estimated cost for this work is \$1,000,000.

The estimated total cost of the Attachment Facilities is \$1,550,000. It is estimated to take 18-24 months to complete this work. These preliminary cost estimates are based on typical engineering costs. A more detailed engineering cost estimates are normally done when the IC provides an exact site plan location for the generation substation during the Facility Study phase. These costs do not include CIAC Tax Gross-up.

Direct Connection Cost Estimate

Substation: Establish the new 115 kV AC2-079 Switching Substation (interconnection substation). The estimated cost of this work scope is \$5,500,000. It is estimated to take 24-36 months to complete this work.

Non-Direct Connection Cost Estimate

Transmission: Install transmission structure in-line with transmission line to allow the proposed interconnection switching station to be interconnected with the transmission system. The estimated cost is \$800,000 and is estimated to take 24-30 months to complete.

Remote Terminal Work: During the Facilities Study, ITO's System Protection Engineering Department will review transmission line protection as well as anti-islanding required to accommodate the new generation and interconnection substation. System Protection Engineering will determine the minimal acceptable protection requirements to reliably interconnect the proposed generating facility with the transmission system. The review is based on maintaining system reliability by reviewing ITO's protection requirements with the known transmission system configuration which includes generating facilities in the area. This review may determine that transmission line protection and communication upgrades are required at remote substations.

Interconnection Customer Requirements

ITO's Facility Connection Requirements as posted on PJM's website

<http://www.pjm.com/~media/planning/plan-standards/private-dominion/facility-connection-requirements1.ashx>

An Interconnection Customer entering the New Services Queue on or after October 1, 2012 with a proposed new Customer Facility that has a Maximum Facility Output equal to or greater than 100 MW shall install and maintain, at its expense, phasor measurement units (PMUs). See Section 8.5.3 of Appendix 2 to the Interconnection Service Agreement as well as section 4.3 of PJM Manual 14D for additional information.

Voltage Ride Through Requirements - The Customer Facility shall be designed to remain in service (not trip) for voltages and times as specified for the Eastern Interconnection in Attachment 1 of NERC Reliability Standard PRC-024-1, and successor Reliability Standards, for both high and low voltage conditions, irrespective of generator size, subject to the permissive trip exceptions established in PRC-024-1 (and successor Reliability Standards).

Frequency Ride Through Requirements - The Customer Facility shall be designed to remain in service (not trip) for frequencies and times as specified in Attachment 2 of NERC Reliability Standard PRC-024-1, and successor Reliability Standards, for both high and low frequency condition, irrespective of generator size, subject to the permissive trip exceptions established in PRC-024-1 (and successor Reliability Standards).

Reactive Power - The Generation Interconnection Customer shall design its non-synchronous Customer Facility with the ability to maintain a power factor of at least 0.95 leading to 0.95 lagging measured at the generator's terminals.

Revenue Metering and SCADA Requirements

PJM Requirements

The IC will be required to install equipment necessary to provide Revenue Metering (KWH, KVARH) and real time data (KW, KVAR) for IC's generating Resource. See PJM Manuals M-01 and M-14D, and PJM Tariff Sections 24.1 and 24.2.

Meteorological Data Reporting Requirement

The solar generation facility shall provide the Transmission Provider with site-specific meteorological data including:

- Temperature (degrees Fahrenheit)
- Atmospheric pressure (hectopascals)
- Irradiance
- Forced outage data

Network Impacts

The Queue Project AC2-079 was evaluated as a 100 MW (Capacity 38 MW) injection tapping the Ivor - Oakridge 115kV line in the ITO area. Project AC2-079 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AC2-079 was studied with a commercial probability of 53%. Potential network impacts were as follows:

Contingency Descriptions

The following contingencies resulted in overloads:

Contingency Name	Description
2342_A	CONTINGENCY '2342_A' /* 2342 @ SUFFOLK OPEN BRANCH FROM BUS 314206 TO BUS 314529 CKT 1 /* 3OAKRIDG 115.00 - 3KINGS F 115.00 OPEN BRANCH FROM BUS 314206 TO BUS 314532 CKT Z1 /* 3OAKRIDG 115.00 - 3OAKRI23 115.00 OPEN BRANCH FROM BUS 931590 TO BUS 314532 CKT 1 /* AC2-079 TAP 115.00 - 3OAKRI23 115.00 OPEN BRANCH FROM BUS 314532 TO BUS 314536 CKT 1 /* 3OAKRI23 115.00 - 3SUFFOLK 115.00 OPEN BRANCH FROM BUS 314536 TO BUS 314537 CKT 1 /* SUFFOLK 230-115 TX#2 END
23T44_A	CONTINGENCY '23T44_A' /* 23T44 @ SUFFOLK OPEN BRANCH FROM BUS 314206 TO BUS 314529 CKT 1 /* 3OAKRIDG 115.00 - 3KINGS F 115.00 OPEN BRANCH FROM BUS 314206 TO BUS 314532 CKT Z1 /* 3OAKRIDG 115.00 - 3OAKRI23 115.00 OPEN BRANCH FROM BUS 931590 TO BUS 314532 CKT 1 /* AC2-079 TAP 115.00 - 3OAKRI23 115.00 OPEN BRANCH FROM BUS 314532 TO BUS 314536 CKT 1 /* 3OAKRI23 115.00 - 3SUFFOLK 115.00 OPEN BRANCH FROM BUS 313803 TO BUS 314531 CKT 1 /* 3OAKRI44 115.00 - 3MYRTLE 115.00 OPEN BRANCH FROM BUS 313803 TO BUS 314536 CKT 1 /* 3OAKRI44 115.00 - 3SUFFOLK 115.00 OPEN BRANCH FROM BUS 314531 TO BUS 924940 CKT 1 /* 3MYRTLE 115.00 - AB2-149 TAP 115.00 OPEN BRANCH FROM BUS 314536 TO BUS 314823 CKT 1 /* SUFFOLK SC142 END
H2T557	CONTINGENCY 'H2T557' /* ELMONT OPEN BRANCH FROM BUS 314908 TO BUS 314903 CKT 1 /*ELMONT TO CHICKAHOMINY (LINE 557) OPEN BRANCH FROM BUS 314903 TO BUS 314214 CKT 1 /*CHICKAHOMINY 500-230 (TX#1) OPEN BRANCH FROM BUS 314908 TO BUS 314218 CKT 2 /*ELMONT 500-230 (TX#2) END

Contingency Name	Description
LN 106	CONTINGENCY 'LN 106' OPEN BRANCH FROM BUS 314262 TO BUS 314280 CKT 1 /* 3NEWBO_1 115.00 - 3NEWBOHE 115.00 OPEN BRANCH FROM BUS 314273 TO BUS 314280 CKT 1 /* 3BAKRS P 115.00 - 3NEWBOHE 115.00 OPEN BRANCH FROM BUS 314280 TO BUS 314329 CKT 1 /* 3NEWBOHE 115.00 - 3POE 115.00 OPEN BRANCH FROM BUS 313879 TO BUS 314273 CKT 1 /* 3SADL_2 115.00 - 3BAKRS P 115.00 OPEN BUS 314262 /* ISLAND OPEN BUS 314273 /* ISLAND OPEN BUS 314280 /* ISLAND END
LN 259	CONTINGENCY 'LN 259-2065' OPEN BRANCH FROM BUS 314276 TO BUS 314287 CKT 1 /* 6BASIN 230.00 - 6CHSTF B 230.00 OPEN BRANCH FROM BUS 314276 TO BUS 314339 CKT 1 /* 6BASIN 230.00 - 6SPRUNCE 230.00 END
LN 557	CONTINGENCY 'LN 557' OPEN BRANCH FROM BUS 314214 TO BUS 314903 CKT 1 /* 6CHCKAHM 230.00 - 8CHCKAHM 500.00 OPEN BRANCH FROM BUS 314903 TO BUS 314908 CKT 1 /* 8CHCKAHM 500.00 - 8ELMONT 500.00 END
LN 563	CONTINGENCY 'LN 563' OPEN BRANCH FROM BUS 314902 TO BUS 314914 CKT 1 /* 8CARSON 500.00 - 8MDLTHAN 500.00 END
LN 574	CONTINGENCY 'LN 574' OPEN BRANCH FROM BUS 314908 TO BUS 314911 CKT 1 /* 8ELMONT 500.00 - 8LDYSMTH 500.00 END
LN 576	CONTINGENCY 'LN 576' OPEN BRANCH FROM BUS 314322 TO BUS 314914 CKT 1 /* 6MDLTHAN 230.00 - 8MDLTHAN 500.00 OPEN BRANCH FROM BUS 314914 TO BUS 314918 CKT 1 /* 8MDLTHAN 500.00 - 8NO ANNA 500.00 END

Summer Peak Analysis – 2020

System Reinforcement responsible by ITO

#	Contingency		Affected Area	Facility Description	Bus			Power Flow	Loading %		Rating		MW Contribution
	Type	Name			From	To	Cir.		Initial	Final	Type	MVA	
1	DCTL	LN 208-259	DVP - DVP	6CHARCTY-6LAKESD 230 kV line	314225	314227	1	DC	140.53	141.34	LDR	459	8.21
2	LFFB	562T563	DVP - DVP	6CHARCTY-6LAKESD 230 kV line	314225	314227	1	DC	104.74	105.39	LDR	459	6.64
3	LFFB	T672B	DVP - DVP	6CHARCTY-6LAKESD 230 kV line	314225	314227	1	DC	106.09	106.85	LDR	459	7.71
4	DCTL	LN 259-2065	DVP - DVP	6CHARCTY-6LAKESD 230 kV line	314225	314227	1	DC	105.47	106.22	LDR	459	7.65
5	DCTL	LN 208-259	DVP - DVP	6MESSER-6CHARCTY 230 kV line	314228	314225	1	DC	152.28	153.08	LDR	459	8.21
6	LFFB	562T563	DVP - DVP	6MESSER-6CHARCTY 230 kV line	314228	314225	1	DC	116.46	117.11	LDR	459	6.64
7	LFFB	T672B	DVP - DVP	6MESSER-6CHARCTY 230 kV line	314228	314225	1	DC	117.81	118.57	LDR	459	7.71
8	DCTL	LN 259-2065	DVP - DVP	6MESSER-6CHARCTY 230 kV line	314228	314225	1	DC	117.19	117.94	LDR	459	7.65
9	DCTL	LN 208-259	DVP - DVP	6CHSTF B-6MESSER 230 kV line	314287	314228	1	DC	152.41	153.21	LDR	459	8.21
10	LFFB	562T563	DVP - DVP	6CHSTF B-6MESSER 230 kV line	314287	314228	1	DC	116.59	117.25	LDR	459	6.64
11	LFFB	T672B	DVP - DVP	6CHSTF B-6MESSER 230 kV line	314287	314228	1	DC	117.94	118.7	LDR	459	7.71
12	DCTL	LN 259-2065	DVP - DVP	6CHSTF B-6MESSER 230 kV line	314287	314228	1	DC	117.34	118.1	LDR	459	7.65

Item 1 – 12 PJM **baseline project (b2745)** will eliminate the identified overloads. The scheduled in service date for b2745 is 06/01/2020.

