

***Generation Interconnection
Feasibility Study Report***

For

***PJM Generation Interconnection Request
Queue Position AC2-141***

***Septa 500kV
168.2MW Capacity / 240MW 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, VA. The installed facilities will have a total capability of 480 MW with 316.76 MW of this output being recognized by PJM as capacity. This queue request is for an additional 240 MW with 168.2 MW being recognized by PJM as capacity. The proposed in-service date for this project is 10/01/2019. **This study does not imply an ITO commitment to this in-service date.**

Point of Interconnection

AC2-141 will interconnect with the ITO transmission system at one of the following points of interconnection:

Option 1 will connect into Septa 500kV substation.

Option 2 will connect via a new three breaker ring bus switching station that connects on the Smithfield – Surry 230kV line # 223.

Cost Summary

The AC2-141 project will be responsible for the following costs:

Description	Total Cost
Attachment Facilities	\$0
Direct Connection Network Upgrades	\$0
Non Direct Connection Network Upgrades	\$0
Total Costs	\$0

In addition, the AC2-141 project may be responsible for a contribution to the following costs:

Description	Total Cost
New System Upgrades	\$ 6,000,000
Previously Identified Upgrades	\$445,633,000
Total Costs	\$451,633,000

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

Transmission Owner Scope of Work

Attachment Facilities

The existing AC1-161 scope of work is sufficient to accommodate this queue request from an Attachment Facilities and substation expansion perspective. The single line is shown below in Attachment 1.

System Reinforcement

Violation #	Upgrade Description	Upgrade Cost
# 1	Wreck and rebuild a 2 mile segment of the existing Loudoun - Morrisville 500kV line. This will increase normal and emergency rating to 3424 MVA. It is estimated to 36-48 months to engineer, permit and construct (VA CPCN is required).	\$6,000,000
# 2, 3, 37, 38	Wreck and rebuild the 17 mile Morrisville - Spotsylvania 500kV line to a minimum rating of 4453 MVA. It is estimated to 44-48 months to permit (VA CPCN required), engineer and construct.	\$56,250,000
# 4, 5	Wreck and rebuild the 19 mile Skiff Creek - King Mill 230kV line to a rating of 1047 MVA. It is estimated to take 30-36 months to permit (VA CPCN required), engineer and construct.	\$28,200,000
# 6 - 8	Replace existing Elmont 500/230kV transformer with a larger unit. It is estimated to 24-30 months to engineer and construct.	\$17,500,000
# 9	Wreck and rebuild the Lightfoot - Waller 230kV line to a rating of 1047 MVA. It is estimated to take 30-36 months to permit (VA CPCN required), engineer and construct.	\$15,200,000
# 10, 11	Replace wave traps at both Carson and Midlothian Substations. This will increase emergency rating by 31% to 3424 MVA. It is estimated to 12-16 months to engineer and construct.	\$500,000
# 12 – 16	Wreck and rebuild the 28 mile Chickahominy - Elmont 500kV line for a higher capacity since the overload exceeds the conductor rating. It is estimated to 36-48 months to engineer and construct.	\$84,000,000
# 17 – 19	Wreck and rebuild the existing Brister - Chance 500kV line since overload exceeds conductor rating of 2913 MVA by 3.1% new line rating 4300 MVA. It is estimated to 36-48 months to engineer, permit and construct (VA CPCN is required). Note: This facility has been identified as End of Life project. Dominion is working with PJM to address the issue through a RTEP process.	\$73,000,000
# 20 – 24	Wreck and rebuild the Elmont – Ladysmith 500kV line of 26 miles for a higher capacity since the overload exceeds the conductor rating. It is estimated to 36-48 months to engineer and construct.	\$78,300,000

Violation #	Upgrade Description	Upgrade Cost
# 25 - 29	Wreck and rebuild the existing Chance - Ladysmith 500kV line since overload exceeds conductor rating of 2913 MVA by 3.1% new line rating 4300 MVA. It is estimated to 36-48 months to engineer, permit and construct (VA CPCN is required).	\$50,000,000
# 30, 31	Replace wave trap at both Ladysmith and Possum Point Substations. This will increase line rating by 12% to 2913 MVA. It is estimated to 14-16 months to engineer and construct.	\$500,000
#32 – 34	Wreck and rebuild a segment of the existing Midlothian - North Anna 500kV line of 41 miles. This will increase emergency rating to 4453 MVA. It is estimated to 36-48 months to engineer, permit and construct (VA CPCN is required). The engineering will evaluate whether the existing structure can be used for the new conductor.	\$123,000
# 35, 36	Wreck and rebuild the 17 mile North Anna - Spotsylvania 500kV line for a higher capacity since the overload exceeds the conductor rating. It is estimated to 36-48 months to engineer, permit and construct (VA CPCN is required).	\$56,250,000
Total Network Upgrades		\$451,633,000

Note: the first to cause the violation will be identified during the Impact Study.

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 AC2-141 was evaluated as a 240.0 MW (Capacity 168.2 MW) injection at the Septa 500 kV substation in the ITO area. Project AC2-141 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AC2-141 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
57302	CONTINGENCY '57302' /*NORTH ANNA OPEN BRANCH FROM BUS 314934 TO BUS 314918 CKT 1 /*NORTH ANNA TO SPOTSYLVANIA (LINE 573) OPEN BRANCH FROM BUS 314918 TO BUS 314232 CKT 1 /*NORTH ANNA 500-230 (TX#5) END
57602	CONTINGENCY '57602' /*NORTH ANNA OPEN BRANCH FROM BUS 314914 TO BUS 314918 CKT 1 /*MIDLOTHIAN TO NORTH ANNA (LINE 576) OPEN BRANCH FROM BUS 314914 TO BUS 314322 CKT 1 /*MIDLOTHIAN 500-230 (TX#2) OPEN BRANCH FROM BUS 314918 TO BUS 314232 CKT 1 /*NORTH ANNA 500-230 (TX#5) END
557T574	CONTINGENCY '557T574' /* 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 314911 TO BUS 314908 CKT 1 /*ELMONT TO LADYSMITH (LINE 574) END
563T576	CONTINGENCY '563T576' /*MIDLOTHIAN OPEN BRANCH FROM BUS 314914 TO BUS 314918 CKT 1 /*MIDLOTHIAN TO NORTH ANNA (LINE 576) OPEN BRANCH FROM BUS 314914 TO BUS 314322 CKT 1 /*MIDLOTHIAN 500-230 (TX#2) OPEN BRANCH FROM BUS 314914 TO BUS 314902 CKT 1 /*MIDLOTHIAN TO CARSON (LINE 563) END
H1T581	CONTINGENCY 'H1T581' /* LADYSMITH OPEN BRANCH FROM BUS 314911 TO BUS 314905 CKT 1 /*LADYSMITH TO CHANCELLOR (LINE 581) OPEN BRANCH FROM BUS 314905 TO BUS 314135 CKT 2 /*CHANCELLOR 500-115 (TX#4) OPEN BRANCH FROM BUS 314911 TO BUS 314196 CKT 1 /*LADYSMITH 500-230 (TX#1) END

Contingency Name	Description
H1T9033	CONTINGENCY 'H1T9033' /*MORRISVILLE OPEN BRANCH FROM BUS 314934 TO BUS 314916 CKT 1 /*SPOTSYLVANIA TO MORRISVILLE (LINE 9033) OPEN BRANCH FROM BUS 314916 TO BUS 314063 CKT 1 /*MORRISVILLE 500-230 (TX#1) OPEN BRANCH FROM BUS 314916 TO BUS 314897 CKT 1 /*MORRISVILLE CAP BANK 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
LN 198-552	CONTINGENCY 'LN 198-552' OPEN BRANCH FROM BUS 314135 TO BUS 314367 CKT 1 /* 3CHANCE 115.00 - 3CHANC_1 115.00 CAP BANK OPEN BRANCH FROM BUS 314135 TO BUS 314775 CKT 1 /* 3CHANCE 115.00 - 3NI RVER 115.00 OPEN BRANCH FROM BUS 314775 TO BUS 314779 CKT 1 /* 3NI RVER 115.00 - 3TDTAVRN 115.00 OPEN BRANCH FROM BUS 314779 TO BUS 314755 CKT 1 /* 3TDTAVRN 115.00 - 3SPOTSYL 115.00 OPEN BUS 314367 /* ISLAND CHANC_1 CAP BANK OPEN BRANCH FROM BUS 314135 TO BUS 314905 CKT 2 /* 3CHANCE 115.00 - 8CHANCE 500.00 TRANSFORMER 2 OPEN BRANCH FROM BUS 314900 TO BUS 314905 CKT 1 /* 8BRISTER 500.00 - 8CHANCE 500.00 OPEN BRANCH FROM BUS 314905 TO BUS 314911 CKT 1 /* 8CHANCE 500.00 - 8LDYSMTH 500.00 END
LN 539	CONTINGENCY 'LN 539' OPEN BRANCH FROM BUS 314900 TO BUS 314919 CKT 1 /* 8BRISTER 500.00 - 8OX 500.00 END
LN 552	CONTINGENCY 'LN 552' OPEN BRANCH FROM BUS 314135 TO BUS 314905 CKT 1 /* 3CHANCE 115.00 - 8CHANCE 500.00 OPEN BRANCH FROM BUS 314900 TO BUS 314905 CKT 1 /* 8BRISTER 500.00 - 8CHANCE 500.00 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

Contingency Name	Description
LN 567	CONTINGENCY 'LN 567' OPEN BRANCH FROM BUS 314903 TO BUS 314924 CKT 1 /* 8CHCKAHM 500.00 - 8SURRY 500.00 END
LN 569	CONTINGENCY 'LN 569' OPEN BRANCH FROM BUS 314913 TO BUS 314916 CKT 1 /* 8LOUDOUN 500.00 - 8MORRSVL 500.00 END
LN 573	CONTINGENCY 'LN 573' OPEN BRANCH FROM BUS 314918 TO BUS 314934 CKT 1 /* 8NO ANNA 500.00 - 8SPOTSYL 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
LN 580	CONTINGENCY 'LN 580' OPEN BRANCH FROM BUS 235110 TO BUS 314929 CKT 1 /* 01MDWBRK 500.00 - 8FRONT ROYAL500.00 END
LN 581	CONTINGENCY 'LN 581' OPEN BRANCH FROM BUS 314135 TO BUS 314905 CKT 2 /* 3CHANCE 115.00 - 8CHANCE 500.00 OPEN BRANCH FROM BUS 314905 TO BUS 314911 CKT 1 /* 8CHANCE 500.00 - 8LDYSMTH 500.00 END
LN 594	CONTINGENCY 'LN 594' OPEN BRANCH FROM BUS 314916 TO BUS 314934 CKT 1 /* 8MORRSVL 500.00 - 8SPOTSYL 500.00 END
SPOTSH1T9033	CONTINGENCY 'SPOTSH1T9033' /*SPOTSILYVANIA OPEN BRANCH FROM BUS 314934 TO BUS 314916 CKT 1 /*SPOTSILYVANIA TO MORRISVILLE (LINE 9033) OPEN BRANCH FROM BUS 314934 TO BUS 314755 CKT 1 /*SPOTSILYVANIA 500/115 (TX#1) END
WT576	CONTINGENCY 'WT576' /*NORTH ANNA OPEN BRANCH FROM BUS 314914 TO BUS 314918 CKT 1 /*MIDLOTHIAN TO NORTH ANNA (LINE 576) OPEN BRANCH FROM BUS 314914 TO BUS 314322 CKT 1 /*MIDLOTHIAN 500-230 (TX#2) OPEN BRANCH FROM BUS 314918 TO BUS 314232 CKT 2 /*NORTH ANNA 500-230 (TX#6) END

Contingency Name	Description
XT573	CONTINGENCY 'XT573' /*NORTH ANNA OPEN BRANCH FROM BUS 314934 TO BUS 314918 CKT 1 /*NORTH ANNA TO SPOTSYLVANIA (LINE 573) OPEN BRANCH FROM BUS 314918 TO BUS 314232 CKT 2 /*NORTH ANNA 500-230 (TX#6) END

Summer Peak Analysis - 2020

Generator Deliverability

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

Contingency			Affected Area	Facility Description	Bus			Power Flow	Loading %		Rating		MW Contribution	Ref
#	Type	Name			From	To	Cir.		Initial	Final	Type	MVA		
1	LFFB	T122C	DVP - DVP	6CLUBHSE 230/115 kV transformer	314562	314563	1	DC	137.73	139.08	ER	194	2.61	1

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
#	Type	Name			From	To	Circuit		Initial	Final	Type	MVA	
2	LFFB	H1T581	DVP - DVP	8SPOTSYL-8MORRSVL 500 kV line	314934	314916	1	DC	99.7	100.94	LD	3938	48.78
3	DCTL	LN 198-552	DVP - DVP	8SPOTSYL-8MORRSVL 500 kV line	314934	314916	1	DC	99.21	100.48	LD	3938	49.76

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	N-1	LN 557	DVP - DVP	6SKIFF CREEK-6KINGS M 230 kV line	314209	314386	1	DC	160.7	163.9	ER	442	14.1	2
5	N-1	LN 567	DVP - DVP	6SKIFF CREEK-6KINGS M 230 kV line	314209	314386	1	DC	103.45	107.01	ER	442	15.76	
6	LFFB	H2T557	DVP - DVP	8ELMONT 500/230 kV transformer	314218	314908	1	DC	119.16	120.8	LD	1051	38.25	3
7	N-1	LN 557	DVP - DVP	6PENNIMAN-6WALR209 230 kV line	314296	314415	1	DC	148.37	151.56	ER	442	14.1	4
8	N-1	LN 557	DVP - DVP	6KINGS M-6PENNIMAN 230 kV line	314386	314296	1	DC	152.24	155.43	ER	442	14.1	5
9	N-1	LN 557	DVP - DVP	6WALR209-6LIGH209 230 kV line	314415	314391	1	DC	132.59	135.78	ER	442	14.1	6
10	N-1	LN 557	DVP - DVP	8CARSON-8MDLTHAN 500 kV line	314902	314914	1	DC	130.27	132.42	ER	2442	52.67	7
11	LFFB	557T574	DVP - DVP	8CARSON-8MDLTHAN 500 kV line	314902	314914	1	DC	127.81	130.32	LD	3144	79.06	
12	N-1	LN 576	DVP - DVP	8CHCKAHM-8ELMONT 500 kV line	314903	314908	1	DC	136.55	139	ER	2442	59.86	8
13	N-1	LN 563	DVP - DVP	8CHCKAHM-8ELMONT 500 kV line	314903	314908	1	DC	131.58	133.94	ER	2442	57.44	

#	Contingency		Affected Area	Facility Description	Bus			Power Flow	Loading %		Rating		MW Contribution	Ref
	Type	Name			From	To	Cir.		Initial	Final	Type	MVA		
14	LFFB	57602	DVP - DVP	8CHCKAHM-8ELMONT 500 kV line	314903	314908	1	DC	122.66	125.37	LD	3144	85.4	
15	LFFB	WT576	DVP - DVP	8CHCKAHM-8ELMONT 500 kV line	314903	314908	1	DC	122.66	125.37	LD	3144	85.4	
16	LFFB	563T576	DVP - DVP	8CHCKAHM-8ELMONT 500 kV line	314903	314908	1	DC	122.65	125.37	LD	3144	85.41	
17	N-1	LN 594	DVP - DVP	8CHANCE-8BRISTER 500 kV line	314905	314900	1	DC	123.69	124.28	ER	2442	32.04	9
18	N-1	LN 573	DVP - DVP	8CHANCE-8BRISTER 500 kV line	314905	314900	1	DC	118.15	118.73	ER	2442	31.45	
19	LFFB	H1T9033	DVP - DVP	8CHANCE-8BRISTER 500 kV line	314905	314900	1	DC	103.86	104.47	LD	3351	45.81	
20	N-1	LN 576	DVP - DVP	8ELMONT-8LDYSMTH 500 kV line	314908	314911	1	DC	151.57	152.57	ER	2442	54.17	10
21	N-1	LN 563	DVP - DVP	8ELMONT-8LDYSMTH 500 kV line	314908	314911	1	DC	141.88	143.81	ER	2442	46.96	
22	LFFB	57602	DVP - DVP	8ELMONT-8LDYSMTH 500 kV line	314908	314911	1	DC	129.55	130.59	LD	3351	77.26	
23	LFFB	WT576	DVP - DVP	8ELMONT-8LDYSMTH 500 kV line	314908	314911	1	DC	129.55	130.59	LD	3351	77.26	
24	LFFB	563T576	DVP - DVP	8ELMONT-8LDYSMTH 500 kV line	314908	314911	1	DC	129.48	130.52	LD	3351	77.29	
25	N-1	LN 573	DVP - DVP	8LDYSMTH-8CHANCE 500 kV line	314911	314905	1	DC	113.85	114.38	ER	2738	32.54	11

#	Contingency		Affected Area	Facility Description	Bus			Power Flow	Loading %		Rating		MW Contribution	Ref
	Type	Name			From	To	Cir.		Initial	Final	Type	MVA		
26	N-1	LN 594	DVP - DVP	8LDYSMTH-8CHANCE 500 kV line	314911	314905	1	DC	111.25	111.77	ER	2738	31.35	
27	LFFB	SPOTSH1T 9033	DVP - DVP	8LDYSMTH-8CHANCE 500 kV line	314911	314905	1	DC	108.17	108.79	LD	3351	46.22	
28	LFFB	57302	DVP - DVP	8LDYSMTH-8CHANCE 500 kV line	314911	314905	1	DC	104.84	105.47	LD	3351	46.7	
29	LFFB	XT573	DVP - DVP	8LDYSMTH-8CHANCE 500 kV line	314911	314905	1	DC	104.83	105.46	LD	3351	46.69	
30	N-1	LN 594	DVP - DVP	8LDYSMTH-8POSSUM 500 kV line	314911	314922	1	DC	109.82	110.34	ER	2442	28.01	12
31	N-1	LN 581	DVP - DVP	8LDYSMTH-8POSSUM 500 kV line	314911	314922	1	DC	109.3	109.82	ER	2442	28.41	
32	LFFB	557T574	DVP - DVP	8MDLTHAN-8NO ANNA 500 kV line	314914	314918	1	DC	128.75	131.22	LD	3144	77.82	13
33	N-1	LN 574	DVP - DVP	8MDLTHAN-8NO ANNA 500 kV line	314914	314918	1	DC	123.81	125.79	ER	2442	48.42	
34	N-1	LN 557	DVP - DVP	8MDLTHAN-8NO ANNA 500 kV line	314914	314918	1	DC	119.17	121.17	ER	2442	48.91	
35	N-1	LN 581	DVP - DVP	8NO ANNA-8SPOTSYL 500 kV line	314918	314934	1	DC	105.81	106.91	ER	3219	35.4	14
36	N-1	LN 552	DVP - DVP	8NO ANNA-8SPOTSYL 500 kV line	314918	314934	1	DC	102.73	103.81	ER	3219	34.81	
37	N-1	LN 552	DVP - DVP	8SPOTSYL-8MORRSVL 500 kV line	314934	314916	1	DC	107.01	108.09	ER	3219	34.99	15

#	Contingency		Affected Area	Facility Description	Bus			Power Flow	Loading %		Rating		MW Contribution	Ref
	Type	Name			From	To	Cir.		Initial	Final	Type	MVA		
38	N-1	LN 581	DVP - DVP	8SPOTSYL-8MORRSVL 500 kV line	314934	314916	1	DC	106.3	107.37	ER	3219	34.46	

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
# 1	8MORRSVL-8LOUDOUN 500 kV line	Wreck and rebuild a segment of the existing line of 2 miles. This will increase normal and emergency rating to 3424 MVA. It is estimated to 36-48 months to engineer, permit and construct (VA CPCN is required).	Pending	\$6,000,000
# 2, 3	8SPOTSYL-8MORRSVL 500 kV line	Wreck and rebuild the line of 17 miles to a minimum rating of 4453 MVA. It is estimated to 44-48 months to permit (VA CPCN required), engineer and construct.	Pending	\$56,250,000
Total New Network Upgrades				\$62,250,000

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
# 4, 5	6SKIFF CREEK-6KINGS M 230 kV line	Wreck and rebuild the line of 19 miles to a rating of 1047 MVA. It is estimated to take 30-36 months to permit (VA CPCN required), engineer and construct.	Pending	\$28,200,000
# 6 - 8	8ELMONT 500/230 kV transformer	Replace existing transformer with a larger unit. It is estimated to 24-30 months to engineer and construct	Pending	\$17,500,000
# 9	6WALR209-6LIGH209 230 kV line	Wreck and rebuild the line to a rating of 1047 MVA. It is estimated to take 30-36 months to permit (VA CPCN required), engineer and construct.	Pending	\$15,200,000
# 10, 11	8CARSON-8MDLTHAN 500 kV line	Replace wave traps at both Carson and Midlothian Substations. This will increase emergency rating by 31% to 3424 MVA. It is estimated to 12-16 months to engineer and construct.	Pending	\$500,000
# 12 - 16	8CHCKAHM-8ELMONT 500 kV line	Wreck and rebuild the line of 28 miles for a higher capacity since the overload exceeds the conductor rating. It is estimated to 36-48 months to engineer and construct.	Pending	\$84,000,000
# 17 - 19	8CHANCE-8BRISTER 500 kV line	Wreck and rebuild the existing line since overload exceeds conductor rating of 2913 MVA by 3.1% new line rating 4300 MVA. It is estimated to 36-48 months to engineer, permit and construct (VA CPCN is required). Note: This facility has been identified as End of Life project. Dominion is working with PJM to address the issue through a RTEP process.	Pending	\$73,000,000
# 20 – 24	8ELMONT-8LDYSMTH 500 kV line	Wreck and rebuild the line of 26 miles for a higher capacity since the overload exceeds the conductor rating. It is estimated to 36-48 months to engineer and construct.	Pending	\$78,300,000
# 25 - 29	8LDYSMTH-8CHANCE 500 kV line	Wreck and rebuild the existing line since overload exceeds conductor rating of 2913 MVA by 3.1% new line rating 4300 MVA. It is estimated to 36-48 months to engineer, permit and construct (VA CPCN is required).	Pending	\$50,000,000
# 30, 31	8LDYSMTH-8POSSUM 500 kV line	Replace wave trap at both Ladysmith and Possum Point Substations. This will increase line rating by 12% to 2913 MVA. It is estimated to 14-16 months to engineer and construct.	Pending	\$500,000

Violation #	Overloaded Facility	Upgrade Description	Network Upgrade Number	Upgrade Cost
# 32 – 34	8MDLTHAN-8NO ANNA 500 kV line	Wreck and rebuild a segment of the existing line of 41 miles. This will increase emergency rating to 4453 MVA. It is estimated to 36-48 months to engineer, permit and construct (VA CPCN is required). The engineering will evaluate whether the existing structure can be used for the new conductor.	Pending	\$123,000
# 35, 36	8NO ANNA-8SPOTSYL 500 kV line	Wreck and rebuild the line of 17 miles for a higher capacity since the overload exceeds the conductor rating. It is estimated to 36-48 months to engineer, permit and construct (VA CPCN is required).	Pending	\$42,060,000
# 37, 38	8SPOTSYL-8MORRSVL 500 kV line	Wreck and rebuild the line of 17 miles to a minimum rating of 4453 MVA. It is estimated to 44-48 months to permit (VA CPCN required), engineer and construct.	Pending	\$56,250,000
Total New Network Upgrades				\$445,633,000

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			Power Flow	Loading %		Rating		MW Contribution
	Type	Name			From	To	Circuit		Initial	Final	Type	MVA	
39	N-1	LN 557	DVP - DVP	6SKIFF CREEK-6KINGS M 230 kV line	314209	314386	1	DC	152.65	154.71	ER	442	20.12
40	N-1	LN 557	DVP - DVP	6PENNIMAN-6WALR209 230 kV line	314296	314415	1	DC	140.32	142.37	ER	442	20.12

