

***Revised
Generation Interconnection
Feasibility Study Report***

For

***PJM Generation Interconnection Request
Queue Position AD2-046***

***Boydton DP- Kerr Dam 115 kV
54.8 MW Capacity / 80 MW Energy***

August / 2018

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.

Revision from July 2018

The study report has been updated to reflect more accurate information regarding the Dominion Energy and Duke/Progress tie line reinforcement requirements and how an Affected System Study will be required with Duke/Progress to determine upgrades required on facilities outside of PJM.

General

The IC has proposed a solar generating facility located in Mecklenburg County, North Carolina. The installed facilities will have a total capability of **80 MW** with **54.8 MW** of this output being recognized by PJM as capacity. The proposed in-service date for this project is **6/1/2021**. **This study does not imply an ITO commitment to this in-service date.**

Point of Interconnection (POI)

Primary (POI):

AD2-046 will interconnect with the ITO transmission system via a tap off of the Boydton DP-Kerr Dam 115 line. This is the primary Point of Interconnection (POI) chosen by the IC.

Secondary (POI)

The IC requested that a secondary POI be reviewed for network impacts. The secondary interconnection chosen was a tap off of the Kerr Dam-Ridge Road 115 kV line.

Cost Summary

The AD2-046 project will be responsible for the following costs:

Description	Total Cost
Attachment Facilities	\$1,550,000
Direct Connection Network Upgrades	\$6,300,000
Non Direct Connection Network Upgrades	\$ 0
Total Costs	\$7,850,000

In addition, the AD2-046 project may be responsible for a contribution to the following costs:

Description	Total Cost
New System Upgrades	\$ 17,400,000
Previously Identified Upgrades	\$141,960,000
Total Costs	\$159,360,000

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

Note: PJM Open Access Transmission Tariff (OATT) section 217.3A outline cost allocation rules. The rules are further clarified in PJM Manual 14A Attachment B. The allocation of costs for a network upgrade will start with the first Queue project to cause the need for the upgrade. Later queue projects will receive cost allocation contingent on their contribution to the violation and are allocated to the queues that have not closed less than 5 years following the execution of the first Interconnection Service Agreement which identifies the need for this upgrade.

The Feasibility Study is used to make a preliminary determination of the type and scope of Attachment Facilities, Local Upgrades, and Network Upgrades that will be necessary to accommodate the Interconnection Request and to provide the Interconnection Customer a preliminary estimate of the time that will be required to construct any necessary facilities and upgrades and the Interconnection Customer's cost responsibility. The System Impact Study provides refined and comprehensive estimates of cost responsibility and construction lead times for new facilities and system upgrades. Facilities Studies will include, commensurate with the degree of engineering specificity as provided in the Facilities Study Agreement, good faith estimates of the cost, determined in accordance with Section 217 of the Tariff,

- (a) to be charged to each affected New Service Customer for the Facilities and System Upgrades that are necessary to accommodate this queue project;
- (b) the time required to complete detailed design and construction of the facilities and upgrades; and

- (c) a description of any site-specific environmental issues or requirements that could reasonably be anticipated to affect the cost or time required to complete construction of such facilities and upgrades.

Transmission Owner Scope of Work

Attachment Facilities

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

Transmission: Construct approximately one span of 115 kV Attachment line between the generation substation and a new AD2-46 Switching Station. The estimated cost for this work is \$1,000,000.

The estimated total cost of the Attachment Facilities is \$1,550,000. It is estimated to take 18-24 months to complete this work upon execution of an Interconnection Construction Service Agreement (ICSA). These preliminary cost estimates are based on typical engineering costs. A more detailed engineering cost estimates are normally done when the IC provides an exact site plan location for the generation substation during the Facility Study phase. See Attachment One.

Direct Connection Cost Estimate

Substation: Establish the new 115 kV AD2-046 Switching Substation (interconnection substation). The arrangement in the substation will be as shown below on Dominion Attachment One: One-Line Diagram. The estimated cost of this work scope is \$5,500,000.

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

The total estimated cost to complete the Direct Connection Network Facilities is \$6,300,000. It is estimated to take 24-36 months to complete this work upon execution of an Interconnection Construction Service Agreement.

Non-Direct Connection Cost Estimate

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

System Reinforcement

Violation #	Upgrade Description	Upgrade Cost
# 1	Uprate the line to 125°C for a higher capacity to meet the overload exceeds. Estimated to take 24-30 months.	\$11,400,000
# 2	Uprate conductor to 125°C M.O.T and increase rating to 265MVA. Estimated to take 24-30 months.	\$3,000,000
# 3	The Kerr Dam – Henderson 115kV line is a joint tie line between the Dominion Energy and Duke/Progress transmission systems. The VEPCO portion can be resolved by an uprating the conductor to 125°C M.O.T an increase in rating to 270MVA. Estimated to take 24-30 months. An affected systems study will need to be completed with Duke/Progress to determine upgrades required on the Duke/Progress system.	\$3,000,000
4,5,6	Add a second 230-115 kV transformer to increase its rating to 276.8 MVA (normal), 292.4 MVA (emergency), and 328.7 MVA (load dump). It is estimated to take 24-30 months to engineer and construct.	\$5,500,000
7,8,9,10, 11,	Replace the 230-115 kV transformer #1 increase its line rating to 276.8 MVA (normal), 292.4 MVA (emergency), and 328.7 MVA (load dump). It is estimated to take 14-16 months to engineer and construct.	\$5,500,000

Violation #	Upgrade Description	Upgrade Cost
12,13,14, 15	Replace wave trap at Clubhouse Substation to increase its line rating to 722 MVA (normal), 722 MVA (emergency), and 830 MVA (load dump). It is estimated to take 12-16 months to engineer and construct.	\$150,000
16	Re-conductor the line to 125 M.O.T for 5 miles to increase its line rating to 262 MVA (normal), 287 MVA (emergency), and 349 MVA (load dump). It is estimated to take 24-30 months to engineer, permit, and construct.	\$3,000,000
17	Wreck and rebuild the line of 29 miles increase its line rating to 722 MVA (normal), 722 MVA (emergency), and 830 MVA (load dump). It is estimated to take 44-48 months to engineer, permit, and construct. A Va CPCN is required.	\$72,300,000
22	Wreck and rebuild the line of 22 miles to increase its line rating to 262 MVA (normal), 287 MVA (emergency), and 349 MVA (load dump). It is estimated to take 32-38 months to engineer, permit, and construct. A Va CPCN is required.	\$11,800,000
24,25	Wreck and rebuild the line of 15 miles to increase its line rating to 722 MVA (normal), 722 MVA (emergency), and 830 MVA (load dump). It is estimated to cost \$36,000,000 and 30-36 months to engineer, permit, and construct. A Va CPCN is required.	\$36,000,000
26	1. Replace Switch (1200 A), estimated cost \$400,000. 2. Replace line risers (Limiting Element: Sub Cond 1590 AAC 61 Str.), estimated cost \$100,000. 3. Rebuild / Reconductor 3.16 miles of conductor (Limiting Element: 336/556 Six Wire ACSR), estimated cost \$4.72 million. 4. Conduct an engineering study to determine if Relay - CT Thermal limit settings can be adjusted to mitigate the overload (Estimated Cost \$25,000), if not, a new relay package will be required (Estimated Cost: \$600,000). (Limiting Element: Relay Thermal Limit 1795 Amps - East Danville) 5. Conduct an engineering study to determine if Relay - CT Thermal limit settings can be adjusted to mitigate the overload (Estimated Cost \$25,000), if not, a new relay package will be required (Estimated Cost: \$600,000). (Limiting Element: Relay Thermal Limit 1795 Amps - Danville) 6. Conduct an engineering study to determine if Relay - CT Compliance Trip limit settings can be adjusted to mitigate the overload (Estimated Cost \$25,000), if not, a new relay package will be required (Estimated Cost: \$600,000). (Limiting Element: Relay Compliance Trip Limit 1916 Amps - East Danville) 7. Conduct an engineering study to determine if Relay - CT Compliance Trip limit settings can be adjusted to mitigate the overload (Estimated Cost \$25,000), if not, a new relay package will be required (Estimated Cost: \$600,000). (Limiting Element: Relay Compliance Trip Limit 1916 Amps - Danville) 8. Rebuild / Reconductor 0.03 miles of conductor (Limiting Element: 1351.5 ACSR 45/7 DIPPER) Near East Danville, estimated cost \$0.045 million. 9. Rebuild / Reconductor 0.03 miles of conductor (Limiting Element: 1351.5 ACSR 45/7 DIPPER) Near Danville, estimated cost \$0.045 million. An approximate construction time would be 24 to 36 months after signing an interconnection agreement	\$7,710,000
	Total System Reinforcements	\$159,360,000

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>

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-Option 1

The Queue Project AD2-046 was evaluated as a 80.0 MW (Capacity 54.8 MW) injection at the tap of the Boydton DP - Kerr Dam 115kV line in the VAP area. Project AD2-046 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AD2-046 was studied with a commercial probability of 53%. Potential network impacts were as follows:

PJM assessed the impact of the proposed Queue Project as an injection into the ITO, for compliance with NERC Reliability Criteria. The system was assessed using the summer 2021 RTEP case. When performing analysis, ITO Criteria considers a transmission facility overloaded if it exceeds 94% of its emergency rating under single contingency (normal and stressed system conditions). A full listing of the 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 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. The results of these studies are discussed in more detail below.