Generator Deliverability

(Single or N-1 contingencies for the Capacity portion only of the interconnection)

None

Multiple Facility Contingency

(Double Circuit Tower Line, Fault with a Stuck Breaker, and Bus Fault contingencies for the full energy output)

#	Contingency		Affected Area	Facility Description	Bus			Power Flow	Loading %		Rating		MW Contribution	Ref
	Type	Name			From	To	Cir.		Initial	Final	Type	MVA		
1	LFFB	23T44_A	DVP - DVP	3SADL_2-3BAKRS P 115 kV line	313879	314273	1	DC	97.57	171.1	LD	136	100	1
2	LFFB	2342_A	DVP - DVP	3SADL_2-3BAKRS P 115 kV line	313879	314273	1	DC	97.57	171.1	LD	136	100	
3	LFFB	23T44_A	DVP - DVP	3BAKRS P-3NEWBOHE 115 kV line	314273	314280	1	DC	85.96	159.49	LD	136	100	2
4	LFFB	2342_A	DVP - DVP	3BAKRS P-3NEWBOHE 115 kV line	314273	314280	1	DC	85.96	159.49	LD	136	100	
5	LFFB	2342_A	DVP - DVP	3NEWBOHE-3POE 115 kV line	314280	314329	1	DC	75.81	149.34	LD	136	100	3
6	LFFB	23T44_A	DVP - DVP	3NEWBOHE-3POE 115 kV line	314280	314329	1	DC	75.81	149.34	LD	136	100	

Short Circuit

(Summary of impacted circuit breakers)

New circuit breakers found to be over-duty:

None

Contributions to previously identified circuit breakers found to be over-duty:

None

Contribution to Previously Identified Overloads

(This project contributes to the following contingency overloads, i.e. "Network Impacts", identified for earlier generation or transmission interconnection projects in the PJM Queue)

#	Contingency		Affected Area	Facility Description	Bus			Power Flow	Loading %		Rating		MW Contribution	Ref
	Type	Name			From	To	Cir.		Initial	Final	Type	MVA		
7	LFFB	H2T557	DVP - DVP	8ELMONT 500/230 kV transformer	314218	314908	1	DC	119	119.75	LD	1051	17.6	4

Steady-State Voltage Requirements

(Summary of the VAR requirements based upon the results of the steady-state voltage studies)

To be determined during Impact Study

Stability and Reactive Power Requirement for Low Voltage Ride Through

(Summary of the VAR requirements based upon the results of the dynamic studies)

To be determined during Impact Study

New System Reinforcements

(Upgrades required to mitigate reliability criteria violations, i.e. Network Impacts, initially caused by the addition of this project generation)

Violation #	Overloaded Facility	Upgrade Description	Network Upgrade Number	Upgrade Cost
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Violation #	Overloaded Facility	Upgrade Description	Network Upgrade Number	Upgrade Cost
1-6	3SADL_2-3BAKRS P 115 kV 3BAKRS P-3NEWBOHE 115 kV line 3NEWBOHE-3POE 115 kV line	Wreck and rebuild the Bell Avenue - Bakers Pond – Poe 115kV line #106 of 32.48 miles for a higher capacity since the overload exceeds the conductor rating. Estimated cost \$64,960,000 dollars and it is estimated to take 30-36 months to permit (VA CPCN Required), engineer and construct. .	Pending	\$64,960,000
Total New Network Upgrades				\$64,960,000

Contribution to Previously Identified System Reinforcements

(Overloads initially caused by prior Queue positions with additional contribution to overloading by this project. This project may have a % allocation cost responsibility which will be calculated and reported for the Impact Study)

Violation #	Overloaded Facility	Upgrade Description	Network Upgrade Number	Upgrade Cost
7	8ELMONT 500/230 kV transformer	Replace the existing transformer with a larger unit. Estimated cost \$17,500,000 and it is estimated to 24-30 months to engineer and construct.	Pending	\$17,500,000
Total New Network Upgrades				\$17,500,000

Potential Congestion due to Local Energy Deliverability

PJM also studied the delivery of the energy portion of this interconnection request. Any problems identified below are likely to result in operational restrictions to the project under study. The IC can proceed with network upgrades to eliminate the operational restriction at their discretion by submitting a Merchant Transmission Interconnection request.

Note: Only the most severely overloaded conditions are listed below. There is no guarantee of full delivery of energy for this project by fixing only the conditions listed in this section. With a Transmission Interconnection Request, a subsequent analysis will be performed which shall study all overload conditions associated with the overloaded element(s) identified.

#	Contingency		Affected Area	Facility Description	Bus		Cir.	Power Flow	Loading %		Rating		MW Contribution
	Type	Name			From	To			Initial	Final	Type	MVA	
8	N-1	LN 557	DVP - DVP	6SKIFF CREEK-6KINGS M 230 kV line	314209	314386	1	DC	154.21	154.76	ER	442	5.36
9	N-1	LN 259	DVP - DVP	6CHARCTY-6LAKESD 230 kV line	314225	314227	1	DC	128.13	129.05	ER	375	7.68
10	N-1	LN 259	DVP - DVP	6MESSER-6CHARCTY 230 kV line	314228	314225	1	DC	142.5	143.42	ER	375	7.68
11	N-1	LN 563	DVP - DVP	6BERMUDA-6CHSTF A 230 kV line	314278	314286	1	DC	115.76	116.62	ER	449	8.6
12	N-1	LN 259	DVP - DVP	6CHSTF B-6MESSER 230 kV line	314287	314228	1	DC	142.66	143.58	ER	375	7.68
13	N-1	LN 563	DVP - DVP	6CHSTF B-6BASIN 230 kV line	314287	314276	1	DC	167.78	168.7	ER	449	9.17
14	N-1	LN 557	DVP - DVP	6PENNIMAN-6WALR209 230 kV line	314296	314415	1	DC	141.9	142.44	ER	442	5.36
15	N-1	LN 563	DVP - DVP	6HOPEWLL-6BERMUDA 230 kV line	314303	314278	1	DC	115.76	116.62	ER	449	8.6
16	N-1	LN 557	DVP - DVP	6KINGS M-6PENNIMAN 230 kV line	314386	314296	1	DC	145.77	146.31	ER	442	5.36
17	N-1	LN 557	DVP - DVP	6WALR209-6LIGH209 230 kV line	314415	314391	1	DC	126.12	126.67	ER	442	5.36
18	N-1	LN 106	DVP - DVP	3OAKRI23-3SUFFOLK 115 kV line	314532	314536	1	DC	98.9	189.06	ER	111	100
19	N-1	LN 557	DVP - DVP	8CARSON-8MDLTHAN 500 kV line	314902	314914	1	DC	145.1	145.57	ER	2442	25.53
20	N-1	LN 576	DVP - DVP	8CHCKAHM-8ELMONT 500 kV line	314903	314908	1	DC	155.39	155.93	ER	2442	29.09
21	N-1	LN 576	DVP - DVP	8ELMONT-8LDYSMTH 500 kV line	314908	314911	1	DC	179.68	180.25	ER	2442	30.93
22	N-1	LN 574	DVP - DVP	8MDLTHAN-8NO ANNA 500 kV line	314914	314918	1	DC	149.31	149.82	ER	2442	27.68
23	N-1	LN 576	DVP - DVP	8SURRY-8CHCKAHM 500	314924	314903	1	DC	111.59	112.19	ER	1809	24.2

				kV line									
24	N-1	LN 106	DVP - DVP	AC2-079 TAP-3OAKRI23 115 kV line	931590	314532	1	DC	119.73	209.88	ER	111	100

Light Load Analysis

Light Load Studies to be conducted during later study phases (as required by PJM Manual 14B).

ITO Analysis

ITO assessed the impact of the proposed Queue Project #AC2-079 interconnection of a 60 MW Energy (22.8 MW Capacity) injection into the ITO's Transmission System at a new interconnection switching station located between the Ivor – Oakridge 115kV line for compliance with NERC Reliability Criteria on ITO's Transmission System. The system was assessed using the summer 2020 RTEP case provided to ITO by PJM. When performing a generation analysis, ITO's main analysis will be load flow study results under single contingency (both normal and stressed system conditions). ITO Criteria considers a transmission facility overloaded if it exceeds 94% of its emergency rating under normal and stressed system conditions. A full listing of ITO's Planning Criteria and interconnection requirements can be found in the ITO's Facility Connection Requirements which are publicly available at: <http://www.dom.com>.

The results of these studies evaluate the system under a limited set of operating conditions and do not guarantee the full delivery of the capacity and associated energy of this proposed generation facility under all operating conditions. NERC Planning and Operating Reliability Criteria allow for the re-dispatch of generating units to resolve projected and actual deficiencies in real time and planning studies. Specifically NERC Category C Contingency Conditions (Bus Fault, Tower Line, N-1-1, and Stuck Breaker scenarios) allow for re-dispatch of generating units to resolve potential reliability deficiencies. For ITO's Planning Criteria the re-dispatch of generating units for these contingency conditions is allowed as long as the projected loading does not exceed 100% of a facility Load Dump Rating.

As part of its generation impact analysis, the ITO routinely evaluates the impact that a proposed new generation resource will have under maximum generation conditions, stress system conditions and import/export system conditions (greater than 20 MW). The results of these studies are discussed in more detail below.

Category B Analysis (Single Contingency):

1. System Normal – No deficiencies identified
2. Critical System Condition (No Surry 230 kV or Possum Point 6 Unit) – No deficiencies identified.

Category C Analysis: (Multiple Facility Analysis)

1. Bus Fault - No deficiencies identified
2. Line Stuck Breaker - No deficiencies identified
3. Tower Line – No deficiencies identified

The import and export conditions into and out of the ITO System are evaluated with any new interconnection greater than 20 MW, any new facility that is interconnected with the ITO System should not significantly decrement FCITC between utilities. These studies will be performed during the System Impact Study.

Affected System Analysis & Mitigation

Duke, Progress & TVA Impacts:

Duke Carolina, Progress, & TVA Impacts to be determined during later study phases (as applicable).

Option 2

Network Impacts

The Queue Project AC2-079 was evaluated as a 100 MW (Capacity 38 MW) injection tapping the Myrtle - Windsor 115kV line in the ITO area. Project AC2-079 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AC2-079 was studied with a commercial probability of 53%. Potential network impacts were as follows:

Contingency Descriptions

The following contingencies resulted in overloads:

Contingency Name	Description
23T44_A	CONTINGENCY '23T44_A' /* 23T44 @ SUFFOLK OPEN BRANCH FROM BUS 314206 TO BUS 314529 CKT 1 /* 3OAKRIDG 115.00 - 3KINGS F 115.00 OPEN BRANCH FROM BUS 314206 TO BUS 314532 CKT Z1 /* 3OAKRIDG 115.00 - 3OAKRI23 115.00 OPEN BRANCH FROM BUS 314528 TO BUS 314532 CKT 1 /* 3IVOR106 115.00 - 3OAKRI23 115.00 OPEN BRANCH FROM BUS 314532 TO BUS 314536 CKT 1 /* 3OAKRI23 115.00 - 3SUFFOLK 115.00 OPEN BRANCH FROM BUS 313803 TO BUS 314531 CKT 1 /* 3OAKRI44 115.00 - 3MYRTLE 115.00 OPEN BRANCH FROM BUS 313803 TO BUS 314536 CKT 1 /* 3OAKRI44 115.00 - 3SUFFOLK 115.00 OPEN BRANCH FROM BUS 314531 TO BUS 924940 CKT 1 /* 3MYRTLE 115.00 - AB2-149 TAP 115.00 OPEN BRANCH FROM BUS 314536 TO BUS 314823 CKT 1 /* SUFFOLK SC142 END
562T563	CONTINGENCY '562T563' /*CARSON OPEN BRANCH FROM BUS 314902 TO BUS 314923 CKT 1 /*CARSON TO MIDLOTHIAN OPEN BRANCH FROM BUS 314914 TO BUS 314902 CKT 1 /*CARSON 500.00 - 8SEPTA 500.00 END

Contingency Name	Description
H2T557	CONTINGENCY 'H2T557' /* ELMONT OPEN BRANCH FROM BUS 314908 TO BUS 314903 CKT 1 /*ELMONT TO CHICKAHOMINY (LINE 557) OPEN BRANCH FROM BUS 314903 TO BUS 314214 CKT 1 /*CHICKAHOMINY 500-230 (TX#1) OPEN BRANCH FROM BUS 314908 TO BUS 314218 CKT 2 /*ELMONT 500-230 (TX#2) END
LN 15	CONTINGENCY 'LN 15' OPEN BRANCH FROM BUS 314292 TO BUS 314350 CKT 1 /* 3DISPUTN 115.00 - 3WVLY DP 115.00 OPEN BRANCH FROM BUS 314292 TO BUS 314329 CKT 1 /* 3DISPUTN 115.00 - 3POE 115.00 OPEN BRANCH FROM BUS 314347 TO BUS 314351 CKT 1 /* 3WAKEFLD 115.00 - 3WAVERLY 115.00 OPEN BRANCH FROM BUS 314350 TO BUS 314351 CKT 1 /* 3WVLY DP 115.00 - 3WAVERLY 115.00 OPEN BRANCH FROM BUS 313878 TO BUS 314347 CKT 1 /* 3SADL_1 115.00 - 3WAKEFLD 115.00 OPEN BUS 314292 /* ISLAND OPEN BUS 314347 /* ISLAND OPEN BUS 314350 /* ISLAND OPEN BUS 314351 /* ISLAND END
LN 208-259	CONTINGENCY 'LN 208-259' OPEN BRANCH FROM BUS 314286 TO BUS 314309 CKT 1 /* 6CHSTF A 230.00 - 6IRON208 230.00 OPEN BRANCH FROM BUS 314309 TO BUS 314338 CKT 1 /* 6IRON208 230.00 - 6SOUWEST 230.00 OPEN BUS 314309 /* ISLAND OPEN BRANCH FROM BUS 314276 TO BUS 314287 CKT 1 /* 6BASIN 230.00 - 6CHSTF B 230.00 END
LN 259	CONTINGENCY 'LN 259' OPEN BRANCH FROM BUS 314276 TO BUS 314287 CKT 1 /* 6BASIN 230.00 - 6CHSTF B 230.00 END
LN 557	CONTINGENCY 'LN 557' OPEN BRANCH FROM BUS 314214 TO BUS 314903 CKT 1 /* 6CHCKAHM 230.00 - 8CHCKAHM 500.00 OPEN BRANCH FROM BUS 314903 TO BUS 314908 CKT 1 /* 8CHCKAHM 500.00 - 8ELMONT 500.00 END