#	Contingency		Affected Area	Facility Description	Bus		Circuit	Power Flow	Loading %		Rating		MW Contribution
	Type	Name			From	To			Initial	Final	Type	MVA	
41	N-1	LN 557	DVP - DVP	6KINGS M-6PENNIMAN 230 kV line	314386	314296	1	DC	144.19	146.24	ER	442	20.12
42	N-1	LN 557	DVP - DVP	6WALR209-6LIGH209 230 kV line	314415	314391	1	DC	124.54	126.59	ER	442	20.12
43	N-1	LN 557	DVP - DVP	8CARSON-8MDLTHAN 500 kV line	314902	314914	1	DC	151.42	154.5	ER	2442	75.16
44	N-1	LN 576	DVP - DVP	8CHCKAHM-8ELMONT 500 kV line	314903	314908	1	DC	157.89	161.38	ER	2442	85.41
45	N-1	LN 594	DVP - DVP	8CHANCE-8BRISTER 500 kV line	314905	314900	1	DC	142.14	142.98	ER	2442	45.71
46	N-1	LN 576	DVP - DVP	8ELMONT-8LDYSMTH 500 kV line	314908	314911	1	DC	177.65	179.08	ER	2442	77.29
47	N-1	LN 573	DVP - DVP	8LDYSMTH-8CHANCE 500 kV line	314911	314905	1	DC	128.02	128.78	ER	2738	46.43
48	N-1	LN 594	DVP - DVP	8LDYSMTH-8POSSUM 500 kV line	314911	314922	1	DC	121.74	122.48	ER	2442	39.96
49	N-1	LN 574	DVP - DVP	8MDLTHAN-8NO ANNA 500 kV line	314914	314918	1	DC	153.6	156.43	ER	2442	69.09
50	N-1	LN 580	DVP - DVP	8MORRSVL-8LOUDOUN 500 kV line	314916	314913	1	DC	105.33	105.82	ER	2738	29.88
51	N-1	LN 594	DVP - DVP	8NO ANNA-8LDYSMTH 500 kV line	314918	314911	1	DC	106.16	106.62	ER	3219	32.74
52	N-1	LN 581	DVP - DVP	8NO ANNA-8SPOTSYL 500 kV line	314918	314934	1	DC	116.71	118.27	ER	3219	50.52

#	Contingency		Affected Area	Facility Description	Bus		Circuit	Power Flow	Loading %		Rating		MW Contribution
	Type	Name			From	To			Initial	Final	Type	MVA	
53	N-1	LN 569	DVP - DVP	8OX-8CLIFTON 500 kV line	314919	314904	1	DC	106.79	107.29	ER	2442	27.09
54	N-1	LN 576	DVP - DVP	8SURRY-8CHCKAHM 500 kV line	314924	314903	1	DC	113.98	118.61	ER	1809	83.64
55	N-1	LN 552	DVP - DVP	8SPOTSYL-8MORRSVL 500 kV line	314934	314916	1	DC	120.78	122.33	ER	3219	49.92

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 #AC2-141 interconnection of a 240 MW Energy (168.2 MW Capacity) injection into the ITO's Transmission System at Septa 500kV switching station, 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 AC2-141 was evaluated as a 240.0 MW (Capacity 168.2 MW) injection tapping the Smithfield – Surry 230 kV line in the ITO area. Project AC2-141 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AC2-141 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
57302	CONTINGENCY '57302' /*NORTH ANNA OPEN BRANCH FROM BUS 314934 TO BUS 314918 CKT 1 /*NORTH ANNA TO SPOTSYLVANIA (LINE 573) OPEN BRANCH FROM BUS 314918 TO BUS 314232 CKT 1 /*NORTH ANNA 500-230 (TX#5) END
57602	CONTINGENCY '57602' /*NORTH ANNA OPEN BRANCH FROM BUS 314914 TO BUS 314918 CKT 1 /*MIDLOTHIAN TO NORTH ANNA (LINE 576) OPEN BRANCH FROM BUS 314914 TO BUS 314322 CKT 1 /*MIDLOTHIAN 500-230 (TX#2) OPEN BRANCH FROM BUS 314918 TO BUS 314232 CKT 1 /*NORTH ANNA 500-230 (TX#5) END
211T2124	CONTINGENCY '211T2124' /*_ HOPEWELL OPEN BRANCH FROM BUS 314303 TO BUS 314287 CKT 1 /*L211 HOPEWELL CHESTERFIELD OPEN BRANCH FROM BUS 314303 TO BUS 314269 CKT 1 /*L2124 END
557T574	CONTINGENCY '557T574' /* 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 314911 TO BUS 314908 CKT 1 /*ELMONT TO LADYSMITH (LINE 574) 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
563T576	CONTINGENCY '563T576' /*MIDLOTHIAN OPEN BRANCH FROM BUS 314914 TO BUS 314918 CKT 1 /*MIDLOTHIAN TO NORTH ANNA (LINE 576) OPEN BRANCH FROM BUS 314914 TO BUS 314322 CKT 1 /*MIDLOTHIAN 500-230 (TX#2) OPEN BRANCH FROM BUS 314914 TO BUS 314902 CKT 1 /*MIDLOTHIAN TO CARSON (LINE 563) END
H1T581	CONTINGENCY 'H1T581' /* LADYSMITH OPEN BRANCH FROM BUS 314911 TO BUS 314905 CKT 1 /*LADYSMITH TO CHANCELLOR (LINE 581) OPEN BRANCH FROM BUS 314905 TO BUS 314135 CKT 2 /*CHANCELLOR 500-115 (TX#4) OPEN BRANCH FROM BUS 314911 TO BUS 314196 CKT 1 /*LADYSMITH 500-230 (TX#1) END
H1T9033	CONTINGENCY 'H1T9033' /*MORRISVILLE OPEN BRANCH FROM BUS 314934 TO BUS 314916 CKT 1 /*SPOTSYLVANIA TO MORRISVILLE (LINE 9033) OPEN BRANCH FROM BUS 314916 TO BUS 314063 CKT 1 /*MORRISVILLE 500-230 (TX#1) OPEN BRANCH FROM BUS 314916 TO BUS 314897 CKT 1 /*MORRISVILLE CAP BANK 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
LN 198-552	CONTINGENCY 'LN 198-552' OPEN BRANCH FROM BUS 314135 TO BUS 314367 CKT 1 /* 3CHANCE 115.00 - 3CHANC_1 115.00 CAP BANK OPEN BRANCH FROM BUS 314135 TO BUS 314775 CKT 1 /* 3CHANCE 115.00 - 3NI RVER 115.00 OPEN BRANCH FROM BUS 314775 TO BUS 314779 CKT 1 /* 3NI RVER 115.00 - 3TDTAVRN 115.00 OPEN BRANCH FROM BUS 314779 TO BUS 314755 CKT 1 /* 3TDTAVRN 115.00 - 3SPOTSYL 115.00 OPEN BUS 314367 /* ISLAND CHANC_1 CAP BANK OPEN BRANCH FROM BUS 314135 TO BUS 314905 CKT 2 /* 3CHANCE 115.00 - 8CHANCE 500.00 TRANSFORMER 2 OPEN BRANCH FROM BUS 314900 TO BUS 314905 CKT 1 /* 8BRISTER 500.00 - 8CHANCE 500.00 OPEN BRANCH FROM BUS 314905 TO BUS 314911 CKT 1 /* 8CHANCE 500.00 - 8LDYSMTH 500.00 END

Contingency Name	Description
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 211	CONTINGENCY 'LN 211-228' OPEN BRANCH FROM BUS 314287 TO BUS 314303 CKT 1 /* 6CHSTF B 230.00 - 6HOPEWLL 230.00 OPEN BRANCH FROM BUS 314278 TO BUS 314286 CKT 1 /* 6BERMUDA 230.00 - 6CHSTF A 230.00 OPEN BRANCH FROM BUS 314278 TO BUS 314303 CKT 1 /* 6BERMUDA 230.00 - 6HOPEWLL 230.00 OPEN BUS 314278 /* ISLAND END
LN 211-228	CONTINGENCY 'LN 211-228' OPEN BRANCH FROM BUS 314287 TO BUS 314303 CKT 1 /* 6CHSTF B 230.00 - 6HOPEWLL 230.00 OPEN BRANCH FROM BUS 314278 TO BUS 314286 CKT 1 /* 6BERMUDA 230.00 - 6CHSTF A 230.00 OPEN BRANCH FROM BUS 314278 TO BUS 314303 CKT 1 /* 6BERMUDA 230.00 - 6HOPEWLL 230.00 OPEN BUS 314278 /* ISLAND END
LN 228	CONTINGENCY 'LN 228' OPEN BRANCH FROM BUS 314278 TO BUS 314286 CKT 1 /* 6BERMUDA 230.00 - 6CHSTF A 230.00 OPEN BRANCH FROM BUS 314278 TO BUS 314303 CKT 1 /* 6BERMUDA 230.00 - 6HOPEWLL 230.00 OPEN BUS 314278 /* ISLAND 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 552	CONTINGENCY 'LN 552' OPEN BRANCH FROM BUS 314135 TO BUS 314905 CKT 1 /* 3CHANCE 115.00 - 8CHANCE 500.00 OPEN BRANCH FROM BUS 314900 TO BUS 314905 CKT 1 /* 8BRISTER 500.00 - 8CHANCE 500.00 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

Contingency Name	Description
LN 567	CONTINGENCY 'LN 567' OPEN BRANCH FROM BUS 314903 TO BUS 314924 CKT 1 /* 8CHCKAHM 500.00 - 8SURRY 500.00 END
LN 569	CONTINGENCY 'LN 569' OPEN BRANCH FROM BUS 314913 TO BUS 314916 CKT 1 /* 8LOUDOUN 500.00 - 8MORRSVL 500.00 END
LN 573	CONTINGENCY 'LN 573' OPEN BRANCH FROM BUS 314918 TO BUS 314934 CKT 1 /* 8NO ANNA 500.00 - 8SPOTSYL 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
LN 580	CONTINGENCY 'LN 580' OPEN BRANCH FROM BUS 235110 TO BUS 314929 CKT 1 /* 01MDWBRK 500.00 - 8FRONT ROYAL500.00 END
LN 581	CONTINGENCY 'LN 581' OPEN BRANCH FROM BUS 314135 TO BUS 314905 CKT 2 /* 3CHANCE 115.00 - 8CHANCE 500.00 OPEN BRANCH FROM BUS 314905 TO BUS 314911 CKT 1 /* 8CHANCE 500.00 - 8LDYSMTH 500.00 END
LN 594	CONTINGENCY 'LN 594' OPEN BRANCH FROM BUS 314916 TO BUS 314934 CKT 1 /* 8MORRSVL 500.00 - 8SPOTSYL 500.00 END
SPOTSH1T9033	CONTINGENCY 'SPOTSH1T9033' /*SPOTSYLVANIA OPEN BRANCH FROM BUS 314934 TO BUS 314916 CKT 1 /*SPOTSYLVANIA TO MORRISVILLE (LINE 9033) OPEN BRANCH FROM BUS 314934 TO BUS 314755 CKT 1 /*SPOTSYLVANIA 500/115 (TX#1) END

Contingency Name	Description
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
WT576	CONTINGENCY 'WT576' /*NORTH ANNA OPEN BRANCH FROM BUS 314914 TO BUS 314918 CKT 1 /*MIDLOTHIAN TO NORTH ANNA (LINE 576) OPEN BRANCH FROM BUS 314914 TO BUS 314322 CKT 1 /*MIDLOTHIAN 500-230 (TX#2) OPEN BRANCH FROM BUS 314918 TO BUS 314232 CKT 2 /*NORTH ANNA 500-230 (TX#6) END
XT573	CONTINGENCY 'XT573' /*NORTH ANNA OPEN BRANCH FROM BUS 314934 TO BUS 314918 CKT 1 /*NORTH ANNA TO SPOTSYLVANIA (LINE 573) OPEN BRANCH FROM BUS 314918 TO BUS 314232 CKT 2 /*NORTH ANNA 500-230 (TX#6) 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	211T2124	DVP - DVP	6BERMUDA-6CHSTF A 230 kV line	314278	314286	1	DC	99.91	104.26	LD	549	53.07	16
2	LFFB	211T2124	DVP - DVP	6HOPEWLL-6BERMUDA 230 kV line	314303	314278	1	DC	99.91	104.26	LD	549	53.07	17
3	LFFB	H1T581	DVP - DVP	8SPOTSYL-8MORRSVL 500 kV line	314934	314916	1	DC	99.73	100.27	LD	3938	47.75	
4	DCTL	LN 198-552	DVP - DVP	8SPOTSYL-8MORRSVL 500 kV line	314934	314916	1	DC	99.24	99.8	LD	3938	48.98	

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		
5	N-1	LN 557	DVP - DVP	6SKIFF CREEK-6KINGS M 230 kV line	314209	314386	1	DC	161.28	162.38	ER	442	10.79	18
6	N-1	LN 567	DVP - DVP	6SKIFF CREEK-6KINGS M 230 kV line	314209	314386	1	DC	103.61	104.91	ER	442	12.7	
7	N-1	LN 574	DVP - DVP	6FRRIVER-6STJOHN 230 kV line	314212	314150	1	DC	113.15	114	ER	749	14.23	19
8	LFFB	H2T557	DVP - DVP	8ELMONT 500/230 kV transformer	314218	314908	1	DC	119.14	121.09	LD	1051	45.5	20
9	DCTL	LN 208-259	DVP - DVP	6CHARCTY-6LAKESD 230 kV line	314225	314227	1	DC	138.91	140.68	LD	459	18	21
10	N-1	LN 259	DVP - DVP	6CHARCTY-6LAKESD 230 kV line	314225	314227	1	DC	114.64	117.66	ER	375	11.33	
11	N-1	LN 576	DVP - DVP	6CHARCTY-6LAKESD 230 kV line	314225	314227	1	DC	111.16	113.94	ER	375	10.4	
12	LFFB	562T563	DVP - DVP	6CHARCTY-6LAKESD 230 kV line	314225	314227	1	DC	105.99	107.32	LD	459	13.61	
13	LFFB	T672B	DVP - DVP	6CHARCTY-6LAKESD 230 kV line	314225	314227	1	DC	105.2	106.79	LD	459	16.16	
14	DCTL	LN 208-259	DVP - DVP	6MESSER-6CHARCTY 230 kV line	314228	314225	1	DC	150.63	152.4	LD	459	18	22

#	Contingency		Affected Area	Facility Description	Bus			Power Flow	Loading %		Rating		MW Contribution	Ref
	Type	Name			From	To	Cir.		Initial	Final	Type	MVA		
15	N-1	LN 259	DVP - DVP	6MESSER-6CHARCTY 230 kV line	314228	314225	1	DC	128.99	132.01	ER	375	11.33	
16	N-1	LN 576	DVP - DVP	6MESSER-6CHARCTY 230 kV line	314228	314225	1	DC	125.51	128.28	ER	375	10.4	
17	LFFB	562T563	DVP - DVP	6MESSER-6CHARCTY 230 kV line	314228	314225	1	DC	117.71	119.04	LD	459	13.61	
18	LFFB	T672B	DVP - DVP	6MESSER-6CHARCTY 230 kV line	314228	314225	1	DC	116.92	118.51	LD	459	16.16	
19	DCTL	LN 211-228	DVP - DVP	6PRGEORG 230/115 kV transformer	314269	314291	1	DC	124.92	129.86	LD	220	24.09	23
20	DCTL	LN 208-259	DVP - DVP	6CHSTF B-6MESSER 230 kV line	314287	314228	1	DC	150.76	152.53	LD	459	18	24
21	N-1	LN 259	DVP - DVP	6CHSTF B-6MESSER 230 kV line	314287	314228	1	DC	129.15	132.17	ER	375	11.33	
22	N-1	LN 576	DVP - DVP	6CHSTF B-6MESSER 230 kV line	314287	314228	1	DC	125.67	128.44	ER	375	10.4	
23	LFFB	562T563	DVP - DVP	6CHSTF B-6MESSER 230 kV line	314287	314228	1	DC	117.84	119.17	LD	459	13.61	
24	LFFB	T672B	DVP - DVP	6CHSTF B-6MESSER 230 kV line	314287	314228	1	DC	117.05	118.64	LD	459	16.16	
25	N-1	LN 563	DVP - DVP	6CHSTF B-6BASIN 230 kV line	314287	314276	1	DC	139.3	140.65	ER	449	13.47	25
26	N-1	LN 576	DVP - DVP	6CHSTF B-6BASIN 230 kV line	314287	314276	1	DC	120.46	121.63	ER	449	11.73	

#	Contingency		Affected Area	Facility Description	Bus			Power Flow	Loading %		Rating		MW Contribution	Ref
	Type	Name			From	To	Cir.		Initial	Final	Type	MVA		
27	N-1	LN 557	DVP - DVP	6PENNNIMAN-6WALR209 230 kV line	314296	314415	1	DC	148.94	150.04	ER	442	10.79	26
28	N-1	LN 557	DVP - DVP	6KINGS M-6PENNNIMAN 230 kV line	314386	314296	1	DC	152.81	153.91	ER	442	10.79	27
29	N-1	LN 557	DVP - DVP	6WALR209-6LIGH209 230 kV line	314415	314391	1	DC	133.16	134.26	ER	442	10.79	28
30	N-1	LN 557	DVP - DVP	8CARSON-8MDLTHAN 500 kV line	314902	314914	1	DC	130.95	131.69	ER	2442	40.16	29
31	LFFB	557T574	DVP - DVP	8CARSON-8MDLTHAN 500 kV line	314902	314914	1	DC	128.7	129.6	LD	3144	62.28	
32	LFFB	H2T557	DVP - DVP	8CARSON-8MDLTHAN 500 kV line	314902	314914	1	DC	120.43	121.28	LD	3144	59.33	
33	N-1	LN 576	DVP - DVP	8CHCKAHM-8ELMONT 500 kV line	314903	314908	1	DC	136.6	137.55	ER	2442	51.15	30
34	N-1	LN 563	DVP - DVP	8CHCKAHM-8ELMONT 500 kV line	314903	314908	1	DC	131.64	132.53	ER	2442	48.36	
35	LFFB	57602	DVP - DVP	8CHCKAHM-8ELMONT 500 kV line	314903	314908	1	DC	122.71	123.76	LD	3144	72.98	
36	LFFB	563T576	DVP - DVP	8CHCKAHM-8ELMONT 500 kV line	314903	314908	1	DC	122.71	123.76	LD	3144	72.98	
37	LFFB	WT576	DVP - DVP	8CHCKAHM-8ELMONT 500 kV line	314903	314908	1	DC	122.71	123.76	LD	3144	72.98	
38	N-1	LN 594	DVP - DVP	8CHANCE-8BRISTER 500 kV line	314905	314900	1	DC	123.73	124.32	ER	2442	31.94	31

#	Contingency		Affected Area	Facility Description	Bus			Power Flow	Loading %		Rating		MW Contribution	Ref
	Type	Name			From	To	Cir.		Initial	Final	Type	MVA		
39	N-1	LN 573	DVP - DVP	8CHANCE-8BRISTER 500 kV line	314905	314900	1	DC	118.18	118.76	ER	2442	31.35	
40	LFFB	H1T9033	DVP - DVP	8CHANCE-8BRISTER 500 kV line	314905	314900	1	DC	103.88	104.5	LD	3351	45.67	
41	N-1	LN 576	DVP - DVP	8ELMONT-8LDYSMTH 500 kV line	314908	314911	1	DC	151.65	152.65	ER	2442	53.81	32
42	N-1	LN 563	DVP - DVP	8ELMONT-8LDYSMTH 500 kV line	314908	314911	1	DC	141.95	142.79	ER	2442	45.48	
43	LFFB	WT576	DVP - DVP	8ELMONT-8LDYSMTH 500 kV line	314908	314911	1	DC	129.61	130.64	LD	3351	76.75	
44	LFFB	57602	DVP - DVP	8ELMONT-8LDYSMTH 500 kV line	314908	314911	1	DC	129.61	130.64	LD	3351	76.75	
45	LFFB	563T576	DVP - DVP	8ELMONT-8LDYSMTH 500 kV line	314908	314911	1	DC	129.54	130.57	LD	3351	76.78	
46	N-1	LN 573	DVP - DVP	8LDYSMTH-8CHANCE 500 kV line	314911	314905	1	DC	113.88	114.42	ER	2738	32.45	33
47	N-1	LN 594	DVP - DVP	8LDYSMTH-8CHANCE 500 kV line	314911	314905	1	DC	111.29	111.81	ER	2738	31.29	
48	LFFB	SPOTSH1T 9033	DVP - DVP	8LDYSMTH-8CHANCE 500 kV line	314911	314905	1	DC	108.2	108.82	LD	3351	46.09	
49	LFFB	57302	DVP - DVP	8LDYSMTH-8CHANCE 500 kV line	314911	314905	1	DC	104.87	105.49	LD	3351	46.56	
50	LFFB	XT573	DVP - DVP	8LDYSMTH-8CHANCE 500 kV line	314911	314905	1	DC	104.87	105.49	LD	3351	46.56	

#	Contingency		Affected Area	Facility Description	Bus			Power Flow	Loading %		Rating		MW Contribution	Ref
	Type	Name			From	To	Cir.		Initial	Final	Type	MVA		
51	N-1	LN 594	DVP - DVP	8LDYSMTH-8POSSUM 500 kV line	314911	314922	1	DC	109.87	110.39	ER	2442	27.86	34
52	N-1	LN 581	DVP - DVP	8LDYSMTH-8POSSUM 500 kV line	314911	314922	1	DC	109.35	109.87	ER	2442	28.47	
53	LFFB	557T574	DVP - DVP	8MDLTHAN-8NO ANNA 500 kV line	314914	314918	1	DC	128.81	129.84	LD	3144	71.63	35
54	N-1	LN 574	DVP - DVP	8MDLTHAN-8NO ANNA 500 kV line	314914	314918	1	DC	123.88	124.73	ER	2442	45.95	
55	N-1	LN 557	DVP - DVP	8MDLTHAN-8NO ANNA 500 kV line	314914	314918	1	DC	119.6	120.39	ER	2442	43.04	
56	N-1	LN 581	DVP - DVP	8NO ANNA-8SPOTSYL 500 kV line	314918	314934	1	DC	105.84	106.33	ER	3219	34.84	36
57	N-1	LN 552	DVP - DVP	8NO ANNA-8SPOTSYL 500 kV line	314918	314934	1	DC	102.76	103.24	ER	3219	34.23	
58	N-1	LN 552	DVP - DVP	8SPOTSYL-8MORRSVL 500 kV line	314934	314916	1	DC	107.04	107.53	ER	3219	34.44	37
59	N-1	LN 581	DVP - DVP	8SPOTSYL-8MORRSVL 500 kV line	314934	314916	1	DC	106.33	106.81	ER	3219	33.92	

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

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		Circuit	Power Flow	Loading %		Rating		MW Contribution
	Type	Name			From	To			Initial	Final	Type	MVA	
60	N-1	LN 557	DVP - DVP	6SKIFF CREEK-6KINGS M 230 kV line	314209	314386	1	DC	152.69	154.27	ER	442	15.4
61	N-1	LN 574	DVP - DVP	6FRRIVER-6STJOHN 230 kV line	314212	314150	1	DC	113.28	114.5	ER	749	20.31
62	N-1	LN 259	DVP - DVP	6CHARCTY-6LAKESD 230 kV line	314225	314227	1	DC	127.04	128.98	ER	375	16.16
63	N-1	LN 259	DVP - DVP	6MESSER-6CHARCTY 230 kV line	314228	314225	1	DC	141.38	143.32	ER	375	16.16
64	N-1	LN 211	DVP - DVP	6BERMUDA-6CHSTF A 230 kV line	314278	314286	1	DC	106.11	110.78	ER	449	46.6
65	N-1	LN 259	DVP - DVP	6CHSTF B-6MESSER 230 kV line	314287	314228	1	DC	141.54	143.48	ER	375	16.16
66	N-1	LN 563	DVP - DVP	6CHSTF B-6BASIN 230 kV line	314287	314276	1	DC	168.71	170.64	ER	449	19.23
67	N-1	LN 557	DVP - DVP	6PENNIMAN-6WALR209 230 kV line	314296	314415	1	DC	140.36	141.93	ER	442	15.4

#	Contingency		Affected Area	Facility Description	Bus		Circuit	Power Flow	Loading %		Rating		MW Contribution
	Type	Name			From	To			Initial	Final	Type	MVA	
68	N-1	LN 211	DVP - DVP	6HOPEWLL-6BERMUDA 230 kV line	314303	314278	1	DC	106.11	110.78	ER	449	46.6
69	N-1	LN 228	DVP - DVP	6HOPEWLL-6CHSTF B 230 kV line	314303	314287	1	DC	112.05	116.84	ER	449	47.73
70	N-1	LN 557	DVP - DVP	6KINGS M-6PENNIMAN 230 kV line	314386	314296	1	DC	144.23	145.8	ER	442	15.4
71	N-1	LN 557	DVP - DVP	6WALR209-6LIGH209 230 kV line	314415	314391	1	DC	124.58	126.15	ER	442	15.4
72	N-1	LN 557	DVP - DVP	8CARSON-8MDLTHAN 500 kV line	314902	314914	1	DC	152.84	153.9	ER	2442	57.31
73	N-1	LN 576	DVP - DVP	8CHCKAHM-8ELMONT 500 kV line	314903	314908	1	DC	157.96	159.3	ER	2442	72.98
74	N-1	LN 594	DVP - DVP	8CHANCE-8BRISTER 500 kV line	314905	314900	1	DC	142.18	143.02	ER	2442	45.57
75	N-1	LN 576	DVP - DVP	8ELMONT-8LDYSMTH 500 kV line	314908	314911	1	DC	177.73	179.15	ER	2442	76.78
76	N-1	LN 573	DVP - DVP	8LDYSMTH-8CHANCE 500 kV line	314911	314905	1	DC	128.05	128.81	ER	2738	46.3
77	N-1	LN 594	DVP - DVP	8LDYSMTH-8POSSUM 500 kV line	314911	314922	1	DC	121.79	122.52	ER	2442	39.75
78	N-1	LN 574	DVP - DVP	8MDLTHAN-8NO ANNA 500 kV line	314914	314918	1	DC	153.67	154.88	ER	2442	65.56
79	N-1	LN 580	DVP - DVP	8MORRSVL-8LOUDOUN 500 kV line	314916	314913	1	DC	105.39	105.88	ER	2738	29.63

#	Contingency		Affected Area	Facility Description	Bus		Circuit	Power Flow	Loading %		Rating		MW Contribution
	Type	Name			From	To			Initial	Final	Type	MVA	
80	N-1	LN 581	DVP - DVP	8NO ANNA-8SPOTSYL 500 kV line	314918	314934	1	DC	116.74	117.44	ER	3219	49.72
81	N-1	LN 569	DVP - DVP	8OX-8CLIFTON 500 kV line	314919	314904	1	DC	106.95	107.45	ER	2442	27.17
82	N-1	LN 576	DVP - DVP	8SURRY-8CHCKAHM 500 kV line	314924	314903	1	DC	115.48	116.89	ER	1809	56.46
83	N-1	LN 552	DVP - DVP	8SPOTSYL-8MORRSVL 500 kV line	314934	314916	1	DC	120.82	121.51	ER	3219	49.14

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 #AC2-141 interconnection of a 240 MW Energy (168.2 MW Capacity) injection into the ITO's Transmission System at a new interconnection switching station located between the Smithfield – Surry 230kV section of Line #223, 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).