Contingency Descriptions

The following contingencies resulted in overloads:

Contingency Name		Description	
"314288	No Data		
AEP_P1-2_#1377	CONTINGENCY 'AEP_P1-2_#1377'		
	OPEN BRANCH FROM BUS 242514 TO BUS 242520 CKT 1	/	242514 05J.FERR 765 242520 05J.FERR 500 1
	OPEN BRANCH FROM BUS 242520 TO BUS 306719 CKT 1	/	242520 05J.FERR 500 306719 8ANTIOCH 500 1
	END		

AEP_P4_#7589_05J.FERR 765	CONTINGENCY 'AEP_P4_#7589_05J.FERR 765' OPEN BRANCH FROM BUS 242514 TO BUS 242520 CKT 1 / 242514 05J.FERR 765 242520 05J.FERR 500 1 OPEN BRANCH FROM BUS 242514 TO BUS 242684 CKT 2 / 242514 05J.FERR 765 242684 05J.FERR 138 2 OPEN BRANCH FROM BUS 242520 TO BUS 306719 CKT 1 / 242520 05J.FERR 500 306719 8ANTIOCH 500 1 END
DVP_P1-2: LN 130-A	CONTINGENCY 'DVP_P1-2: LN 130-A' OPEN BRANCH FROM BUS 314562 TO BUS 314570 CKT 1 /* 3CLUBHSE 115.00 - 3METCATP 115.00 OPEN BRANCH FROM BUS 314570 TO BUS 314572 CKT 1 /* 3METCATP 115.00 - 3EMPORIA 115.00 OPEN BRANCH FROM BUS 314570 TO BUS 314588 CKT 1 /* 3METCATP 115.00 - 3METCALF 115.00 OPEN BRANCH FROM BUS 314572 TO BUS 925170 CKT 1 /* 3EMPORIA 115.00 - AB2-174 TAP 115.00 OPEN BRANCH FROM BUS 314572 TO BUS 314863 CKT 1 /* 3EMPORIA 115.00 - 3EMPOR_1 115.00 OPEN BUS 314570 /* ISLAND OPEN BUS 314572 /* ISLAND OPEN BUS 314588 /* ISLAND END
DVP_P1-2: LN 2027-A	CONTINGENCY 'DVP_P1-2: LN 2027-A' OPEN BRANCH FROM BUS 314310 TO BUS 314322 CKT 1 /* 6JUDES F 230.00 - 6MDLTHAN 230.00 OPEN BRANCH FROM BUS 314310 TO BUS 314333 CKT 1 /* 6JUDES F 230.00 - 6POWHATN 230.00 OPEN BRANCH FROM BUS 314333 TO BUS 933500 CKT 1 /* 6POWHATN 230.00 - AC2-165 TAP 230.00 OPEN BUS 314310 /* ISLAND OPEN BUS 314333 /* ISLAND

	END
DVP_P1-2: LN 2131A	CONTINGENCY 'DVP_P1-2: LN 2131A' OPEN BRANCH FROM BUS 314662 TO BUS 916040 CKT 1 /* 6S HERTFORD 230.00 - Z1-036 TAP 230.00 OPEN BRANCH FROM BUS 314651 TO BUS 314662 CKT 1 /* 6WINFALL 230.00 - 6S HERTFORD 230.00 OPEN BUS 314662 /* ISLAND END
DVP_P1-2: LN 238	CONTINGENCY 'DVP_P1-2: LN 238' OPEN BRANCH FROM BUS 314282 TO BUS 314435 CKT 1 /* 6CARSON 230.00 - 6SAPONY 230.00 OPEN BRANCH FROM BUS 314435 TO BUS 314563 CKT 1 /* 6SAPONY 230.00 - 6CLUBHSE 230.00 OPEN BRANCH FROM BUS 314562 TO BUS 314563 CKT 1 /* 3CLUBHSE 115.00 - 6CLUBHSE 230.00 OPEN BUS 314435 /* ISLAND END
DVP_P1-2: LN 246	CONTINGENCY 'DVP_P1-2: LN 246' OPEN BRANCH FROM BUS 314537 TO BUS 314575 CKT 1 /* 6SUFFOLK 230.00 - 6NUCO TP 230.00 OPEN BRANCH FROM BUS 314569 TO BUS 314575 CKT 1 /* 6EARLEYS 230.00 - 6NUCO TP 230.00 OPEN BRANCH FROM BUS 314575 TO BUS 314590 CKT 1 /* 6NUCO TP 230.00 - 6NUCOR 230.00 OPEN BUS 314575 /* ISLAND OPEN BUS 314590 /* ISLAND

	END
DVP_P1-2: LN 556	CONTINGENCY 'DVP_P1-2: LN 556' OPEN BRANCH FROM BUS 314686 TO BUS 314906 CKT 1 /* 6CLOVER 230.00 - 8CLOVER 500.00 OPEN BRANCH FROM BUS 314686 TO BUS 314906 CKT 2 /* 6CLOVER 230.00 - 8CLOVER 500.00 OPEN BRANCH FROM BUS 314686 TO BUS 314906 CKT 3 /* 6CLOVER 230.00 - 8CLOVER 500.00 OPEN BRANCH FROM BUS 314906 TO BUS 314936 CKT 1 /* 8CLOVER 500.00 - 8RAWLINGS 500.00 OPEN BUS 314906 /* ISLAND END
DVP_P1-3: 3CAROLNA-6CAROLNA	CONTINGENCY 'DVP_P1-3: 3CAROLNA-6CAROLNA' OPEN BRANCH FROM BUS 314559 TO BUS 314561 CKT 1 END
DVP_P4-2: 101002	CONTINGENCY 'DVP_P4-2: 101002' /* CAROLINA 115 KV OPEN BRANCH FROM BUS 313723 TO BUS 314259 CKT 1 /* 3PECAN 115.00 - 3CAROL56_1 115.00 OPEN BRANCH FROM BUS 314259 TO BUS 314559 CKT Z1 /* 3CAROL56_1 115.00 - 3CAROLNA 115.00 OPEN BRANCH FROM BUS 314259 TO BUS 314835 CKT 1 /* 3CAROL56_1 115.00 - 3CAROL_1 115.00 OPEN BUS 314259 /* ISLAND: 3CAROL56_1 115.00 OPEN BUS 314835 /* ISLAND: 3CAROL_1 115.00 OPEN BRANCH FROM BUS 314559 TO BUS 314571 CKT 1 /* 3CAROLNA 115.00 - 3EATON F 115.00

	OPEN BRANCH FROM BUS 314559 TO BUS 919690 CKT 1 /* 3CAROLNA 115.00 - AA2-053 TAP 115.00 OPEN BRANCH FROM BUS 314559 TO BUS 314600 CKT 1 /* 3CAROLNA 115.00 - 3PLHITP 115.00 OPEN BRANCH FROM BUS 314559 TO BUS 314561 CKT 1 /* 3CAROLNA 115.00 - 6CAROLNA 230.00 END
DVP_P4-2: 14852	CONTINGENCY 'DVP_P4-2: 14852' /* CLUBHOUSE OPEN BUS 314562 /* CLUBHOUSE 115KV BUS OPEN BUS 314325 /* LINE 148 OPEN BUS 314312 /* LINE 148 END
DVP_P4-2: 2202	CONTINGENCY 'DVP_P4-2: 2202' /* CAROLINA OPEN BRANCH FROM BUS 314559 TO BUS 314571 CKT 1 /* LINE 22 OPEN BRANCH FROM BUS 314571 TO BUS 925780 CKT 1 /* LINE 22 OPEN BRANCH FROM BUS 314559 TO BUS 314259 CKT Z1 /* LINE 56 OPEN BRANCH FROM BUS 314559 TO BUS 919690 CKT 1 /* LINE 54 OPEN BRANCH FROM BUS 314559 TO BUS 314600 CKT 1 /* LINE 130 OPEN BRANCH FROM BUS 314559 TO BUS 314561 CKT 1 /* TX. #4 DECREASE BUS 314559 LOAD BY 100 PERCENT /* REMOVE ALL LOAD AT CAROLINA END

DVP_P4-2: 24662	CONTINGENCY 'DVP_P4-2: 24662' /* EARLEYS OPEN BRANCH FROM BUS 314568 TO BUS 314569 CKT 1 /* TX. #3 OPEN BRANCH FROM BUS 314569 TO BUS 314575 CKT 1 /* 246 OPEN BRANCH FROM BUS 314575 TO BUS 314537 CKT 1 /* 246 OPEN BRANCH FROM BUS 314575 TO BUS 314590 CKT 1 /* 246 - NUCOR END
DVP_P4-2: 24682	CONTINGENCY 'DVP_P4-2: 24682' /* 24682 @ SUFFOLK OPEN BRANCH FROM BUS 314537 TO BUS 314575 CKT 1 /* SUFFOLK - NUCOR TAP OPEN BRANCH FROM BUS 314569 TO BUS 314575 CKT 1 /* NUCOR TAP - EARLEYS OPEN BRANCH FROM BUS 314536 TO BUS 314537 CKT 2 /* SUFFOLK 230-115 TX#5 OPEN BRANCH FROM BUS 314928 TO BUS 314537 CKT 2 /* SUFFOLK 500-230 TX#8 END
DVP_P4-2: 246T2034	CONTINGENCY 'DVP_P4-2: 246T2034' /* EARLEYS OPEN BRANCH FROM BUS 314569 TO BUS 314575 CKT 1 /* 246 OPEN BRANCH FROM BUS 314575 TO BUS 314537 CKT 1 /* 246 OPEN BRANCH FROM BUS 314575 TO BUS 314590 CKT 1 /* 246 - NUCOR OPEN BRANCH FROM BUS 314569 TO BUS 314620 CKT 1 /* 2034 OPEN BRANCH FROM BUS 314620 TO BUS 933990 CKT 1 /* 2034 END