Contingency Name	Description
LN 563	CONTINGENCY 'LN 563' OPEN BRANCH FROM BUS 314902 TO BUS 314914 CKT 1 /* 8CARSON 500.00 - 8MDLTHAN 500.00 END
LN 574	CONTINGENCY 'LN 574' OPEN BRANCH FROM BUS 314908 TO BUS 314911 CKT 1 /* 8ELMONT 500.00 - 8LDYSMTH 500.00 END
LN 576	CONTINGENCY 'LN 576' OPEN BRANCH FROM BUS 314322 TO BUS 314914 CKT 1 /* 6MDLTHAN 230.00 - 8MDLTHAN 500.00 OPEN BRANCH FROM BUS 314914 TO BUS 314918 CKT 1 /* 8MDLTHAN 500.00 - 8NO ANNA 500.00 END
T672B	CONTINGENCY 'T672B' /*_ BASIN OPEN BRANCH FROM BUS 314276 TO BUS 314260 CKT 1 /*L284 BASIN VARINA OPEN BRANCH FROM BUS 314275 TO BUS 314276 CKT 1 /*L2055 BASIN BELLMEADE REMOVE MACHINE 1 FROM BUS 315053 /*BELMEADE GEN CT-1 REMOVE MACHINE 2 FROM BUS 315054 /*BELMEADE GEN CT-2 REMOVE MACHINE 3 FROM BUS 315055 /*BELMEADE GEN ST OPEN BRANCH FROM BUS 314274 TO BUS 314276 CKT 1 /*BASIN TX5 OPEN BRANCH FROM BUS 314274 TO BUS 314276 CKT 2 /*BASIN TX6 OPEN BRANCH FROM BUS 314276 TO BUS 314287 CKT 1 /*L259 BASIN CHESTERFIELD OPEN BRANCH FROM BUS 314276 TO BUS 314339 CKT 1 /*L2065 BASIN SPRUANCE NUG END

Summer Peak Analysis - 2020

Generator Deliverability

(Single or N-1 contingencies for the Capacity portion only of the interconnection)

None

Multiple Facility Contingency

(Double Circuit Tower Line, Fault with a Stuck Breaker, and Bus Fault contingencies for the full energy output)

#	Contingency		Affected Area	Facility Description	Bus			Power Flow	Loading %		Rating		MW Contribution	Ref
	Type	Name			From	To	Cir.		Initial	Final	Type	MVA		
1	LFFB	23T44_A	DVP - DVP	3SADL_1-3WAKEFLD 115 kV line	313878	314347	1	DC	30.66	104.19	LD	136	100	1
2	LFFB	23T44_A	DVP - DVP	3WINDSOR-3SADL_1 115 kV line	314542	313878	1	DC	30.66	104.19	LD	136	100	2
3	LFFB	23T44_A	DVP - DVP	AB2-149 TAP-3WINDSOR 115 kV line	924940	314542	1	DC	36.76	110.29	LD	136	100	3

Short Circuit

(Summary of impacted circuit breakers)

New circuit breakers found to be over-duty:

None

Contributions to previously identified circuit breakers found to be over-duty:

None

Contribution to Previously Identified Overloads

(This project contributes to the following contingency overloads, i.e. "Network Impacts", identified for earlier generation or transmission interconnection projects in the PJM Queue)

#	Contingency		Affected Area	Facility Description	Bus			Power Flow	Loading %		Rating		MW Contribution	Ref
	Type	Name			From	To	Cir.		Initial	Final	Type	MVA		
4	LFFB	H2T557	DVP - DVP	8ELMONT 500/230 kV transformer	314218	314908	1	DC	118.93	119.69	LD	1051	17.66	4
5	DCTL	LN 208-259	DVP - DVP	6CHARCTY-6LAKESD 230 kV line	314225	314227	1	DC	138.59	139.4	LD	459	8.34	5
6	LFFB	562T563	DVP - DVP	6CHARCTY-6LAKESD 230 kV line	314225	314227	1	DC	103.86	104.52	LD	459	6.72	
7	LFFB	T672B	DVP - DVP	6CHARCTY-6LAKESD 230 kV line	314225	314227	1	DC	105.9	106.67	LD	459	7.83	
8	DCTL	LN 208-259	DVP - DVP	6MESSER-6CHARCTY 230 kV line	314228	314225	1	DC	150.33	151.15	LD	459	8.34	6
9	LFFB	562T563	DVP - DVP	6MESSER-6CHARCTY 230 kV line	314228	314225	1	DC	115.58	116.24	LD	459	6.72	
10	LFFB	T672B	DVP - DVP	6MESSER-6CHARCTY 230 kV line	314228	314225	1	DC	117.62	118.39	LD	459	7.83	
11	DCTL	LN 208-259	DVP - DVP	6CHSTF B-6MESSER 230 kV line	314287	314228	1	DC	150.46	151.28	LD	459	8.34	7
12	LFFB	562T563	DVP - DVP	6CHSTF B-6MESSER 230 kV line	314287	314228	1	DC	115.71	116.37	LD	459	6.72	
13	LFFB	T672B	DVP - DVP	6CHSTF B-6MESSER 230 kV line	314287	314228	1	DC	117.75	118.52	LD	459	7.83	

Steady-State Voltage Requirements

(Summary of the VAR requirements based upon the results of the steady-state voltage studies)

To be determined during the Impact Study

Stability and Reactive Power Requirement for Low Voltage Ride Through

(Summary of the VAR requirements based upon the results of the dynamic studies)

To be determined during the Impact Study

Potential Congestion due to Local Energy Deliverability

PJM also studied the delivery of the energy portion of this interconnection request. Any problems identified below are likely to result in operational restrictions to the project under study. The IC can proceed with network upgrades to eliminate the operational restriction at their discretion by submitting a Merchant Transmission Interconnection request.

Note: Only the most severely overloaded conditions are listed below. There is no guarantee of full delivery of energy for this project by fixing only the conditions listed in this section. With a Transmission Interconnection Request, a subsequent analysis will be performed which shall study all overload conditions associated with the overloaded element(s) identified.

#	Contingency		Affected Area	Facility Description	Bus			Power Flow	Loading %		Rating		MW Contribution
	Type	Name			From	To	Cir.		Initial	Final	Type	MVA	
14	N-1	LN 15	DVP - DVP	3OAKRI44-3SUFFOLK 115 kV line	313803	314536	1	DC	23.26	113.42	ER	111	100
15	N-1	LN 557	DVP - DVP	6SKIFF CREEK-6KINGS M 230 kV line	314209	314386	1	DC	154.21	154.75	ER	442	5.29
16	N-1	LN 259	DVP - DVP	6CHARCTY-6LAKESD 230 kV line	314225	314227	1	DC	127.89	128.83	ER	375	7.81
17	N-1	LN 259	DVP - DVP	6MESSER-6CHARCTY 230 kV line	314228	314225	1	DC	142.26	143.2	ER	375	7.81

Contingency			Affected Area	Facility Description	Bus			Power Flow	Loading %		Rating		MW Contribution
#	Type	Name			From	To	Cir.		Initial	Final	Type	MVA	
18	N-1	LN 563	DVP - DVP	6BERMUDA-6CHSTF A 230 kV line	314278	314286	1	DC	114.55	115.42	ER	449	8.7
19	N-1	LN 259	DVP - DVP	6CHSTF B-6MESSER 230 kV line	314287	314228	1	DC	142.42	143.36	ER	375	7.81
20	N-1	LN 563	DVP - DVP	6CHSTF B-6BASIN 230 kV line	314287	314276	1	DC	166.54	167.47	ER	449	9.28
21	N-1	LN 557	DVP - DVP	6PENNIMAN-6WALR209 230 kV line	314296	314415	1	DC	141.9	142.44	ER	442	5.29
22	N-1	LN 563	DVP - DVP	6HOPEWLL-6BERMUDA 230 kV line	314303	314278	1	DC	114.55	115.42	ER	449	8.7
23	N-1	LN 557	DVP - DVP	6KINGS M-6PENNIMAN 230 kV line	314386	314296	1	DC	145.77	146.31	ER	442	5.29
24	N-1	LN 557	DVP - DVP	6WALR209-6LIGH209 230 kV line	314415	314391	1	DC	126.12	126.66	ER	442	5.29
25	N-1	LN 15	DVP - DVP	3MYRTLE-3OAKRI44 115 kV line	314531	313803	1	DC	23.26	113.42	ER	111	100
26	N-1	LN 557	DVP - DVP	8CARSON-8MDLTHAN 500 kV line	314902	314914	1	DC	146.12	146.59	ER	2442	25.42
27	N-1	LN 576	DVP - DVP	8CHCKAHM-8ELMONT 500 kV line	314903	314908	1	DC	155.42	155.95	ER	2442	28.99
28	N-1	LN 576	DVP - DVP	8ELMONT-8LDYSMTH 500 kV line	314908	314911	1	DC	179.67	180.24	ER	2442	30.94
29	N-1	LN 574	DVP - DVP	8MDLTHAN-8NO ANNA 500 kV line	314914	314918	1	DC	149.32	149.83	ER	2442	27.67

#	Contingency		Affected Area	Facility Description	Bus			Power Flow	Loading %		Rating		MW Contribution
	Type	Name			From	To	Cir.		Initial	Final	Type	MVA	
30	N-1	LN 576	DVP - DVP	8SURREY-8CHCKAHM 500 kV line	314924	314903	1	DC	113.03	113.63	ER	1809	24.03
31	N-1	LN 15	DVP - DVP	AB2-149 TAP-3MYRTLE 115 kV line	924940	314531	1	DC	37.59	127.75	ER	111	100

Light Load Analysis

Light Load Studies to be conducted during later study phases (as required by PJM Manual 14B).

ITO Analysis

ITO assessed the impact of the proposed Queue Project #AC2-079 interconnection of a 100 MW Energy (38 MW Capacity) injection into the ITO's Transmission System at a new interconnection switching station located between the Myrtle - Windsor 115kV line, for compliance with NERC Reliability Criteria on ITO's Transmission System. The system was assessed using the summer 2020 RTEP case provided to ITO by PJM. When performing a generation analysis, ITO's main analysis will be load flow study results under single contingency (both normal and stressed system conditions). ITO Criteria considers a transmission facility overloaded if it exceeds 94% of its emergency rating under normal and stressed system conditions. A full listing of ITO's Planning Criteria and interconnection requirements can be found in the ITO's Facility Connection Requirements which are publicly available at: <http://www.dom.com>.

The results of these studies evaluate the system under a limited set of operating conditions and do not guarantee the full delivery of the capacity and associated energy of this proposed generation facility under all operating conditions. NERC Planning and Operating Reliability Criteria allow for the re-dispatch of generating units to resolve projected and actual deficiencies in real time and planning studies. Specifically NERC Category C Contingency Conditions (Bus Fault, Tower Line, N-1-1, and Stuck Breaker scenarios) allow for re-dispatch of generating units to resolve potential reliability deficiencies. For ITO's Planning Criteria the re-dispatch of generating units for these contingency conditions is allowed as long as the projected loading does not exceed 100% of a facility Load Dump Rating.

As part of its generation impact analysis, the ITO routinely evaluates the impact that a proposed new generation resource will have under maximum generation conditions, stress system conditions and import/export system conditions (greater than 20 MW). The results of these studies are discussed in more detail below.

Category B Analysis (Single Contingency):

1. System Normal – No deficiencies identified

2. Critical System Condition (No Surry 230 kV or Possum Point 6 Unit) – No deficiencies identified.

Category C Analysis: (Multiple Facility Analysis)

1. Bus Fault - No deficiencies identified
2. Line Stuck Breaker - No deficiencies identified
3. Tower Line – No deficiencies identified

The import and export conditions into and out of the ITO System are evaluated with any new interconnection greater than 20 MW, any new facility that is interconnected with the ITO System should not significantly decrement FCITC between utilities. These studies will be performed during the System Impact Study.

Affected System Analysis & Mitigation

Duke, Progress & TVA Impacts:

Duke Carolina, Progress, & TVA Impacts to be determined during later study phases (as applicable).

Appendices

The following appendices contain additional information about each flowgate presented in the body of the report. For each appendix, a description of the flowgate and its contingency was included for convenience. However, the intent of the appendix section is to provide more information on which projects/generators have contributions to the flowgate in question. Although this information is not used "as is" for cost allocation purposes, it can be used to gauge other generators impact. When a flowgate is identified in multiple analysis the appendix is presented for only the analysis with the greatest overload.

It should be noted the generator contributions presented in the appendices sections are full contributions, whereas in the body of the report, those contributions take into consideration the commercial probability of each project.