Attachment 1.
System Configuration

Attachment 2.

Flowgate Appendices

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.

Appendix 1

(DVP - DVP) The 8MORRSVL-8LOUDOUN 500 kV line (from bus 314916 to bus 314913 ckt 1) loads from 99.57% to 100.32% (**DC power flow**) of its emergency rating (2738 MVA) for the single line contingency outage of 'LN 539'. This project contributes approximately 20.56 MW to the thermal violation.

CONTINGENCY 'LN 539'

OPEN BRANCH FROM BUS 314900 TO BUS 314919 CKT 1

/* 8BRISTER

500.00 - 80X 500.00

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315053	1BELMED1	1.9
315054	1BELMED2	1.9
315055	1BELMED3	1.58
315172	1LOISA A	2.17
315173	1LOISA B	2.18
315174	1LOISA C	2.18
315175	1LOISA D	2.18
315176	1LOISA E	4.45
315028	1M RUN A	5.94
315029	1M RUN B	5.89
315030	1M RUN C	5.94
315225	1N ANNA1	30.53
315226	1N ANNA2	30.05
315021	1REMNGT1	5.44
315022	1REMNGT2	5.33
315023	1REMNGT3	5.35
315024	1REMNGT4	5.41
315177	1SANNAG1	1.2
315179	1SANNAG2	1.2
315178	1SANNAS1	0.61
315180	1SANNAS2	0.61
315083	1SPRUNCA	7.2
315084	1SPRUNCB	7.2
315085	1SPRUNCC	5.34
315086	1SPRUNCD	5.34
315233	1SURRY 2	17.1
314251	6S PUMP	0.64

314093	6WARRNTN	0.07
931151	AC2-022 C	13.76
931611	AC2-082 C	6.87
931711	AC2-094 C	11.38
931781	AC2-102 C OP	6.22
931861	AC2-113 C	2.77
931971	AC2-121 C OP	11.11
932291	AC2-141 C OP	20.56
923861	AB2-026 C	1.69
923891	AB2-029 C	1.65
924241	AB2-068 OP	129.72
925021	AB2-158 C	10.69
925671	AC1-043 C	8.08
926001	AC1-076 C	4.99
926291	AC1-107 OP	195.81
926481	AC1-120 C OP	8.18
926501	AC1-121 C OP	2.81
926611	AC1-143 C OP	8.76
926731	AC1-158 C	82.11
926751	AC1-161 C OP	20.56
926781	AC1-164 C OP	27.02

Appendix 2

(DVP - DVP) The 6SKIFF CREEK-6KINGS M 230 kV line (from bus 314209 to bus 314386 ckt 1) loads from 160.7% to 163.9% (**DC power flow**) of its emergency rating (442 MVA) for the single line contingency outage of 'LN 557'. This project contributes approximately 14.1 MW to the thermal violation.

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

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315108	1ELIZAR1	1.33
315109	1ELIZAR2	1.3
315110	1ELIZAR3	1.34
315233	1SURRY 2	13.71
315090	1YORKTN1	23.09
315091	1YORKTN2	23.96
315092	1YORKTN3	18.85
314421	6WINCHST	0.1
931041	AC2-012 C OP	4.21
931591	AC2-079 C OP	2.04
932291	AC2-141 C OP	14.1
932451	AC2-158 C OP	1.69
932471	AC2-161 C	0.88
932711	AC2-194 C	0.42
932731	AC2-196 C	0.74
916191	Z1-068 C	0.02
921092	AA1-049 C	0.99
921532	AA1-132 C	3.05
921572	AA1-138 C	3.67
921582	AA1-139 C	6.14
921772	AA2-059 C	0.43
921982	AA2-088 C	1.9
922532	AA2-178 C	3.34
922602	AB1-013 C	1.01
923801	AB2-015 C OP	2.77

923831	AB2-022 C	0.92
924071	AB2-051 C OP	56.79
924241	AB2-068 OP	103.49
924941	AB2-149 C OP	1.01
925121	AB2-169 C OP	1.97
925141	AB2-171 C OP	1.52
925281	AB2-186 C	0.23
925291	AB2-188 C OP	0.82
925521	AC1-027 C	0.83
925691	AC1-045 C	0.75
925701	AC1-046 C	0.72
925711	AC1-047 C	0.95
926291	AC1-107 OP	156.21
926661	AC1-147 C	0.93
926741	AC1-159 C	56.35
926751	AC1-161 C OP	14.1
926781	AC1-164 C OP	21.56
927051	AC1-193 C	1.12

Appendix 3

(DVP - DVP) The 8ELMONT 500/230 kV transformer (from bus 314218 to bus 314908 ckt 1) loads from 119.16% to 120.8% (**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 38.25 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	4.15
315068	1DARBY 2	4.16
315069	1DARBY 3	4.21
315070	1DARBY 4	4.21
315043	1FRIVERA	5.59
315044	1FRIVERB	4.32
315045	1FRIVERC	5.59
315046	1FRIVERD	4.32
315047	1FRIVERE	4.32
315048	1FRIVERF	5.59
315074	1HOPCGN1	11.03
315075	1HOPCGN2	10.89
315134	1ROAVALA	22.58
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	30.62
315091	1YORKTN2	31.78
314539	3UNCAMP	2.15

314541	3WATKINS	0.6
314229	6MT R221	1.42
314236	6NRTHEST	0.31
314189	6PAPERMILL	8.8
314251	6S PUMP	1.59
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
932061	AC2-130	3.46
932071	AC2-131 1	2.34
932081	AC2-131 2	1.07
932111	AC2-132 1	1.23
932121	AC2-132 2	0.63
932261	AC2-137 C	3.16
932262	AC2-137 E	2.05
932271	AC2-138 C	0.87
932272	AC2-138 E	1.09
932291	AC2-141 C OP	26.8
932292	AC2-141 E OP	11.44
932451	AC2-158 C OP	4.53
932452	AC2-158 E OP	4.53
932471	AC2-161 C	2.43
932472	AC2-161 E	1.25
932481	AC2-162 C	4.19
932482	AC2-162 E	2.16
932521	AC2-167 C	2.73
932522	AC2-167 E	4.46
932711	AC2-194 C	0.97
932712	AC2-194 E	1.57
932731	AC2-196 C	1.63

932732	AC2-196 E	1.09
292791	U1-032 E	4.77
297087	V2-040	0.23
900672	V4-068 E	0.25
901082	W1-029 E	41.26
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
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
921292	AA1-083	6.01
921532	AA1-132 C	6.78
921533	AA1-132 E	2.91
921572	AA1-138 C	8.67
921573	AA1-138 E	3.72
921582	AA1-139 C	13.62
921583	AA1-139 E	5.84
921622	AA1-145	102.14
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
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	4.92
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	7.58
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	126.98
924072	AB2-051 E OP	17.43
924241	AB2-068 OP	175.78
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
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	27.73
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	1.58
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	265.33
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	8.58
926661	AC1-147 C	2.1
926662	AC1-147 E	1.23
926741	AC1-159 C	126.
926751	AC1-161 C OP	26.8
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	4.95
927221	AC1-216 C OP	11.87
927222	AC1-216 E OP	9.34

Appendix 4

(DVP - DVP) The 6PENNIMAN-6WALR209 230 kV line (from bus 314296 to bus 314415 ckt 1) loads from 148.37% to 151.56% (**DC power flow**) of its emergency rating (442 MVA) for the single line contingency outage of 'LN 557'. This project contributes approximately 14.1 MW to the thermal violation.

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

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315108	1ELIZAR1	1.33
315109	1ELIZAR2	1.3
315110	1ELIZAR3	1.34
315233	1SURRY 2	13.71
315090	1YORKTN1	23.09
315091	1YORKTN2	23.96
315092	1YORKTN3	18.85
314421	6WINCHST	0.1
931041	AC2-012 C OP	4.21
931591	AC2-079 C OP	2.04
932291	AC2-141 C OP	14.1
932451	AC2-158 C OP	1.69
932471	AC2-161 C	0.88
932711	AC2-194 C	0.42
932731	AC2-196 C	0.74
916191	Z1-068 C	0.02
921092	AA1-049 C	0.99
921532	AA1-132 C	3.05
921572	AA1-138 C	3.67
921582	AA1-139 C	6.14
921772	AA2-059 C	0.43
921982	AA2-088 C	1.9
922532	AA2-178 C	3.34
922602	AB1-013 C	1.01
923801	AB2-015 C OP	2.77

923831	AB2-022 C	0.92
924071	AB2-051 C OP	56.79
924241	AB2-068 OP	103.49
924941	AB2-149 C OP	1.01
925121	AB2-169 C OP	1.97
925141	AB2-171 C OP	1.52
925281	AB2-186 C	0.23
925291	AB2-188 C OP	0.82
925521	AC1-027 C	0.83
925691	AC1-045 C	0.75
925701	AC1-046 C	0.72
925711	AC1-047 C	0.95
926291	AC1-107 OP	156.21
926661	AC1-147 C	0.93
926741	AC1-159 C	56.35
926751	AC1-161 C OP	14.1
926781	AC1-164 C OP	21.56
927051	AC1-193 C	1.12

Appendix 5

(DVP - DVP) The 6KINGS M-6PENNIMAN 230 kV line (from bus 314386 to bus 314296 ckt 1) loads from 152.24% to 155.43% (**DC power flow**) of its emergency rating (442 MVA) for the single line contingency outage of 'LN 557'. This project contributes approximately 14.1 MW to the thermal violation.

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

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315108	1ELIZAR1	1.33
315109	1ELIZAR2	1.3
315110	1ELIZAR3	1.34
315233	1SURRY 2	13.71
315090	1YORKTN1	23.09
315091	1YORKTN2	23.96
315092	1YORKTN3	18.85
314421	6WINCHST	0.1
931041	AC2-012 C OP	4.21
931591	AC2-079 C OP	2.04
932291	AC2-141 C OP	14.1
932451	AC2-158 C OP	1.69
932471	AC2-161 C	0.88
932711	AC2-194 C	0.42
932731	AC2-196 C	0.74
916191	Z1-068 C	0.02
921092	AA1-049 C	0.99
921532	AA1-132 C	3.05
921572	AA1-138 C	3.67
921582	AA1-139 C	6.14
921772	AA2-059 C	0.43
921982	AA2-088 C	1.9
922532	AA2-178 C	3.34
922602	AB1-013 C	1.01
923801	AB2-015 C OP	2.77

923831	AB2-022 C	0.92
924071	AB2-051 C OP	56.79
924241	AB2-068 OP	103.49
924941	AB2-149 C OP	1.01
925121	AB2-169 C OP	1.97
925141	AB2-171 C OP	1.52
925281	AB2-186 C	0.23
925291	AB2-188 C OP	0.82
925521	AC1-027 C	0.83
925691	AC1-045 C	0.75
925701	AC1-046 C	0.72
925711	AC1-047 C	0.95
926291	AC1-107 OP	156.21
926661	AC1-147 C	0.93
926741	AC1-159 C	56.35
926751	AC1-161 C OP	14.1
926781	AC1-164 C OP	21.56
927051	AC1-193 C	1.12

Appendix 6

(DVP - DVP) The 6WALR209-6LIGH209 230 kV line (from bus 314415 to bus 314391 ckt 1) loads from 132.59% to 135.78% (**DC power flow**) of its emergency rating (442 MVA) for the single line contingency outage of 'LN 557'. This project contributes approximately 14.1 MW to the thermal violation.

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

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315108	1ELIZAR1	1.33
315109	1ELIZAR2	1.3
315110	1ELIZAR3	1.34
315233	1SURRY 2	13.71
315090	1YORKTN1	23.09
315091	1YORKTN2	23.96
315092	1YORKTN3	18.85
314421	6WINCHST	0.1
931041	AC2-012 C OP	4.21
931591	AC2-079 C OP	2.04
932291	AC2-141 C OP	14.1
932451	AC2-158 C OP	1.69
932471	AC2-161 C	0.88
932711	AC2-194 C	0.42
932731	AC2-196 C	0.74
916191	Z1-068 C	0.02
921092	AA1-049 C	0.99
921532	AA1-132 C	3.05
921572	AA1-138 C	3.67
921582	AA1-139 C	6.14
921772	AA2-059 C	0.43
921982	AA2-088 C	1.9
922532	AA2-178 C	3.34
922602	AB1-013 C	1.01
923801	AB2-015 C OP	2.77

923831	AB2-022 C	0.92
924071	AB2-051 C OP	56.79
924241	AB2-068 OP	103.49
924941	AB2-149 C OP	1.01
925121	AB2-169 C OP	1.97
925141	AB2-171 C OP	1.52
925281	AB2-186 C	0.23
925291	AB2-188 C OP	0.82
925521	AC1-027 C	0.83
925691	AC1-045 C	0.75
925701	AC1-046 C	0.72
925711	AC1-047 C	0.95
926291	AC1-107 OP	156.21
926661	AC1-147 C	0.93
926741	AC1-159 C	56.35
926751	AC1-161 C OP	14.1
926781	AC1-164 C OP	21.56
927051	AC1-193 C	1.12

Appendix 7

(DVP - DVP) The 8CARSON-8MDLTHAN 500 kV line (from bus 314902 to bus 314914 ckt 1) loads from 130.27% to 132.42% (**DC power flow**) of its emergency rating (2442 MVA) for the single line contingency outage of 'LN 557'. This project contributes approximately 52.67 MW to the thermal violation.

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

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315102	1BRUNSWICKG1	15.35
315103	1BRUNSWICKG2	15.35
315104	1BRUNSWICKG3	15.35
315105	1BRUNSWICKS1	31.89
315099	1CHESPKB	1.76
315131	1EDGECEMA	12.96
315132	1EDGECEMB	12.96
315108	1ELIZAR1	5.18
315109	1ELIZAR2	5.09
315110	1ELIZAR3	5.25
315134	1ROAVALA	39.59
315135	1ROAVALB	10.56
315233	1SURRY 2	41.67
315090	1YORKTN1	37.09
315091	1YORKTN2	38.49
931041	AC2-012 C OP	16.45
931581	AC2-078 C OP	4.7
931591	AC2-079 C OP	9.72
931631	AC2-084 C	12.59
931701	AC2-093 C	136.93
931761	AC2-100 C	7.06
932291	AC2-141 C OP	52.67
932451	AC2-158 C OP	8.24
932461	AC2-159 C OP	9.67
932471	AC2-161 C	3.31

932521	AC2-167 C	4.76
932711	AC2-194 C	1.73
932731	AC2-196 C	2.92
916191	Z1-068 C	0.07
916301	Z1-086 C	93.68
LTF	Z2-067	27.66
921092	AA1-049 C	3.93
LTF	AA1-058	1.22
921162	AA1-063AC	12.25
921182	AA1-067 C	2.47
921532	AA1-132 C	12.13
921562	AA1-135 C	13.63
921572	AA1-138 C	15.3
921582	AA1-139 C	24.35
921752	AA2-053 C	12.45
921762	AA2-057 C	10.07
921772	AA2-059 C	1.85
921862	AA2-068 C	3.17
LTF	AA2-074	8.23
921982	AA2-088 C	9.55
922442	AA2-165 C	1.37
922472	AA2-169 C	2.96
922512	AA2-174 C	0.57
922522	AA2-177 C	10.21
922532	AA2-178 C	14.87
922602	AB1-013 C	4.49
922922	AB1-081 C OP	12.51
923262	AB1-132 C OP	20.
923572	AB1-173 C OP	3.16
923582	AB1-173AC OP	3.16
923801	AB2-015 C OP	12.95
923831	AB2-022 C	3.7
923851	AB2-025 C	3.4
923911	AB2-031 C OP	3.13
923941	AB2-035 C	0.48
923981	AB2-039 C OP	11.08
923991	AB2-040 C OP	10.29
924021	AB2-043 C OP	3.65
924071	AB2-051 C OP	221.83

924151	AB2-059 C OP	14.75
924241	AB2-068 OP	314.47
924301	AB2-077 C OP	2.33
924311	AB2-078 C OP	2.33
924321	AB2-079 C OP	2.33
924381	AB2-087 C	0.84
924391	AB2-088 C	0.61
924401	AB2-089 C	2.76
924411	AB2-090 C	4.6
924491	AB2-098 C	0.82
924501	AB2-099 C	0.87
924511	AB2-100 C	16.06
924761	AB2-128 C	13.76
924811	AB2-134 C OP	13.09
924931	AB2-147 C	3.53
924941	AB2-149 C OP	4.84
924951	AB2-150 C OP	3.53
925061	AB2-161 C OP	4.48
925121	AB2-169 C OP	9.73
925141	AB2-171 C OP	7.3
925171	AB2-174 C OP	9.81
925221	AB2-176 C	1.89
925281	AB2-186 C	0.97
925291	AB2-188 C OP	3.67
925331	AB2-190 C	23.33
925521	AC1-027 C	3.25
925591	AC1-034 C OP	9.72
925691	AC1-045 C	2.64
925701	AC1-046 C	2.84
925711	AC1-047 C	3.76
925781	AC1-054 C OP	9.43
926071	AC1-086 C	29.45
926201	AC1-098 C	8.83
926211	AC1-099 C	2.96
926271	AC1-105 C OP	7.04
926291	AC1-107 OP	474.67
926661	AC1-147 C	3.64
926741	AC1-159 C	220.12
926751	AC1-161 C OP	52.67

926771	<i>AC1-163 C</i>	3.13
926781	<i>AC1-164 C OP</i>	65.5
927021	<i>AC1-189 C</i>	12.44
927051	<i>AC1-193 C</i>	5.35
927141	<i>AC1-208 C</i>	12.73
927211	<i>AC1-215 C</i>	12.63
927221	<i>AC1-216 C OP</i>	9.99
927251	<i>AC1-221 C</i>	3.99
927261	<i>AC1-222 C</i>	5.97

Appendix 8

(DVP - DVP) The 8CHCKAHM-8ELMONT 500 kV line (from bus 314903 to bus 314908 ckt 1) loads from 136.55% to 139.0% (**DC power flow**) of its emergency rating (2442 MVA) for the single line contingency outage of 'LN 576'. This project contributes approximately 59.86 MW to the thermal violation.

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

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315131	1EDGECEMA	11.88
315132	1EDGECEMB	11.88
315108	1ELIZAR1	5.88
315109	1ELIZAR2	5.78
315110	1ELIZAR3	5.96
315074	1HOPCGN1	10.82
315075	1HOPCGN2	10.68
315134	1ROAVALA	38.71
315135	1ROAVALB	10.32
315233	1SURRY 2	53.66
315090	1YORKTN1	53.81
315091	1YORKTN2	55.84
315092	1YORKTN3	43.72
314421	6WINCHST	0.25
931041	AC2-012 C OP	18.72
931531	AC2-073 C	3.9
931581	AC2-078 C OP	5.62
931591	AC2-079 C OP	11.06
931631	AC2-084 C	12.19
931701	AC2-093 C	105.47
931831	AC2-110 C	2.15
932061	AC2-130	3.13
932071	AC2-131 1	2.12
932081	AC2-131 2	0.96
932111	AC2-132 1	1.11

932121	AC2-132 2	0.57
932261	AC2-137 C	2.88
932271	AC2-138 C	0.94
932291	AC2-141 C OP	59.86
932451	AC2-158 C OP	8.49
932461	AC2-159 C OP	9.63
932471	AC2-161 C	4.09
932521	AC2-167 C	4.93
932711	AC2-194 C	1.91
932731	AC2-196 C	3.29
916191	Z1-068 C	0.08
LTF	Z2-067	22.13
921092	AA1-049 C	4.39
LTF	AA1-058	1.05
921162	AA1-063AC	12.24
921182	AA1-067 C	2.38
921532	AA1-132 C	13.56
921562	AA1-135 C	13.59
921572	AA1-138 C	16.71
921582	AA1-139 C	27.28
921752	AA2-053 C	12.25
921762	AA2-057 C	9.5
921772	AA2-059 C	2.
921862	AA2-068 C	3.04
LTF	AA2-074	6.71
921982	AA2-088 C	9.93
922442	AA2-165 C	1.3
922472	AA2-169 C	2.78
922512	AA2-174 C	0.56
922522	AA2-177 C	14.89
922532	AA2-178 C	15.84
922602	AB1-013 C	4.78
922922	AB1-081 C OP	11.48
923262	AB1-132 C OP	19.37
923272	AB1-135 C OP	4.32
923572	AB1-173 C OP	3.05
923582	AB1-173AC OP	3.05
923801	AB2-015 C OP	13.83
923831	AB2-022 C	4.11

923841	AB2-024 C	4.11
923851	AB2-025 C	3.27
923911	AB2-031 C OP	3.03
923941	AB2-035 C	0.45
923981	AB2-039 C OP	12.84
923991	AB2-040 C OP	9.94
924071	AB2-051 C OP	251.95
924151	AB2-059 C OP	13.54
924241	AB2-068 OP	619.64
924381	AB2-087 C	0.86
924391	AB2-088 C	0.57
924401	AB2-089 C	2.54
924491	AB2-098 C	0.79
924501	AB2-099 C	0.89
924511	AB2-100 C	15.52
924761	AB2-128 C	13.29
924811	AB2-134 C OP	19.1
924931	AB2-147 C	3.39
924941	AB2-149 C OP	5.51
924951	AB2-150 C OP	3.39
925051	AB2-160 C OP	6.39
925061	AB2-161 C OP	5.19
925121	AB2-169 C OP	9.89
925141	AB2-171 C OP	7.72
925171	AB2-174 C OP	9.46
925281	AB2-186 C	1.07
925291	AB2-188 C OP	3.9
925331	AB2-190 C	34.04
925521	AC1-027 C	3.68
925591	AC1-034 C OP	9.08
925691	AC1-045 C	3.09
925701	AC1-046 C	3.19
925711	AC1-047 C	4.22
925781	AC1-054 C OP	8.74
925811	AC1-060	0.1
925821	AC1-061	0.04
925841	AC1-063	0.62
925861	AC1-065 C	5.38
926071	AC1-086 C	28.52

926201	AC1-098 C	8.55
926211	AC1-099 C	2.87
926291	AC1-107 OP	935.31
926591	AC1-142 C	13.62
926661	AC1-147 C	4.14
926741	AC1-159 C	250.01
926751	AC1-161 C OP	59.86
926771	AC1-163 C	3.2
926781	AC1-164 C OP	129.07
927021	AC1-189 C	11.92
927051	AC1-193 C	5.66
927141	AC1-208 C	11.97
927221	AC1-216 C OP	14.57

Appendix 9

(DVP - DVP) The 8CHANCE-8BRISTER 500 kV line (from bus 314905 to bus 314900 ckt 1) loads from 123.69% to 124.28% (**DC power flow**) of its emergency rating (2442 MVA) for the single line contingency outage of 'LN 594'. This project contributes approximately 32.04 MW to the thermal violation.