DVP_P4-2: 246T247	CONTINGENCY 'DVP_P4-2: 246T247'	/* SUFFOLK 230 KV
	OPEN BRANCH FROM BUS 314537 TO BUS 314575 CKT 1	/* 6SUFFOLK 230.00 - 6NUCO TP 230.00
	OPEN BRANCH FROM BUS 314569 TO BUS 314575 CKT 1	/* 6EARLEYS 230.00 - 6NUCO TP 230.00
	OPEN BRANCH FROM BUS 314575 TO BUS 314590 CKT 1	/* 6NUCO TP 230.00 - 6NUCOR 230.00
	OPEN BUS 314575	/* ISLAND: 6NUCO TP 230.00
	OPEN BUS 314590	/* ISLAND: 6NUCOR 230.00
	OPEN BRANCH FROM BUS 314537 TO BUS 314648 CKT 1	/* 6SUFFOLK 230.00 - 6SUNBURY 230.00
	OPEN BRANCH FROM BUS 314648 TO BUS 901080 CKT 1	/* 6SUNBURY 230.00 - W1-029 230.00
	OPEN BUS 314648	/* ISLAND: 6SUNBURY 230.00
DVP_P4-2: 5402	END	
	CONTINGENCY 'DVP_P4-2: 5402'	/* CAROLINA
	OPEN BRANCH FROM BUS 314559 TO BUS 919690 CKT 1	/* LINE 54
	OPEN BRANCH FROM BUS 314559 TO BUS 314571 CKT 1	/* LINE 22
	OPEN BRANCH FROM BUS 314559 TO BUS 314259 CKT Z1	/* LINE 56
	OPEN BRANCH FROM BUS 314559 TO BUS 314600 CKT 1	/* LINE 130
	OPEN BRANCH FROM BUS 314559 TO BUS 314561 CKT 1	/* TX. #4
	DECREASE BUS 314559 LOAD BY 100 PERCENT	/* REMOVE ALL LOAD AT CAROLINA
	END	

DVP_P4-2: 5602	CONTINGENCY 'DVP_P4-2: 5602'	/* CAROLINA 115 KV
	OPEN BRANCH FROM BUS 313723 TO BUS 314604 CKT 1	/* 3PECAN 115.00 - 3SEABORD 115.00
	OPEN BRANCH FROM BUS 314558 TO BUS 314587 CKT 1	/* 3BOYKINS 115.00 - 3MARGTSV 115.00
	OPEN BRANCH FROM BUS 314587 TO BUS 314604 CKT 1	/* 3MARGTSV 115.00 - 3SEABORD 115.00
	OPEN BUS 314587	/* ISLAND: 3MARGTSV 115.00
	OPEN BUS 314604	/* ISLAND: 3SEABORD 115.00
	OPEN BRANCH FROM BUS 314559 TO BUS 314571 CKT 1	/* 3CAROLNA 115.00 - 3EATON F 115.00
	OPEN BRANCH FROM BUS 314559 TO BUS 919690 CKT 1	/* 3CAROLNA 115.00 - AA2-053 TAP 115.00
	OPEN BRANCH FROM BUS 314559 TO BUS 314600 CKT 1	/* 3CAROLNA 115.00 - 3PLHITP 115.00
	OPEN BRANCH FROM BUS 314559 TO BUS 314561 CKT 1	/* 3CAROLNA 115.00 - 6CAROLNA 230.00
DVP_P4-2: 7152	END	
	CONTINGENCY 'DVP_P4-2: 7152'	/* CLUBHOUSE
	OPEN BUS 314562	/* CLUBHOUSE 115KV BUS
	OPEN BUS 314565	/* LINE 71
	OPEN BUS 314850	/* LINE 71
	OPEN BUS 314693	/* LINE 71
	OPEN BUS 314704	/* LINE 71
	OPEN BUS 314676	/* LINE 71
	OPEN BUS 314782	/* LINE 132
	OPEN BUS 314786	/* LINE 132
	OPEN BUS 314787	/* LINE 50

	OPEN BUS 314782	/* LINE 50
	OPEN BUS 314785	/* LINE 50
	OPEN BUS 314516	/* LINE 71
	OPEN BUS 314675	/* LINE 71
	END	
DVP_P4-3: L152	CONTINGENCY 'DVP_P4-3: L152'	/* CLUBHOUSE
	OPEN BUS 314562	/* CLUBHOUSE 115KV BUS
	END	
DVP_P4-5: T122C	CONTINGENCY 'DVP_P4-5: T122C'	/* CAROLINA
	OPEN BUS 314559	/* CAROLINA 115KV BUS
	OPEN BUS 315126	/* ROANOKE RAPIDS GEN 1 AND 2
	OPEN BUS 315128	/* ROANOKE RAPIDS GEN 3 AND 4
	OPEN BRANCH FROM BUS 314559 TO BUS 314561 CKT 1	/* TX. #4
	END	

DVP_P7-1: LN 22-90_A	CONTINGENCY 'DVP_P7-1: LN 22-90_A'	
	OPEN BRANCH FROM BUS 925780 TO BUS 314702 CKT 1	/* AC1-054 TAP 115.00 - 3KERR 115.00
	OPEN BRANCH FROM BUS 314265 TO BUS 314584 CKT 1	/* 3FIVEFORKSDP115.00 - 3LITTLTN 115.00
	OPEN BRANCH FROM BUS 314265 TO BUS 314673 CKT 1	/* 3FIVEFORKSDP115.00 - 3BCHWD90 115.00
	OPEN BRANCH FROM BUS 314559 TO BUS 314585 CKT 1	/* 3CAROLNA 115.00 - 3L GASTN 115.00
	OPEN BRANCH FROM BUS 314584 TO BUS 314585 CKT 1	/* 3LITTLTN 115.00 - 3L GASTN 115.00
	OPEN BRANCH FROM BUS 314672 TO BUS 314673 CKT 1	/* 3BEECHWD 115.00 - 3BCHWD90 115.00
	OPEN BRANCH FROM BUS 314673 TO BUS 314702 CKT 1	/* 3BCHWD90 115.00 - 3KERR 115.00
	OPEN BUS 314265	/* ISLAND
	OPEN BUS 314584	/* ISLAND
	OPEN BUS 314585	/* ISLAND
	OPEN BUS 314672	/* ISLAND
	OPEN BUS 314673	/* ISLAND
END		

DVP_P7-1: LN 22-90_B	CONTINGENCY 'DVP_P7-1: LN 22-90_B'	
	OPEN BRANCH FROM BUS 314559 TO BUS 314571 CKT 1	/* 3CAROLNA 115.00 - 3EATON F 115.00
	OPEN BRANCH FROM BUS 314571 TO BUS 925780 CKT 1	/* 3EATON F 115.00 - AC1-054 TAP 115.00
	OPEN BUS 314571	/* ISLAND
	OPEN BRANCH FROM BUS 314265 TO BUS 314584 CKT 1	/* 3FIVEFORKSDP115.00 - 3LITTLTN 115.00
	OPEN BRANCH FROM BUS 314265 TO BUS 314673 CKT 1	/* 3FIVEFORKSDP115.00 - 3BCHWD90 115.00
	OPEN BRANCH FROM BUS 314559 TO BUS 314585 CKT 1	/* 3CAROLNA 115.00 - 3L GASTN 115.00
	OPEN BRANCH FROM BUS 314584 TO BUS 314585 CKT 1	/* 3LITTLTN 115.00 - 3L GASTN 115.00
	OPEN BRANCH FROM BUS 314672 TO BUS 314673 CKT 1	/* 3BEECHWD 115.00 - 3BCHWD90 115.00
	OPEN BRANCH FROM BUS 314673 TO BUS 314702 CKT 1	/* 3BCHWD90 115.00 - 3KERR 115.00
	OPEN BUS 314265	/* ISLAND
	OPEN BUS 314584	/* ISLAND
	OPEN BUS 314585	/* ISLAND
	OPEN BUS 314672	/* ISLAND
	OPEN BUS 314673	/* ISLAND
	END	

DVP_P7-1: LN 54-2012_B	CONTINGENCY 'DVP_P7-1: LN 54-2012_B' OPEN BRANCH FROM BUS 919690 TO BUS 314581 CKT 1 /* AA2-053 TAP 115.00 - 3JACKSON 115.00 OPEN BRANCH FROM BUS 314581 TO BUS 314626 CKT 1 /* 3JACKSON 115.00 - 3WOODLND 115.00 OPEN BRANCH FROM BUS 314625 TO BUS 314626 CKT 1 /* 3AULANDR 115.00 - 3WOODLND 115.00 OPEN BUS 314581 /* ISLAND OPEN BUS 314625 /* ISLAND OPEN BUS 314626 /* ISLAND OPEN BRANCH FROM BUS 314266 TO BUS 314569 CKT 1 /* 6NORTHAMPTON230.00 - 6EARLEYS 230.00 OPEN BRANCH FROM BUS 314266 TO BUS 314599 CKT 1 /* 6NORTHAMPTON230.00 - 6ROA VAL 230.00 OPEN BUS 314266 /* ISLAND END
DVP_P7-1: LN 56-2060	CONTINGENCY 'DVP_P7-1: LN 56-2060' OPEN BRANCH FROM BUS 313723 TO BUS 314604 CKT 1 /* 3PECAN 115.00 - 3SEABORD 115.00 OPEN BRANCH FROM BUS 314558 TO BUS 314587 CKT 1 /* 3BOYKINS 115.00 - 3MARGTSV 115.00 OPEN BRANCH FROM BUS 314587 TO BUS 314604 CKT 1 /* 3MARGTSV 115.00 - 3SEABORD 115.00 OPEN BUS 314587 /* ISLAND: 3MARGTSV 115.00 OPEN BUS 314604 /* ISLAND: 3SEABORD 115.00 OPEN BRANCH FROM BUS 314561 TO BUS 314599 CKT 1 /* 6CAROLNA 230.00 - 6ROA VAL 230.00 END