OPTION 1

Appendix 1

(DVP - DVP) The 3SADL_2-3BAKRS P 115 kV line (from bus 313879 to bus 314273 ckt 1) loads from 97.57% to 171.1% (**DC power flow**) of its load dump rating (136 MVA) for the line fault with failed breaker contingency outage of '23T44_A'. This project contributes approximately 100.0 MW to the thermal violation.

```

CONTINGENCY '23T44_A'                                /* 23T44 @ SUFFOLK
  OPEN BRANCH FROM BUS 314206 TO BUS 314529 CKT 1      /* 3OAKRIDG
115.00 - 3KINGS F 115.00
  OPEN BRANCH FROM BUS 314206 TO BUS 314532 CKT Z1      /* 3OAKRIDG
115.00 - 3OAKRI23 115.00
  OPEN BRANCH FROM BUS 931590 TO BUS 314532 CKT 1      /* AC2-079 TAP
115.00 - 3OAKRI23 115.00
  OPEN BRANCH FROM BUS 314532 TO BUS 314536 CKT 1      /* 3OAKRI23
115.00 - 3SUFFOLK 115.00
  OPEN BRANCH FROM BUS 313803 TO BUS 314531 CKT 1      /* 3OAKRI44
115.00 - 3MYRTLE 115.00
  OPEN BRANCH FROM BUS 313803 TO BUS 314536 CKT 1      /* 3OAKRI44
115.00 - 3SUFFOLK 115.00
  OPEN BRANCH FROM BUS 314531 TO BUS 924940 CKT 1      /* 3MYRTLE
115.00 - AB2-149 TAP 115.00
  OPEN BRANCH FROM BUS 314536 TO BUS 314823 CKT 1      /* SUFFOLK
SC142
END

```

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
931591	AC2-079 C OP	38.
931592	AC2-079 E OP	62.
923981	AB2-039 C OP	47.
923982	AB2-039 E OP	38.
925061	AB2-161 C OP	19.
925062	AB2-161 E OP	31.

Appendix 2

(DVP - DVP) The 3BAKRS P-3NEWBOHE 115 kV line (from bus 314273 to bus 314280 ckt 1) loads from 85.96% to 159.49% (**DC power flow**) of its load dump rating (136 MVA) for the line fault with failed breaker contingency outage of '23T44_A'. This project contributes approximately 100.0 MW to the thermal violation.

CONTINGENCY '23T44_A' /* 23T44 @ SUFFOLK
OPEN BRANCH FROM BUS 314206 TO BUS 314529 CKT 1 /* 3OAKRIDG
115.00 - 3KINGS F 115.00
OPEN BRANCH FROM BUS 314206 TO BUS 314532 CKT Z1 /* 3OAKRIDG
115.00 - 3OAKRI23 115.00
OPEN BRANCH FROM BUS 931590 TO BUS 314532 CKT 1 /* AC2-079 TAP
115.00 - 3OAKRI23 115.00
OPEN BRANCH FROM BUS 314532 TO BUS 314536 CKT 1 /* 3OAKRI23
115.00 - 3SUFFOLK 115.00
OPEN BRANCH FROM BUS 313803 TO BUS 314531 CKT 1 /* 3OAKRI44
115.00 - 3MYRTLE 115.00
OPEN BRANCH FROM BUS 313803 TO BUS 314536 CKT 1 /* 3OAKRI44
115.00 - 3SUFFOLK 115.00
OPEN BRANCH FROM BUS 314531 TO BUS 924940 CKT 1 /* 3MYRTLE
115.00 - AB2-149 TAP 115.00
OPEN BRANCH FROM BUS 314536 TO BUS 314823 CKT 1 /* SUFFOLK
SC142
END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
931591	AC2-079 C OP	38.
931592	AC2-079 E OP	62.
923981	AB2-039 C OP	47.
923982	AB2-039 E OP	38.
925061	AB2-161 C OP	19.
925062	AB2-161 E OP	31.

Appendix 3

(DVP - DVP) The 3NEWBOHE-3POE 115 kV line (from bus 314280 to bus 314329 ckt 1) loads from 75.81% to 149.34% (**DC power flow**) of its load dump rating (136 MVA) for the line fault with failed breaker contingency outage of '2342_A'. This project contributes approximately 100.0 MW to the thermal violation.

```
CONTINGENCY '2342_A'                                /* 2342 @ SUFFOLK
  OPEN BRANCH FROM BUS 314206 TO BUS 314529 CKT 1    /* 3OAKRIDG
115.00 - 3KINGS F 115.00
  OPEN BRANCH FROM BUS 314206 TO BUS 314532 CKT Z1    /* 3OAKRIDG
115.00 - 3OAKRI23 115.00
  OPEN BRANCH FROM BUS 931590 TO BUS 314532 CKT 1    /* AC2-079 TAP
115.00 - 3OAKRI23 115.00
  OPEN BRANCH FROM BUS 314532 TO BUS 314536 CKT 1    /* 3OAKRI23
115.00 - 3SUFFOLK 115.00
  OPEN BRANCH FROM BUS 314536 TO BUS 314537 CKT 1    /* SUFFOLK 230-
115 TX#2
END
```

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
931591	AC2-079 C OP	38.
931592	AC2-079 E OP	62.
923981	AB2-039 C OP	47.
923982	AB2-039 E OP	38.
925061	AB2-161 C OP	19.
925062	AB2-161 E OP	31.

Appendix 4

(DVP - DVP) The 8ELMONT 500/230 kV transformer (from bus 314218 to bus 314908 ckt 1) loads from 119.0% to 119.75% (**DC power flow**) of its load dump rating (1051 MVA) for the line fault with failed breaker contingency outage of 'H2T557'. This project contributes approximately 17.6 MW to the thermal violation.

CONTINGENCY 'H2T557' /* ELMONT
 OPEN BRANCH FROM BUS 314908 TO BUS 314903 CKT 1 /*ELMONT TO
 CHICKAHOMINY (LINE 557)
 OPEN BRANCH FROM BUS 314903 TO BUS 314214 CKT 1
 /*CHICKAHOMINY 500-230 (TX#1)
 OPEN BRANCH FROM BUS 314908 TO BUS 314218 CKT 2 /*ELMONT 500-
 230 (TX#2)
 END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315067	1DARBY 1	4.47
315068	1DARBY 2	4.48
315069	1DARBY 3	4.53
315070	1DARBY 4	4.53
315043	1FRIVERA	6.02
315044	1FRIVERB	4.66
315045	1FRIVERC	6.02
315046	1FRIVERD	4.66
315047	1FRIVERE	4.66
315048	1FRIVERF	6.02
315074	1HOPCGN1	11.03
315075	1HOPCGN2	10.89
315134	1ROAVALA	22.59
315135	1ROAVALB	6.02
315083	1SPRUNCA	14.8
315084	1SPRUNCB	14.8
315085	1SPRUNCC	10.97
315086	1SPRUNCD	10.97
315073	1STONECA	9.15
314784	1WEYRHSB	1.72
315090	1YORKTN1	30.63
315091	1YORKTN2	31.78
314539	3UNCAMP	2.15
314541	3WATKINS	0.6
314229	6MT R221	1.42
314236	6NRTHEST	0.33
314189	6PAPERMILL	8.8
314251	6S PUMP	1.62
931041	AC2-012 C OP	9.48

931042	AC2-012 E OP	15.47
931501	AC2-070 C	2.92
931502	AC2-070 E	1.21
931531	AC2-073 C	3.09
931532	AC2-073 E	1.56
931581	AC2-078 C OP	4.63
931582	AC2-078 E OP	7.55
931591	AC2-079 C OP	6.69
931592	AC2-079 E OP	10.91
931831	AC2-110 C	1.74
931832	AC2-110 E	2.84
292791	U1-032 E	4.77
297087	V2-040	0.25
900672	V4-068 E	0.25
901082	W1-029 E	41.27
907092	X1-038 E	5.37
913392	Y1-086 E	1.97
916042	Z1-036 E	40.07
916192	Z1-068 E	1.73
917122	Z2-027 E	0.95
917332	Z2-043 E	0.8
917592	Z2-099 E	0.37
921092	AA1-049 C	2.2
921093	AA1-049 E	1.03
921162	AA1-063AC	6.95
921163	AA1-063AE	3.28
918512	AA1-065 E OP	3.66
918562	AA1-072 E	0.13
921292	AA1-083	6.01
921532	AA1-132 C	6.79
921533	AA1-132 E	2.91
921572	AA1-138 C	8.68
921573	AA1-138 E	3.72
921582	AA1-139 C	13.62
921583	AA1-139 E	5.84
921622	AA1-145	102.15
921752	AA2-053 C	6.97
921753	AA2-053 E	2.99
921772	AA2-059 C	1.03
921773	AA2-059 E	0.48
920022	AA2-086 E	0.2
921982	AA2-088 C	5.5
921983	AA2-088 E	8.97
922512	AA2-174 C	0.32
922513	AA2-174 E	0.35

922522	AA2-177 C	12.13
922523	AA2-177 E	5.2
922532	AA2-178 C	8.22
922533	AA2-178 E	3.52
922602	AB1-013 C	2.48
922603	AB1-013 E	16.61
922672	AB1-026 C	2.22
922673	AB1-026 E	0.95
922682	AB1-027 C	4.45
922683	AB1-027 E	1.91
923262	AB1-132 C OP	11.49
923263	AB1-132 E OP	4.93
923272	AB1-135 C OP	3.7
923273	AB1-135 E OP	1.59
923572	AB1-173 C OP	1.85
923573	AB1-173 E OP	0.86
923582	AB1-173AC OP	1.85
923583	AB1-173AE OP	0.86
923801	AB2-015 C OP	7.59
923802	AB2-015 E OP	6.22
923831	AB2-022 C	2.07
923832	AB2-022 E	1.12
923841	AB2-024 C	3.3
923842	AB2-024 E	1.48
923851	AB2-025 C	2.36
923852	AB2-025 E	1.06
923861	AB2-026 C	1.95
923862	AB2-026 E	0.88
923911	AB2-031 C OP	1.84
923912	AB2-031 E OP	0.91
923981	AB2-039 C OP	8.78
923982	AB2-039 E OP	7.1
923991	AB2-040 C OP	6.04
923992	AB2-040 E OP	4.94
924061	AB2-050	6.01
924071	AB2-051 C OP	127.
924072	AB2-051 E OP	17.44
924241	AB2-068 OP	175.81
924381	AB2-087 C	0.47
924382	AB2-087 E	0.22
924501	AB2-099 C	0.48
924502	AB2-099 E	0.21
924511	AB2-100 C	9.75
924512	AB2-100 E	4.8
924761	AB2-128 C	8.36

924762	AB2-128 E	3.29
924811	AB2-134 C OP	15.56
924812	AB2-134 E OP	20.8
924931	AB2-147 C	2.14
924932	AB2-147 E	3.48
924941	AB2-149 C OP	3.35
924942	AB2-149 E OP	5.47
924951	AB2-150 C OP	2.14
924952	AB2-150 E OP	3.48
925051	AB2-160 C OP	7.01
925052	AB2-160 E OP	11.43
925061	AB2-161 C OP	3.55
925062	AB2-161 E OP	5.79
925121	AB2-169 C OP	5.19
925122	AB2-169 E OP	4.66
925141	AB2-171 C OP	4.25
925142	AB2-171 E OP	6.94
925171	AB2-174 C OP	5.83
925172	AB2-174 E OP	5.27
925281	AB2-186 C	0.54
925282	AB2-186 E	0.23
925291	AB2-188 C OP	2.03
925292	AB2-188 E OP	0.91
925331	AB2-190 C	27.74
925332	AB2-190 E	6.93
925521	AC1-027 C	1.85
925522	AC1-027 E	1.06
925691	AC1-045 C	1.65
925692	AC1-045 E	0.9
925701	AC1-046 C	1.59
925702	AC1-046 E	0.87
925711	AC1-047 C	2.1
925712	AC1-047 E	1.16
925811	AC1-060	0.1
925821	AC1-061	0.05
925841	AC1-063	0.5
925861	AC1-065 C	4.35
925862	AC1-065 E	7.09
926071	AC1-086 C	16.92
926072	AC1-086 E	7.7
926291	AC1-107 OP	265.38
926411	AC1-112 C	3.46
926412	AC1-112 E	1.94
926441	AC1-115 C	1.03
926442	AC1-115 E	1.67

926471	AC1-118 C	2.1
926472	AC1-118 E	1.08
926551	AC1-134	15.02
926591	AC1-142 C	11.38
926592	AC1-142 E	8.59
926661	AC1-147 C	2.1
926662	AC1-147 E	1.23
926741	AC1-159 C	126.03
926751	AC1-161 C OP	26.81
926752	AC1-161 E OP	11.44
926771	AC1-163 C	1.74
926772	AC1-163 E	0.82
926781	AC1-164 C OP	36.62
926782	AC1-164 E OP	16.45
927041	AC1-191 C	19.88
927042	AC1-191 E	9.9
927051	AC1-193 C	3.12
927052	AC1-193 E	5.09
927111	AC1-206 C OP	10.48
927112	AC1-206 E OP	4.96
927221	AC1-216 C OP	11.87
927222	AC1-216 E OP	9.34

Appendix 5

(DVP - DVP) The 6CHARCTY-6LAKESD 230 kV line (from bus 314225 to bus 314227 ckt 1) loads from 140.53% to 141.34% (**DC power flow**) of its load dump rating (459 MVA) for the tower line contingency outage of 'LN 208-259'. This project contributes approximately 8.21 MW to the thermal violation.