CONTINGENCY 'LN 594'

OPEN BRANCH FROM BUS 314916 TO BUS 314934 CKT 1 /* 8MORRSVL

500.00 - 8SPOTSYL 500.00

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315053	1BELMED1	3.04
315054	1BELMED2	3.04
315055	1BELMED3	2.52
315067	1DARBY 1	2.77
315068	1DARBY 2	2.77
315069	1DARBY 3	2.81
315070	1DARBY 4	2.81
315043	1FRIVERA	3.73
315044	1FRIVERB	2.89
315045	1FRIVERC	3.73
315046	1FRIVERD	2.89
315047	1FRIVERE	2.89
315048	1FRIVERF	3.73
315074	1HOPCGN1	8.95
315075	1HOPCGN2	8.83
315225	1N ANNA1	42.
315226	1N ANNA2	41.35
315134	1ROAVALA	26.61
315135	1ROAVALB	7.1
315083	1SPRUNCA	11.4
315084	1SPRUNCB	11.4
315085	1SPRUNCC	8.45
315086	1SPRUNCD	8.45
315090	1YORKTN1	30.44
315091	1YORKTN2	31.59
314309	6IRON208	0.42
314236	6NRTHEST	0.2

314251	6S PUMP	1.03
931041	AC2-012 C OP	10.73
931501	AC2-070 C	1.84
931531	AC2-073 C	2.52
931581	AC2-078 C OP	4.3
931591	AC2-079 C OP	7.06
931631	AC2-084 C	8.26
931701	AC2-093 C	70.43
931711	AC2-094 C	11.23
931831	AC2-110 C	1.43
932011	AC2-125	2.9
932021	AC2-126	2.92
932031	AC2-127	1.6
932041	AC2-128	1.54
932051	AC2-129	1.44
932061	AC2-130	2.59
932071	AC2-131 1	1.75
932081	AC2-131 2	0.8
932111	AC2-132 1	0.92
932121	AC2-132 2	0.47
932261	AC2-137 C	2.25
932271	AC2-138 C	0.78
932291	AC2-141 C OP	32.04
932451	AC2-158 C OP	5.39
932461	AC2-159 C OP	6.44
932471	AC2-161 C	2.5
932481	AC2-162 C	2.64
932501	AC2-165 C	10.46
932521	AC2-167 C	3.19
932711	AC2-194 C	1.12
932731	AC2-196 C	1.87
297087	V2-040	0.13
LTF	Z2-067	16.82
921092	AA1-049 C	2.52
LTF	AA1-058	0.75
921162	AA1-063AC	8.26
921292	AA1-083	4.01
921532	AA1-132 C	7.8
921562	AA1-135 C	8.83

921572	AA1-138 C	10.
921582	AA1-139 C	15.64
921622	AA1-145	68.18
921752	AA2-053 C	8.37
921772	AA2-059 C	1.2
LTF	AA2-074	5.
921982	AA2-088 C	6.41
922512	AA2-174 C	0.38
922522	AA2-177 C	10.74
922532	AA2-178 C	9.65
922602	AB1-013 C	2.91
922682	AB1-027 C	2.8
923262	AB1-132 C OP	13.51
923272	AB1-135 C OP	2.76
923572	AB1-173 C OP	2.18
923582	AB1-173AC OP	2.18
923801	AB2-015 C OP	8.7
923831	AB2-022 C	2.39
923841	AB2-024 C	2.64
923851	AB2-025 C	2.48
923861	AB2-026 C	2.34
923911	AB2-031 C OP	2.16
923981	AB2-039 C OP	8.78
923991	AB2-040 C OP	7.1
924061	AB2-050	4.01
924071	AB2-051 C OP	144.13
924241	AB2-068 OP	216.38
924381	AB2-087 C	0.56
924501	AB2-099 C	0.57
924511	AB2-100 C	11.1
924761	AB2-128 C	9.51
924811	AB2-134 C OP	13.77
924931	AB2-147 C	2.48
924941	AB2-149 C OP	3.53
924951	AB2-150 C OP	2.48
925051	AB2-160 C OP	5.82
925061	AB2-161 C OP	3.55
925121	AB2-169 C OP	6.29
925141	AB2-171 C OP	4.9

925171	AB2-174 C OP	6.81
925281	AB2-186 C	0.63
925291	AB2-188 C OP	2.38
925331	AB2-190 C	24.55
925521	AC1-027 C	2.1
925691	AC1-045 C	1.81
925701	AC1-046 C	1.82
925711	AC1-047 C	2.41
925811	AC1-060	0.08
925821	AC1-061	0.04
925841	AC1-063	0.41
925861	AC1-065 C	3.58
926001	AC1-076 C	4.69
926071	AC1-086 C	19.89
926201	AC1-098 C	5.79
926211	AC1-099 C	1.94
926291	AC1-107 OP	326.61
926411	AC1-112 C	2.18
926441	AC1-115 C	1.12
926551	AC1-134	10.03
926591	AC1-142 C	9.94
926661	AC1-147 C	2.37
926731	AC1-158 C	88.54
926741	AC1-159 C	143.02
926751	AC1-161 C OP	32.04
926771	AC1-163 C	2.07
926781	AC1-164 C OP	45.07
927041	AC1-191 C	10.81
927051	AC1-193 C	3.6
927221	AC1-216 C OP	10.51

Appendix 10

(DVP - DVP) The 8ELMONT-8LDYSMTH 500 kV line (from bus 314908 to bus 314911 ckt 1) loads from 151.57% to 152.57% (**DC power flow**) of its emergency rating (2442 MVA) for the single line contingency outage of 'LN 576'. This project contributes approximately 54.17 MW to the thermal violation.

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

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315058	1CHESTF3	5.34
315059	1CHESTF4	8.65
315060	1CHESTF5	18.35
315061	1CHESTG7	7.19
315063	1CHESTG8	7.13
315062	1CHESTS7	3.27
315064	1CHESTS8	3.65
315067	1DARBY 1	4.69
315068	1DARBY 2	4.69
315069	1DARBY 3	4.75
315070	1DARBY 4	4.75
315074	1HOPCGN1	15.04
315075	1HOPCGN2	14.85
315134	1ROAVALA	44.06
315135	1ROAVALB	11.75
315083	1SPRUNCA	18.68
315084	1SPRUNCB	18.68
315085	1SPRUNCC	13.85
315086	1SPRUNCD	13.85
315233	1SURRY 2	46.61
315090	1YORKTN1	51.92
315091	1YORKTN2	53.88
315092	1YORKTN3	42.1
314309	6IRON208	0.7
314236	6NRTHEST	0.34

314251	6S PUMP	1.7
931041	AC2-012 C OP	18.03
931501	AC2-070 C	3.16
931531	AC2-073 C	4.17
931581	AC2-078 C OP	7.13
931591	AC2-079 C OP	11.78
931631	AC2-084 C	13.73
931701	AC2-093 C	112.73
931831	AC2-110 C	2.34
932061	AC2-130	4.4
932071	AC2-131 1	2.98
932081	AC2-131 2	1.35
932111	AC2-132 1	1.57
932121	AC2-132 2	0.8
932261	AC2-137 C	3.88
932291	AC2-141 C OP	54.17
932451	AC2-158 C OP	8.99
932461	AC2-159 C OP	10.7
932471	AC2-161 C	4.21
932481	AC2-162 C	4.53
932521	AC2-167 C	5.31
932711	AC2-194 C	1.88
932731	AC2-196 C	3.15
297087	V2-040	0.22
LTF	Z2-067	28.93
921092	AA1-049 C	4.24
LTF	AA1-058	1.26
921162	AA1-063AC	13.69
921532	AA1-132 C	13.09
921562	AA1-135 C	14.74
921572	AA1-138 C	16.74
921582	AA1-139 C	26.27
921752	AA2-053 C	13.86
921772	AA2-059 C	2.01
LTF	AA2-074	8.49
921982	AA2-088 C	10.67
922512	AA2-174 C	0.63
922522	AA2-177 C	18.08
922532	AA2-178 C	16.16

922602	AB1-013 C	4.88
922682	AB1-027 C	4.81
923262	AB1-132 C OP	22.33
923272	AB1-135 C OP	4.8
923572	AB1-173 C OP	3.59
923582	AB1-173AC OP	3.59
923642	AB1-181	3.5
923643	AB1-181 2	3.5
923644	AB1-181 3	3.5
923801	AB2-015 C OP	14.51
923831	AB2-022 C	4.01
923841	AB2-024 C	4.42
923851	AB2-025 C	4.04
923861	AB2-026 C	3.56
923911	AB2-031 C OP	3.56
923981	AB2-039 C OP	14.62
923991	AB2-040 C OP	11.69
924071	AB2-051 C OP	242.25
924241	AB2-068 OP	417.82
924381	AB2-087 C	0.93
924501	AB2-099 C	0.96
924511	AB2-100 C	18.26
924761	AB2-128 C	15.65
924811	AB2-134 C OP	23.18
924931	AB2-147 C	4.07
924941	AB2-149 C OP	5.89
924951	AB2-150 C OP	4.07
925051	AB2-160 C OP	9.63
925061	AB2-161 C OP	5.91
925121	AB2-169 C OP	10.51
925141	AB2-171 C OP	8.17
925171	AB2-174 C OP	11.2
925281	AB2-186 C	1.06
925291	AB2-188 C OP	3.98
925331	AB2-190 C	41.32
925521	AC1-027 C	3.53
925691	AC1-045 C	3.05
925701	AC1-046 C	3.06
925711	AC1-047 C	4.05

925811	AC1-060	0.13
925821	AC1-061	0.06
925841	AC1-063	0.68
925861	AC1-065 C	5.85
926071	AC1-086 C	32.88
926201	AC1-098 C	9.63
926211	AC1-099 C	3.23
926291	AC1-107 OP	630.67
926411	AC1-112 C	3.74
926661	AC1-147 C	3.99
926741	AC1-159 C	240.38
926751	AC1-161 C OP	54.17
926771	AC1-163 C	3.45
926781	AC1-164 C OP	87.03
927041	AC1-191 C	18.37
927051	AC1-193 C	5.99
927221	AC1-216 C OP	17.69

Appendix 11

(DVP - DVP) The 8LDYSMTH-8CHANCE 500 kV line (from bus 314911 to bus 314905 ckt 1) loads from 113.85% to 114.38% (**DC power flow**) of its emergency rating (2738 MVA) for the single line contingency outage of 'LN 573'. This project contributes approximately 32.54 MW to the thermal violation.

CONTINGENCY 'LN 573'

OPEN BRANCH FROM BUS 314918 TO BUS 314934 CKT 1

/* 8NO ANNA

500.00 - 8SPOTSYL 500.00

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315053	1BELMED1	3.09
315054	1BELMED2	3.09
315055	1BELMED3	2.56
315067	1DARBY 1	2.82
315068	1DARBY 2	2.82
315069	1DARBY 3	2.86
315070	1DARBY 4	2.86
315043	1FRIVERA	3.81
315044	1FRIVERB	2.94
315045	1FRIVERC	3.81
315046	1FRIVERD	2.94
315047	1FRIVERE	2.94
315048	1FRIVERF	3.81
315074	1HOPCGN1	9.1
315075	1HOPCGN2	8.98
315037	1LDYSMT1	4.93
315039	1LDYSMT3	5.21
315040	1LDYSMT4	5.22
315041	1LDYSMT5	5.24
315225	1N ANNA1	42.6
315226	1N ANNA2	41.94
315134	1ROAVALA	26.96
315135	1ROAVALB	7.19
315083	1SPRUNCA	11.58
315084	1SPRUNCB	11.58
315085	1SPRUNCC	8.58
315086	1SPRUNCD	8.58

315090	1YORKTN1	30.94
315091	1YORKTN2	32.1
314309	6IRON208	0.43
314236	6NRTHEST	0.2
314251	6S PUMP	1.05
931041	AC2-012 C OP	10.9
931501	AC2-070 C	1.87
931531	AC2-073 C	2.57
931581	AC2-078 C OP	4.37
931591	AC2-079 C OP	7.16
931631	AC2-084 C	8.36
931701	AC2-093 C	71.32
931711	AC2-094 C	10.46
931831	AC2-110 C	1.46
932011	AC2-125	2.97
932021	AC2-126	2.99
932031	AC2-127	1.64
932041	AC2-128	1.58
932051	AC2-129	1.48
932061	AC2-130	2.63
932071	AC2-131 1	1.78
932081	AC2-131 2	0.81
932111	AC2-132 1	0.94
932121	AC2-132 2	0.48
932261	AC2-137 C	2.29
932271	AC2-138 C	0.8
932291	AC2-141 C OP	32.54
932451	AC2-158 C OP	5.46
932461	AC2-159 C OP	6.53
932471	AC2-161 C	2.54
932481	AC2-162 C	2.68
932501	AC2-165 C	10.41
932521	AC2-167 C	3.24
932711	AC2-194 C	1.14
932731	AC2-196 C	1.9
297087	V2-040	0.13
LTF	Z2-067	16.97
921092	AA1-049 C	2.56
LTF	AA1-058	0.76

921162	AA1-063AC	8.37
921292	AA1-083	4.09
921532	AA1-132 C	7.92
921562	AA1-135 C	8.95
921572	AA1-138 C	10.15
921582	AA1-139 C	15.88
921622	AA1-145	69.55
921752	AA2-053 C	8.47
921772	AA2-059 C	1.22
LTF	AA2-074	5.04
921982	AA2-088 C	6.5
922512	AA2-174 C	0.39
922522	AA2-177 C	10.91
922532	AA2-178 C	9.79
922602	AB1-013 C	2.96
922682	AB1-027 C	2.85
923262	AB1-132 C OP	13.68
923272	AB1-135 C OP	2.8
923572	AB1-173 C OP	2.21
923582	AB1-173AC OP	2.21
923801	AB2-015 C OP	8.82
923831	AB2-022 C	2.42
923841	AB2-024 C	2.69
923851	AB2-025 C	2.51
923861	AB2-026 C	2.34
923911	AB2-031 C OP	2.19
923981	AB2-039 C OP	8.92
923991	AB2-040 C OP	7.19
924061	AB2-050	4.09
924071	AB2-051 C OP	146.36
924241	AB2-068 OP	220.33
924381	AB2-087 C	0.56
924501	AB2-099 C	0.58
924511	AB2-100 C	11.24
924761	AB2-128 C	9.63
924811	AB2-134 C OP	13.99
924931	AB2-147 C	2.51
924941	AB2-149 C OP	3.58
924951	AB2-150 C OP	2.51

925051	AB2-160 C OP	5.91
925061	AB2-161 C OP	3.61
925121	AB2-169 C OP	6.37
925141	AB2-171 C OP	4.97
925171	AB2-174 C OP	6.9
925281	AB2-186 C	0.64
925291	AB2-188 C OP	2.41
925331	AB2-190 C	24.94
925521	AC1-027 C	2.14
925691	AC1-045 C	1.84
925701	AC1-046 C	1.85
925711	AC1-047 C	2.45
925811	AC1-060	0.08
925821	AC1-061	0.04
925841	AC1-063	0.42
925861	AC1-065 C	3.65
926071	AC1-086 C	20.15
926201	AC1-098 C	5.87
926211	AC1-099 C	1.97
926291	AC1-107 OP	332.58
926411	AC1-112 C	2.22
926441	AC1-115 C	1.15
926551	AC1-134	10.23
926591	AC1-142 C	10.13
926661	AC1-147 C	2.41
926741	AC1-159 C	145.24
926751	AC1-161 C OP	32.54
926771	AC1-163 C	2.1
926781	AC1-164 C OP	45.9
927041	AC1-191 C	11.01
927051	AC1-193 C	3.65
927221	AC1-216 C OP	10.68

Appendix 12

(DVP - DVP) The 8LDYSMTH-8POSSUM 500 kV line (from bus 314911 to bus 314922 ckt 1) loads from 109.82% to 110.34% (**DC power flow**) of its emergency rating (2442 MVA) for the single line contingency outage of 'LN 594'. This project contributes approximately 28.01 MW to the thermal violation.

CONTINGENCY 'LN 594'

OPEN BRANCH FROM BUS 314916 TO BUS 314934 CKT 1

/* 8MORRSVL

500.00 - 8SPOTSYL 500.00

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315053	1BELMED1	2.64
315054	1BELMED2	2.64
315055	1BELMED3	2.19
315060	1CHESTF5	9.33
315061	1CHESTG7	3.66
315063	1CHESTG8	3.63
315062	1CHESTS7	1.66
315064	1CHESTS8	1.86
315067	1DARBY 1	2.39
315068	1DARBY 2	2.39
315069	1DARBY 3	2.43
315070	1DARBY 4	2.43
315043	1FRIVERA	3.15
315045	1FRIVERC	3.15
315048	1FRIVERF	3.15
315074	1HOPCGN1	7.77
315075	1HOPCGN2	7.67
315225	1N ANNA1	35.98
315226	1N ANNA2	35.42
315083	1SPRUNCA	9.9
315084	1SPRUNCB	9.9
315085	1SPRUNCC	7.34
315086	1SPRUNCD	7.34
315090	1YORKTN1	26.46
315091	1YORKTN2	27.46
314309	6IRON208	0.36
314236	6NRTHEST	0.17

314251	6S PUMP	0.89
931041	AC2-012 C OP	9.39
931501	AC2-070 C	1.58
931531	AC2-073 C	2.16
931581	AC2-078 C OP	3.75
931591	AC2-079 C OP	6.18
931711	AC2-094 C	10.71
931831	AC2-110 C	1.22
932011	AC2-125	2.3
932021	AC2-126	2.31
932031	AC2-127	1.27
932041	AC2-128	1.22
932051	AC2-129	1.14
932061	AC2-130	2.24
932071	AC2-131 1	1.52
932081	AC2-131 2	0.69
932111	AC2-132 1	0.8
932121	AC2-132 2	0.41
932261	AC2-137 C	1.94
932291	AC2-141 C OP	28.01
932471	AC2-161 C	2.18
932481	AC2-162 C	2.27
932521	AC2-167 C	2.84
932711	AC2-194 C	0.99
932731	AC2-196 C	1.64
297087	V2-040	0.11
921092	AA1-049 C	2.21
LTF	AA1-058	0.69
921292	AA1-083	3.39
921532	AA1-132 C	6.83
921572	AA1-138 C	8.8
921582	AA1-139 C	13.7
921622	AA1-145	57.59
921772	AA2-059 C	1.06
LTF	AA2-074	4.73
921982	AA2-088 C	5.69
922522	AA2-177 C	9.34
922532	AA2-178 C	8.54
922602	AB1-013 C	2.58

922682	AB1-027 C	2.41
923272	AB1-135 C OP	2.38
923801	AB2-015 C OP	7.69
923831	AB2-022 C	2.09
923841	AB2-024 C	2.27
923851	AB2-025 C	2.18
923861	AB2-026 C	2.11
923981	AB2-039 C OP	7.68
924061	AB2-050	3.39
924071	AB2-051 C OP	126.08
924241	AB2-068 OP	188.12
924811	AB2-134 C OP	11.98
924941	AB2-149 C OP	3.09
925051	AB2-160 C OP	5.06
925061	AB2-161 C OP	3.1
925141	AB2-171 C OP	4.34
925281	AB2-186 C	0.55
925291	AB2-188 C OP	2.1
925331	AB2-190 C	21.36
925521	AC1-027 C	1.84
925691	AC1-045 C	1.59
925701	AC1-046 C	1.59
925711	AC1-047 C	2.11
925811	AC1-060	0.07
925821	AC1-061	0.03
925841	AC1-063	0.35
925861	AC1-065 C	3.06
926291	AC1-107 OP	283.95
926411	AC1-112 C	1.88
926441	AC1-115 C	0.92
926551	AC1-134	8.47
926661	AC1-147 C	2.07
926731	AC1-158 C	74.76
926741	AC1-159 C	125.11
926751	AC1-161 C OP	28.01
926781	AC1-164 C OP	39.19
927041	AC1-191 C	9.31
927051	AC1-193 C	3.18
927221	AC1-216 C OP	9.14

Appendix 13

(DVP - DVP) The 8MDLTHAN-8NO ANNA 500 kV line (from bus 314914 to bus 314918 ckt 1) loads from 128.75% to 131.22% (**DC power flow**) of its load dump rating (3144 MVA) for the line fault with failed breaker contingency outage of '557T574'. This project contributes approximately 77.82 MW to the thermal violation.

CONTINGENCY '557T574' /* 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 314911 TO BUS 314908 CKT 1 /*ELMONT TO
 LADYSMITH (LINE 574)
 END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315102	1BRUNSWICKG1	14.47
315103	1BRUNSWICKG2	14.47
315104	1BRUNSWICKG3	14.47
315105	1BRUNSWICKS1	30.06
315131	1EDGECEMA	14.22
315132	1EDGECEMB	14.22
315108	1ELIZAR1	5.62
315109	1ELIZAR2	5.53
315110	1ELIZAR3	5.7
315074	1HOPCGN1	12.5
315075	1HOPCGN2	12.34
315134	1ROAVALA	44.83
315135	1ROAVALB	11.95
315083	1SPRUNCA	15.86
315084	1SPRUNCB	15.86
315085	1SPRUNCC	11.76
315086	1SPRUNCD	11.76
315073	1STONECA	10.37
315233	1SURRY 2	44.59
314784	1WEYRHSB	3.48
315090	1YORKTN1	46.52
315091	1YORKTN2	48.27
314539	3UNCAMP	4.09

314541	3WATKINS	1.16
314189	6PAPERMILL	8.93
931041	AC2-012 C OP	17.91
931042	AC2-012 E OP	29.22
931531	AC2-073 C	3.19
931532	AC2-073 E	1.61
931581	AC2-078 C OP	6.62
931582	AC2-078 E OP	10.8
931591	AC2-079 C OP	11.47
931592	AC2-079 E OP	18.71
931631	AC2-084 C	14.02
931632	AC2-084 E	6.91
931701	AC2-093 C	130.91
931702	AC2-093 E	74.88
931831	AC2-110 C	1.81
931832	AC2-110 E	2.96
932061	AC2-130	3.34
932071	AC2-131 1	2.26
932081	AC2-131 2	1.03
932111	AC2-132 1	1.19
932121	AC2-132 2	0.61
932261	AC2-137 C	2.75
932262	AC2-137 E	1.78
932291	AC2-141 C OP	54.54
932292	AC2-141 E OP	23.28
932451	AC2-158 C OP	9.09
932452	AC2-158 E OP	9.09
932461	AC2-159 C OP	10.86
932462	AC2-159 E OP	10.86
932471	AC2-161 C	3.99
932472	AC2-161 E	2.06
932501	AC2-165 C	16.18
932502	AC2-165 E	8.24
932521	AC2-167 C	5.35
932522	AC2-167 E	8.73
932711	AC2-194 C	1.88
932712	AC2-194 E	3.04
932731	AC2-196 C	3.15
932732	AC2-196 E	2.1

292791	U1-032 E	5.4
900672	V4-068 E	0.5
901082	W1-029 E	79.62
907092	X1-038 E	10.23
913392	Y1-086 E	3.8
916042	Z1-036 E	78.17
916192	Z1-068 E	3.3
916301	Z1-086 C	88.03
916302	Z1-086 E	16.86
917122	Z2-027 E	1.84
917332	Z2-043 E	1.62
917342	Z2-044 E	0.9
LTF	Z2-067	29.76
917512	Z2-088 E OP1	12.56
917592	Z2-099 E	0.73
921092	AA1-049 C	4.24
921093	AA1-049 E	1.99
LTF	AA1-058	1.31
921162	AA1-063AC	13.89
921163	AA1-063AE	6.55
918512	AA1-065 E OP	7.35
921182	AA1-067 C	2.7
921183	AA1-067 E	1.16
918562	AA1-072 E	0.27
921532	AA1-132 C	13.09
921533	AA1-132 E	5.61
921562	AA1-135 C	14.99
921563	AA1-135 E	6.42
921572	AA1-138 C	16.76
921573	AA1-138 E	7.18
921582	AA1-139 C	26.26
921583	AA1-139 E	11.25
921752	AA2-053 C	14.1
921753	AA2-053 E	6.05
921762	AA2-057 C	11.17
921763	AA2-057 E	5.58
921772	AA2-059 C	2.01
921773	AA2-059 E	0.95
921862	AA2-068 C	3.54

921863	AA2-068 E	1.63
LTF	AA2-074	8.82
920022	AA2-086 E	0.39
921982	AA2-088 C	10.74
921983	AA2-088 E	17.52
922442	AA2-165 C	1.52
922443	AA2-165 E	0.74
922472	AA2-169 C	3.43
922473	AA2-169 E	1.58
922512	AA2-174 C	0.65
922513	AA2-174 E	0.7
922522	AA2-177 C	15.81
922523	AA2-177 E	6.78
922532	AA2-178 C	16.26
922533	AA2-178 E	6.97
922602	AB1-013 C	4.91
922603	AB1-013 E	32.84
922922	AB1-081 C OP	13.74
922923	AB1-081 E OP	5.89
923262	AB1-132 C OP	22.74
923263	AB1-132 E OP	9.75
923272	AB1-135 C OP	3.42
923273	AB1-135 E OP	1.46
923572	AB1-173 C OP	3.65
923573	AB1-173 E OP	1.71
923582	AB1-173AC OP	3.65
923583	AB1-173AE OP	1.71
923801	AB2-015 C OP	14.52
923802	AB2-015 E OP	11.9
923831	AB2-022 C	4.01
923832	AB2-022 E	2.16
923841	AB2-024 C	3.34
923842	AB2-024 E	1.5
923851	AB2-025 C	4.09
923852	AB2-025 E	1.84
923861	AB2-026 C	3.74
923862	AB2-026 E	1.68
923911	AB2-031 C OP	3.63
923912	AB2-031 E OP	1.79