Summer Peak Analysis - 2021

Generator Deliverability

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

Overload Number	Type	Contingency Name	Affected Area	Facility Description	Bus		Circuit	Power Flow	Loading %		Rating		MW Contribution	Flowgate Appendix
					From	To			Initial	Final	Type	MVA		
1	N-1	DVP_P1-2: LN 2027-A	DVP - DVP	6BREMODIST-6MTEAGLE 230 kV line	313867	314765	1	DC	99.51	100.33	ER	662	5.43	1

Multiple Facility Contingency

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

Overload Number	Type	Contingency Name	Affected Area	Facility Description	Bus		Circuit	Power Flow	Loading %		Rating		MW Contribution	Flowgate Appendix
					From	To			Initial	Final	Type	MVA		
2	LFFB	DVP_P4-2: 5602	DVP - DVP	3SO JUSTICE-3COX DP 115 kV line	313858	314577	1	DC	98.64	100.3		202	5.95	2
3	DCTL	DVP_P7-1: LN 22-90_A	DVP - CPLE	3KERR-3GW KING TAP 115 kV line	314702	304102	1	DC	94.53	100.43	ER	199	26.04	

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)

Overload		Contingency		Affected Area	Facility Description	Bus			Power Flow	Loading %		Rating		MW Contribution	Flowgate Appendix
Number	Type	Name				From	To	Circuit		Initial	Final	Type	MVA		
4	LFFB	DVP_P4-2: 7152	DVP - DVP		6CAROLNA 230/115 kV transformer	314559	314561	1	DC	111.01	112.98		289	12.54	3
5	LFFB	DVP_P4-2: 14852	DVP - DVP		6CAROLNA 230/115 kV transformer	314559	314561	1	DC	110.1	112.06		289	12.54	
6	LFFB	DVP_P4-3: L152	DVP - DVP		6CAROLNA 230/115 kV transformer	314559	314561	1	DC	110.1	112.06		289	12.54	
7	LFFB	DVP_P4-5: T122C	DVP - DVP		6CLUBHSE 230/115 kV transformer	314562	314563	1	DC	142.66	147.6		209	10.3	4
8	LFFB	DVP_P4-2: 2202	DVP - DVP		6CLUBHSE 230/115 kV transformer	314562	314563	1	DC	135.96	140.81		209	9.06	
9	LFFB	DVP_P4-2: 5602	DVP - DVP		6CLUBHSE 230/115 kV transformer	314562	314563	1	DC	135.4	140.26		209	9.05	
10	LFFB	DVP_P4-2: 5402	DVP - DVP		6CLUBHSE 230/115 kV transformer	314562	314563	1	DC	135.14	140		209	9.06	
11	LFFB	DVP_P4-2: 101002	DVP - DVP		6CLUBHSE 230/115 kV transformer	314562	314563	1	DC	134.37	139.23		209	9.06	
12	LFFB	DVP_P4-2: 246T247	DVP - DVP		6CLUBHSE-6SAPONY 230 kV line	314563	314435	1	DC	127.92	128.79		637	12.23	5
13	LFFB	DVP_P4-2: 246T2034	DVP - DVP		6CLUBHSE-6SAPONY 230 kV line	314563	314435	1	DC	121.52	122.53		637	12.87	
14	LFFB	DVP_P4-2: 24662	DVP - DVP		6CLUBHSE-6SAPONY 230 kV line	314563	314435	1	DC	121.31	122.17		637	12.09	
15	LFFB	DVP_P4-2: 24682	DVP - DVP		6CLUBHSE-6SAPONY 230 kV line	314563	314435	1	DC	121.23	122.09		637	12.1	
16	LFFB	DVP_P4-2: 5602	DVP - DVP		3COX DP-3CHESTNUT 115 kV line	314577	313719	1	DC	108.37	110.3		174	5.95	6
17	N-1	DVP_P1-2: LN 556	DVP - DVP		6BUCKING-6BREMO 230 kV line	314677	314747	1	DC	102.27	103.89	ER	572	9.26	7
18	N-1	DVP_P1-2: LN 556	DVP - DVP		6FARMVIL-6BUCKING 230 kV line	314692	314677	1	DC	103.98	105.64	ER	559	9.27	8
19	LFFB	DVP_P4-5: T122C	DVP - CPLE		3KERR-3GW KING TAP 115 kV line	314702	304102	1	DC	104.6	110.45	ER	199	26.17	9

20	DCTL	DVP_P7-1: LN 22-90_B	DVP - CPLE	3KERR-3GW KING TAP 115 kV line	314702	304102	1	DC	103.5	109.4	ER	199	26.04	
21	LFFB	DVP_P4-2: 2202	DVP - CPLE	3KERR-3GW KING TAP 115 kV line	314702	304102	1	DC	101.44	106.63	ER	199	22.92	
22	LFFB	DVP_P4-2: 5602	DVP - DVP	AC1-208 TAP-3SO JUSTICE 115 kV line	927140	313858	1	DC	103.25	105.27		202	9.01	10
23	N-1	DVP_P1-2: LN 556	DVP - CPLE	AC1-221 TAP-6PERSON230 T 230 kV line	927250	304070	1	DC	100.09	101.21	ER	718	8.56	11
24	DCTL	DVP_P7-1: LN 54-2012_B	DVP - DVP	AD1-057 TAP-6MORNSTR 230 kV line	934330	313845	1	DC	101.22	101.68		541	5.5	12
25	DCTL	DVP_P7-1: LN 56-2060	DVP - DVP	AD1-057 TAP-6MORNSTR 230 kV line	934330	313845	1	DC	100.43	100.9		541	5.55	
26	LFFB	AEP_P4_#7589_05J.FERR 765	AEP - AEP	05EDAN 1-05DANVL2 138 kV line	242631	242620	1	DC	133.15	133.76	ER	415	5.6	13

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	6BREMODIST-6MTEAGLE 230 kV line	Uprate the line to 125°C for a higher capacity to meet the overload exceeds. Estimated to take 24-30 months.	Pending	\$11,400,000
2	3SO JUSTICE-3COX DP 115 kV line	Uprate conductor to 125°C M.O.T and increase rating to 265MVA. Estimated to take 24-30 months.	Pending	\$3,000,000
3	3KERR-3GW KING TAP 115 kV line	The Kerr Dam – Henderson 115kV line is a joint tie line between the Dominion Energy and Duke/Progress transmission systems. The VEPCO portion can be resolved by an uprating the conductor to 125°C M.O.T an increase in rating to 270MVA. Estimated to take 24-30 months. An affected systems study will need to be completed with Duke/Progress to determine upgrades required on the Duke/Progress system.	Pending	\$3,000,000
Total New Network Upgrades				\$17,400,000

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
4,5,6	6CAROLNA 230/115 kV transformer	Add a second 230-115 kV transformer to increase its rating to 276.8 MVA (normal), 292.4 MVA (emergency), and 328.7 MVA (load dump). It is estimated to take 24-30 months to engineer and construct.	Pending	\$5,500,000
7,8,9,10, 11,	6CLUBHSE 230/115 kV transformer	Replace the 230-115 kV transformer #1 increase its line rating to 276.8 MVA (normal), 292.4 MVA (emergency), and 328.7 MVA (load dump). It is estimated to take 14-16 months to engineer and construct.	Pending	\$5,500,000
12,13,14, 15	6CLUBHSE-6SAPONY 230 kV line	Replace wave trap at Clubhouse Substation to increase its line rating to 722 MVA (normal), 722 MVA (emergency), and 830 MVA (load dump). It is estimated to take 12-16 months to engineer and construct.	Pending	\$150,000
16	3COX DP-3CHESTNUT 115 kV line	Re-conductor the line to 125 M.O.T for 5 miles to increase its line rating to 262 MVA (normal), 287 MVA (emergency), and 349 MVA (load dump). It is estimated to take 24-30 months to engineer, permit, and construct.	Pending	\$3,000,000
17	6BUCKING-6BREMO 230 kV line	Wreck and rebuild the line of 29 miles increase its line rating to 722 MVA (normal), 722 MVA (emergency), and 830 MVA (load dump). It is estimated to take 44-48 months to engineer, permit, and construct. A Va CPCN is required.	Pending	\$72,300,000
18	6FARMVIL-6BUCKING 230 kV line	Reinforcement is the same as for violation 17	-	-
19, 20, 21	3KERR-3GW KING TAP 115 kV line	Reinforcement is the same as for violation 3	-	-
22	AC1-208 TAP-3SO JUSTICE 115 kV line	Wreck and rebuild the line of 22 miles to increase its line rating to 262 MVA (normal), 287 MVA (emergency), and 349 MVA (load dump). It is estimated to take 32-38 months to engineer, permit, and construct. A Va CPCN is required.	Pending	\$11,800,000

Violation #	Overloaded Facility	Upgrade Description	Network Upgrade Number	Upgrade Cost
23	AC1-221 TAP-6PERSON230 T 230 kV line	The PJM ITO portion of this tie line is rated 904MVA (normal), 904MVA (Emergency) and 1105 MVA (normal). Therefore, the line limit element is not overloaded on the PJM ITO portion of this line. An affected systems study will need to be completed with Duke/Progress to determine upgrades required on the Duke/Progress system.	-	-
24, 25	AD1-057 TAP-6MORNSTR 230 kV line	Wreck and rebuild the line of 15 miles to increase its line rating to 722 MVA (normal), 722 MVA (emergency), and 830 MVA (load dump). It is estimated to cost \$36,000,000 and 30-36 months to engineer, permit, and construct. A Va CPCN is required.	Pending	\$36,000,000