CONTINGENCY 'LN 208-259'

OPEN BRANCH FROM BUS 314286 TO BUS 314309 CKT 1 /* 6CHSTF A

230.00 - 6IRON208 230.00

OPEN BRANCH FROM BUS 314309 TO BUS 314338 CKT 1 /* 6IRON208

230.00 - 6SOUWEST 230.00

OPEN BUS 314309 /* ISLAND

OPEN BRANCH FROM BUS 314276 TO BUS 314287 CKT 1 /* 6BASIN 230.00 -
6CHSTF B 230.00

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315065	1CHESTF6	33.42
315074	1HOPCGN1	6.83
315075	1HOPCGN2	6.74
315077	1HOPHCF1	1.94
315078	1HOPHCF2	1.94
315079	1HOPHCF3	1.94
315080	1HOPHCF4	2.94
315076	1HOPPOLC	1.65
315134	1ROAVALA	11.3
315135	1ROAVALB	3.01
315073	1STONECA	5.67
314784	1WEYRHSB	0.65
314539	3UNCAMP	0.86
314541	3WATKINS	0.25
314229	6MT R221	-0.33
931041	AC2-012 C OP	2.94
931042	AC2-012 E OP	4.79
931581	AC2-078 C OP	3.15
931582	AC2-078 E OP	5.13
931591	AC2-079 C OP	3.12
931592	AC2-079 E OP	5.09
931631	AC2-084 C	2.99
931632	AC2-084 E	1.47
292791	U1-032 E	2.95
900672	V4-068 E	0.11
901082	W1-029 E	13.48
907092	X1-038 E	2.14
913392	Y1-086 E	0.63

914231	Y2-077	0.78
916042	Z1-036 E	13.58
916192	Z1-068 E	0.53
917122	Z2-027 E	0.31
917332	Z2-043 E	0.34
917342	Z2-044 E	0.18
917592	Z2-099 E	0.16
921162	AA1-063AC	3.19
921163	AA1-063AE	1.51
918512	AA1-065 E OP	1.48
918562	AA1-072 E	0.06
921562	AA1-135 C	2.95
921563	AA1-135 E	1.26
921572	AA1-138 C	3.
921573	AA1-138 E	1.29
921752	AA2-053 C	3.25
921753	AA2-053 E	1.4
921762	AA2-057 C	2.34
921763	AA2-057 E	1.17
921772	AA2-059 C	0.36
921773	AA2-059 E	0.17
921862	AA2-068 C	0.76
921863	AA2-068 E	0.35
920022	AA2-086 E	0.09
921982	AA2-088 C	2.33
921983	AA2-088 E	3.8
922442	AA2-165 C	0.32
922443	AA2-165 E	0.15
922472	AA2-169 C	0.71
922473	AA2-169 E	0.33
922512	AA2-174 C	0.15
922513	AA2-174 E	0.16
922522	AA2-177 C	6.39
922523	AA2-177 E	2.74
922532	AA2-178 C	2.96
922533	AA2-178 E	1.27
922602	AB1-013 C	0.89
922603	AB1-013 E	5.97
923262	AB1-132 C OP	5.96
923263	AB1-132 E OP	2.56
923572	AB1-173 C OP	0.98
923573	AB1-173 E OP	0.46
923582	AB1-173AC OP	0.98
923583	AB1-173AE OP	0.46
923801	AB2-015 C OP	3.06

923802	AB2-015 E OP	2.51
923831	AB2-022 C	0.66
923832	AB2-022 E	0.35
923851	AB2-025 C	1.62
923852	AB2-025 E	0.73
923911	AB2-031 C OP	0.98
923912	AB2-031 E OP	0.48
923981	AB2-039 C OP	4.92
923982	AB2-039 E OP	3.98
923991	AB2-040 C OP	3.21
923992	AB2-040 E OP	2.63
924071	AB2-051 C OP	39.03
924072	AB2-051 E OP	5.36
924381	AB2-087 C	0.19
924382	AB2-087 E	0.09
924501	AB2-099 C	0.2
924502	AB2-099 E	0.09
924511	AB2-100 C	5.57
924512	AB2-100 E	2.74
924761	AB2-128 C	4.77
924762	AB2-128 E	1.88
924811	AB2-134 C OP	8.19
924812	AB2-134 E OP	10.95
924931	AB2-147 C	1.2
924932	AB2-147 E	1.96
924941	AB2-149 C OP	1.58
924942	AB2-149 E OP	2.59
924951	AB2-150 C OP	1.2
924952	AB2-150 E OP	1.96
925051	AB2-160 C OP	4.18
925052	AB2-160 E OP	6.83
925061	AB2-161 C OP	1.99
925062	AB2-161 E OP	3.24
925121	AB2-169 C OP	2.01
925122	AB2-169 E OP	1.81
925141	AB2-171 C OP	1.75
925142	AB2-171 E OP	2.85
925171	AB2-174 C OP	3.17
925172	AB2-174 E OP	2.87
925281	AB2-186 C	0.18
925282	AB2-186 E	0.08
925291	AB2-188 C OP	0.73
925292	AB2-188 E OP	0.33
925331	AB2-190 C	14.6
925332	AB2-190 E	3.65

925521	AC1-027 C	0.57
925522	AC1-027 E	0.32
925691	AC1-045 C	0.53
925692	AC1-045 E	0.29
925821	AC1-061	0.03
926071	AC1-086 C	8.78
926072	AC1-086 E	4.
926201	AC1-098 C	2.1
926202	AC1-098 E	1.25
926211	AC1-099 C	0.7
926212	AC1-099 E	0.41
926661	AC1-147 C	0.65
926662	AC1-147 E	0.38
926741	AC1-159 C	38.73
926771	AC1-163 C	0.73
926772	AC1-163 E	0.34
927051	AC1-193 C	1.28
927052	AC1-193 E	2.09
927111	AC1-206 C OP	6.48
927112	AC1-206 E OP	3.06
927141	AC1-208 C	3.26
927142	AC1-208 E	1.45
927221	AC1-216 C OP	6.25
927222	AC1-216 E OP	4.92

Appendix 6

(DVP - DVP) The 6MESSER-6CHARCTY 230 kV line (from bus 314228 to bus 314225 ckt 1) loads from 152.28% to 153.08% (**DC power flow**) of its load dump rating (459 MVA) for the tower line contingency outage of 'LN 208-259'. This project contributes approximately 8.21 MW to the thermal violation.

CONTINGENCY 'LN 208-259'

OPEN BRANCH FROM BUS 314286 TO BUS 314309 CKT 1 /* 6CHSTF A

230.00 - 6IRON208 230.00

OPEN BRANCH FROM BUS 314309 TO BUS 314338 CKT 1 /* 6IRON208

230.00 - 6SOUWEST 230.00

OPEN BUS 314309 /* ISLAND

OPEN BRANCH FROM BUS 314276 TO BUS 314287 CKT 1 /* 6BASIN 230.00 -
6CHSTF B 230.00

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315065	1CHESTF6	33.42
315074	1HOPCGN1	6.83
315075	1HOPCGN2	6.74
315077	1HOPHCF1	1.94
315078	1HOPHCF2	1.94
315079	1HOPHCF3	1.94
315080	1HOPHCF4	2.94
315076	1HOPPOLC	1.65
315134	1ROAVALA	11.3
315135	1ROAVALB	3.01
315073	1STONECA	5.67
314784	1WEYRHSB	0.65
314539	3UNCAMP	0.86
314541	3WATKINS	0.25
314229	6MT R221	-0.33
931041	AC2-012 C OP	2.94
931042	AC2-012 E OP	4.79
931581	AC2-078 C OP	3.15
931582	AC2-078 E OP	5.13
931591	AC2-079 C OP	3.12
931592	AC2-079 E OP	5.09
931631	AC2-084 C	2.99
931632	AC2-084 E	1.47
292791	U1-032 E	2.95
900672	V4-068 E	0.11
901082	W1-029 E	13.48
907092	X1-038 E	2.14
913392	Y1-086 E	0.63

914231	Y2-077	0.78
916042	Z1-036 E	13.58
916192	Z1-068 E	0.53
917122	Z2-027 E	0.31
917332	Z2-043 E	0.34
917342	Z2-044 E	0.18
917592	Z2-099 E	0.16
921162	AA1-063AC	3.19
921163	AA1-063AE	1.51
918512	AA1-065 E OP	1.48
918562	AA1-072 E	0.06
921562	AA1-135 C	2.95
921563	AA1-135 E	1.26
921572	AA1-138 C	3.
921573	AA1-138 E	1.29
921752	AA2-053 C	3.25
921753	AA2-053 E	1.4
921762	AA2-057 C	2.34
921763	AA2-057 E	1.17
921772	AA2-059 C	0.36
921773	AA2-059 E	0.17
921862	AA2-068 C	0.76
921863	AA2-068 E	0.35
920022	AA2-086 E	0.09
921982	AA2-088 C	2.33
921983	AA2-088 E	3.8
922442	AA2-165 C	0.32
922443	AA2-165 E	0.15
922472	AA2-169 C	0.71
922473	AA2-169 E	0.33
922512	AA2-174 C	0.15
922513	AA2-174 E	0.16
922522	AA2-177 C	6.39
922523	AA2-177 E	2.74
922532	AA2-178 C	2.96
922533	AA2-178 E	1.27
922602	AB1-013 C	0.89
922603	AB1-013 E	5.97
923262	AB1-132 C OP	5.96
923263	AB1-132 E OP	2.56
923572	AB1-173 C OP	0.98
923573	AB1-173 E OP	0.46
923582	AB1-173AC OP	0.98
923583	AB1-173AE OP	0.46
923801	AB2-015 C OP	3.06

923802	AB2-015 E OP	2.51
923831	AB2-022 C	0.66
923832	AB2-022 E	0.35
923851	AB2-025 C	1.62
923852	AB2-025 E	0.73
923911	AB2-031 C OP	0.98
923912	AB2-031 E OP	0.48
923981	AB2-039 C OP	4.92
923982	AB2-039 E OP	3.98
923991	AB2-040 C OP	3.21
923992	AB2-040 E OP	2.63
924071	AB2-051 C OP	39.03
924072	AB2-051 E OP	5.36
924381	AB2-087 C	0.19
924382	AB2-087 E	0.09
924501	AB2-099 C	0.2
924502	AB2-099 E	0.09
924511	AB2-100 C	5.57
924512	AB2-100 E	2.74
924761	AB2-128 C	4.77
924762	AB2-128 E	1.88
924811	AB2-134 C OP	8.19
924812	AB2-134 E OP	10.95
924931	AB2-147 C	1.2
924932	AB2-147 E	1.96
924941	AB2-149 C OP	1.58
924942	AB2-149 E OP	2.59
924951	AB2-150 C OP	1.2
924952	AB2-150 E OP	1.96
925051	AB2-160 C OP	4.18
925052	AB2-160 E OP	6.83
925061	AB2-161 C OP	1.99
925062	AB2-161 E OP	3.24
925121	AB2-169 C OP	2.01
925122	AB2-169 E OP	1.81
925141	AB2-171 C OP	1.75
925142	AB2-171 E OP	2.85
925171	AB2-174 C OP	3.17
925172	AB2-174 E OP	2.87
925281	AB2-186 C	0.18
925282	AB2-186 E	0.08
925291	AB2-188 C OP	0.73
925292	AB2-188 E OP	0.33
925331	AB2-190 C	14.6
925332	AB2-190 E	3.65

925521	AC1-027 C	0.57
925522	AC1-027 E	0.32
925691	AC1-045 C	0.53
925692	AC1-045 E	0.29
925821	AC1-061	0.03
926071	AC1-086 C	8.78
926072	AC1-086 E	4.
926201	AC1-098 C	2.1
926202	AC1-098 E	1.25
926211	AC1-099 C	0.7
926212	AC1-099 E	0.41
926661	AC1-147 C	0.65
926662	AC1-147 E	0.38
926741	AC1-159 C	38.73
926771	AC1-163 C	0.73
926772	AC1-163 E	0.34
927051	AC1-193 C	1.28
927052	AC1-193 E	2.09
927111	AC1-206 C OP	6.48
927112	AC1-206 E OP	3.06
927141	AC1-208 C	3.26
927142	AC1-208 E	1.45
927221	AC1-216 C OP	6.25
927222	AC1-216 E OP	4.92

Appendix 7

(DVP - DVP) The 6CHSTF B-6MESSER 230 kV line (from bus 314287 to bus 314228 ckt 1) loads from 152.41% to 153.21% (**DC power flow**) of its load dump rating (459 MVA) for the tower line contingency outage of 'LN 208-259'. This project contributes approximately 8.21 MW to the thermal violation.