923941	AB2-035 C	0.52
923942	AB2-035 E	0.22
923981	AB2-039 C OP	13.96
923982	AB2-039 E OP	11.29
923991	AB2-040 C OP	11.91
923992	AB2-040 E OP	9.74
924021	AB2-043 C OP	4.49
924022	AB2-043 E OP	7.37
924071	AB2-051 C OP	240.86
924072	AB2-051 E OP	33.07
924151	AB2-059 C OP	16.19
924152	AB2-059 E OP	8.34
924161	AB2-060 C OP	12.6
924162	AB2-060 E OP	5.93
924241	AB2-068 OP	336.47
924301	AB2-077 C OP	2.85
924302	AB2-077 E OP	1.9
924311	AB2-078 C OP	2.85
924312	AB2-078 E OP	1.9
924321	AB2-079 C OP	2.85
924322	AB2-079 E OP	1.9
924381	AB2-087 C	0.94
924382	AB2-087 E	0.44
924391	AB2-088 C	0.67
924392	AB2-088 E	0.32
924401	AB2-089 C	3.22
924402	AB2-089 E	1.66
924411	AB2-090 C	5.66
924412	AB2-090 E	2.9
924491	AB2-098 C	0.9
924492	AB2-098 E	0.39
924501	AB2-099 C	0.97
924502	AB2-099 E	0.42
924511	AB2-100 C	18.57
924512	AB2-100 E	9.15
924761	AB2-128 C	15.91
924762	AB2-128 E	6.26
924811	AB2-134 C OP	20.27
924812	AB2-134 E OP	27.1

924931	AB2-147 C	4.14
924932	AB2-147 E	6.76
924941	AB2-149 C OP	5.73
924942	AB2-149 E OP	9.35
924951	AB2-150 C OP	4.14
924952	AB2-150 E OP	6.76
925051	AB2-160 C OP	8.38
925052	AB2-160 E OP	13.68
925061	AB2-161 C OP	5.64
925062	AB2-161 E OP	9.21
925121	AB2-169 C OP	10.66
925122	AB2-169 E OP	9.56
925141	AB2-171 C OP	8.19
925142	AB2-171 E OP	13.37
925171	AB2-174 C OP	11.41
925172	AB2-174 E OP	10.32
925221	AB2-176 C	2.33
925222	AB2-176 E	1.
925281	AB2-186 C	1.06
925282	AB2-186 E	0.45
925291	AB2-188 C OP	4.01
925292	AB2-188 E OP	1.8
925331	AB2-190 C	36.14
925332	AB2-190 E	9.03
925521	AC1-027 C	3.52
925522	AC1-027 E	2.01
925591	AC1-034 C OP	10.66
925592	AC1-034 E OP	8.04
925611	AC1-036 C	1.32
925612	AC1-036 E	2.16
925691	AC1-045 C	2.97
925692	AC1-045 E	1.62
925701	AC1-046 C	3.05
925702	AC1-046 E	1.67
925711	AC1-047 C	4.05
925712	AC1-047 E	2.23
925781	AC1-054 C OP	10.97
925782	AC1-054 E OP	5.05
925811	AC1-060	0.1

925821	AC1-061	0.06
925841	AC1-063	0.52
925861	AC1-065 C	4.53
925862	AC1-065 E	7.39
926071	AC1-086 C	33.49
926072	AC1-086 E	15.24
926201	AC1-098 C	9.84
926202	AC1-098 E	5.86
926211	AC1-099 C	3.3
926212	AC1-099 E	1.94
926271	AC1-105 C OP	7.96
926272	AC1-105 E OP	3.96
926291	AC1-107 OP	507.87
926661	AC1-147 C	3.96
926662	AC1-147 E	2.33
926741	AC1-159 C	239.01
926751	AC1-161 C OP	54.54
926752	AC1-161 E OP	23.28
926761	AC1-162 C	38.53
926762	AC1-162 E	16.45
926771	AC1-163 C	3.49
926772	AC1-163 E	1.63
926781	AC1-164 C OP	70.09
926782	AC1-164 E OP	31.49
927021	AC1-189 C	13.62
927022	AC1-189 E	6.79
927051	AC1-193 C	6.01
927052	AC1-193 E	9.8
927111	AC1-206 C OP	19.26
927112	AC1-206 E OP	9.11
927141	AC1-208 C	14.2
927142	AC1-208 E	6.3
927211	AC1-215 C	16.18
927212	AC1-215 E	7.34
927221	AC1-216 C OP	15.47
927222	AC1-216 E OP	12.17

Appendix 14

(DVP - DVP) The 8NO ANNA-8SPOTSYL 500 kV line (from bus 314918 to bus 314934 ckt 1) loads from 105.81% to 106.91% (**DC power flow**) of its emergency rating (3219 MVA) for the single line contingency outage of 'LN 581'. This project contributes approximately 35.4 MW to the thermal violation.

CONTINGENCY 'LN 581'

OPEN BRANCH FROM BUS 314135 TO BUS 314905 CKT 2 /* 3CHANCE
115.00 - 8CHANCE 500.00

OPEN BRANCH FROM BUS 314905 TO BUS 314911 CKT 1 /* 8CHANCE
500.00 - 8LDYSMTH 500.00

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315053	1BELMED1	3.26
315054	1BELMED2	3.26
315055	1BELMED3	2.7
315065	1CHESTF6	23.11
315108	1ELIZAR1	3.72
315109	1ELIZAR2	3.65
315110	1ELIZAR3	3.76
315074	1HOPCGN1	9.59
315075	1HOPCGN2	9.47
315225	1N ANNA1	61.25
315226	1N ANNA2	60.31
315134	1ROAVALA	29.76
315135	1ROAVALB	7.94
315083	1SPRUNCA	12.37
315084	1SPRUNCB	12.37
315085	1SPRUNCC	9.17
315086	1SPRUNCD	9.17
315233	1SURRY 2	29.32
315090	1YORKTN1	32.76
315091	1YORKTN2	33.99
314309	6IRON208	0.44
314251	6S PUMP	1.09
931041	AC2-012 C OP	11.85
931501	AC2-070 C	1.88
931531	AC2-073 C	2.63

931581	AC2-078 C OP	4.71
931591	AC2-079 C OP	7.78
931631	AC2-084 C	9.24
931701	AC2-093 C	81.57
931711	AC2-094 C	15.37
931831	AC2-110 C	1.5
932011	AC2-125	2.64
932021	AC2-126	2.66
932031	AC2-127	1.45
932041	AC2-128	1.4
932051	AC2-129	1.31
932061	AC2-130	2.72
932071	AC2-131 1	1.84
932081	AC2-131 2	0.84
932111	AC2-132 1	0.97
932121	AC2-132 2	0.5
932261	AC2-137 C	2.34
932291	AC2-141 C OP	35.4
932451	AC2-158 C OP	6.
932461	AC2-159 C OP	7.19
932471	AC2-161 C	2.74
932481	AC2-162 C	2.69
932501	AC2-165 C	11.83
932521	AC2-167 C	3.55
932711	AC2-194 C	1.24
932731	AC2-196 C	2.07
LTF	Z2-067	18.9
921092	AA1-049 C	2.79
LTF	AA1-058	0.84
921162	AA1-063AC	9.22
921182	AA1-067 C	1.77
921292	AA1-083	3.95
921532	AA1-132 C	8.63
921562	AA1-135 C	9.85
921572	AA1-138 C	11.08
921582	AA1-139 C	17.3
921622	AA1-145	67.1
921752	AA2-053 C	9.35
921772	AA2-059 C	1.33

921862	AA2-068 C	2.33
LTF	AA2-074	5.63
921982	AA2-088 C	7.13
922512	AA2-174 C	0.43
922522	AA2-177 C	11.59
922532	AA2-178 C	10.72
922602	AB1-013 C	3.24
922682	AB1-027 C	2.86
923262	AB1-132 C OP	15.11
923272	AB1-135 C OP	2.86
923572	AB1-173 C OP	2.44
923582	AB1-173AC OP	2.44
923801	AB2-015 C OP	9.66
923831	AB2-022 C	2.64
923841	AB2-024 C	2.75
923851	AB2-025 C	2.78
923861	AB2-026 C	2.66
923911	AB2-031 C OP	2.42
923981	AB2-039 C OP	9.66
923991	AB2-040 C OP	7.95
924061	AB2-050	3.95
924071	AB2-051 C OP	159.22
924241	AB2-068 OP	217.61
924381	AB2-087 C	0.62
924491	AB2-098 C	0.59
924501	AB2-099 C	0.64
924511	AB2-100 C	12.42
924761	AB2-128 C	10.64
924811	AB2-134 C OP	14.87
924931	AB2-147 C	2.78
924941	AB2-149 C OP	3.89
924951	AB2-150 C OP	2.78
925051	AB2-160 C OP	6.31
925061	AB2-161 C OP	3.91
925121	AB2-169 C OP	7.01
925141	AB2-171 C OP	5.45
925171	AB2-174 C OP	7.63
925281	AB2-186 C	0.7
925291	AB2-188 C OP	2.64

925331	AB2-190 C	26.5
925521	AC1-027 C	2.32
925691	AC1-045 C	1.99
925701	AC1-046 C	2.01
925711	AC1-047 C	2.67
925811	AC1-060	0.08
925821	AC1-061	0.04
925841	AC1-063	0.43
925861	AC1-065 C	3.74
926071	AC1-086 C	22.25
926201	AC1-098 C	6.48
926211	AC1-099 C	2.17
926291	AC1-107 OP	328.46
926411	AC1-112 C	2.22
926441	AC1-115 C	1.06
926551	AC1-134	9.87
926591	AC1-142 C	10.27
926661	AC1-147 C	2.62
926741	AC1-159 C	158.
926751	AC1-161 C OP	35.4
926771	AC1-163 C	2.31
926781	AC1-164 C OP	45.33
927041	AC1-191 C	10.89
927051	AC1-193 C	4.
927141	AC1-208 C	9.35
927221	AC1-216 C OP	11.35

Appendix 15

(DVP - DVP) The 8SPOTSYL-8MORRSVL 500 kV line (from bus 314934 to bus 314916 ckt 1) loads from 107.01% to 108.09% (**DC power flow**) of its emergency rating (3219 MVA) for the single line contingency outage of 'LN 552'. This project contributes approximately 34.99 MW to the thermal violation.

CONTINGENCY 'LN 552'

OPEN BRANCH FROM BUS 314135 TO BUS 314905 CKT 1 /* 3CHANCE
115.00 - 8CHANCE 500.00

OPEN BRANCH FROM BUS 314900 TO BUS 314905 CKT 1 /* 8BRISTER
500.00 - 8CHANCE 500.00

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315053	1BELMED1	3.22
315054	1BELMED2	3.22
315055	1BELMED3	2.67
315065	1CHESTF6	22.85
315108	1ELIZAR1	3.67
315109	1ELIZAR2	3.61
315110	1ELIZAR3	3.72
315074	1HOPCGN1	9.48
315075	1HOPCGN2	9.36
315225	1N ANNA1	60.02
315226	1N ANNA2	59.1
315134	1ROAVALA	29.47
315135	1ROAVALB	7.86
315083	1SPRUNCA	12.24
315084	1SPRUNCB	12.24
315085	1SPRUNCC	9.07
315086	1SPRUNCD	9.07
315233	1SURRY 2	28.98
315090	1YORKTN1	32.38
315091	1YORKTN2	33.6
314309	6IRON208	0.44
314251	6S PUMP	1.08
931041	AC2-012 C OP	11.71
931501	AC2-070 C	1.86
931531	AC2-073 C	2.6

931581	AC2-078 C OP	4.66
931591	AC2-079 C OP	7.69
931631	AC2-084 C	9.15
931701	AC2-093 C	80.68
931711	AC2-094 C	16.17
931831	AC2-110 C	1.48
932011	AC2-125	2.6
932021	AC2-126	2.62
932031	AC2-127	1.43
932041	AC2-128	1.38
932051	AC2-129	1.29
932061	AC2-130	2.69
932071	AC2-131 1	1.82
932081	AC2-131 2	0.83
932111	AC2-132 1	0.96
932121	AC2-132 2	0.49
932261	AC2-137 C	2.31
932291	AC2-141 C OP	34.99
932451	AC2-158 C OP	5.94
932461	AC2-159 C OP	7.12
932471	AC2-161 C	2.71
932481	AC2-162 C	2.66
932501	AC2-165 C	11.93
932521	AC2-167 C	3.52
932711	AC2-194 C	1.23
932731	AC2-196 C	2.05
LTF	Z2-067	18.78
921092	AA1-049 C	2.76
LTF	AA1-058	0.84
921162	AA1-063AC	9.13
921292	AA1-083	3.9
921532	AA1-132 C	8.53
921562	AA1-135 C	9.76
921572	AA1-138 C	10.96
921582	AA1-139 C	17.1
921622	AA1-145	66.31
921752	AA2-053 C	9.26
921772	AA2-059 C	1.31
921862	AA2-068 C	2.31

<i>LTF</i>	<i>AA2-074</i>	<i>5.59</i>
921982	<i>AA2-088 C</i>	<i>7.06</i>
922512	<i>AA2-174 C</i>	<i>0.42</i>
922522	<i>AA2-177 C</i>	<i>11.46</i>
922532	<i>AA2-178 C</i>	<i>10.61</i>
922602	<i>AB1-013 C</i>	<i>3.2</i>
922682	<i>AB1-027 C</i>	<i>2.82</i>
923262	<i>AB1-132 C OP</i>	<i>14.96</i>
923272	<i>AB1-135 C OP</i>	<i>2.82</i>
923572	<i>AB1-173 C OP</i>	<i>2.42</i>
923582	<i>AB1-173AC OP</i>	<i>2.42</i>
923801	<i>AB2-015 C OP</i>	<i>9.55</i>
923831	<i>AB2-022 C</i>	<i>2.61</i>
923841	<i>AB2-024 C</i>	<i>2.72</i>
923851	<i>AB2-025 C</i>	<i>2.75</i>
923861	<i>AB2-026 C</i>	<i>2.67</i>
923911	<i>AB2-031 C OP</i>	<i>2.4</i>
923981	<i>AB2-039 C OP</i>	<i>9.55</i>
923991	<i>AB2-040 C OP</i>	<i>7.88</i>
924061	<i>AB2-050</i>	<i>3.9</i>
924071	<i>AB2-051 C OP</i>	<i>157.38</i>
924241	<i>AB2-068 OP</i>	<i>215.21</i>
924381	<i>AB2-087 C</i>	<i>0.61</i>
924501	<i>AB2-099 C</i>	<i>0.63</i>
924511	<i>AB2-100 C</i>	<i>12.3</i>
924761	<i>AB2-128 C</i>	<i>10.53</i>
924811	<i>AB2-134 C OP</i>	<i>14.7</i>
924931	<i>AB2-147 C</i>	<i>2.75</i>
924941	<i>AB2-149 C OP</i>	<i>3.85</i>
924951	<i>AB2-150 C OP</i>	<i>2.75</i>
925021	<i>AB2-158 C</i>	<i>10.23</i>
925051	<i>AB2-160 C OP</i>	<i>6.24</i>
925061	<i>AB2-161 C OP</i>	<i>3.86</i>
925121	<i>AB2-169 C OP</i>	<i>6.94</i>
925141	<i>AB2-171 C OP</i>	<i>5.39</i>
925171	<i>AB2-174 C OP</i>	<i>7.56</i>
925281	<i>AB2-186 C</i>	<i>0.69</i>
925291	<i>AB2-188 C OP</i>	<i>2.61</i>
925331	<i>AB2-190 C</i>	<i>26.2</i>

925521	AC1-027 C	2.3
925691	AC1-045 C	1.97
925701	AC1-046 C	1.99
925711	AC1-047 C	2.64
925811	AC1-060	0.08
925821	AC1-061	0.04
925841	AC1-063	0.43
925861	AC1-065 C	3.7
926001	AC1-076 C	6.31
926071	AC1-086 C	22.03
926201	AC1-098 C	6.42
926211	AC1-099 C	2.15
926291	AC1-107 OP	324.85
926411	AC1-112 C	2.2
926441	AC1-115 C	1.05
926551	AC1-134	9.75
926591	AC1-142 C	10.14
926661	AC1-147 C	2.59
926731	AC1-158 C	184.52
926741	AC1-159 C	156.17
926751	AC1-161 C OP	34.99
926771	AC1-163 C	2.28
926781	AC1-164 C OP	44.83
927041	AC1-191 C	10.77
927051	AC1-193 C	3.95
927221	AC1-216 C OP	11.22

Appendix 16

(DVP - DVP) The 6BERMUDA-6CHSTF A 230 kV line (from bus 314278 to bus 314286 ckt 1) loads from 99.91% to 104.26% (**DC power flow**) of its load dump rating (549 MVA) for the line fault with failed breaker contingency outage of '211T2124'. This project contributes approximately 53.07 MW to the thermal violation.

CONTINGENCY '211T2124' /*_ HOPEWELL
 OPEN BRANCH FROM BUS 314303 TO BUS 314287 CKT 1 /*L211
 HOPEWELL CHESTERFIELD
 OPEN BRANCH FROM BUS 314303 TO BUS 314269 CKT 1 /*L2124
 END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315119	1GRAVEL3	3.56
315120	1GRAVEL4	3.58
315121	1GRAVEL5	3.52
315122	1GRAVEL6	3.58
315074	1HOPCGN1	27.85
315075	1HOPCGN2	27.49
315077	1HOPHCF1	7.33
315078	1HOPHCF2	7.33
315079	1HOPHCF3	7.33
315080	1HOPHCF4	11.13
315076	1HOPPOLC	6.26
315073	1STONECA	23.1
315116	1SURRY 1	37.25
932291	AC2-141 C OP	37.19
932292	AC2-141 E OP	15.88
932471	AC2-161 C	2.52
932472	AC2-161 E	1.3
292791	U1-032 E	12.03
914231	Y2-077	2.95
922522	AA2-177 C	23.88
922523	AA2-177 E	10.23
924811	AB2-134 C OP	30.61
924812	AB2-134 E OP	40.93
925331	AB2-190 C	54.58
925332	AB2-190 E	13.64
925691	AC1-045 C	0.97

925692	<i>AC1-045 E</i>	<i>0.53</i>
926661	<i>AC1-147 C</i>	<i>1.17</i>
926662	<i>AC1-147 E</i>	<i>0.69</i>
927221	<i>AC1-216 C OP</i>	<i>23.37</i>
927222	<i>AC1-216 E OP</i>	<i>18.38</i>

Appendix 17

(DVP - DVP) The 6HOPEWELL-6BERMUDA 230 kV line (from bus 314303 to bus 314278 ckt 1) loads from 99.91% to 104.26% (**DC power flow**) of its load dump rating (549 MVA) for the line fault with failed breaker contingency outage of '211T2124'. This project contributes approximately 53.07 MW to the thermal violation.

CONTINGENCY '211T2124' /*_ HOPEWELL
 OPEN BRANCH FROM BUS 314303 TO BUS 314287 CKT 1 /*L211
 HOPEWELL CHESTERFIELD
 OPEN BRANCH FROM BUS 314303 TO BUS 314269 CKT 1 /*L2124
 END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315119	1GRAVEL3	3.56
315120	1GRAVEL4	3.58
315121	1GRAVEL5	3.52
315122	1GRAVEL6	3.58
315074	1HOPCGN1	27.85
315075	1HOPCGN2	27.49
315077	1HOPHCF1	7.33
315078	1HOPHCF2	7.33
315079	1HOPHCF3	7.33
315080	1HOPHCF4	11.13
315076	1HOPPOLC	6.26
315073	1STONECA	23.1
315116	1SURRY 1	37.25
932291	AC2-141 C OP	37.19
932292	AC2-141 E OP	15.88
932471	AC2-161 C	2.52
932472	AC2-161 E	1.3
292791	U1-032 E	12.03
914231	Y2-077	2.95
922522	AA2-177 C	23.88
922523	AA2-177 E	10.23
924811	AB2-134 C OP	30.61
924812	AB2-134 E OP	40.93
925331	AB2-190 C	54.58
925332	AB2-190 E	13.64
925691	AC1-045 C	0.97

925692	<i>AC1-045 E</i>	<i>0.53</i>
926661	<i>AC1-147 C</i>	<i>1.17</i>
926662	<i>AC1-147 E</i>	<i>0.69</i>
927221	<i>AC1-216 C OP</i>	<i>23.37</i>
927222	<i>AC1-216 E OP</i>	<i>18.38</i>

Appendix 18

(DVP - DVP) The 6SKIFF CREEK-6KINGS M 230 kV line (from bus 314209 to bus 314386 ckt 1) loads from 161.28% to 162.38% (**DC power flow**) of its emergency rating (442 MVA) for the single line contingency outage of 'LN 557'. This project contributes approximately 10.79 MW to the thermal violation.

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

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315108	1ELIZAR1	1.33
315109	1ELIZAR2	1.3
315110	1ELIZAR3	1.34
315233	1SURRY 2	13.72
315090	1YORKTN1	23.09
315091	1YORKTN2	23.96
315092	1YORKTN3	18.86
314421	6WINCHST	0.1
931041	AC2-012 C OP	4.22
931591	AC2-079 C OP	2.01
932291	AC2-141 C OP	10.79
932471	AC2-161 C	0.88
932711	AC2-194 C	0.42
932731	AC2-196 C	0.74
916191	Z1-068 C	0.02
921092	AA1-049 C	0.99
921532	AA1-132 C	3.05
921572	AA1-138 C	3.67
921582	AA1-139 C	6.14
921772	AA2-059 C	0.43
921982	AA2-088 C	1.9
922532	AA2-178 C	3.34
922602	AB1-013 C	1.01
923801	AB2-015 C OP	2.77
923831	AB2-022 C	0.92

924071	AB2-051 C OP	56.79
924241	AB2-068 OP	103.49
924941	AB2-149 C OP	1.01
925121	AB2-169 C OP	1.97
925141	AB2-171 C OP	1.52
925281	AB2-186 C	0.23
925291	AB2-188 C OP	0.82
925521	AC1-027 C	0.83
925691	AC1-045 C	0.75
925701	AC1-046 C	0.72
925711	AC1-047 C	0.95
926291	AC1-107 OP	156.21
926661	AC1-147 C	0.93
926741	AC1-159 C	56.35
926751	AC1-161 C OP	14.1
926781	AC1-164 C OP	21.56
927051	AC1-193 C	1.12

Appendix 19

(DVP - DVP) The 6FRRIVER-6STJOHN 230 kV line (from bus 314212 to bus 314150 ckt 1) loads from 113.15% to 114.0% (**DC power flow**) of its emergency rating (749 MVA) for the single line contingency outage of 'LN 574'. This project contributes approximately 14.23 MW to the thermal violation.