Violation #	Overloaded Facility	Upgrade Description	Network Upgrade Number	Upgrade Cost
26	05EDAN 1-05DANVL2 138 kV line	10. Replace Switch (1200 A), estimated cost \$400,000. 11. Replace line risers (Limiting Element: Sub Cond 1590 AAC 61 Str.), estimated cost \$100,000. 12. Rebuild / Reconductor 3.16 miles of conductor (Limiting Element: 336/556 Six Wire ACSR), estimated cost \$4.72 million. 13. Conduct an engineering study to determine if Relay - CT Thermal limit settings can be adjusted to mitigate the overload (Estimated Cost \$25,000), if not, a new relay package will be required (Estimated Cost: \$600,000). (Limiting Element: Relay Thermal Limit 1795 Amps - East Danville) 14. Conduct an engineering study to determine if Relay - CT Thermal limit settings can be adjusted to mitigate the overload (Estimated Cost \$25,000), if not, a new relay package will be required (Estimated Cost: \$600,000). (Limiting Element: Relay Thermal Limit 1795 Amps - Danville) 15. Conduct an engineering study to determine if Relay - CT Compliance Trip limit settings can be adjusted to mitigate the overload (Estimated Cost \$25,000), if not, a new relay package will be required (Estimated Cost: \$600,000). (Limiting Element: Relay Compliance Trip Limit 1916 Amps - East Danville) 16. Conduct an engineering study to determine if Relay - CT Compliance Trip limit settings can be adjusted to mitigate the overload (Estimated Cost \$25,000), if not, a new relay package will be required (Estimated Cost: \$600,000). (Limiting Element: Relay Compliance Trip Limit 1916 Amps - Danville) 17. Rebuild / Reconductor 0.03 miles of conductor (Limiting Element: 1351.5 ACSR 45/7 DIPPER) Near East Danville, estimated cost \$0.045 million. 18. Rebuild / Reconductor 0.03 miles of conductor (Limiting Element: 1351.5 ACSR 45/7 DIPPER) Near Danville, estimated cost \$0.045 million. An approximate construction time would be 24 to 36 months after signing an interconnection agreement	Pending	\$7,710,000
Total Previous Network Upgrades (This project may have a contribution towards these reinforcements)				\$141,960,000

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.

Overload Number	Type	Contingency Name	Affected Area	Facility Description	Bus			Power Flow	Loading %		Rating		MW Contribution	Flowgate Appendix
					From	To	Circuit		Initial	Final	Type	MVA		
27	N-1	DVP_P1-2: LN 2027-A	DVP - DVP	6BREMODIST-6MTEAGLE 230 kV line	313867	314765	1	DC	107.02	107.56	ER	662	7.92	
28	N-1	"314288	DVP - DVP	6CARSON-6CHRL249 230 kV line	314282	314285	1	DC	101.41	101.87	ER	559	5.62	
29	N-1	DVP_P1-2: LN 2131A	DVP - DVP	6SAPONY-6CARSON 230 kV line	314435	314282	1	DC	121.6	122.36	ER	679	11.4	
30	N-1	DVP_P1-2: LN 130-A	DVP - DVP	6CAROLNA 230/115 kV transformer	314559	314561	1	DC	128.6	130.69	ER	240	11.11	
31	N-1	DVP_P1-3: 3CAROLNA-6CAROLNA	DVP - DVP	6CLUBHSE 230/115 kV transformer	314562	314563	1	DC	135.07	141.15	ER	183	11.08	
32	Non	Non	DVP - DVP	6CLUBHSE 230/115 kV transformer	314562	314563	1	DC	105.61	110.29	NR	177	8.27	
33	N-1	DVP_P1-2: LN 246	DVP - DVP	6CLUBHSE-6SAPONY 230 kV line	314563	314435	1	DC	128.97	129.89	ER	599	12.08	
34	Non	Non	DVP - DVP	6CLUBHSE-6SAPONY 230 kV line	314563	314435	1	DC	109.58	110.47	NR	599	10.98	
35	N-1	DVP_P1-2: LN 238	DVP - DVP	6HORNRTN-AD1-057 TAP 230 kV line	314579	934330	1	DC	102.6	103.15	ER	442	5.4	
36	N-1	DVP_P1-2: LN 556	DVP - DVP	6BUCKING-6BREMO 230 kV line	314677	314747	1	DC	105.88	106.94	ER	572	13.52	
37	N-1	DVP_P1-2: LN 556	DVP - DVP	6FARMVIL-6BUCKING 230 kV line	314692	314677	1	DC	106.03	107.12	ER	559	13.53	
38	N-1	DVP_P1-2: LN 556	DVP - DVP	6HALIFAX-AC1-221 TAP 230 kV line	314697	927250	1	DC	117.54	118.3	ER	675	12.49	
39	N-1	DVP_P1-2: LN 2027-A	DVP - DVP	6BREMO-6BREMODIST 230 kV line	314747	313867	1	DC	109.13	109.68	ER	662	7.92	
40	N-1	DVP_P1-2: LN 2027-A	DVP - DVP	6MTEAGLE-6CHARLVL 230 kV line	314765	314749	1	DC	103.79	104.34	ER	662	7.92	
41	N-1	DVP_P1-2: LN 556	DVP - CPLE	AC1-221 TAP-6PERSON230 T 230 kV line	927250	304070	1	DC	124.72	125.45	ER	718	12.49	
42	N-1	AEP_P1-2_#1377	AEP - AEP	05EDAN 1-05DANVL2 138 kV line	242631	242620	1	DC	133.13	133.74	ER	415	5.6	
43	Non	Non	AEP - AEP	05EDAN 1-05DANVL2 138 kV line	242631	242620	1	DC	108.53	109.29	NR	275	4.64	

Light Load Analysis

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

Affected System Analysis & Mitigation

Duke, Progress & TVA Impacts:

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

The Feasibility Study identified issues on joint tie lines between the Dominion Energy and Duke/Progress transmission systems. It is expected that an Affected System Study will be required with Duke/Progress to determine the upgrades necessary to the following facilities:

- Kerr – King tap 115kV line
- AC1-221 Tap – Person 230kV line

Network Impacts-Option 2

The Queue Project AD2-046 was evaluated as a 80.0 MW (Capacity 54.8 MW) injection at the tap of the Kerr Dam-Ridge Road 115kV line in the VAP area. Project AD2-046 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AD2-046 was studied with a commercial probability of 53%. Potential network impacts were as follows:

PJM assessed the impact of the proposed Queue Project as an injection into the ITO, for compliance with NERC Reliability Criteria. The system was assessed using the summer 2021 RTEP case. When performing analysis, ITO Criteria considers a transmission facility overloaded if it exceeds 94% of its emergency rating under single contingency (normal and stressed system conditions). A full listing of the 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 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. The results of these studies are discussed in more detail below.

Contingency Descriptions

The following contingencies resulted in overloads:

Contingency Name	Description
"314288	No Data
AEP_P1-2_#1377	CONTINGENCY 'AEP_P1-2_#1377' OPEN BRANCH FROM BUS 242514 TO BUS 242520 CKT 1 / 242514 05J.FERR 765 242520 05J.FERR 500 1 OPEN BRANCH FROM BUS 242520 TO BUS 306719 CKT 1 / 242520 05J.FERR 500 306719 8ANTIOCH 500 1 END

AEP_P4_#7589_05J.FERR 765	CONTINGENCY 'AEP_P4_#7589_05J.FERR 765' OPEN BRANCH FROM BUS 242514 TO BUS 242520 CKT 1 / 242514 05J.FERR 765 242520 05J.FERR 500 1 OPEN BRANCH FROM BUS 242514 TO BUS 242684 CKT 2 / 242514 05J.FERR 765 242684 05J.FERR 138 2 OPEN BRANCH FROM BUS 242520 TO BUS 306719 CKT 1 / 242520 05J.FERR 500 306719 8ANTIOCH 500 1 END
DVP_P1-2: LN 130-A	CONTINGENCY 'DVP_P1-2: LN 130-A' OPEN BRANCH FROM BUS 314562 TO BUS 314570 CKT 1 /* 3CLUBHSE 115.00 - 3METCATP 115.00 OPEN BRANCH FROM BUS 314570 TO BUS 314572 CKT 1 /* 3METCATP 115.00 - 3EMPORIA 115.00 OPEN BRANCH FROM BUS 314570 TO BUS 314588 CKT 1 /* 3METCATP 115.00 - 3METCALF 115.00 OPEN BRANCH FROM BUS 314572 TO BUS 925170 CKT 1 /* 3EMPORIA 115.00 - AB2-174 TAP 115.00 OPEN BRANCH FROM BUS 314572 TO BUS 314863 CKT 1 /* 3EMPORIA 115.00 - 3EMPOR_1 115.00 OPEN BUS 314570 /* ISLAND OPEN BUS 314572 /* ISLAND OPEN BUS 314588 /* ISLAND END
DVP_P1-2: LN 2027-A	CONTINGENCY 'DVP_P1-2: LN 2027-A' OPEN BRANCH FROM BUS 314310 TO BUS 314322 CKT 1 /* 6JUDES F 230.00 - 6MDLTHAN 230.00 OPEN BRANCH FROM BUS 314310 TO BUS 314333 CKT 1 /* 6JUDES F 230.00 - 6POWHATN 230.00 OPEN BRANCH FROM BUS 314333 TO BUS 933500 CKT 1 /* 6POWHATN 230.00 - AC2-165 TAP 230.00 OPEN BUS 314310 /* ISLAND OPEN BUS 314333 /* ISLAND