CONTINGENCY 'LN 208-259'

OPEN BRANCH FROM BUS 314286 TO BUS 314309 CKT 1 /* 6CHSTF A

230.00 - 6IRON208 230.00

OPEN BRANCH FROM BUS 314309 TO BUS 314338 CKT 1 /* 6IRON208

230.00 - 6SOUWEST 230.00

OPEN BUS 314309 /* ISLAND

OPEN BRANCH FROM BUS 314276 TO BUS 314287 CKT 1 /* 6BASIN 230.00 -
6CHSTF B 230.00

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315065	1CHESTF6	33.42
315074	1HOPCGN1	6.83
315075	1HOPCGN2	6.74
315077	1HOPHCF1	1.94
315078	1HOPHCF2	1.94
315079	1HOPHCF3	1.94
315080	1HOPHCF4	2.94
315076	1HOPPOLC	1.65
315134	1ROAVALA	11.3
315135	1ROAVALB	3.01
315073	1STONECA	5.67
314784	1WEYRHSB	0.65
314539	3UNCAMP	0.86
314541	3WATKINS	0.25
314229	6MT R221	-0.33
931041	AC2-012 C OP	2.94
931042	AC2-012 E OP	4.79
931581	AC2-078 C OP	3.15
931582	AC2-078 E OP	5.13
931591	AC2-079 C OP	3.12
931592	AC2-079 E OP	5.09
931631	AC2-084 C	2.99
931632	AC2-084 E	1.47
292791	U1-032 E	2.95
900672	V4-068 E	0.11
901082	W1-029 E	13.48
907092	X1-038 E	2.14
913392	Y1-086 E	0.63

914231	Y2-077	0.78
916042	Z1-036 E	13.58
916192	Z1-068 E	0.53
917122	Z2-027 E	0.31
917332	Z2-043 E	0.34
917342	Z2-044 E	0.18
917592	Z2-099 E	0.16
921162	AA1-063AC	3.19
921163	AA1-063AE	1.51
918512	AA1-065 E OP	1.48
918562	AA1-072 E	0.06
921562	AA1-135 C	2.95
921563	AA1-135 E	1.26
921572	AA1-138 C	3.
921573	AA1-138 E	1.29
921752	AA2-053 C	3.25
921753	AA2-053 E	1.4
921762	AA2-057 C	2.34
921763	AA2-057 E	1.17
921772	AA2-059 C	0.36
921773	AA2-059 E	0.17
921862	AA2-068 C	0.76
921863	AA2-068 E	0.35
920022	AA2-086 E	0.09
921982	AA2-088 C	2.33
921983	AA2-088 E	3.8
922442	AA2-165 C	0.32
922443	AA2-165 E	0.15
922472	AA2-169 C	0.71
922473	AA2-169 E	0.33
922512	AA2-174 C	0.15
922513	AA2-174 E	0.16
922522	AA2-177 C	6.39
922523	AA2-177 E	2.74
922532	AA2-178 C	2.96
922533	AA2-178 E	1.27
922602	AB1-013 C	0.89
922603	AB1-013 E	5.97
923262	AB1-132 C OP	5.96
923263	AB1-132 E OP	2.56
923572	AB1-173 C OP	0.98
923573	AB1-173 E OP	0.46
923582	AB1-173AC OP	0.98
923583	AB1-173AE OP	0.46
923801	AB2-015 C OP	3.06

923802	AB2-015 E OP	2.51
923831	AB2-022 C	0.66
923832	AB2-022 E	0.35
923851	AB2-025 C	1.62
923852	AB2-025 E	0.73
923911	AB2-031 C OP	0.98
923912	AB2-031 E OP	0.48
923981	AB2-039 C OP	4.92
923982	AB2-039 E OP	3.98
923991	AB2-040 C OP	3.21
923992	AB2-040 E OP	2.63
924071	AB2-051 C OP	39.03
924072	AB2-051 E OP	5.36
924381	AB2-087 C	0.19
924382	AB2-087 E	0.09
924501	AB2-099 C	0.2
924502	AB2-099 E	0.09
924511	AB2-100 C	5.57
924512	AB2-100 E	2.74
924761	AB2-128 C	4.77
924762	AB2-128 E	1.88
924811	AB2-134 C OP	8.19
924812	AB2-134 E OP	10.95
924931	AB2-147 C	1.2
924932	AB2-147 E	1.96
924941	AB2-149 C OP	1.58
924942	AB2-149 E OP	2.59
924951	AB2-150 C OP	1.2
924952	AB2-150 E OP	1.96
925051	AB2-160 C OP	4.18
925052	AB2-160 E OP	6.83
925061	AB2-161 C OP	1.99
925062	AB2-161 E OP	3.24
925121	AB2-169 C OP	2.01
925122	AB2-169 E OP	1.81
925141	AB2-171 C OP	1.75
925142	AB2-171 E OP	2.85
925171	AB2-174 C OP	3.17
925172	AB2-174 E OP	2.87
925281	AB2-186 C	0.18
925282	AB2-186 E	0.08
925291	AB2-188 C OP	0.73
925292	AB2-188 E OP	0.33
925331	AB2-190 C	14.6
925332	AB2-190 E	3.65

925521	AC1-027 C	0.57
925522	AC1-027 E	0.32
925691	AC1-045 C	0.53
925692	AC1-045 E	0.29
925821	AC1-061	0.03
926071	AC1-086 C	8.78
926072	AC1-086 E	4.
926201	AC1-098 C	2.1
926202	AC1-098 E	1.25
926211	AC1-099 C	0.7
926212	AC1-099 E	0.41
926661	AC1-147 C	0.65
926662	AC1-147 E	0.38
926741	AC1-159 C	38.73
926771	AC1-163 C	0.73
926772	AC1-163 E	0.34
927051	AC1-193 C	1.28
927052	AC1-193 E	2.09
927111	AC1-206 C OP	6.48
927112	AC1-206 E OP	3.06
927141	AC1-208 C	3.26
927142	AC1-208 E	1.45
927221	AC1-216 C OP	6.25
927222	AC1-216 E OP	4.92

OPTION 2

Appendix 1

(DVP - DVP) The 3SADL_1-3WAKEFLD 115 kV line (from bus 313878 to bus 314347 ckt 1) loads from 30.66% to 104.19% (**DC power flow**) of its load dump rating (136 MVA) for the line fault with failed breaker contingency outage of '23T44_A'. This project contributes approximately 100.0 MW to the thermal violation.

```

CONTINGENCY '23T44_A'                                /* 23T44 @ SUFFOLK
  OPEN BRANCH FROM BUS 314206 TO BUS 314529 CKT 1      /* 3OAKRIDG
115.00 - 3KINGS F 115.00
  OPEN BRANCH FROM BUS 314206 TO BUS 314532 CKT Z1     /* 3OAKRIDG
115.00 - 3OAKRI23 115.00
  OPEN BRANCH FROM BUS 314528 TO BUS 314532 CKT 1     /* 3IVOR106
115.00 - 3OAKRI23 115.00
  OPEN BRANCH FROM BUS 314532 TO BUS 314536 CKT 1     /* 3OAKRI23
115.00 - 3SUFFOLK 115.00
  OPEN BRANCH FROM BUS 313803 TO BUS 314531 CKT 1     /* 3OAKRI44
115.00 - 3MYRTLE 115.00
  OPEN BRANCH FROM BUS 313803 TO BUS 314536 CKT 1     /* 3OAKRI44
115.00 - 3SUFFOLK 115.00
  OPEN BRANCH FROM BUS 314531 TO BUS 924940 CKT 1     /* 3MYRTLE
115.00 - AB2-149 TAP 115.00
  OPEN BRANCH FROM BUS 314536 TO BUS 314823 CKT 1     /* SUFFOLK
SC142
END
  
```

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
931591	AC2-079 C OP	38.
931592	AC2-079 E OP	62.
924941	AB2-149 C OP	19.
924942	AB2-149 E OP	31.

Appendix 2

(DVP - DVP) The 3WINDSOR-3SADL_1 115 kV line (from bus 314542 to bus 313878 ckt 1) loads from 30.66% to 104.19% (**DC power flow**) of its load dump rating (136 MVA) for the line fault with failed breaker contingency outage of '23T44_A'. This project contributes approximately 100.0 MW to the thermal violation.

```
CONTINGENCY '23T44_A'                                /* 23T44 @ SUFFOLK
  OPEN BRANCH FROM BUS 314206 TO BUS 314529 CKT 1      /* 3OAKRIDG
115.00 - 3KINGS F 115.00
  OPEN BRANCH FROM BUS 314206 TO BUS 314532 CKT Z1     /* 3OAKRIDG
115.00 - 3OAKRI23 115.00
  OPEN BRANCH FROM BUS 314528 TO BUS 314532 CKT 1     /* 3IVOR106
115.00 - 3OAKRI23 115.00
  OPEN BRANCH FROM BUS 314532 TO BUS 314536 CKT 1     /* 3OAKRI23
115.00 - 3SUFFOLK 115.00
  OPEN BRANCH FROM BUS 313803 TO BUS 314531 CKT 1     /* 3OAKRI44
115.00 - 3MYRTLE 115.00
  OPEN BRANCH FROM BUS 313803 TO BUS 314536 CKT 1     /* 3OAKRI44
115.00 - 3SUFFOLK 115.00
  OPEN BRANCH FROM BUS 314531 TO BUS 924940 CKT 1     /* 3MYRTLE
115.00 - AB2-149 TAP 115.00
  OPEN BRANCH FROM BUS 314536 TO BUS 314823 CKT 1     /* SUFFOLK
SC142
END
```

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
931591	AC2-079 C OP	38.
931592	AC2-079 E OP	62.
924941	AB2-149 C OP	19.
924942	AB2-149 E OP	31.

Appendix 3

(DVP - DVP) The AB2-149 TAP-3WINDSOR 115 kV line (from bus 924940 to bus 314542 ckt 1) loads from 36.76% to 110.29% (**DC power flow**) of its load dump rating (136 MVA) for the line fault with failed breaker contingency outage of '23T44_A'. This project contributes approximately 100.0 MW to the thermal violation.

```
CONTINGENCY '23T44_A'                                /* 23T44 @ SUFFOLK
  OPEN BRANCH FROM BUS 314206 TO BUS 314529 CKT 1      /* 3OAKRIDG
115.00 - 3KINGS F 115.00
  OPEN BRANCH FROM BUS 314206 TO BUS 314532 CKT Z1     /* 3OAKRIDG
115.00 - 3OAKRI23 115.00
  OPEN BRANCH FROM BUS 314528 TO BUS 314532 CKT 1      /* 3IVOR106
115.00 - 3OAKRI23 115.00
  OPEN BRANCH FROM BUS 314532 TO BUS 314536 CKT 1      /* 3OAKRI23
115.00 - 3SUFFOLK 115.00
  OPEN BRANCH FROM BUS 313803 TO BUS 314531 CKT 1      /* 3OAKRI44
115.00 - 3MYRTLE 115.00
  OPEN BRANCH FROM BUS 313803 TO BUS 314536 CKT 1      /* 3OAKRI44
115.00 - 3SUFFOLK 115.00
  OPEN BRANCH FROM BUS 314531 TO BUS 924940 CKT 1      /* 3MYRTLE
115.00 - AB2-149 TAP 115.00
  OPEN BRANCH FROM BUS 314536 TO BUS 314823 CKT 1      /* SUFFOLK
SC142
END
```

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
931591	AC2-079 C OP	38.
931592	AC2-079 E OP	62.
924941	AB2-149 C OP	19.
924942	AB2-149 E OP	31.

Appendix 4

(DVP - DVP) The 8ELMONT 500/230 kV transformer (from bus 314218 to bus 314908 ckt 1) loads from 118.93% to 119.69% (**DC power flow**) of its load dump rating (1051 MVA) for the line fault with failed breaker contingency outage of 'H2T557'. This project contributes approximately 17.66 MW to the thermal violation.