CONTINGENCY 'LN 574'

OPEN BRANCH FROM BUS 314908 TO BUS 314911 CKT 1

/* 8ELMONT

500.00 - 8LDYSMTH 500.00

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315053	1BELMED1	1.72
315054	1BELMED2	1.72
315055	1BELMED3	1.42
315058	1CHESTF3	1.81
315059	1CHESTF4	2.93
315060	1CHESTF5	5.91
315061	1CHESTG7	2.32
315063	1CHESTG8	2.3
315062	1CHESTS7	1.05
315064	1CHESTS8	1.18
315067	1DARBY 1	1.71
315068	1DARBY 2	1.71
315069	1DARBY 3	1.74
315070	1DARBY 4	1.74
315043	1FRIVERA	5.65
315044	1FRIVERB	4.37
315045	1FRIVERC	5.65
315046	1FRIVERD	4.37
315047	1FRIVERE	4.37
315048	1FRIVERF	5.65
315074	1HOPCGN1	4.65
315075	1HOPCGN2	4.59
315083	1SPRUNCA	6.14
315084	1SPRUNCB	6.14
315085	1SPRUNCC	4.55
315086	1SPRUNCD	4.55
315090	1YORKTN1	13.52

315091	1YORKTN2	14.03
314309	6IRON208	0.24
314236	6NRTHEST	0.13
314251	6S PUMP	0.67
931501	AC2-070 C	1.2
931531	AC2-073 C	1.13
932061	AC2-130	1.42
932071	AC2-131 1	0.96
932081	AC2-131 2	0.44
932111	AC2-132 1	0.5
932121	AC2-132 2	0.26
932261	AC2-137 C	1.28
932291	AC2-141 C OP	14.23
932481	AC2-162 C	1.72
297087	V2-040	0.1
921292	AA1-083	6.07
921622	AA1-145	103.17
922522	AA2-177 C	5.23
922682	AB1-027 C	1.83
923272	AB1-135 C OP	1.47
923841	AB2-024 C	1.24
924061	AB2-050	6.07
924241	AB2-068 OP	107.88
924811	AB2-134 C OP	6.7
925051	AB2-160 C OP	2.95
925331	AB2-190 C	11.95
925811	AC1-060	0.04
925821	AC1-061	0.02
926291	AC1-107 OP	162.83
926411	AC1-112 C	1.42
926551	AC1-134	15.17
926781	AC1-164 C OP	22.47
927041	AC1-191 C	8.34
927221	AC1-216 C OP	5.11

Appendix 20

(DVP - DVP) The 8ELMONT 500/230 kV transformer (from bus 314218 to bus 314908 ckt 1) loads from 119.14% to 121.09% (**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 45.5 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	4.15
315068	1DARBY 2	4.16
315069	1DARBY 3	4.21
315070	1DARBY 4	4.21
315043	1FRIVERA	5.59
315044	1FRIVERB	4.33
315045	1FRIVERC	5.59
315046	1FRIVERD	4.33
315047	1FRIVERE	4.33
315048	1FRIVERF	5.59
315074	1HOPCGN1	11.03
315075	1HOPCGN2	10.89
315134	1ROAVALA	22.58
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	30.62
315091	1YORKTN2	31.78
314539	3UNCAMP	2.15

314541	3WATKINS	0.6
314229	6MT R221	1.42
314236	6NRTHEST	0.31
314189	6PAPERMILL	8.8
314251	6S PUMP	1.6
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	10.94
931831	AC2-110 C	1.74
931832	AC2-110 E	2.84
932061	AC2-130	3.46
932071	AC2-131 1	2.34
932081	AC2-131 2	1.07
932111	AC2-132 1	1.23
932121	AC2-132 2	0.63
932261	AC2-137 C	3.16
932262	AC2-137 E	2.05
932271	AC2-138 C	0.87
932272	AC2-138 E	1.09
932291	AC2-141 C OP	31.89
932292	AC2-141 E OP	13.61
932461	AC2-159 C OP	5.51
932462	AC2-159 E OP	5.51
932471	AC2-161 C	2.43
932472	AC2-161 E	1.25
932481	AC2-162 C	4.19
932482	AC2-162 E	2.16
932521	AC2-167 C	2.73
932522	AC2-167 E	4.46
932711	AC2-194 C	0.97
932712	AC2-194 E	1.57
932731	AC2-196 C	1.63

932732	AC2-196 E	1.09
292791	U1-032 E	4.77
297087	V2-040	0.23
900672	V4-068 E	0.25
901082	W1-029 E	41.26
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
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
921292	AA1-083	6.01
921532	AA1-132 C	6.78
921533	AA1-132 E	2.91
921572	AA1-138 C	8.67
921573	AA1-138 E	3.72
921582	AA1-139 C	13.62
921583	AA1-139 E	5.84
921622	AA1-145	102.14
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
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	4.92
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	7.58
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	126.98
924072	AB2-051 E OP	17.43
924241	AB2-068 OP	175.78
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
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	27.73
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	1.58
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	265.33
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	8.58
926661	AC1-147 C	2.1
926662	AC1-147 E	1.23
926741	AC1-159 C	126.
926751	AC1-161 C OP	26.8
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	4.95
927221	AC1-216 C OP	11.87
927222	AC1-216 E OP	9.34

Appendix 21

(DVP - DVP) The 6CHARCTY-6LAKESD 230 kV line (from bus 314225 to bus 314227 ckt 1) loads from 138.91% to 140.68% (**DC power flow**) of its load dump rating (459 MVA) for the tower line contingency outage of 'LN 208-259'. This project contributes approximately 18.0 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	31.06
315074	1HOPCGN1	6.83
315075	1HOPCGN2	6.75
315077	1HOPHCF1	1.8
315078	1HOPHCF2	1.8
315079	1HOPHCF3	1.8
315080	1HOPHCF4	2.73
315076	1HOPPOLC	1.54
315134	1ROAVALA	11.31
315135	1ROAVALB	3.02
315073	1STONECA	5.67
314784	1WEYRHSB	0.66
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
932061	AC2-130	0.81

932071	AC2-131 1	0.55
932081	AC2-131 2	0.25
932111	AC2-132 1	0.29
932121	AC2-132 2	0.15
932291	AC2-141 C OP	12.62
932292	AC2-141 E OP	5.38
932451	AC2-158 C OP	1.71
932452	AC2-158 E OP	1.71
932461	AC2-159 C OP	2.47
932462	AC2-159 E OP	2.47
932471	AC2-161 C	0.92
932472	AC2-161 E	0.47
932521	AC2-167 C	1.16
932522	AC2-167 E	1.9
932711	AC2-194 C	0.32
932712	AC2-194 E	0.52
292791	U1-032 E	2.95
900672	V4-068 E	0.11
901082	W1-029 E	13.49
907092	X1-038 E	2.15
913392	Y1-086 E	0.63
914231	Y2-077	0.72
916042	Z1-036 E	13.59
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
921092	AA1-049 C	0.68
921093	AA1-049 E	0.32
921162	AA1-063AC	3.19
921163	AA1-063AE	1.51
918512	AA1-065 E OP	1.48
918562	AA1-072 E	0.06
921532	AA1-132 C	2.1
921533	AA1-132 E	0.9
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	3.26
921753	AA2-053 E	1.4
921762	AA2-057 C	2.35
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	3.81
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	5.98
923262	AB1-132 C OP	5.97
923263	AB1-132 E OP	2.56
923572	AB1-173 C OP	0.99
923573	AB1-173 E OP	0.46
923582	AB1-173AC OP	0.99
923583	AB1-173AE OP	0.46
923801	AB2-015 C OP	3.07
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	39.06
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	5.58
924512	AB2-100 E	2.75
924761	AB2-128 C	4.78
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	1.59
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	2.02
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	0.54
925692	AC1-045 E	0.29
925821	AC1-061	0.03
926071	AC1-086 C	8.79
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	38.76
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 22

(DVP - DVP) The 6MESSER-6CHARCTY 230 kV line (from bus 314228 to bus 314225 ckt 1) loads from 150.63% to 152.4% (**DC power flow**) of its load dump rating (459 MVA) for the tower line contingency outage of 'LN 208-259'. This project contributes approximately 18.0 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	31.06
315074	1HOPCGN1	6.83
315075	1HOPCGN2	6.75
315077	1HOPHCF1	1.8
315078	1HOPHCF2	1.8
315079	1HOPHCF3	1.8
315080	1HOPHCF4	2.73
315076	1HOPPOLC	1.54
315134	1ROAVALA	11.31
315135	1ROAVALB	3.02
315073	1STONECA	5.67
314784	1WEYRHSB	0.66
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
932061	AC2-130	0.81

932071	AC2-131 1	0.55
932081	AC2-131 2	0.25
932111	AC2-132 1	0.29
932121	AC2-132 2	0.15
932291	AC2-141 C OP	12.62
932292	AC2-141 E OP	5.38
932451	AC2-158 C OP	1.71
932452	AC2-158 E OP	1.71
932461	AC2-159 C OP	2.47
932462	AC2-159 E OP	2.47
932471	AC2-161 C	0.92
932472	AC2-161 E	0.47
932521	AC2-167 C	1.16
932522	AC2-167 E	1.9
932711	AC2-194 C	0.32
932712	AC2-194 E	0.52
292791	U1-032 E	2.95
900672	V4-068 E	0.11
901082	W1-029 E	13.49
907092	X1-038 E	2.15
913392	Y1-086 E	0.63
914231	Y2-077	0.72
916042	Z1-036 E	13.59
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
921092	AA1-049 C	0.68
921093	AA1-049 E	0.32
921162	AA1-063AC	3.19
921163	AA1-063AE	1.51
918512	AA1-065 E OP	1.48
918562	AA1-072 E	0.06
921532	AA1-132 C	2.1
921533	AA1-132 E	0.9
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	3.26
921753	AA2-053 E	1.4
921762	AA2-057 C	2.35
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	3.81
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	5.98
923262	AB1-132 C OP	5.97
923263	AB1-132 E OP	2.56
923572	AB1-173 C OP	0.99
923573	AB1-173 E OP	0.46
923582	AB1-173AC OP	0.99
923583	AB1-173AE OP	0.46
923801	AB2-015 C OP	3.07
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	39.06
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	5.58
924512	AB2-100 E	2.75
924761	AB2-128 C	4.78
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	1.59
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	2.02
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	0.54
925692	AC1-045 E	0.29
925821	AC1-061	0.03
926071	AC1-086 C	8.79
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	38.76
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 23

(DVP - DVP) The 6PRGEORG 230/115 kV transformer (from bus 314269 to bus 314291 ckt 1) loads from 124.92% to 129.86% (**DC power flow**) of its load dump rating (220 MVA) for the tower line contingency outage of 'LN 211-228'. This project contributes approximately 24.09 MW to the thermal violation.

CONTINGENCY 'LN 211-228'

OPEN BRANCH FROM BUS 314287 TO BUS 314303 CKT 1 /* 6CHSTF B
230.00 - 6HOPEWLL 230.00

OPEN BRANCH FROM BUS 314278 TO BUS 314286 CKT 1 /* 6BERMUDA
230.00 - 6CHSTF A 230.00

OPEN BRANCH FROM BUS 314278 TO BUS 314303 CKT 1 /* 6BERMUDA
230.00 - 6HOPEWLL 230.00

OPEN BUS 314278 /* ISLAND

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315119	1GRAVEL3	1.63
315120	1GRAVEL4	1.64
315121	1GRAVEL5	1.61
315122	1GRAVEL6	1.64
315074	1HOPCGN1	13.03
315075	1HOPCGN2	12.86
315077	1HOPHCF1	3.43
315078	1HOPHCF2	3.43
315079	1HOPHCF3	3.43
315080	1HOPHCF4	5.21
315076	1HOPPOLC	2.93
315073	1STONECA	10.81
315116	1SURRY 1	17.06
932291	AC2-141 C OP	16.88
932292	AC2-141 E OP	7.21
932471	AC2-161 C	1.13
932472	AC2-161 E	0.58
292791	U1-032 E	5.63
914231	Y2-077	1.38
922522	AA2-177 C	11.1
922523	AA2-177 E	4.76
924811	AB2-134 C OP	14.23

924812	<i>AB2-134 E OP</i>	<i>19.03</i>
925331	<i>AB2-190 C</i>	<i>25.38</i>
925332	<i>AB2-190 E</i>	<i>6.34</i>
927221	<i>AC1-216 C OP</i>	<i>10.86</i>
927222	<i>AC1-216 E OP</i>	<i>8.54</i>

Appendix 24

(DVP - DVP) The 6CHSTF B-6MESSER 230 kV line (from bus 314287 to bus 314228 ckt 1) loads from 150.76% to 152.53% (**DC power flow**) of its load dump rating (459 MVA) for the tower line contingency outage of 'LN 208-259'. This project contributes approximately 18.0 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	31.06
315074	1HOPCGN1	6.83
315075	1HOPCGN2	6.75
315077	1HOPHCF1	1.8
315078	1HOPHCF2	1.8
315079	1HOPHCF3	1.8
315080	1HOPHCF4	2.73
315076	1HOPPOLC	1.54
315134	1ROAVALA	11.31
315135	1ROAVALB	3.02
315073	1STONECA	5.67
314784	1WEYRHSB	0.66
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
932061	AC2-130	0.81

932071	AC2-131 1	0.55
932081	AC2-131 2	0.25
932111	AC2-132 1	0.29
932121	AC2-132 2	0.15
932291	AC2-141 C OP	12.62
932292	AC2-141 E OP	5.38
932451	AC2-158 C OP	1.71
932452	AC2-158 E OP	1.71
932461	AC2-159 C OP	2.47
932462	AC2-159 E OP	2.47
932471	AC2-161 C	0.92
932472	AC2-161 E	0.47
932521	AC2-167 C	1.16
932522	AC2-167 E	1.9
932711	AC2-194 C	0.32
932712	AC2-194 E	0.52
292791	U1-032 E	2.95
900672	V4-068 E	0.11
901082	W1-029 E	13.49
907092	X1-038 E	2.15
913392	Y1-086 E	0.63
914231	Y2-077	0.72
916042	Z1-036 E	13.59
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
921092	AA1-049 C	0.68
921093	AA1-049 E	0.32
921162	AA1-063AC	3.19
921163	AA1-063AE	1.51
918512	AA1-065 E OP	1.48
918562	AA1-072 E	0.06
921532	AA1-132 C	2.1
921533	AA1-132 E	0.9
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	3.26
921753	AA2-053 E	1.4
921762	AA2-057 C	2.35
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	3.81
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	5.98
923262	AB1-132 C OP	5.97
923263	AB1-132 E OP	2.56
923572	AB1-173 C OP	0.99
923573	AB1-173 E OP	0.46
923582	AB1-173AC OP	0.99
923583	AB1-173AE OP	0.46
923801	AB2-015 C OP	3.07
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	39.06
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	5.58
924512	AB2-100 E	2.75
924761	AB2-128 C	4.78
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	1.59
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	2.02
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	0.54
925692	AC1-045 E	0.29
925821	AC1-061	0.03
926071	AC1-086 C	8.79
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	38.76
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 25

(DVP - DVP) The 6CHSTF B-6BASIN 230 kV line (from bus 314287 to bus 314276 ckt 1) loads from 139.3% to 140.65% (**DC power flow**) of its emergency rating (449 MVA) for the single line contingency outage of 'LN 563'. This project contributes approximately 13.47 MW to the thermal violation.

CONTINGENCY 'LN 563'

OPEN BRANCH FROM BUS 314902 TO BUS 314914 CKT 1 /* 8CARSON

500.00 - 8MDLTHAN 500.00

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315065	1CHESTF6	31.31
315131	1EDGECEMA	3.59
315132	1EDGECEMB	3.59
315139	1GASTONA	1.5
315141	1GASTONB	1.5
315119	1GRAVEL3	1.19
315120	1GRAVEL4	1.2
315121	1GRAVEL5	1.18
315122	1GRAVEL6	1.2
315117	1GRAVELC	0.41
315074	1HOPCGN1	6.39
315075	1HOPCGN2	6.31
315077	1HOPHCF1	1.68
315078	1HOPHCF2	1.68
315079	1HOPHCF3	1.68
315080	1HOPHCF4	2.55
315076	1HOPPOLC	1.44
315134	1ROAVALA	13.32
315135	1ROAVALB	3.55
315116	1SURRY 1	12.45
314314	3LOCKS	0.95
931041	AC2-012 C OP	3.57
931581	AC2-078 C OP	2.55
931591	AC2-079 C OP	3.53
931631	AC2-084 C	3.65
931701	AC2-093 C	26.49
932291	AC2-141 C OP	13.47

932451	AC2-158 C OP	2.12
932461	AC2-159 C OP	2.96
932471	AC2-161 C	1.01
932521	AC2-167 C	1.39
932711	AC2-194 C	0.4
932731	AC2-196 C	0.62
914231	Y2-077	0.68
921092	AA1-049 C	0.86
921162	AA1-063AC	3.79
921182	AA1-067 C	0.65
921532	AA1-132 C	2.64
921562	AA1-135 C	3.65
921572	AA1-138 C	3.69
921582	AA1-139 C	5.28
921752	AA2-053 C	3.88
921762	AA2-057 C	2.89
921772	AA2-059 C	0.44
921862	AA2-068 C	0.93
921982	AA2-088 C	2.78
922442	AA2-165 C	0.39
922472	AA2-169 C	0.86
922512	AA2-174 C	0.18
922522	AA2-177 C	6.22
922532	AA2-178 C	3.66
922602	AB1-013 C	1.11
922922	AB1-081 C OP	3.45
923262	AB1-132 C OP	6.99
923572	AB1-173 C OP	1.14
923582	AB1-173AC OP	1.14
923801	AB2-015 C OP	3.65
923831	AB2-022 C	0.83
923851	AB2-025 C	1.79
923911	AB2-031 C OP	1.13
923941	AB2-035 C	0.13
923981	AB2-039 C OP	5.26
923991	AB2-040 C OP	3.72
924071	AB2-051 C OP	48.63
924151	AB2-059 C OP	4.07
924381	AB2-087 C	0.24

924391	AB2-088 C	0.17
924491	AB2-098 C	0.22
924501	AB2-099 C	0.25
924511	AB2-100 C	6.39
924761	AB2-128 C	5.47
924811	AB2-134 C OP	7.97
924931	AB2-147 C	1.38
924941	AB2-149 C OP	1.76
924951	AB2-150 C OP	1.38
925051	AB2-160 C OP	3.86
925061	AB2-161 C OP	2.13
925121	AB2-169 C OP	2.5
925141	AB2-171 C OP	2.08
925171	AB2-174 C OP	3.66
925281	AB2-186 C	0.23
925291	AB2-188 C OP	0.9
925331	AB2-190 C	14.21
925521	AC1-027 C	0.71
925591	AC1-034 C OP	2.64
925691	AC1-045 C	0.64
925701	AC1-046 C	0.61
925711	AC1-047 C	0.81
925781	AC1-054 C OP	2.63
925821	AC1-061	0.03
926071	AC1-086 C	10.29
926201	AC1-098 C	2.56
926211	AC1-099 C	0.86
926661	AC1-147 C	0.81
926741	AC1-159 C	48.26
926771	AC1-163 C	0.88
927021	AC1-189 C	3.3
927051	AC1-193 C	1.53
927141	AC1-208 C	3.94
927221	AC1-216 C OP	6.08

Appendix 26

(DVP - DVP) The 6PENNIMAN-6WALR209 230 kV line (from bus 314296 to bus 314415 ckt 1) loads from 148.94% to 150.04% (**DC power flow**) of its emergency rating (442 MVA) for the single line contingency outage of 'LN 557'. This project contributes approximately 10.79 MW to the thermal violation.

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

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315108	1ELIZAR1	1.33
315109	1ELIZAR2	1.3
315110	1ELIZAR3	1.34
315233	1SURRY 2	13.72
315090	1YORKTN1	23.09
315091	1YORKTN2	23.96
315092	1YORKTN3	18.86
314421	6WINCHST	0.1
931041	AC2-012 C OP	4.22
931591	AC2-079 C OP	2.01
932291	AC2-141 C OP	10.79
932471	AC2-161 C	0.88
932711	AC2-194 C	0.42
932731	AC2-196 C	0.74
916191	Z1-068 C	0.02
921092	AA1-049 C	0.99
921532	AA1-132 C	3.05
921572	AA1-138 C	3.67
921582	AA1-139 C	6.14
921772	AA2-059 C	0.43
921982	AA2-088 C	1.9
922532	AA2-178 C	3.34
922602	AB1-013 C	1.01
923801	AB2-015 C OP	2.77
923831	AB2-022 C	0.92

924071	AB2-051 C OP	56.79
924241	AB2-068 OP	103.49
924941	AB2-149 C OP	1.01
925121	AB2-169 C OP	1.97
925141	AB2-171 C OP	1.52
925281	AB2-186 C	0.23
925291	AB2-188 C OP	0.82
925521	AC1-027 C	0.83
925691	AC1-045 C	0.75
925701	AC1-046 C	0.72
925711	AC1-047 C	0.95
926291	AC1-107 OP	156.21
926661	AC1-147 C	0.93
926741	AC1-159 C	56.35
926751	AC1-161 C OP	14.1
926781	AC1-164 C OP	21.56
927051	AC1-193 C	1.12

Appendix 27

(DVP - DVP) The 6KINGS M-6PENNIMAN 230 kV line (from bus 314386 to bus 314296 ckt 1) loads from 152.81% to 153.91% (**DC power flow**) of its emergency rating (442 MVA) for the single line contingency outage of 'LN 557'. This project contributes approximately 10.79 MW to the thermal violation.

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

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315108	1ELIZAR1	1.33
315109	1ELIZAR2	1.3
315110	1ELIZAR3	1.34
315233	1SURRY 2	13.72
315090	1YORKTN1	23.09
315091	1YORKTN2	23.96
315092	1YORKTN3	18.86
314421	6WINCHST	0.1
931041	AC2-012 C OP	4.22
931591	AC2-079 C OP	2.01
932291	AC2-141 C OP	10.79
932471	AC2-161 C	0.88
932711	AC2-194 C	0.42
932731	AC2-196 C	0.74
916191	Z1-068 C	0.02
921092	AA1-049 C	0.99
921532	AA1-132 C	3.05
921572	AA1-138 C	3.67
921582	AA1-139 C	6.14
921772	AA2-059 C	0.43
921982	AA2-088 C	1.9
922532	AA2-178 C	3.34
922602	AB1-013 C	1.01
923801	AB2-015 C OP	2.77
923831	AB2-022 C	0.92

924071	AB2-051 C OP	56.79
924241	AB2-068 OP	103.49
924941	AB2-149 C OP	1.01
925121	AB2-169 C OP	1.97
925141	AB2-171 C OP	1.52
925281	AB2-186 C	0.23
925291	AB2-188 C OP	0.82
925521	AC1-027 C	0.83
925691	AC1-045 C	0.75
925701	AC1-046 C	0.72
925711	AC1-047 C	0.95
926291	AC1-107 OP	156.21
926661	AC1-147 C	0.93
926741	AC1-159 C	56.35
926751	AC1-161 C OP	14.1
926781	AC1-164 C OP	21.56
927051	AC1-193 C	1.12

Appendix 28

(DVP - DVP) The 6WALR209-6LIGH209 230 kV line (from bus 314415 to bus 314391 ckt 1) loads from 133.16% to 134.26% (**DC power flow**) of its emergency rating (442 MVA) for the single line contingency outage of 'LN 557'. This project contributes approximately 10.79 MW to the thermal violation.

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

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315108	1ELIZAR1	1.33
315109	1ELIZAR2	1.3
315110	1ELIZAR3	1.34
315233	1SURRY 2	13.72
315090	1YORKTN1	23.09
315091	1YORKTN2	23.96
315092	1YORKTN3	18.86
314421	6WINCHST	0.1
931041	AC2-012 C OP	4.22
931591	AC2-079 C OP	2.01
932291	AC2-141 C OP	10.79
932471	AC2-161 C	0.88
932711	AC2-194 C	0.42
932731	AC2-196 C	0.74
916191	Z1-068 C	0.02
921092	AA1-049 C	0.99
921532	AA1-132 C	3.05
921572	AA1-138 C	3.67
921582	AA1-139 C	6.14
921772	AA2-059 C	0.43
921982	AA2-088 C	1.9
922532	AA2-178 C	3.34
922602	AB1-013 C	1.01
923801	AB2-015 C OP	2.77
923831	AB2-022 C	0.92

924071	AB2-051 C OP	56.79
924241	AB2-068 OP	103.49
924941	AB2-149 C OP	1.01
925121	AB2-169 C OP	1.97
925141	AB2-171 C OP	1.52
925281	AB2-186 C	0.23
925291	AB2-188 C OP	0.82
925521	AC1-027 C	0.83
925691	AC1-045 C	0.75
925701	AC1-046 C	0.72
925711	AC1-047 C	0.95
926291	AC1-107 OP	156.21
926661	AC1-147 C	0.93
926741	AC1-159 C	56.35
926751	AC1-161 C OP	14.1
926781	AC1-164 C OP	21.56
927051	AC1-193 C	1.12

Appendix 29

(DVP - DVP) The 8CARSON-8MDLTHAN 500 kV line (from bus 314902 to bus 314914 ckt 1) loads from 130.95% to 131.69% (**DC power flow**) of its emergency rating (2442 MVA) for the single line contingency outage of 'LN 557'. This project contributes approximately 40.16 MW to the thermal violation.