	END
DVP_P1-2: LN 2131A	CONTINGENCY 'DVP_P1-2: LN 2131A' OPEN BRANCH FROM BUS 314662 TO BUS 916040 CKT 1 /* 6S HERTFORD 230.00 - Z1-036 TAP 230.00 OPEN BRANCH FROM BUS 314651 TO BUS 314662 CKT 1 /* 6WINFALL 230.00 - 6S HERTFORD 230.00 OPEN BUS 314662 /* ISLAND END
DVP_P1-2: LN 238	CONTINGENCY 'DVP_P1-2: LN 238' OPEN BRANCH FROM BUS 314282 TO BUS 314435 CKT 1 /* 6CARSON 230.00 - 6SAPONY 230.00 OPEN BRANCH FROM BUS 314435 TO BUS 314563 CKT 1 /* 6SAPONY 230.00 - 6CLUBHSE 230.00 OPEN BRANCH FROM BUS 314562 TO BUS 314563 CKT 1 /* 3CLUBHSE 115.00 - 6CLUBHSE 230.00 OPEN BUS 314435 /* ISLAND END
DVP_P1-2: LN 246	CONTINGENCY 'DVP_P1-2: LN 246' OPEN BRANCH FROM BUS 314537 TO BUS 314575 CKT 1 /* 6SUFFOLK 230.00 - 6NUCO TP 230.00 OPEN BRANCH FROM BUS 314569 TO BUS 314575 CKT 1 /* 6EARLEYS 230.00 - 6NUCO TP 230.00 OPEN BRANCH FROM BUS 314575 TO BUS 314590 CKT 1 /* 6NUCO TP 230.00 - 6NUCOR 230.00 OPEN BUS 314575 /* ISLAND OPEN BUS 314590 /* ISLAND

	END
DVP_P1-2: LN 556	CONTINGENCY 'DVP_P1-2: LN 556' OPEN BRANCH FROM BUS 314686 TO BUS 314906 CKT 1 /* 6CLOVER 230.00 - 8CLOVER 500.00 OPEN BRANCH FROM BUS 314686 TO BUS 314906 CKT 2 /* 6CLOVER 230.00 - 8CLOVER 500.00 OPEN BRANCH FROM BUS 314686 TO BUS 314906 CKT 3 /* 6CLOVER 230.00 - 8CLOVER 500.00 OPEN BRANCH FROM BUS 314906 TO BUS 314936 CKT 1 /* 8CLOVER 500.00 - 8RAWLINGS 500.00 OPEN BUS 314906 /* ISLAND END
DVP_P1-3: 3CAROLNA-6CAROLNA	CONTINGENCY 'DVP_P1-3: 3CAROLNA-6CAROLNA' OPEN BRANCH FROM BUS 314559 TO BUS 314561 CKT 1 END
DVP_P4-2: 101002	CONTINGENCY 'DVP_P4-2: 101002' /* CAROLINA 115 KV OPEN BRANCH FROM BUS 313723 TO BUS 314259 CKT 1 /* 3PECAN 115.00 - 3CAROL56_1 115.00 OPEN BRANCH FROM BUS 314259 TO BUS 314559 CKT Z1 /* 3CAROL56_1 115.00 - 3CAROLNA 115.00 OPEN BRANCH FROM BUS 314259 TO BUS 314835 CKT 1 /* 3CAROL56_1 115.00 - 3CAROL_1 115.00 OPEN BUS 314259 /* ISLAND: 3CAROL56_1 115.00 OPEN BUS 314835 /* ISLAND: 3CAROL_1 115.00 OPEN BRANCH FROM BUS 314559 TO BUS 314571 CKT 1 /* 3CAROLNA 115.00 - 3EATON F 115.00

	OPEN BRANCH FROM BUS 314559 TO BUS 919690 CKT 1	/* 3CAROLNA 115.00 - AA2-053 TAP 115.00
	OPEN BRANCH FROM BUS 314559 TO BUS 314600 CKT 1	/* 3CAROLNA 115.00 - 3PLHITP 115.00
	OPEN BRANCH FROM BUS 314559 TO BUS 314561 CKT 1	/* 3CAROLNA 115.00 - 6CAROLNA 230.00
	END	
DVP_P4-2: 14852	CONTINGENCY 'DVP_P4-2: 14852'	/* CLUBHOUSE
	OPEN BUS 314562	/* CLUBHOUSE 115KV BUS
	OPEN BUS 314325	/* LINE 148
	OPEN BUS 314312	/* LINE 148
	END	
DVP_P4-2: 2202	CONTINGENCY 'DVP_P4-2: 2202'	/* CAROLINA
	OPEN BRANCH FROM BUS 314559 TO BUS 314571 CKT 1	/* LINE 22
	OPEN BRANCH FROM BUS 314571 TO BUS 925780 CKT 1	/* LINE 22
	OPEN BRANCH FROM BUS 314559 TO BUS 314259 CKT Z1	/* LINE 56
	OPEN BRANCH FROM BUS 314559 TO BUS 919690 CKT 1	/* LINE 54
	OPEN BRANCH FROM BUS 314559 TO BUS 314600 CKT 1	/* LINE 130
	OPEN BRANCH FROM BUS 314559 TO BUS 314561 CKT 1	/* TX. #4
	DECREASE BUS 314559 LOAD BY 100 PERCENT	/* REMOVE ALL LOAD AT CAROLINA
	END	

DVP_P4-2: 24662	CONTINGENCY 'DVP_P4-2: 24662' /* EARLEYS OPEN BRANCH FROM BUS 314568 TO BUS 314569 CKT 1 /* TX. #3 OPEN BRANCH FROM BUS 314569 TO BUS 314575 CKT 1 /* 246 OPEN BRANCH FROM BUS 314575 TO BUS 314537 CKT 1 /* 246 OPEN BRANCH FROM BUS 314575 TO BUS 314590 CKT 1 /* 246 - NUCOR END
DVP_P4-2: 24682	CONTINGENCY 'DVP_P4-2: 24682' /* 24682 @ SUFFOLK OPEN BRANCH FROM BUS 314537 TO BUS 314575 CKT 1 /* SUFFOLK - NUCOR TAP OPEN BRANCH FROM BUS 314569 TO BUS 314575 CKT 1 /* NUCOR TAP - EARLEYS OPEN BRANCH FROM BUS 314536 TO BUS 314537 CKT 2 /* SUFFOLK 230-115 TX#5 OPEN BRANCH FROM BUS 314928 TO BUS 314537 CKT 2 /* SUFFOLK 500-230 TX#8 END
DVP_P4-2: 246T2034	CONTINGENCY 'DVP_P4-2: 246T2034' /* EARLEYS OPEN BRANCH FROM BUS 314569 TO BUS 314575 CKT 1 /* 246 OPEN BRANCH FROM BUS 314575 TO BUS 314537 CKT 1 /* 246 OPEN BRANCH FROM BUS 314575 TO BUS 314590 CKT 1 /* 246 - NUCOR OPEN BRANCH FROM BUS 314569 TO BUS 314620 CKT 1 /* 2034 OPEN BRANCH FROM BUS 314620 TO BUS 933990 CKT 1 /* 2034 END

DVP_P4-2: 246T247	CONTINGENCY 'DVP_P4-2: 246T247'		/* SUFFOLK 230 KV	
	OPEN BRANCH FROM BUS 314537 TO BUS 314575 CKT 1		/* 6SUFFOLK 230.00 - 6NUCO TP 230.00	
	OPEN BRANCH FROM BUS 314569 TO BUS 314575 CKT 1		/* 6EARLEYS 230.00 - 6NUCO TP 230.00	
	OPEN BRANCH FROM BUS 314575 TO BUS 314590 CKT 1		/* 6NUCO TP 230.00 - 6NUCOR 230.00	
	OPEN BUS 314575		/* ISLAND: 6NUCO TP 230.00	
	OPEN BUS 314590		/* ISLAND: 6NUCOR 230.00	
	OPEN BRANCH FROM BUS 314537 TO BUS 314648 CKT 1		/* 6SUFFOLK 230.00 - 6SUNBURY 230.00	
	OPEN BRANCH FROM BUS 314648 TO BUS 901080 CKT 1		/* 6SUNBURY 230.00 - W1-029 230.00	
	OPEN BUS 314648		/* ISLAND: 6SUNBURY 230.00	
DVP_P4-2: 5402	CONTINGENCY 'DVP_P4-2: 5402'		/* CAROLINA	
	OPEN BRANCH FROM BUS 314559 TO BUS 919690 CKT 1		/* LINE 54	
	OPEN BRANCH FROM BUS 314559 TO BUS 314571 CKT 1		/* LINE 22	
	OPEN BRANCH FROM BUS 314559 TO BUS 314259 CKT Z1		/* LINE 56	
	OPEN BRANCH FROM BUS 314559 TO BUS 314600 CKT 1		/* LINE 130	
	OPEN BRANCH FROM BUS 314559 TO BUS 314561 CKT 1		/* TX. #4	
	DECREASE BUS 314559 LOAD BY 100 PERCENT		/* REMOVE ALL LOAD AT CAROLINA	
	END			