CONTINGENCY 'H2T557' /* ELMONT
 OPEN BRANCH FROM BUS 314908 TO BUS 314903 CKT 1 /*ELMONT TO
 CHICKAHOMINY (LINE 557)
 OPEN BRANCH FROM BUS 314903 TO BUS 314214 CKT 1
 /*CHICKAHOMINY 500-230 (TX#1)
 OPEN BRANCH FROM BUS 314908 TO BUS 314218 CKT 2 /*ELMONT 500-
 230 (TX#2)
 END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315067	1DARBY 1	4.47
315068	1DARBY 2	4.48
315069	1DARBY 3	4.53
315070	1DARBY 4	4.53
315043	1FRIVERA	6.02
315044	1FRIVERB	4.66
315045	1FRIVERC	6.02
315046	1FRIVERD	4.66
315047	1FRIVERE	4.66
315048	1FRIVERF	6.02
315074	1HOPCGN1	11.03
315075	1HOPCGN2	10.89
315134	1ROAVALA	22.59
315135	1ROAVALB	6.02
315083	1SPRUNCA	14.8
315084	1SPRUNCB	14.8
315085	1SPRUNCC	10.97
315086	1SPRUNCD	10.97
315073	1STONECA	9.15
314784	1WEYRHSB	1.72
315090	1YORKTN1	30.63
315091	1YORKTN2	31.78
314539	3UNCAMP	2.15
314541	3WATKINS	0.6
314229	6MT R221	1.42
314236	6NRTHEST	0.33
314189	6PAPERMILL	8.8
314251	6S PUMP	1.62
931041	AC2-012 C OP	9.29

931042	AC2-012 E OP	15.16
931501	AC2-070 C	2.92
931502	AC2-070 E	1.21
931531	AC2-073 C	3.09
931532	AC2-073 E	1.56
931581	AC2-078 C OP	4.26
931582	AC2-078 E OP	6.95
931591	AC2-079 C OP	6.71
931592	AC2-079 E OP	10.95
931831	AC2-110 C	1.74
931832	AC2-110 E	2.84
292791	U1-032 E	4.77
297087	V2-040	0.25
900672	V4-068 E	0.25
901082	W1-029 E	41.27
907092	X1-038 E	5.37
913392	Y1-086 E	1.97
916042	Z1-036 E	40.07
916192	Z1-068 E	1.73
917122	Z2-027 E	0.95
917332	Z2-043 E	0.8
917592	Z2-099 E	0.37
921092	AA1-049 C	2.2
921093	AA1-049 E	1.03
921162	AA1-063AC	6.95
921163	AA1-063AE	3.28
918512	AA1-065 E OP	3.66
918562	AA1-072 E	0.13
921292	AA1-083	6.01
921532	AA1-132 C	6.79
921533	AA1-132 E	2.91
921572	AA1-138 C	8.68
921573	AA1-138 E	3.72
921582	AA1-139 C	13.62
921583	AA1-139 E	5.84
921622	AA1-145	102.15
921752	AA2-053 C	6.97
921753	AA2-053 E	2.99
921772	AA2-059 C	1.03
921773	AA2-059 E	0.48
920022	AA2-086 E	0.2
921982	AA2-088 C	5.5
921983	AA2-088 E	8.97
922512	AA2-174 C	0.32
922513	AA2-174 E	0.35

922522	AA2-177 C	12.13
922523	AA2-177 E	5.2
922532	AA2-178 C	8.22
922533	AA2-178 E	3.52
922602	AB1-013 C	2.48
922603	AB1-013 E	16.61
922672	AB1-026 C	2.22
922673	AB1-026 E	0.95
922682	AB1-027 C	4.45
922683	AB1-027 E	1.91
923262	AB1-132 C OP	11.49
923263	AB1-132 E OP	4.93
923272	AB1-135 C OP	3.7
923273	AB1-135 E OP	1.59
923572	AB1-173 C OP	1.85
923573	AB1-173 E OP	0.86
923582	AB1-173AC OP	1.85
923583	AB1-173AE OP	0.86
923801	AB2-015 C OP	7.59
923802	AB2-015 E OP	6.22
923831	AB2-022 C	2.07
923832	AB2-022 E	1.12
923841	AB2-024 C	3.3
923842	AB2-024 E	1.48
923851	AB2-025 C	2.36
923852	AB2-025 E	1.06
923861	AB2-026 C	1.95
923862	AB2-026 E	0.88
923911	AB2-031 C OP	1.84
923912	AB2-031 E OP	0.91
923981	AB2-039 C OP	8.78
923982	AB2-039 E OP	7.1
923991	AB2-040 C OP	6.04
923992	AB2-040 E OP	4.94
924061	AB2-050	6.01
924071	AB2-051 C OP	127.
924072	AB2-051 E OP	17.44
924241	AB2-068 OP	175.81
924381	AB2-087 C	0.47
924382	AB2-087 E	0.22
924501	AB2-099 C	0.48
924502	AB2-099 E	0.21
924511	AB2-100 C	9.75
924512	AB2-100 E	4.8
924761	AB2-128 C	8.36

924762	AB2-128 E	3.29
924811	AB2-134 C OP	15.56
924812	AB2-134 E OP	20.8
924931	AB2-147 C	2.14
924932	AB2-147 E	3.48
924941	AB2-149 C OP	3.35
924942	AB2-149 E OP	5.47
924951	AB2-150 C OP	2.14
924952	AB2-150 E OP	3.48
925051	AB2-160 C OP	7.01
925052	AB2-160 E OP	11.43
925061	AB2-161 C OP	3.55
925062	AB2-161 E OP	5.79
925121	AB2-169 C OP	5.19
925122	AB2-169 E OP	4.66
925141	AB2-171 C OP	4.25
925142	AB2-171 E OP	6.94
925171	AB2-174 C OP	5.83
925172	AB2-174 E OP	5.27
925281	AB2-186 C	0.54
925282	AB2-186 E	0.23
925291	AB2-188 C OP	2.03
925292	AB2-188 E OP	0.91
925331	AB2-190 C	27.74
925332	AB2-190 E	6.93
925521	AC1-027 C	1.85
925522	AC1-027 E	1.06
925691	AC1-045 C	1.65
925692	AC1-045 E	0.9
925701	AC1-046 C	1.59
925702	AC1-046 E	0.87
925711	AC1-047 C	2.1
925712	AC1-047 E	1.16
925811	AC1-060	0.1
925821	AC1-061	0.05
925841	AC1-063	0.5
925861	AC1-065 C	4.35
925862	AC1-065 E	7.09
926071	AC1-086 C	16.92
926072	AC1-086 E	7.7
926291	AC1-107 OP	265.38
926411	AC1-112 C	3.46
926412	AC1-112 E	1.94
926441	AC1-115 C	1.03
926442	AC1-115 E	1.67

926471	AC1-118 C	2.1
926472	AC1-118 E	1.08
926551	AC1-134	15.02
926591	AC1-142 C	11.38
926592	AC1-142 E	8.59
926661	AC1-147 C	2.1
926662	AC1-147 E	1.23
926741	AC1-159 C	126.03
926751	AC1-161 C OP	26.81
926752	AC1-161 E OP	11.44
926771	AC1-163 C	1.74
926772	AC1-163 E	0.82
926781	AC1-164 C OP	36.62
926782	AC1-164 E OP	16.45
927041	AC1-191 C	19.88
927042	AC1-191 E	9.9
927051	AC1-193 C	3.12
927052	AC1-193 E	5.09
927111	AC1-206 C OP	10.48
927112	AC1-206 E OP	4.96
927221	AC1-216 C OP	11.87
927222	AC1-216 E OP	9.34

Appendix 5

(DVP - DVP) The 6CHARCTY-6LAKESD 230 kV line (from bus 314225 to bus 314227 ckt 1) loads from 138.59% to 139.4% (**DC power flow**) of its load dump rating (459 MVA) for the tower line contingency outage of 'LN 208-259'. This project contributes approximately 8.34 MW to the thermal violation.

CONTINGENCY 'LN 208-259'

OPEN BRANCH FROM BUS 314286 TO BUS 314309 CKT 1 /* 6CHSTF A

230.00 - 6IRON208 230.00

OPEN BRANCH FROM BUS 314309 TO BUS 314338 CKT 1 /* 6IRON208

230.00 - 6SOUWEST 230.00

OPEN BUS 314309 /* ISLAND

OPEN BRANCH FROM BUS 314276 TO BUS 314287 CKT 1 /* 6BASIN 230.00 -
6CHSTF B 230.00

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315065	1CHESTF6	33.42
315074	1HOPCGN1	6.83
315075	1HOPCGN2	6.74
315077	1HOPHCF1	1.94
315078	1HOPHCF2	1.94
315079	1HOPHCF3	1.94
315080	1HOPHCF4	2.94
315076	1HOPPOLC	1.65
315134	1ROAVALA	11.3
315135	1ROAVALB	3.01
315073	1STONECA	5.67
314784	1WEYRHSB	0.65
314539	3UNCAMP	0.86
314541	3WATKINS	0.25
314229	6MT R221	-0.33
931581	AC2-078 C OP	2.39
931582	AC2-078 E OP	3.89
931591	AC2-079 C OP	3.17
931592	AC2-079 E OP	5.17
931631	AC2-084 C	2.99
931632	AC2-084 E	1.47
292791	U1-032 E	2.95
900672	V4-068 E	0.11
901082	W1-029 E	13.48
907092	X1-038 E	2.14
913392	Y1-086 E	0.63
914231	Y2-077	0.78
916042	Z1-036 E	13.58

916192	Z1-068 E	0.53
917122	Z2-027 E	0.31
917332	Z2-043 E	0.34
917342	Z2-044 E	0.18
917592	Z2-099 E	0.16
921162	AA1-063AC	3.19
921163	AA1-063AE	1.51
918512	AA1-065 E OP	1.48
918562	AA1-072 E	0.06
921562	AA1-135 C	2.95
921563	AA1-135 E	1.26
921572	AA1-138 C	3.
921573	AA1-138 E	1.29
921752	AA2-053 C	3.25
921753	AA2-053 E	1.4
921762	AA2-057 C	2.34
921763	AA2-057 E	1.17
921772	AA2-059 C	0.36
921773	AA2-059 E	0.17
921862	AA2-068 C	0.76
921863	AA2-068 E	0.35
920022	AA2-086 E	0.09
921982	AA2-088 C	2.33
921983	AA2-088 E	3.8
922442	AA2-165 C	0.32
922443	AA2-165 E	0.15
922472	AA2-169 C	0.71
922473	AA2-169 E	0.33
922512	AA2-174 C	0.15
922513	AA2-174 E	0.16
922522	AA2-177 C	6.39
922523	AA2-177 E	2.74
922532	AA2-178 C	2.96
922533	AA2-178 E	1.27
922602	AB1-013 C	0.89
922603	AB1-013 E	5.97
923262	AB1-132 C OP	5.96
923263	AB1-132 E OP	2.56
923572	AB1-173 C OP	0.98
923573	AB1-173 E OP	0.46
923582	AB1-173AC OP	0.98
923583	AB1-173AE OP	0.46
923801	AB2-015 C OP	3.06
923802	AB2-015 E OP	2.51
923831	AB2-022 C	0.66

923832	AB2-022 E	0.35
923851	AB2-025 C	1.62
923852	AB2-025 E	0.73
923911	AB2-031 C OP	0.98
923912	AB2-031 E OP	0.48
923981	AB2-039 C OP	4.92
923982	AB2-039 E OP	3.98
923991	AB2-040 C OP	3.21
923992	AB2-040 E OP	2.63
924071	AB2-051 C OP	39.03
924072	AB2-051 E OP	5.36
924381	AB2-087 C	0.19
924382	AB2-087 E	0.09
924501	AB2-099 C	0.2
924502	AB2-099 E	0.09
924511	AB2-100 C	5.57
924512	AB2-100 E	2.74
924761	AB2-128 C	4.77
924762	AB2-128 E	1.88
924811	AB2-134 C OP	8.19
924812	AB2-134 E OP	10.95
924931	AB2-147 C	1.2
924932	AB2-147 E	1.96
924941	AB2-149 C OP	1.58
924942	AB2-149 E OP	2.59
924951	AB2-150 C OP	1.2
924952	AB2-150 E OP	1.96
925051	AB2-160 C OP	4.18
925052	AB2-160 E OP	6.83
925061	AB2-161 C OP	1.99
925062	AB2-161 E OP	3.24
925121	AB2-169 C OP	2.01
925122	AB2-169 E OP	1.81
925141	AB2-171 C OP	1.75
925142	AB2-171 E OP	2.85
925171	AB2-174 C OP	3.17
925172	AB2-174 E OP	2.87
925281	AB2-186 C	0.18
925282	AB2-186 E	0.08
925291	AB2-188 C OP	0.73
925292	AB2-188 E OP	0.33
925331	AB2-190 C	14.6
925332	AB2-190 E	3.65
925521	AC1-027 C	0.57
925522	AC1-027 E	0.32

925691	AC1-045 C	0.53
925692	AC1-045 E	0.29
925821	AC1-061	0.03
926071	AC1-086 C	8.78
926072	AC1-086 E	4.
926201	AC1-098 C	2.1
926202	AC1-098 E	1.25
926211	AC1-099 C	0.7
926212	AC1-099 E	0.41
926661	AC1-147 C	0.65
926662	AC1-147 E	0.38
926741	AC1-159 C	38.73
926771	AC1-163 C	0.73
926772	AC1-163 E	0.34
927051	AC1-193 C	1.28
927052	AC1-193 E	2.09
927111	AC1-206 C OP	6.48
927112	AC1-206 E OP	3.06
927141	AC1-208 C	3.26
927142	AC1-208 E	1.45
927221	AC1-216 C OP	6.25
927222	AC1-216 E OP	4.92

Appendix 6

(DVP - DVP) The 6MESSER-6CHARCTY 230 kV line (from bus 314228 to bus 314225 ckt 1) loads from 150.33% to 151.15% (**DC power flow**) of its load dump rating (459 MVA) for the tower line contingency outage of 'LN 208-259'. This project contributes approximately 8.34 MW to the thermal violation.