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

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315102	1BRUNSWICKG1	15.36
315103	1BRUNSWICKG2	15.36
315104	1BRUNSWICKG3	15.36
315105	1BRUNSWICKS1	31.91
315099	1CHESPKB	1.76
315131	1EDGECEMA	12.96
315132	1EDGECEMB	12.96
315108	1ELIZAR1	5.18
315109	1ELIZAR2	5.09
315110	1ELIZAR3	5.25
315134	1ROAVALA	39.59
315135	1ROAVALB	10.56
315233	1SURRY 2	41.69
315090	1YORKTN1	37.09
315091	1YORKTN2	38.49
931041	AC2-012 C OP	16.62
931581	AC2-078 C OP	5.38
931591	AC2-079 C OP	9.67
931631	AC2-084 C	12.59
931701	AC2-093 C	136.93
931761	AC2-100 C	7.06
931821	AC2-107 C OP	12.13
932291	AC2-141 C OP	40.16
932451	AC2-158 C OP	7.91
932461	AC2-159 C OP	9.86

932471	AC2-161 C	3.31
932521	AC2-167 C	4.76
932711	AC2-194 C	1.73
932731	AC2-196 C	2.92
916191	Z1-068 C	0.07
916301	Z1-086 C	93.74
LTF	Z2-067	27.66
921092	AA1-049 C	3.93
LTF	AA1-058	1.22
921162	AA1-063AC	12.25
921182	AA1-067 C	2.47
921532	AA1-132 C	12.13
921562	AA1-135 C	13.63
921572	AA1-138 C	15.3
921582	AA1-139 C	24.35
921752	AA2-053 C	12.45
921762	AA2-057 C	10.07
921772	AA2-059 C	1.85
921862	AA2-068 C	3.17
LTF	AA2-074	8.23
921982	AA2-088 C	9.55
922442	AA2-165 C	1.37
922472	AA2-169 C	2.96
922512	AA2-174 C	0.57
922522	AA2-177 C	10.21
922532	AA2-178 C	14.87
922602	AB1-013 C	4.49
922922	AB1-081 C OP	12.51
923262	AB1-132 C OP	20.
923572	AB1-173 C OP	3.16
923582	AB1-173AC OP	3.16
923801	AB2-015 C OP	12.95
923831	AB2-022 C	3.7
923851	AB2-025 C	3.4
923911	AB2-031 C OP	3.13
923941	AB2-035 C	0.48
923981	AB2-039 C OP	11.08
923991	AB2-040 C OP	10.29
924021	AB2-043 C OP	3.65

924071	AB2-051 C OP	221.83
924151	AB2-059 C OP	14.75
924241	AB2-068 OP	314.47
924301	AB2-077 C OP	2.33
924311	AB2-078 C OP	2.33
924321	AB2-079 C OP	2.33
924381	AB2-087 C	0.84
924391	AB2-088 C	0.61
924401	AB2-089 C	2.76
924411	AB2-090 C	4.6
924491	AB2-098 C	0.82
924501	AB2-099 C	0.87
924511	AB2-100 C	16.06
924761	AB2-128 C	13.76
924811	AB2-134 C OP	13.09
924931	AB2-147 C	3.53
924941	AB2-149 C OP	4.84
924951	AB2-150 C OP	3.53
925061	AB2-161 C OP	4.48
925121	AB2-169 C OP	9.73
925141	AB2-171 C OP	7.3
925171	AB2-174 C OP	9.81
925221	AB2-176 C	1.89
925281	AB2-186 C	0.97
925291	AB2-188 C OP	3.67
925331	AB2-190 C	23.33
925521	AC1-027 C	3.25
925591	AC1-034 C OP	9.72
925691	AC1-045 C	2.64
925701	AC1-046 C	2.84
925711	AC1-047 C	3.76
925781	AC1-054 C OP	9.43
926071	AC1-086 C	29.45
926201	AC1-098 C	8.83
926211	AC1-099 C	2.96
926271	AC1-105 C OP	7.04
926291	AC1-107 OP	474.67
926661	AC1-147 C	3.64
926741	AC1-159 C	220.12

926751	<i>AC1-161 C OP</i>	52.67
926771	<i>AC1-163 C</i>	3.13
926781	<i>AC1-164 C OP</i>	65.5
927021	<i>AC1-189 C</i>	12.44
927051	<i>AC1-193 C</i>	5.35
927141	<i>AC1-208 C</i>	12.73
927211	<i>AC1-215 C</i>	12.63
927221	<i>AC1-216 C OP</i>	9.99
927251	<i>AC1-221 C</i>	3.99
927261	<i>AC1-222 C</i>	5.97

Appendix 30

(DVP - DVP) The 8CHCKAHM-8ELMONT 500 kV line (from bus 314903 to bus 314908 ckt 1) loads from 136.6% to 137.55% (**DC power flow**) of its emergency rating (2442 MVA) for the single line contingency outage of 'LN 576'. This project contributes approximately 51.15 MW to the thermal violation.

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

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315131	1EDGECEMA	11.88
315132	1EDGECEMB	11.88
315108	1ELIZAR1	5.89
315109	1ELIZAR2	5.79
315110	1ELIZAR3	5.96
315074	1HOPCGN1	10.82
315075	1HOPCGN2	10.68
315134	1ROAVALA	38.71
315135	1ROAVALB	10.32
315233	1SURRY 2	53.69
315090	1YORKTN1	53.81
315091	1YORKTN2	55.84
315092	1YORKTN3	43.75
314421	6WINCHST	0.25
931041	AC2-012 C OP	18.67
931531	AC2-073 C	3.9
931581	AC2-078 C OP	6.23
931591	AC2-079 C OP	11.02
931631	AC2-084 C	12.19
931701	AC2-093 C	105.47
931831	AC2-110 C	2.15
932061	AC2-130	3.13
932071	AC2-131 1	2.12
932081	AC2-131 2	0.96
932111	AC2-132 1	1.11

932121	AC2-132 2	0.57
932261	AC2-137 C	2.88
932271	AC2-138 C	0.94
932291	AC2-141 C OP	51.15
932451	AC2-158 C OP	7.89
932461	AC2-159 C OP	9.9
932471	AC2-161 C	4.09
932521	AC2-167 C	4.93
932711	AC2-194 C	1.91
932731	AC2-196 C	3.29
916191	Z1-068 C	0.08
LTF	Z2-067	22.13
921092	AA1-049 C	4.39
LTF	AA1-058	1.05
921162	AA1-063AC	12.24
921182	AA1-067 C	2.38
921532	AA1-132 C	13.56
921562	AA1-135 C	13.59
921572	AA1-138 C	16.71
921582	AA1-139 C	27.28
921752	AA2-053 C	12.25
921762	AA2-057 C	9.5
921772	AA2-059 C	2.
921862	AA2-068 C	3.04
LTF	AA2-074	6.71
921982	AA2-088 C	9.93
922442	AA2-165 C	1.3
922472	AA2-169 C	2.78
922512	AA2-174 C	0.56
922522	AA2-177 C	14.89
922532	AA2-178 C	15.84
922602	AB1-013 C	4.78
922922	AB1-081 C OP	11.48
923262	AB1-132 C OP	19.37
923272	AB1-135 C OP	4.32
923572	AB1-173 C OP	3.05
923582	AB1-173AC OP	3.05
923801	AB2-015 C OP	13.83
923831	AB2-022 C	4.11

923841	AB2-024 C	4.11
923851	AB2-025 C	3.27
923911	AB2-031 C OP	3.03
923941	AB2-035 C	0.45
923981	AB2-039 C OP	12.84
923991	AB2-040 C OP	9.94
924071	AB2-051 C OP	251.95
924151	AB2-059 C OP	13.54
924241	AB2-068 OP	619.64
924381	AB2-087 C	0.86
924391	AB2-088 C	0.57
924401	AB2-089 C	2.54
924491	AB2-098 C	0.79
924501	AB2-099 C	0.89
924511	AB2-100 C	15.52
924761	AB2-128 C	13.29
924811	AB2-134 C OP	19.1
924931	AB2-147 C	3.39
924941	AB2-149 C OP	5.51
924951	AB2-150 C OP	3.39
925051	AB2-160 C OP	6.39
925061	AB2-161 C OP	5.19
925121	AB2-169 C OP	9.89
925141	AB2-171 C OP	7.72
925171	AB2-174 C OP	9.46
925281	AB2-186 C	1.07
925291	AB2-188 C OP	3.9
925331	AB2-190 C	34.04
925521	AC1-027 C	3.68
925591	AC1-034 C OP	9.08
925691	AC1-045 C	3.09
925701	AC1-046 C	3.19
925711	AC1-047 C	4.22
925781	AC1-054 C OP	8.74
925811	AC1-060	0.1
925821	AC1-061	0.04
925841	AC1-063	0.62
925861	AC1-065 C	5.38
926071	AC1-086 C	28.52

926201	AC1-098 C	8.55
926211	AC1-099 C	2.87
926291	AC1-107 OP	935.31
926591	AC1-142 C	13.62
926661	AC1-147 C	4.14
926741	AC1-159 C	250.01
926751	AC1-161 C OP	59.86
926771	AC1-163 C	3.2
926781	AC1-164 C OP	129.07
927021	AC1-189 C	11.92
927051	AC1-193 C	5.66
927141	AC1-208 C	11.97
927221	AC1-216 C OP	14.57

Appendix 31

(DVP - DVP) The 8CHANCE-8BRISTER 500 kV line (from bus 314905 to bus 314900 ckt 1) loads from 123.73% to 124.32% (**DC power flow**) of its emergency rating (2442 MVA) for the single line contingency outage of 'LN 594'. This project contributes approximately 31.94 MW to the thermal violation.

CONTINGENCY 'LN 594'

OPEN BRANCH FROM BUS 314916 TO BUS 314934 CKT 1 /* 8MORRSVL

500.00 - 8SPOTSYL 500.00

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315053	1BELMED1	3.04
315054	1BELMED2	3.04
315055	1BELMED3	2.52
315067	1DARBY 1	2.77
315068	1DARBY 2	2.77
315069	1DARBY 3	2.81
315070	1DARBY 4	2.81
315043	1FRIVERA	3.73
315044	1FRIVERB	2.89
315045	1FRIVERC	3.73
315046	1FRIVERD	2.89
315047	1FRIVERE	2.89
315048	1FRIVERF	3.73
315074	1HOPCGN1	8.95
315075	1HOPCGN2	8.83
315225	1N ANNA1	42.02
315226	1N ANNA2	41.37
315134	1ROAVALA	26.61
315135	1ROAVALB	7.1
315083	1SPRUNCA	11.4
315084	1SPRUNCB	11.4
315085	1SPRUNCC	8.45
315086	1SPRUNCD	8.45
315090	1YORKTN1	30.44
315091	1YORKTN2	31.59
314309	6IRON208	0.42
314236	6NRTHEST	0.2

314251	6S PUMP	1.03
931041	AC2-012 C OP	10.66
931501	AC2-070 C	1.84
931531	AC2-073 C	2.52
931581	AC2-078 C OP	4.26
931591	AC2-079 C OP	7.06
931631	AC2-084 C	8.26
931701	AC2-093 C	70.43
931711	AC2-094 C	11.23
931831	AC2-110 C	1.43
932011	AC2-125	2.9
932021	AC2-126	2.92
932031	AC2-127	1.6
932041	AC2-128	1.54
932051	AC2-129	1.44
932061	AC2-130	2.59
932071	AC2-131 1	1.75
932081	AC2-131 2	0.8
932111	AC2-132 1	0.92
932121	AC2-132 2	0.47
932261	AC2-137 C	2.25
932271	AC2-138 C	0.78
932291	AC2-141 C OP	31.94
932451	AC2-158 C OP	5.12
932461	AC2-159 C OP	6.53
932471	AC2-161 C	2.5
932481	AC2-162 C	2.64
932501	AC2-165 C	10.46
932521	AC2-167 C	3.19
932711	AC2-194 C	1.12
932731	AC2-196 C	1.87
297087	V2-040	0.13
LTF	Z2-067	16.82
921092	AA1-049 C	2.52
LTF	AA1-058	0.75
921162	AA1-063AC	8.26
921292	AA1-083	4.01
921532	AA1-132 C	7.8
921562	AA1-135 C	8.83

921572	AA1-138 C	10.
921582	AA1-139 C	15.64
921622	AA1-145	68.18
921752	AA2-053 C	8.37
921772	AA2-059 C	1.2
LTF	AA2-074	5.
921982	AA2-088 C	6.41
922512	AA2-174 C	0.38
922522	AA2-177 C	10.74
922532	AA2-178 C	9.65
922602	AB1-013 C	2.91
922682	AB1-027 C	2.8
923262	AB1-132 C OP	13.51
923272	AB1-135 C OP	2.76
923572	AB1-173 C OP	2.18
923582	AB1-173AC OP	2.18
923801	AB2-015 C OP	8.7
923831	AB2-022 C	2.39
923841	AB2-024 C	2.64
923851	AB2-025 C	2.48
923861	AB2-026 C	2.34
923911	AB2-031 C OP	2.16
923981	AB2-039 C OP	8.78
923991	AB2-040 C OP	7.1
924061	AB2-050	4.01
924071	AB2-051 C OP	144.13
924241	AB2-068 OP	216.38
924381	AB2-087 C	0.56
924501	AB2-099 C	0.57
924511	AB2-100 C	11.1
924761	AB2-128 C	9.51
924811	AB2-134 C OP	13.77
924931	AB2-147 C	2.48
924941	AB2-149 C OP	3.53
924951	AB2-150 C OP	2.48
925051	AB2-160 C OP	5.82
925061	AB2-161 C OP	3.55
925121	AB2-169 C OP	6.29
925141	AB2-171 C OP	4.9

925171	AB2-174 C OP	6.81
925281	AB2-186 C	0.63
925291	AB2-188 C OP	2.38
925331	AB2-190 C	24.55
925521	AC1-027 C	2.1
925691	AC1-045 C	1.81
925701	AC1-046 C	1.82
925711	AC1-047 C	2.41
925811	AC1-060	0.08
925821	AC1-061	0.04
925841	AC1-063	0.41
925861	AC1-065 C	3.58
926001	AC1-076 C	4.69
926071	AC1-086 C	19.89
926201	AC1-098 C	5.79
926211	AC1-099 C	1.94
926291	AC1-107 OP	326.61
926411	AC1-112 C	2.18
926441	AC1-115 C	1.12
926551	AC1-134	10.03
926591	AC1-142 C	9.94
926661	AC1-147 C	2.37
926731	AC1-158 C	88.54
926741	AC1-159 C	143.02
926751	AC1-161 C OP	32.04
926771	AC1-163 C	2.07
926781	AC1-164 C OP	45.07
927041	AC1-191 C	10.81
927051	AC1-193 C	3.6
927221	AC1-216 C OP	10.51

Appendix 32

(DVP - DVP) The 8ELMONT-8LDYSMTH 500 kV line (from bus 314908 to bus 314911 ckt 1) loads from 151.65% to 152.65% (**DC power flow**) of its emergency rating (2442 MVA) for the single line contingency outage of 'LN 576'. This project contributes approximately 53.81 MW to the thermal violation.

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

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315058	1CHESTF3	5.34
315059	1CHESTF4	8.66
315060	1CHESTF5	18.36
315061	1CHESTG7	7.2
315063	1CHESTG8	7.14
315062	1CHESTS7	3.27
315064	1CHESTS8	3.65
315067	1DARBY 1	4.69
315068	1DARBY 2	4.69
315069	1DARBY 3	4.75
315070	1DARBY 4	4.75
315074	1HOPCGN1	15.04
315075	1HOPCGN2	14.85
315134	1ROAVALA	44.06
315135	1ROAVALB	11.75
315083	1SPRUNCA	18.68
315084	1SPRUNCB	18.68
315085	1SPRUNCC	13.85
315086	1SPRUNCD	13.85
315233	1SURRY 2	46.64
315090	1YORKTN1	51.92
315091	1YORKTN2	53.88
315092	1YORKTN3	42.13
314309	6IRON208	0.71
314236	6NRTHEST	0.34

314251	6S PUMP	1.7
931041	AC2-012 C OP	17.91
931501	AC2-070 C	3.16
931531	AC2-073 C	4.17
931581	AC2-078 C OP	7.09
931591	AC2-079 C OP	11.79
931631	AC2-084 C	13.73
931701	AC2-093 C	112.73
931831	AC2-110 C	2.34
932061	AC2-130	4.4
932071	AC2-131 1	2.98
932081	AC2-131 2	1.35
932111	AC2-132 1	1.57
932121	AC2-132 2	0.8
932261	AC2-137 C	3.88
932291	AC2-141 C OP	53.81
932451	AC2-158 C OP	8.55
932461	AC2-159 C OP	10.86
932471	AC2-161 C	4.21
932481	AC2-162 C	4.53
932521	AC2-167 C	5.31
932711	AC2-194 C	1.88
932731	AC2-196 C	3.15
297087	V2-040	0.22
LTF	Z2-067	28.93
921092	AA1-049 C	4.24
LTF	AA1-058	1.26
921162	AA1-063AC	13.69
921532	AA1-132 C	13.09
921562	AA1-135 C	14.74
921572	AA1-138 C	16.74
921582	AA1-139 C	26.27
921752	AA2-053 C	13.86
921772	AA2-059 C	2.01
LTF	AA2-074	8.49
921982	AA2-088 C	10.67
922512	AA2-174 C	0.63
922522	AA2-177 C	18.08
922532	AA2-178 C	16.16

922602	AB1-013 C	4.88
922682	AB1-027 C	4.81
923262	AB1-132 C OP	22.33
923272	AB1-135 C OP	4.8
923572	AB1-173 C OP	3.59
923582	AB1-173AC OP	3.59
923642	AB1-181	3.5
923643	AB1-181 2	3.5
923644	AB1-181 3	3.5
923801	AB2-015 C OP	14.51
923831	AB2-022 C	4.01
923841	AB2-024 C	4.42
923851	AB2-025 C	4.04
923861	AB2-026 C	3.56
923911	AB2-031 C OP	3.56
923981	AB2-039 C OP	14.62
923991	AB2-040 C OP	11.69
924071	AB2-051 C OP	242.25
924241	AB2-068 OP	417.82
924381	AB2-087 C	0.93
924501	AB2-099 C	0.96
924511	AB2-100 C	18.26
924761	AB2-128 C	15.65
924811	AB2-134 C OP	23.18
924931	AB2-147 C	4.07
924941	AB2-149 C OP	5.89
924951	AB2-150 C OP	4.07
925051	AB2-160 C OP	9.63
925061	AB2-161 C OP	5.91
925121	AB2-169 C OP	10.51
925141	AB2-171 C OP	8.17
925171	AB2-174 C OP	11.2
925281	AB2-186 C	1.06
925291	AB2-188 C OP	3.98
925331	AB2-190 C	41.32
925521	AC1-027 C	3.53
925691	AC1-045 C	3.05
925701	AC1-046 C	3.06
925711	AC1-047 C	4.05

925811	AC1-060	0.13
925821	AC1-061	0.06
925841	AC1-063	0.68
925861	AC1-065 C	5.85
926071	AC1-086 C	32.88
926201	AC1-098 C	9.63
926211	AC1-099 C	3.23
926291	AC1-107 OP	630.67
926411	AC1-112 C	3.74
926661	AC1-147 C	3.99
926741	AC1-159 C	240.38
926751	AC1-161 C OP	54.17
926771	AC1-163 C	3.45
926781	AC1-164 C OP	87.03
927041	AC1-191 C	18.37
927051	AC1-193 C	5.99
927221	AC1-216 C OP	17.69

Appendix 33

(DVP - DVP) The 8LDYSMTH-8CHANCE 500 kV line (from bus 314911 to bus 314905 ckt 1) loads from 113.88% to 114.42% (**DC power flow**) of its emergency rating (2738 MVA) for the single line contingency outage of 'LN 573'. This project contributes approximately 32.45 MW to the thermal violation.

CONTINGENCY 'LN 573'

OPEN BRANCH FROM BUS 314918 TO BUS 314934 CKT 1

/* 8NO ANNA

500.00 - 8SPOTSYL 500.00

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315053	1BELMED1	3.09
315054	1BELMED2	3.09
315055	1BELMED3	2.57
315067	1DARBY 1	2.82
315068	1DARBY 2	2.82
315069	1DARBY 3	2.86
315070	1DARBY 4	2.86
315043	1FRIVERA	3.81
315044	1FRIVERB	2.95
315045	1FRIVERC	3.81
315046	1FRIVERD	2.95
315047	1FRIVERE	2.95
315048	1FRIVERF	3.81
315074	1HOPCGN1	9.1
315075	1HOPCGN2	8.98
315037	1LDYSMT1	4.93
315039	1LDYSMT3	5.21
315040	1LDYSMT4	5.22
315041	1LDYSMT5	5.24
315225	1N ANNA1	42.63
315226	1N ANNA2	41.97
315134	1ROAVALA	26.96
315135	1ROAVALB	7.19
315083	1SPRUNCA	11.58
315084	1SPRUNCB	11.58
315085	1SPRUNCC	8.58
315086	1SPRUNCD	8.58

315090	1YORKTN1	30.94
315091	1YORKTN2	32.1
314309	6IRON208	0.43
314236	6NRTHEST	0.2
314251	6S PUMP	1.05
931041	AC2-012 C OP	10.83
931501	AC2-070 C	1.87
931531	AC2-073 C	2.57
931581	AC2-078 C OP	4.33
931591	AC2-079 C OP	7.17
931631	AC2-084 C	8.36
931701	AC2-093 C	71.32
931711	AC2-094 C	10.46
931831	AC2-110 C	1.46
932011	AC2-125	2.97
932021	AC2-126	2.99
932031	AC2-127	1.64
932041	AC2-128	1.58
932051	AC2-129	1.48
932061	AC2-130	2.63
932071	AC2-131 1	1.78
932081	AC2-131 2	0.81
932111	AC2-132 1	0.94
932121	AC2-132 2	0.48
932261	AC2-137 C	2.29
932271	AC2-138 C	0.8
932291	AC2-141 C OP	32.45
932451	AC2-158 C OP	5.19
932461	AC2-159 C OP	6.62
932471	AC2-161 C	2.54
932481	AC2-162 C	2.68
932501	AC2-165 C	10.41
932521	AC2-167 C	3.24
932711	AC2-194 C	1.14
932731	AC2-196 C	1.9
297087	V2-040	0.13
LTF	Z2-067	16.97
921092	AA1-049 C	2.56
LTF	AA1-058	0.76

921162	AA1-063AC	8.37
921292	AA1-083	4.09
921532	AA1-132 C	7.92
921562	AA1-135 C	8.95
921572	AA1-138 C	10.15
921582	AA1-139 C	15.88
921622	AA1-145	69.55
921752	AA2-053 C	8.47
921772	AA2-059 C	1.22
LTF	AA2-074	5.04
921982	AA2-088 C	6.5
922512	AA2-174 C	0.39
922522	AA2-177 C	10.91
922532	AA2-178 C	9.79
922602	AB1-013 C	2.96
922682	AB1-027 C	2.85
923262	AB1-132 C OP	13.68
923272	AB1-135 C OP	2.8
923572	AB1-173 C OP	2.21
923582	AB1-173AC OP	2.21
923801	AB2-015 C OP	8.82
923831	AB2-022 C	2.42
923841	AB2-024 C	2.69
923851	AB2-025 C	2.51
923861	AB2-026 C	2.34
923911	AB2-031 C OP	2.19
923981	AB2-039 C OP	8.92
923991	AB2-040 C OP	7.19
924061	AB2-050	4.09
924071	AB2-051 C OP	146.36
924241	AB2-068 OP	220.33
924381	AB2-087 C	0.56
924501	AB2-099 C	0.58
924511	AB2-100 C	11.24
924761	AB2-128 C	9.63
924811	AB2-134 C OP	13.99
924931	AB2-147 C	2.51
924941	AB2-149 C OP	3.58
924951	AB2-150 C OP	2.51

925051	AB2-160 C OP	5.91
925061	AB2-161 C OP	3.61
925121	AB2-169 C OP	6.37
925141	AB2-171 C OP	4.97
925171	AB2-174 C OP	6.9
925281	AB2-186 C	0.64
925291	AB2-188 C OP	2.41
925331	AB2-190 C	24.94
925521	AC1-027 C	2.14
925691	AC1-045 C	1.84
925701	AC1-046 C	1.85
925711	AC1-047 C	2.45
925811	AC1-060	0.08
925821	AC1-061	0.04
925841	AC1-063	0.42
925861	AC1-065 C	3.65
926071	AC1-086 C	20.15
926201	AC1-098 C	5.87
926211	AC1-099 C	1.97
926291	AC1-107 OP	332.58
926411	AC1-112 C	2.22
926441	AC1-115 C	1.15
926551	AC1-134	10.23
926591	AC1-142 C	10.13
926661	AC1-147 C	2.41
926741	AC1-159 C	145.24
926751	AC1-161 C OP	32.54
926771	AC1-163 C	2.1
926781	AC1-164 C OP	45.9
927041	AC1-191 C	11.01
927051	AC1-193 C	3.65
927221	AC1-216 C OP	10.68

Appendix 34

(DVP - DVP) The 8LDYSMTH-8POSSUM 500 kV line (from bus 314911 to bus 314922 ckt 1) loads from 109.87% to 110.39% (**DC power flow**) of its emergency rating (2442 MVA) for the single line contingency outage of 'LN 594'. This project contributes approximately 27.86 MW to the thermal violation.