DVP_P4-2: 5602	CONTINGENCY 'DVP_P4-2: 5602'	/* CAROLINA 115 KV
	OPEN BRANCH FROM BUS 313723 TO BUS 314604 CKT 1	/* 3PECAN 115.00 - 3SEABORD 115.00
	OPEN BRANCH FROM BUS 314558 TO BUS 314587 CKT 1	/* 3BOYKINS 115.00 - 3MARGTSV 115.00
	OPEN BRANCH FROM BUS 314587 TO BUS 314604 CKT 1	/* 3MARGTSV 115.00 - 3SEABORD 115.00
	OPEN BUS 314587	/* ISLAND: 3MARGTSV 115.00
	OPEN BUS 314604	/* ISLAND: 3SEABORD 115.00
	OPEN BRANCH FROM BUS 314559 TO BUS 314571 CKT 1	/* 3CAROLNA 115.00 - 3EATON F 115.00
	OPEN BRANCH FROM BUS 314559 TO BUS 919690 CKT 1	/* 3CAROLNA 115.00 - AA2-053 TAP 115.00
	OPEN BRANCH FROM BUS 314559 TO BUS 314600 CKT 1	/* 3CAROLNA 115.00 - 3PLHITP 115.00
	OPEN BRANCH FROM BUS 314559 TO BUS 314561 CKT 1	/* 3CAROLNA 115.00 - 6CAROLNA 230.00
DVP_P4-2: 7152	END	
	CONTINGENCY 'DVP_P4-2: 7152'	/* CLUBHOUSE
	OPEN BUS 314562	/* CLUBHOUSE 115KV BUS
	OPEN BUS 314565	/* LINE 71
	OPEN BUS 314850	/* LINE 71
	OPEN BUS 314693	/* LINE 71
	OPEN BUS 314704	/* LINE 71
	OPEN BUS 314676	/* LINE 71
	OPEN BUS 314782	/* LINE 132
	OPEN BUS 314786	/* LINE 132
	OPEN BUS 314787	/* LINE 50

	OPEN BUS 314782	/* LINE 50
	OPEN BUS 314785	/* LINE 50
	OPEN BUS 314516	/* LINE 71
	OPEN BUS 314675	/* LINE 71
	END	
DVP_P4-3: L152	CONTINGENCY 'DVP_P4-3: L152'	/* CLUBHOUSE
	OPEN BUS 314562	/* CLUBHOUSE 115KV BUS
	END	
DVP_P4-5: T122C	CONTINGENCY 'DVP_P4-5: T122C'	/* CAROLINA
	OPEN BUS 314559	/* CAROLINA 115KV BUS
	OPEN BUS 315126	/* ROANOKE RAPIDS GEN 1 AND 2
	OPEN BUS 315128	/* ROANOKE RAPIDS GEN 3 AND 4
	OPEN BRANCH FROM BUS 314559 TO BUS 314561 CKT 1	/* TX. #4
	END	

DVP_P7-1: LN 22-90_B	CONTINGENCY 'DVP_P7-1: LN 22-90_B' OPEN BRANCH FROM BUS 314559 TO BUS 314571 CKT 1 /* 3CAROLNA 115.00 - 3EATON F 115.00 OPEN BRANCH FROM BUS 314571 TO BUS 925780 CKT 1 /* 3EATON F 115.00 - AC1-054 TAP 115.00 OPEN BUS 314571 /* ISLAND OPEN BRANCH FROM BUS 314265 TO BUS 314584 CKT 1 /* 3FIVEFORKSDP115.00 - 3LITTLTN 115.00 OPEN BRANCH FROM BUS 314265 TO BUS 314673 CKT 1 /* 3FIVEFORKSDP115.00 - 3BCHWD90 115.00 OPEN BRANCH FROM BUS 314559 TO BUS 314585 CKT 1 /* 3CAROLNA 115.00 - 3L GASTN 115.00 OPEN BRANCH FROM BUS 314584 TO BUS 314585 CKT 1 /* 3LITTLTN 115.00 - 3L GASTN 115.00 OPEN BRANCH FROM BUS 314672 TO BUS 314673 CKT 1 /* 3BEECHWD 115.00 - 3BCHWD90 115.00 OPEN BRANCH FROM BUS 314673 TO BUS 314702 CKT 1 /* 3BCHWD90 115.00 - 3KERR 115.00 OPEN BUS 314265 /* ISLAND OPEN BUS 314584 /* ISLAND OPEN BUS 314585 /* ISLAND OPEN BUS 314672 /* ISLAND OPEN BUS 314673 /* ISLAND END
DVP_P7-1: LN 38-137_B	CONTINGENCY 'DVP_P7-1: LN 38-137_B' OPEN BRANCH FROM BUS 314255 TO BUS 314674 CKT 1 /* 3BOYDPLK 115.00 - 3BOYDTON 115.00 OPEN BRANCH FROM BUS 314674 TO BUS 314702 CKT 1 /* 3BOYDTON 115.00 - 3KERR 115.00 OPEN BUS 314674 /* ISLAND OPEN BRANCH FROM BUS 313849 TO BUS 936360 CKT 1 /* 33RIDGERD 115.00 - AD2-046 TAP 115.00

	END
DVP_P7-1: LN 56-2060	CONTINGENCY 'DVP_P7-1: LN 56-2060' OPEN BRANCH FROM BUS 313723 TO BUS 314604 CKT 1 /* 3PECAN 115.00 - 3SEABORD 115.00 OPEN BRANCH FROM BUS 314558 TO BUS 314587 CKT 1 /* 3BOYKINS 115.00 - 3MARGTSV 115.00 OPEN BRANCH FROM BUS 314587 TO BUS 314604 CKT 1 /* 3MARGTSV 115.00 - 3SEABORD 115.00 OPEN BUS 314587 /* ISLAND: 3MARGTSV 115.00 OPEN BUS 314604 /* ISLAND: 3SEABORD 115.00 OPEN BRANCH FROM BUS 314561 TO BUS 314599 CKT 1 /* 6CAROLNA 230.00 - 6ROA VAL 230.00 END

Summer Peak Analysis - 2021

Generator Deliverability

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

Overload Number	Type	Contingency Name	Affected Area	Facility Description	Bus		Circuit	Power Flow	Loading %		Rating		MW Contribution	Flowgate Appendix
					From	To			Initial	Final	Type	MVA		
1	N-1	DVP_P1-2: LN 2027-A	DVP - DVP	6BREMODIST-6MTEAGLE 230 kV line	313867	314765	1	DC	99.41	100.21	ER	662	5.61	1

Multiple Facility Contingency

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

Overload Number	Type	Contingency Name	Affected Area	Facility Description	Bus		Circuit	Power Flow	Loading %		Rating		MW Contribution	Flowgate Appendix
					From	To			Initial	Final	Type	MVA		
2	LFFB	DVP_P4-2: 5602	DVP - DVP	3SO JUSTICE-3COX DP 115 kV line	313858	314577	1	DC	98.64	100.56		202	5.71	2
3	DCTL	DVP_P7-1: LN 38-137_B	DVP - CPLE	3KERR-3GW KING TAP 115 kV line	314702	304102	1	DC	97.54	103.51	ER	199	26.33	

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)

Overload Number	Type	Contingency Name	Affected Area	Facility Description	Bus			Power Flow	Loading %		Rating		MW Contribution	Flowgate Appendix
					From	To	Circuit		Initial	Final	Type	MVA		
4	LFFB	DVP_P4-2: 7152	DVP - DVP	6CAROLNA 230/115 kV transformer	314559	314561	1	DC	111.1	113.08		289	12.12	3
5	LFFB	DVP_P4-2: 14852	DVP - DVP	6CAROLNA 230/115 kV transformer	314559	314561	1	DC	110.09	111.99		289	12.12	
6	LFFB	DVP_P4-3: L152	DVP - DVP	6CAROLNA 230/115 kV transformer	314559	314561	1	DC	110.09	111.99		289	12.12	
7	LFFB	DVP_P4-5: T122C	DVP - DVP	6CLUBHSE 230/115 kV transformer	314562	314563	1	DC	142.66	147.74		209	10.6	4
8	LFFB	DVP_P4-2: 2202	DVP - DVP	6CLUBHSE 230/115 kV transformer	314562	314563	1	DC	136.62	142.01		209	9.41	
9	LFFB	DVP_P4-2: 5602	DVP - DVP	6CLUBHSE 230/115 kV transformer	314562	314563	1	DC	136.07	141.46		209	9.41	
10	LFFB	DVP_P4-2: 5402	DVP - DVP	6CLUBHSE 230/115 kV transformer	314562	314563	1	DC	135.81	141.2		209	9.41	
11	LFFB	DVP_P4-2: 101002	DVP - DVP	6CLUBHSE 230/115 kV transformer	314562	314563	1	DC	135.04	140.43		209	9.41	
12	LFFB	DVP_P4-2: 246T247	DVP - DVP	6CLUBHSE-6SAPONY 230 kV line	314563	314435	1	DC	127.92	128.79		637	12.14	5
13	LFFB	DVP_P4-2: 246T2034	DVP - DVP	6CLUBHSE-6SAPONY 230 kV line	314563	314435	1	DC	121.53	122.54		637	12.76	
14	LFFB	DVP_P4-2: 24662	DVP - DVP	6CLUBHSE-6SAPONY 230 kV line	314563	314435	1	DC	121.31	122.16		637	12	
15	LFFB	DVP_P4-2: 24682	DVP - DVP	6CLUBHSE-6SAPONY 230 kV line	314563	314435	1	DC	121.23	122.09		637	12.02	
16	LFFB	DVP_P4-2: 5602	DVP - DVP	3COX DP-3CHESTNUT 115 kV line	314577	313719	1	DC	108.37	110.6		174	5.71	6
17	N-1	DVP_P1-2: LN 556	DVP - DVP	6BUCKING-6BREMO 230 kV line	314677	314747	1	DC	102.27	103.95	ER	572	9.57	7
18	N-1	DVP_P1-2: LN 556	DVP - DVP	6FARMVIL-6BUCKING 230 kV line	314692	314677	1	DC	103.98	105.69	ER	559	9.58	8
19	LFFB	DVP_P4-5: T122C	DVP - CPLE	3KERR-3GW KING TAP 115 kV line	314702	304102	1	DC	104.57	110.14	ER	199	25.13	9
20	DCTL	DVP_P7-1: LN 22-90_B	DVP - CPLE	3KERR-3GW KING TAP 115 kV line	314702	304102	1	DC	104.27	109.94	ER	199	24.99	
21	LFFB	DVP_P4-2: 2202	DVP - CPLE	3KERR-3GW KING TAP 115 kV line	314702	304102	1	DC	101.44	106.42	ER	199	22	
22	LFFB	DVP_P4-2: 5602	DVP - DVP	AC1-208 TAP-3SO JUSTICE 115 kV line	927140	313858	1	DC	103.25	105.19		202	8.65	10
23	N-1	DVP_P1-2: LN 556	DVP - CPLE	AC1-221 TAP-6PERSON230 T 230 kV line	927250	304070	1	DC	100.14	101.32	ER	718	8.94	11
24	DCTL	DVP_P7-1: LN 56-2060	DVP - DVP	AD1-057 TAP-6MORNSTR 230 kV line	934330	313845	1	DC	100.43	100.89		541	5.48	12
25	LFFB	AEP_P4_#7589_05J.FERR 765	AEP - AEP	05EDAN 1-05DANVL2 138 kV line	242631	242620	1	DC	133.13	133.73	ER	415	5.56	13