CONTINGENCY 'LN 208-259'

OPEN BRANCH FROM BUS 314286 TO BUS 314309 CKT 1 /* 6CHSTF A

230.00 - 6IRON208 230.00

OPEN BRANCH FROM BUS 314309 TO BUS 314338 CKT 1 /* 6IRON208

230.00 - 6SOUWEST 230.00

OPEN BUS 314309 /* ISLAND

OPEN BRANCH FROM BUS 314276 TO BUS 314287 CKT 1 /* 6BASIN 230.00 -
6CHSTF B 230.00

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315065	1CHESTF6	33.42
315074	1HOPCGN1	6.83
315075	1HOPCGN2	6.74
315077	1HOPHCF1	1.94
315078	1HOPHCF2	1.94
315079	1HOPHCF3	1.94
315080	1HOPHCF4	2.94
315076	1HOPPOLC	1.65
315134	1ROAVALA	11.3
315135	1ROAVALB	3.01
315073	1STONECA	5.67
314784	1WEYRHSB	0.65
314539	3UNCAMP	0.86
314541	3WATKINS	0.25
314229	6MT R221	-0.33
931581	AC2-078 C OP	2.39
931582	AC2-078 E OP	3.89
931591	AC2-079 C OP	3.17
931592	AC2-079 E OP	5.17
931631	AC2-084 C	2.99
931632	AC2-084 E	1.47
292791	U1-032 E	2.95
900672	V4-068 E	0.11
901082	W1-029 E	13.48
907092	X1-038 E	2.14
913392	Y1-086 E	0.63
914231	Y2-077	0.78
916042	Z1-036 E	13.58

916192	Z1-068 E	0.53
917122	Z2-027 E	0.31
917332	Z2-043 E	0.34
917342	Z2-044 E	0.18
917592	Z2-099 E	0.16
921162	AA1-063AC	3.19
921163	AA1-063AE	1.51
918512	AA1-065 E OP	1.48
918562	AA1-072 E	0.06
921562	AA1-135 C	2.95
921563	AA1-135 E	1.26
921572	AA1-138 C	3.
921573	AA1-138 E	1.29
921752	AA2-053 C	3.25
921753	AA2-053 E	1.4
921762	AA2-057 C	2.34
921763	AA2-057 E	1.17
921772	AA2-059 C	0.36
921773	AA2-059 E	0.17
921862	AA2-068 C	0.76
921863	AA2-068 E	0.35
920022	AA2-086 E	0.09
921982	AA2-088 C	2.33
921983	AA2-088 E	3.8
922442	AA2-165 C	0.32
922443	AA2-165 E	0.15
922472	AA2-169 C	0.71
922473	AA2-169 E	0.33
922512	AA2-174 C	0.15
922513	AA2-174 E	0.16
922522	AA2-177 C	6.39
922523	AA2-177 E	2.74
922532	AA2-178 C	2.96
922533	AA2-178 E	1.27
922602	AB1-013 C	0.89
922603	AB1-013 E	5.97
923262	AB1-132 C OP	5.96
923263	AB1-132 E OP	2.56
923572	AB1-173 C OP	0.98
923573	AB1-173 E OP	0.46
923582	AB1-173AC OP	0.98
923583	AB1-173AE OP	0.46
923801	AB2-015 C OP	3.06
923802	AB2-015 E OP	2.51
923831	AB2-022 C	0.66

923832	AB2-022 E	0.35
923851	AB2-025 C	1.62
923852	AB2-025 E	0.73
923911	AB2-031 C OP	0.98
923912	AB2-031 E OP	0.48
923981	AB2-039 C OP	4.92
923982	AB2-039 E OP	3.98
923991	AB2-040 C OP	3.21
923992	AB2-040 E OP	2.63
924071	AB2-051 C OP	39.03
924072	AB2-051 E OP	5.36
924381	AB2-087 C	0.19
924382	AB2-087 E	0.09
924501	AB2-099 C	0.2
924502	AB2-099 E	0.09
924511	AB2-100 C	5.57
924512	AB2-100 E	2.74
924761	AB2-128 C	4.77
924762	AB2-128 E	1.88
924811	AB2-134 C OP	8.19
924812	AB2-134 E OP	10.95
924931	AB2-147 C	1.2
924932	AB2-147 E	1.96
924941	AB2-149 C OP	1.58
924942	AB2-149 E OP	2.59
924951	AB2-150 C OP	1.2
924952	AB2-150 E OP	1.96
925051	AB2-160 C OP	4.18
925052	AB2-160 E OP	6.83
925061	AB2-161 C OP	1.99
925062	AB2-161 E OP	3.24
925121	AB2-169 C OP	2.01
925122	AB2-169 E OP	1.81
925141	AB2-171 C OP	1.75
925142	AB2-171 E OP	2.85
925171	AB2-174 C OP	3.17
925172	AB2-174 E OP	2.87
925281	AB2-186 C	0.18
925282	AB2-186 E	0.08
925291	AB2-188 C OP	0.73
925292	AB2-188 E OP	0.33
925331	AB2-190 C	14.6
925332	AB2-190 E	3.65
925521	AC1-027 C	0.57
925522	AC1-027 E	0.32

925691	AC1-045 C	0.53
925692	AC1-045 E	0.29
925821	AC1-061	0.03
926071	AC1-086 C	8.78
926072	AC1-086 E	4.
926201	AC1-098 C	2.1
926202	AC1-098 E	1.25
926211	AC1-099 C	0.7
926212	AC1-099 E	0.41
926661	AC1-147 C	0.65
926662	AC1-147 E	0.38
926741	AC1-159 C	38.73
926771	AC1-163 C	0.73
926772	AC1-163 E	0.34
927051	AC1-193 C	1.28
927052	AC1-193 E	2.09
927111	AC1-206 C OP	6.48
927112	AC1-206 E OP	3.06
927141	AC1-208 C	3.26
927142	AC1-208 E	1.45
927221	AC1-216 C OP	6.25
927222	AC1-216 E OP	4.92

Appendix 7

(DVP - DVP) The 6CHSTF B-6MESSER 230 kV line (from bus 314287 to bus 314228 ckt 1) loads from 150.46% to 151.28% (**DC power flow**) of its load dump rating (459 MVA) for the tower line contingency outage of 'LN 208-259'. This project contributes approximately 8.34 MW to the thermal violation.

CONTINGENCY 'LN 208-259'

OPEN BRANCH FROM BUS 314286 TO BUS 314309 CKT 1 /* 6CHSTF A

230.00 - 6IRON208 230.00

OPEN BRANCH FROM BUS 314309 TO BUS 314338 CKT 1 /* 6IRON208

230.00 - 6SOUWEST 230.00

OPEN BUS 314309 /* ISLAND

OPEN BRANCH FROM BUS 314276 TO BUS 314287 CKT 1 /* 6BASIN 230.00 -
6CHSTF B 230.00

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315065	1CHESTF6	33.42
315074	1HOPCGN1	6.83
315075	1HOPCGN2	6.74
315077	1HOPHCF1	1.94
315078	1HOPHCF2	1.94
315079	1HOPHCF3	1.94
315080	1HOPHCF4	2.94
315076	1HOPPOLC	1.65
315134	1ROAVALA	11.3
315135	1ROAVALB	3.01
315073	1STONECA	5.67
314784	1WEYRHSB	0.65
314539	3UNCAMP	0.86
314541	3WATKINS	0.25
314229	6MT R221	-0.33
931581	AC2-078 C OP	2.39
931582	AC2-078 E OP	3.89
931591	AC2-079 C OP	3.17
931592	AC2-079 E OP	5.17
931631	AC2-084 C	2.99
931632	AC2-084 E	1.47
292791	U1-032 E	2.95
900672	V4-068 E	0.11
901082	W1-029 E	13.48
907092	X1-038 E	2.14
913392	Y1-086 E	0.63
914231	Y2-077	0.78
916042	Z1-036 E	13.58

916192	Z1-068 E	0.53
917122	Z2-027 E	0.31
917332	Z2-043 E	0.34
917342	Z2-044 E	0.18
917592	Z2-099 E	0.16
921162	AA1-063AC	3.19
921163	AA1-063AE	1.51
918512	AA1-065 E OP	1.48
918562	AA1-072 E	0.06
921562	AA1-135 C	2.95
921563	AA1-135 E	1.26
921572	AA1-138 C	3.
921573	AA1-138 E	1.29
921752	AA2-053 C	3.25
921753	AA2-053 E	1.4
921762	AA2-057 C	2.34
921763	AA2-057 E	1.17
921772	AA2-059 C	0.36
921773	AA2-059 E	0.17
921862	AA2-068 C	0.76
921863	AA2-068 E	0.35
920022	AA2-086 E	0.09
921982	AA2-088 C	2.33
921983	AA2-088 E	3.8
922442	AA2-165 C	0.32
922443	AA2-165 E	0.15
922472	AA2-169 C	0.71
922473	AA2-169 E	0.33
922512	AA2-174 C	0.15
922513	AA2-174 E	0.16
922522	AA2-177 C	6.39
922523	AA2-177 E	2.74
922532	AA2-178 C	2.96
922533	AA2-178 E	1.27
922602	AB1-013 C	0.89
922603	AB1-013 E	5.97
923262	AB1-132 C OP	5.96
923263	AB1-132 E OP	2.56
923572	AB1-173 C OP	0.98
923573	AB1-173 E OP	0.46
923582	AB1-173AC OP	0.98
923583	AB1-173AE OP	0.46
923801	AB2-015 C OP	3.06
923802	AB2-015 E OP	2.51
923831	AB2-022 C	0.66

923832	AB2-022 E	0.35
923851	AB2-025 C	1.62
923852	AB2-025 E	0.73
923911	AB2-031 C OP	0.98
923912	AB2-031 E OP	0.48
923981	AB2-039 C OP	4.92
923982	AB2-039 E OP	3.98
923991	AB2-040 C OP	3.21
923992	AB2-040 E OP	2.63
924071	AB2-051 C OP	39.03
924072	AB2-051 E OP	5.36
924381	AB2-087 C	0.19
924382	AB2-087 E	0.09
924501	AB2-099 C	0.2
924502	AB2-099 E	0.09
924511	AB2-100 C	5.57
924512	AB2-100 E	2.74
924761	AB2-128 C	4.77
924762	AB2-128 E	1.88
924811	AB2-134 C OP	8.19
924812	AB2-134 E OP	10.95
924931	AB2-147 C	1.2
924932	AB2-147 E	1.96
924941	AB2-149 C OP	1.58
924942	AB2-149 E OP	2.59
924951	AB2-150 C OP	1.2
924952	AB2-150 E OP	1.96
925051	AB2-160 C OP	4.18
925052	AB2-160 E OP	6.83
925061	AB2-161 C OP	1.99
925062	AB2-161 E OP	3.24
925121	AB2-169 C OP	2.01
925122	AB2-169 E OP	1.81
925141	AB2-171 C OP	1.75
925142	AB2-171 E OP	2.85
925171	AB2-174 C OP	3.17
925172	AB2-174 E OP	2.87
925281	AB2-186 C	0.18
925282	AB2-186 E	0.08
925291	AB2-188 C OP	0.73
925292	AB2-188 E OP	0.33
925331	AB2-190 C	14.6
925332	AB2-190 E	3.65
925521	AC1-027 C	0.57
925522	AC1-027 E	0.32

925691	AC1-045 C	0.53
925692	AC1-045 E	0.29
925821	AC1-061	0.03
926071	AC1-086 C	8.78
926072	AC1-086 E	4.
926201	AC1-098 C	2.1
926202	AC1-098 E	1.25
926211	AC1-099 C	0.7
926212	AC1-099 E	0.41
926661	AC1-147 C	0.65
926662	AC1-147 E	0.38
926741	AC1-159 C	38.73
926771	AC1-163 C	0.73
926772	AC1-163 E	0.34
927051	AC1-193 C	1.28
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