CONTINGENCY 'LN 594'

OPEN BRANCH FROM BUS 314916 TO BUS 314934 CKT 1 /* 8MORRSVL

500.00 - 8SPOTSYL 500.00

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315053	1BELMED1	2.64
315054	1BELMED2	2.64
315055	1BELMED3	2.19
315060	1CHESTF5	9.34
315061	1CHESTG7	3.66
315063	1CHESTG8	3.63
315062	1CHESTS7	1.66
315064	1CHESTS8	1.86
315067	1DARBY 1	2.39
315068	1DARBY 2	2.4
315069	1DARBY 3	2.43
315070	1DARBY 4	2.43
315043	1FRIVERA	3.15
315045	1FRIVERC	3.15
315048	1FRIVERF	3.15
315074	1HOPCGN1	7.77
315075	1HOPCGN2	7.67
315225	1N ANNA1	36.
315226	1N ANNA2	35.44
315083	1SPRUNCA	9.9
315084	1SPRUNCB	9.9
315085	1SPRUNCC	7.34
315086	1SPRUNCD	7.34
315090	1YORKTN1	26.46
315091	1YORKTN2	27.46
314309	6IRON208	0.36
314236	6NRTHEST	0.17

314251	6S PUMP	0.89
931041	AC2-012 C OP	9.34
931501	AC2-070 C	1.58
931531	AC2-073 C	2.16
931581	AC2-078 C OP	3.73
931591	AC2-079 C OP	6.18
931711	AC2-094 C	10.71
931831	AC2-110 C	1.22
932011	AC2-125	2.3
932021	AC2-126	2.31
932031	AC2-127	1.27
932041	AC2-128	1.22
932051	AC2-129	1.14
932061	AC2-130	2.24
932071	AC2-131 1	1.52
932081	AC2-131 2	0.69
932111	AC2-132 1	0.8
932121	AC2-132 2	0.41
932261	AC2-137 C	1.94
932291	AC2-141 C OP	27.86
932471	AC2-161 C	2.18
932481	AC2-162 C	2.27
932521	AC2-167 C	2.84
932711	AC2-194 C	0.99
932731	AC2-196 C	1.64
297087	V2-040	0.11
921092	AA1-049 C	2.21
LTF	AA1-058	0.69
921292	AA1-083	3.39
921532	AA1-132 C	6.83
921572	AA1-138 C	8.8
921582	AA1-139 C	13.7
921622	AA1-145	57.59
921772	AA2-059 C	1.06
LTF	AA2-074	4.73
921982	AA2-088 C	5.69
922522	AA2-177 C	9.34
922532	AA2-178 C	8.54
922602	AB1-013 C	2.58

922682	AB1-027 C	2.41
923272	AB1-135 C OP	2.38
923801	AB2-015 C OP	7.69
923831	AB2-022 C	2.09
923841	AB2-024 C	2.27
923851	AB2-025 C	2.18
923861	AB2-026 C	2.11
923981	AB2-039 C OP	7.68
924061	AB2-050	3.39
924071	AB2-051 C OP	126.08
924241	AB2-068 OP	188.12
924811	AB2-134 C OP	11.98
924941	AB2-149 C OP	3.09
925051	AB2-160 C OP	5.06
925061	AB2-161 C OP	3.1
925141	AB2-171 C OP	4.34
925281	AB2-186 C	0.55
925291	AB2-188 C OP	2.1
925331	AB2-190 C	21.36
925521	AC1-027 C	1.84
925691	AC1-045 C	1.59
925701	AC1-046 C	1.59
925711	AC1-047 C	2.11
925811	AC1-060	0.07
925821	AC1-061	0.03
925841	AC1-063	0.35
925861	AC1-065 C	3.06
926291	AC1-107 OP	283.95
926411	AC1-112 C	1.88
926441	AC1-115 C	0.92
926551	AC1-134	8.47
926661	AC1-147 C	2.07
926731	AC1-158 C	74.76
926741	AC1-159 C	125.11
926751	AC1-161 C OP	28.01
926781	AC1-164 C OP	39.19
927041	AC1-191 C	9.31
927051	AC1-193 C	3.18
927221	AC1-216 C OP	9.14

Appendix 35

(DVP - DVP) The 8MDLTHAN-8NO ANNA 500 kV line (from bus 314914 to bus 314918 ckt 1) loads from 128.81% to 129.84% (**DC power flow**) of its load dump rating (3144 MVA) for the line fault with failed breaker contingency outage of '557T574'. This project contributes approximately 71.63 MW to the thermal violation.

```
CONTINGENCY '557T574'                                /* 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 314911 TO BUS 314908 CKT 1      /*ELMONT TO
LADYSMITH (LINE 574)
END
```

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315102	1BRUNSWICKG1	14.48
315103	1BRUNSWICKG2	14.48
315104	1BRUNSWICKG3	14.48
315105	1BRUNSWICKS1	30.08
315131	1EDGECEMA	14.22
315132	1EDGECEMB	14.22
315108	1ELIZAR1	5.63
315109	1ELIZAR2	5.53
315110	1ELIZAR3	5.7
315074	1HOPCGN1	12.5
315075	1HOPCGN2	12.34
315134	1ROAVALA	44.83
315135	1ROAVALB	11.95
315083	1SPRUNCA	15.86
315084	1SPRUNCB	15.86
315085	1SPRUNCC	11.76
315086	1SPRUNCD	11.76
315073	1STONECA	10.37
315233	1SURRY 2	44.62
314784	1WEYRHSB	3.48
315090	1YORKTN1	46.52
315091	1YORKTN2	48.27
314539	3UNCAMP	4.09

314541	3WATKINS	1.16
314189	6PAPERMILL	8.93
931041	AC2-012 C OP	17.9
931042	AC2-012 E OP	29.21
931531	AC2-073 C	3.19
931532	AC2-073 E	1.61
931581	AC2-078 C OP	6.77
931582	AC2-078 E OP	11.05
931591	AC2-079 C OP	11.46
931592	AC2-079 E OP	18.69
931631	AC2-084 C	14.02
931632	AC2-084 E	6.91
931701	AC2-093 C	130.91
931702	AC2-093 E	74.88
931831	AC2-110 C	1.81
931832	AC2-110 E	2.96
932061	AC2-130	3.34
932071	AC2-131 1	2.26
932081	AC2-131 2	1.03
932111	AC2-132 1	1.19
932121	AC2-132 2	0.61
932261	AC2-137 C	2.75
932262	AC2-137 E	1.78
932291	AC2-141 C OP	50.2
932292	AC2-141 E OP	21.43
932451	AC2-158 C OP	8.7
932452	AC2-158 E OP	8.7
932461	AC2-159 C OP	11.01
932462	AC2-159 E OP	11.01
932471	AC2-161 C	3.99
932472	AC2-161 E	2.06
932501	AC2-165 C	16.18
932502	AC2-165 E	8.24
932521	AC2-167 C	5.35
932522	AC2-167 E	8.73
932711	AC2-194 C	1.88
932712	AC2-194 E	3.04
932731	AC2-196 C	3.15
932732	AC2-196 E	2.1

292791	U1-032 E	5.4
900672	V4-068 E	0.5
901082	W1-029 E	79.62
907092	X1-038 E	10.23
913392	Y1-086 E	3.8
916042	Z1-036 E	78.17
916192	Z1-068 E	3.3
916301	Z1-086 C	88.09
916302	Z1-086 E	16.86
917122	Z2-027 E	1.84
917332	Z2-043 E	1.62
917342	Z2-044 E	0.9
LTF	Z2-067	29.76
917512	Z2-088 E OP1	12.56
917592	Z2-099 E	0.73
921092	AA1-049 C	4.24
921093	AA1-049 E	1.99
LTF	AA1-058	1.31
921162	AA1-063AC	13.89
921163	AA1-063AE	6.55
918512	AA1-065 E OP	7.35
921182	AA1-067 C	2.7
921183	AA1-067 E	1.16
918562	AA1-072 E	0.27
921532	AA1-132 C	13.09
921533	AA1-132 E	5.61
921562	AA1-135 C	14.99
921563	AA1-135 E	6.42
921572	AA1-138 C	16.76
921573	AA1-138 E	7.18
921582	AA1-139 C	26.26
921583	AA1-139 E	11.25
921752	AA2-053 C	14.1
921753	AA2-053 E	6.05
921762	AA2-057 C	11.17
921763	AA2-057 E	5.58
921772	AA2-059 C	2.01
921773	AA2-059 E	0.95
921862	AA2-068 C	3.54

921863	AA2-068 E	1.63
LTF	AA2-074	8.82
920022	AA2-086 E	0.39
921982	AA2-088 C	10.74
921983	AA2-088 E	17.52
922442	AA2-165 C	1.52
922443	AA2-165 E	0.74
922472	AA2-169 C	3.43
922473	AA2-169 E	1.58
922512	AA2-174 C	0.65
922513	AA2-174 E	0.7
922522	AA2-177 C	15.81
922523	AA2-177 E	6.78
922532	AA2-178 C	16.26
922533	AA2-178 E	6.97
922602	AB1-013 C	4.91
922603	AB1-013 E	32.84
922922	AB1-081 C OP	13.74
922923	AB1-081 E OP	5.89
923262	AB1-132 C OP	22.74
923263	AB1-132 E OP	9.75
923272	AB1-135 C OP	3.42
923273	AB1-135 E OP	1.46
923572	AB1-173 C OP	3.65
923573	AB1-173 E OP	1.71
923582	AB1-173AC OP	3.65
923583	AB1-173AE OP	1.71
923801	AB2-015 C OP	14.52
923802	AB2-015 E OP	11.9
923831	AB2-022 C	4.01
923832	AB2-022 E	2.16
923841	AB2-024 C	3.34
923842	AB2-024 E	1.5
923851	AB2-025 C	4.09
923852	AB2-025 E	1.84
923861	AB2-026 C	3.74
923862	AB2-026 E	1.68
923911	AB2-031 C OP	3.63
923912	AB2-031 E OP	1.79

923941	AB2-035 C	0.52
923942	AB2-035 E	0.22
923981	AB2-039 C OP	13.96
923982	AB2-039 E OP	11.29
923991	AB2-040 C OP	11.91
923992	AB2-040 E OP	9.74
924021	AB2-043 C OP	4.49
924022	AB2-043 E OP	7.37
924071	AB2-051 C OP	240.86
924072	AB2-051 E OP	33.07
924151	AB2-059 C OP	16.19
924152	AB2-059 E OP	8.34
924161	AB2-060 C OP	12.6
924162	AB2-060 E OP	5.93
924241	AB2-068 OP	336.47
924301	AB2-077 C OP	2.85
924302	AB2-077 E OP	1.9
924311	AB2-078 C OP	2.85
924312	AB2-078 E OP	1.9
924321	AB2-079 C OP	2.85
924322	AB2-079 E OP	1.9
924381	AB2-087 C	0.94
924382	AB2-087 E	0.44
924391	AB2-088 C	0.67
924392	AB2-088 E	0.32
924401	AB2-089 C	3.22
924402	AB2-089 E	1.66
924411	AB2-090 C	5.66
924412	AB2-090 E	2.9
924491	AB2-098 C	0.9
924492	AB2-098 E	0.39
924501	AB2-099 C	0.97
924502	AB2-099 E	0.42
924511	AB2-100 C	18.57
924512	AB2-100 E	9.15
924761	AB2-128 C	15.91
924762	AB2-128 E	6.26
924811	AB2-134 C OP	20.27
924812	AB2-134 E OP	27.1

924931	AB2-147 C	4.14
924932	AB2-147 E	6.76
924941	AB2-149 C OP	5.73
924942	AB2-149 E OP	9.35
924951	AB2-150 C OP	4.14
924952	AB2-150 E OP	6.76
925051	AB2-160 C OP	8.38
925052	AB2-160 E OP	13.68
925061	AB2-161 C OP	5.64
925062	AB2-161 E OP	9.21
925121	AB2-169 C OP	10.66
925122	AB2-169 E OP	9.56
925141	AB2-171 C OP	8.19
925142	AB2-171 E OP	13.37
925171	AB2-174 C OP	11.41
925172	AB2-174 E OP	10.32
925221	AB2-176 C	2.33
925222	AB2-176 E	1.
925281	AB2-186 C	1.06
925282	AB2-186 E	0.45
925291	AB2-188 C OP	4.01
925292	AB2-188 E OP	1.8
925331	AB2-190 C	36.14
925332	AB2-190 E	9.03
925521	AC1-027 C	3.52
925522	AC1-027 E	2.01
925591	AC1-034 C OP	10.66
925592	AC1-034 E OP	8.04
925611	AC1-036 C	1.32
925612	AC1-036 E	2.16
925691	AC1-045 C	2.97
925692	AC1-045 E	1.62
925701	AC1-046 C	3.05
925702	AC1-046 E	1.67
925711	AC1-047 C	4.05
925712	AC1-047 E	2.23
925781	AC1-054 C OP	10.97
925782	AC1-054 E OP	5.05
925811	AC1-060	0.1

925821	AC1-061	0.06
925841	AC1-063	0.52
925861	AC1-065 C	4.53
925862	AC1-065 E	7.39
926071	AC1-086 C	33.49
926072	AC1-086 E	15.24
926201	AC1-098 C	9.84
926202	AC1-098 E	5.86
926211	AC1-099 C	3.3
926212	AC1-099 E	1.94
926271	AC1-105 C OP	7.96
926272	AC1-105 E OP	3.96
926291	AC1-107 OP	507.87
926661	AC1-147 C	3.96
926662	AC1-147 E	2.33
926741	AC1-159 C	239.01
926751	AC1-161 C OP	54.54
926752	AC1-161 E OP	23.28
926761	AC1-162 C	38.53
926762	AC1-162 E	16.45
926771	AC1-163 C	3.49
926772	AC1-163 E	1.63
926781	AC1-164 C OP	70.09
926782	AC1-164 E OP	31.49
927021	AC1-189 C	13.62
927022	AC1-189 E	6.79
927051	AC1-193 C	6.01
927052	AC1-193 E	9.8
927111	AC1-206 C OP	19.26
927112	AC1-206 E OP	9.11
927141	AC1-208 C	14.2
927142	AC1-208 E	6.3
927211	AC1-215 C	16.18
927212	AC1-215 E	7.34
927221	AC1-216 C OP	15.47
927222	AC1-216 E OP	12.17

Appendix 36

(DVP - DVP) The 8NO ANNA-8SPOTSYL 500 kV line (from bus 314918 to bus 314934 ckt 1) loads from 105.84% to 106.33% (**DC power flow**) of its emergency rating (3219 MVA) for the single line contingency outage of 'LN 581'. This project contributes approximately 34.84 MW to the thermal violation.

CONTINGENCY 'LN 581'

OPEN BRANCH FROM BUS 314135 TO BUS 314905 CKT 2 /* 3CHANCE
115.00 - 8CHANCE 500.00

OPEN BRANCH FROM BUS 314905 TO BUS 314911 CKT 1 /* 8CHANCE
500.00 - 8LDYSMTH 500.00

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315053	1BELMED1	3.26
315054	1BELMED2	3.26
315055	1BELMED3	2.71
315065	1CHESTF6	23.12
315108	1ELIZAR1	3.72
315109	1ELIZAR2	3.66
315110	1ELIZAR3	3.77
315074	1HOPCGN1	9.59
315075	1HOPCGN2	9.47
315225	1N ANNA1	61.29
315226	1N ANNA2	60.35
315134	1ROAVALA	29.76
315135	1ROAVALB	7.94
315083	1SPRUNCA	12.37
315084	1SPRUNCB	12.37
315085	1SPRUNCC	9.17
315086	1SPRUNCD	9.17
315233	1SURRY 2	29.34
315090	1YORKTN1	32.76
315091	1YORKTN2	33.99
314309	6IRON208	0.44
314251	6S PUMP	1.09
931041	AC2-012 C OP	11.79
931501	AC2-070 C	1.88
931531	AC2-073 C	2.63

931581	AC2-078 C OP	4.69
931591	AC2-079 C OP	7.78
931631	AC2-084 C	9.24
931701	AC2-093 C	81.57
931711	AC2-094 C	15.37
931831	AC2-110 C	1.5
932011	AC2-125	2.64
932021	AC2-126	2.66
932031	AC2-127	1.45
932041	AC2-128	1.4
932051	AC2-129	1.31
932061	AC2-130	2.72
932071	AC2-131 1	1.84
932081	AC2-131 2	0.84
932111	AC2-132 1	0.97
932121	AC2-132 2	0.5
932261	AC2-137 C	2.34
932291	AC2-141 C OP	34.84
932451	AC2-158 C OP	5.72
932461	AC2-159 C OP	7.29
932471	AC2-161 C	2.74
932481	AC2-162 C	2.69
932501	AC2-165 C	11.83
932521	AC2-167 C	3.55
932711	AC2-194 C	1.24
932731	AC2-196 C	2.07
LTF	Z2-067	18.9
921092	AA1-049 C	2.79
LTF	AA1-058	0.84
921162	AA1-063AC	9.22
921182	AA1-067 C	1.77
921292	AA1-083	3.95
921532	AA1-132 C	8.63
921562	AA1-135 C	9.85
921572	AA1-138 C	11.08
921582	AA1-139 C	17.3
921622	AA1-145	67.1
921752	AA2-053 C	9.35
921772	AA2-059 C	1.33

921862	AA2-068 C	2.33
LTF	AA2-074	5.63
921982	AA2-088 C	7.13
922512	AA2-174 C	0.43
922522	AA2-177 C	11.59
922532	AA2-178 C	10.72
922602	AB1-013 C	3.24
922682	AB1-027 C	2.86
923262	AB1-132 C OP	15.11
923272	AB1-135 C OP	2.86
923572	AB1-173 C OP	2.44
923582	AB1-173AC OP	2.44
923801	AB2-015 C OP	9.66
923831	AB2-022 C	2.64
923841	AB2-024 C	2.75
923851	AB2-025 C	2.78
923861	AB2-026 C	2.66
923911	AB2-031 C OP	2.42
923981	AB2-039 C OP	9.66
923991	AB2-040 C OP	7.95
924061	AB2-050	3.95
924071	AB2-051 C OP	159.22
924241	AB2-068 OP	217.61
924381	AB2-087 C	0.62
924491	AB2-098 C	0.59
924501	AB2-099 C	0.64
924511	AB2-100 C	12.42
924761	AB2-128 C	10.64
924811	AB2-134 C OP	14.87
924931	AB2-147 C	2.78
924941	AB2-149 C OP	3.89
924951	AB2-150 C OP	2.78
925051	AB2-160 C OP	6.31
925061	AB2-161 C OP	3.91
925121	AB2-169 C OP	7.01
925141	AB2-171 C OP	5.45
925171	AB2-174 C OP	7.63
925281	AB2-186 C	0.7
925291	AB2-188 C OP	2.64

925331	AB2-190 C	26.5
925521	AC1-027 C	2.32
925691	AC1-045 C	1.99
925701	AC1-046 C	2.01
925711	AC1-047 C	2.67
925811	AC1-060	0.08
925821	AC1-061	0.04
925841	AC1-063	0.43
925861	AC1-065 C	3.74
926071	AC1-086 C	22.25
926201	AC1-098 C	6.48
926211	AC1-099 C	2.17
926291	AC1-107 OP	328.46
926411	AC1-112 C	2.22
926441	AC1-115 C	1.06
926551	AC1-134	9.87
926591	AC1-142 C	10.27
926661	AC1-147 C	2.62
926741	AC1-159 C	158.
926751	AC1-161 C OP	35.4
926771	AC1-163 C	2.31
926781	AC1-164 C OP	45.33
927041	AC1-191 C	10.89
927051	AC1-193 C	4.
927141	AC1-208 C	9.35
927221	AC1-216 C OP	11.35

Appendix 37

(DVP - DVP) The 8SPOTSYL-8MORRSVL 500 kV line (from bus 314934 to bus 314916 ckt 1) loads from 107.04% to 107.53% (**DC power flow**) of its emergency rating (3219 MVA) for the single line contingency outage of 'LN 552'. This project contributes approximately 34.44 MW to the thermal violation.

CONTINGENCY 'LN 552'

OPEN BRANCH FROM BUS 314135 TO BUS 314905 CKT 1 /* 3CHANCE
115.00 - 8CHANCE 500.00

OPEN BRANCH FROM BUS 314900 TO BUS 314905 CKT 1 /* 8BRISTER
500.00 - 8CHANCE 500.00

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315053	1BELMED1	3.22
315054	1BELMED2	3.22
315055	1BELMED3	2.68
315065	1CHESTF6	22.86
315108	1ELIZAR1	3.68
315109	1ELIZAR2	3.61
315110	1ELIZAR3	3.72
315074	1HOPCGN1	9.48
315075	1HOPCGN2	9.36
315225	1N ANNA1	60.06
315226	1N ANNA2	59.13
315134	1ROAVALA	29.47
315135	1ROAVALB	7.86
315083	1SPRUNCA	12.24
315084	1SPRUNCB	12.24
315085	1SPRUNCC	9.07
315086	1SPRUNCD	9.07
315233	1SURRY 2	29.
315090	1YORKTN1	32.38
315091	1YORKTN2	33.6
314309	6IRON208	0.44
314251	6S PUMP	1.08
931041	AC2-012 C OP	11.66
931501	AC2-070 C	1.86
931531	AC2-073 C	2.6

931581	AC2-078 C OP	4.63
931591	AC2-079 C OP	7.7
931631	AC2-084 C	9.15
931701	AC2-093 C	80.68
931711	AC2-094 C	16.17
931831	AC2-110 C	1.48
932011	AC2-125	2.6
932021	AC2-126	2.62
932031	AC2-127	1.43
932041	AC2-128	1.38
932051	AC2-129	1.29
932061	AC2-130	2.69
932071	AC2-131 1	1.82
932081	AC2-131 2	0.83
932111	AC2-132 1	0.96
932121	AC2-132 2	0.49
932261	AC2-137 C	2.31
932291	AC2-141 C OP	34.44
932451	AC2-158 C OP	5.66
932461	AC2-159 C OP	7.21
932471	AC2-161 C	2.71
932481	AC2-162 C	2.66
932501	AC2-165 C	11.93
932521	AC2-167 C	3.52
932711	AC2-194 C	1.23
932731	AC2-196 C	2.05
LTF	Z2-067	18.78
921092	AA1-049 C	2.76
LTF	AA1-058	0.84
921162	AA1-063AC	9.13
921292	AA1-083	3.9
921532	AA1-132 C	8.53
921562	AA1-135 C	9.76
921572	AA1-138 C	10.96
921582	AA1-139 C	17.1
921622	AA1-145	66.31
921752	AA2-053 C	9.26
921772	AA2-059 C	1.31
921862	AA2-068 C	2.31

<i>LTF</i>	<i>AA2-074</i>	<i>5.59</i>
921982	<i>AA2-088 C</i>	<i>7.06</i>
922512	<i>AA2-174 C</i>	<i>0.42</i>
922522	<i>AA2-177 C</i>	<i>11.46</i>
922532	<i>AA2-178 C</i>	<i>10.61</i>
922602	<i>AB1-013 C</i>	<i>3.2</i>
922682	<i>AB1-027 C</i>	<i>2.82</i>
923262	<i>AB1-132 C OP</i>	<i>14.96</i>
923272	<i>AB1-135 C OP</i>	<i>2.82</i>
923572	<i>AB1-173 C OP</i>	<i>2.42</i>
923582	<i>AB1-173AC OP</i>	<i>2.42</i>
923801	<i>AB2-015 C OP</i>	<i>9.55</i>
923831	<i>AB2-022 C</i>	<i>2.61</i>
923841	<i>AB2-024 C</i>	<i>2.72</i>
923851	<i>AB2-025 C</i>	<i>2.75</i>
923861	<i>AB2-026 C</i>	<i>2.67</i>
923911	<i>AB2-031 C OP</i>	<i>2.4</i>
923981	<i>AB2-039 C OP</i>	<i>9.55</i>
923991	<i>AB2-040 C OP</i>	<i>7.88</i>
924061	<i>AB2-050</i>	<i>3.9</i>
924071	<i>AB2-051 C OP</i>	<i>157.38</i>
924241	<i>AB2-068 OP</i>	<i>215.21</i>
924381	<i>AB2-087 C</i>	<i>0.61</i>
924501	<i>AB2-099 C</i>	<i>0.63</i>
924511	<i>AB2-100 C</i>	<i>12.3</i>
924761	<i>AB2-128 C</i>	<i>10.53</i>
924811	<i>AB2-134 C OP</i>	<i>14.7</i>
924931	<i>AB2-147 C</i>	<i>2.75</i>
924941	<i>AB2-149 C OP</i>	<i>3.85</i>
924951	<i>AB2-150 C OP</i>	<i>2.75</i>
925021	<i>AB2-158 C</i>	<i>10.23</i>
925051	<i>AB2-160 C OP</i>	<i>6.24</i>
925061	<i>AB2-161 C OP</i>	<i>3.86</i>
925121	<i>AB2-169 C OP</i>	<i>6.94</i>
925141	<i>AB2-171 C OP</i>	<i>5.39</i>
925171	<i>AB2-174 C OP</i>	<i>7.56</i>
925281	<i>AB2-186 C</i>	<i>0.69</i>
925291	<i>AB2-188 C OP</i>	<i>2.61</i>
925331	<i>AB2-190 C</i>	<i>26.2</i>

925521	AC1-027 C	2.3
925691	AC1-045 C	1.97
925701	AC1-046 C	1.99
925711	AC1-047 C	2.64
925811	AC1-060	0.08
925821	AC1-061	0.04
925841	AC1-063	0.43
925861	AC1-065 C	3.7
926001	AC1-076 C	6.31
926071	AC1-086 C	22.03
926201	AC1-098 C	6.42
926211	AC1-099 C	2.15
926291	AC1-107 OP	324.85
926411	AC1-112 C	2.2
926441	AC1-115 C	1.05
926551	AC1-134	9.75
926591	AC1-142 C	10.14
926661	AC1-147 C	2.59
926731	AC1-158 C	184.52
926741	AC1-159 C	156.17
926751	AC1-161 C OP	34.99
926771	AC1-163 C	2.28
926781	AC1-164 C OP	44.83
927041	AC1-191 C	10.77
927051	AC1-193 C	3.95
927221	AC1-216 C OP	11.22