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.

Overload Number	Type	Contingency Name	Affected Area	Facility Description	Bus From	Bus To	Circuit	Power Flow	Loading %		Rating		MW Contribution	Flowgate Appendix
26	N-1	DVP_P1-2: LN 2027-A	DVP - DVP	6BREMODIST-6MTEAGLE 230 kV line	313867	314765	1	DC	106.85	107.34	ER	662	8.19	
27	N-1	"314288	DVP - DVP	6CARSON-6CHRL249 230 kV line	314282	314285	1	DC	101.41	101.87	ER	559	5.6	
28	N-1	DVP_P1-2: LN 2131A	DVP - DVP	6SAPONY-6CARSON 230 kV line	314435	314282	1	DC	121.6	122.35	ER	679	11.33	
29	N-1	DVP_P1-2: LN 130-A	DVP - DVP	6CAROLNA 230/115 kV transformer	314559	314561	1	DC	128.64	130.64	ER	240	10.61	
30	N-1	DVP_P1-3: 3CAROLNA-6CAROLNA	DVP - DVP	6CLUBHSE 230/115 kV transformer	314562	314563	1	DC	135.08	141.21	ER	183	11.19	
31	Non	Non	DVP - DVP	6CLUBHSE 230/115 kV transformer	314562	314563	1	DC	105.61	110.4	NR	177	8.47	
32	N-1	DVP_P1-2: LN 246	DVP - DVP	6CLUBHSE-6SAPONY 230 kV line	314563	314435	1	DC	128.96	129.86	ER	599	11.99	
33	Non	Non	DVP - DVP	6CLUBHSE-6SAPONY 230 kV line	314563	314435	1	DC	109.59	110.49	NR	599	10.92	
34	N-1	DVP_P1-2: LN 238	DVP - DVP	6HORNRTN-AD1-057 TAP 230 kV line	314579	934330	1	DC	102.6	103.14	ER	442	5.29	
35	N-1	DVP_P1-2: LN 556	DVP - DVP	6BUCKING-6BREMO 230 kV line	314677	314747	1	DC	105.88	106.98	ER	572	13.98	

36	N-1	DVP_P1-2: LN 556	DVP - DVP	6FARMVIL-6BUCKING 230 kV line	314692	314677	1	DC	106.03	107.15	ER	559	13.98	
37	N-1	DVP_P1-2: LN 556	DVP - DVP	6HALIFAX-AC1-221 TAP 230 kV line	314697	927250	1	DC	117.73	118.55	ER	675	13.06	
38	N-1	DVP_P1-2: LN 2027-A	DVP - DVP	6BREMO-6BREMODIST 230 kV line	314747	313867	1	DC	108.96	109.46	ER	662	8.19	
39	N-1	DVP_P1-2: LN 2027-A	DVP - DVP	6MTEAGLE-6CHARLVL 230 kV line	314765	314749	1	DC	103.79	104.35	ER	662	8.18	
40	N-1	DVP_P1-2: LN 556	DVP - CPLE	AC1-221 TAP-6PERSON230 T 230 kV line	927250	304070	1	DC	124.88	125.65	ER	718	13.06	
41	N-1	AEP_P1-2_#1377	AEP - AEP	05EDAN 1-05DANVL2 138 kV line	242631	242620	1	DC	133.1	133.71	ER	415	5.56	
42	Non	Non	AEP - AEP	05EDAN 1-05DANVL2 138 kV line	242631	242620	1	DC	108.49	109.24	NR	275	4.61	

Light Load Analysis

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

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 – Option 1

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. All New Service Queue Requests, through the end of the Queue under study, that are contributors to a flowgate will be listed in the Appendices. Please note that there may be contributors that are subsequently queued after the queue under study that are not listed in the Appendices. Although this information is not used "as is" for cost allocation purposes, it can be used to gauge the impact of other projects/generators.

It should be noted the project/generator MW contributions presented in the body of the report and appendices sections are full contributions, whereas the loading percentages reported in the body of the report, take into consideration the commercial probability of each project as well as the ramping impact of "Adder" contributions.

Appendix 1

(DVP - DVP) The 6BREMIST-6MTEAGLE 230 kV line (from bus 313867 to bus 314765 ckt 1) loads from 99.51% to 100.33% (**DC power flow**) of its emergency rating (662 MVA) for the single line contingency outage of 'DVP_P1-2: LN 2027-A'. This project contributes approximately 5.43 MW to the thermal violation.

CONTINGENCY 'DVP_P1-2: LN 2027-A'

OPEN BRANCH FROM BUS 314310 TO BUS 314322 CKT 1 /* 6JUDES F 230.00
 - 6MDLTHAN 230.00
 OPEN BRANCH FROM BUS 314310 TO BUS 314333 CKT 1 /* 6JUDES F 230.00
 - 6POWHATN 230.00
 OPEN BRANCH FROM BUS 314333 TO BUS 933500 CKT 1 /* 6POWHATN
 230.00 - AC2-165 TAP 230.00
 OPEN BUS 314310 /* ISLAND
 OPEN BUS 314333 /* ISLAND
 END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315191	1BEARGRDN G1	15.61
315192	1BEARGRDN G2	15.61
315193	1BEARGRDN S1	32.13
315170	1BREMO 3	29.99
315171	1BREMO 4	65.89
315150	1BUGGS 1	7.21
315151	1BUGGS 2	7.21
315153	1CLOVER1	8.06
315154	1CLOVER2	7.95
315159	1KERR 2	0.92
315164	1KERR 7	0.9
314429	3JTRSVLE	0.66
932511	AC2-071 C	6.19
933501	AC2-165 C	37.8

934231	AD1-050 C	2.5
934311	AD1-055 C	1.26
934611	AD1-087 C O1	4.26
934621	AD1-088 C	14.58
934911	AD1-123 C	0.55
935171	AD1-152 C O1	4.23
935221	AD1-157 C	2.33
935231	AD1-160 C	1.71
936261	AD2-033 C	12.87
936361	AD2-046 C O1	5.43
936481	AD2-063 C O1	14.27
936651	AD2-082 C	2.61
937461	AD2-200 C	1.84
937481	AD2-202 C O1	1.17
LTF	CARR	0.22
LTF	CBM-S1	2.63
LTF	CBM-S2	6.62
LTF	CBM-W1	3.53
LTF	CBM-W2	13.37
LTF	CIN	0.84
LTF	CPL	2.16
LTF	IPL	0.53
LTF	LGEE	0.19
LTF	MEC	2.3
LTF	MECS	0.32
LTF	RENSSELAER	0.18

<i>LTF</i>	<i>ROSETON</i>	<i>1.29</i>
<i>LTF</i>	<i>WEC</i>	<i>0.23</i>
<i>LTF</i>	<i>AA2-074</i>	<i>1.47</i>
<i>920291</i>	<i>AA2-127</i>	<i>3.42</i>
<i>924021</i>	<i>AB2-043 C O1</i>	<i>2.49</i>
<i>924031</i>	<i>AB2-045 C</i>	<i>1.17</i>
<i>924161</i>	<i>AB2-060 C O1</i>	<i>7.38</i>
<i>924301</i>	<i>AB2-077 C O1</i>	<i>1.54</i>
<i>924311</i>	<i>AB2-078 C O1</i>	<i>1.54</i>
<i>924321</i>	<i>AB2-079 C O1</i>	<i>1.54</i>
<i>924401</i>	<i>AB2-089 C</i>	<i>1.13</i>
<i>924411</i>	<i>AB2-090 C</i>	<i>3.14</i>
<i>925221</i>	<i>AB2-176 C</i>	<i>1.29</i>
<i>925611</i>	<i>AC1-036 C</i>	<i>1.09</i>
<i>925781</i>	<i>AC1-054 C</i>	<i>3.63</i>
<i>925831</i>	<i>AC1-062</i>	<i>0.09</i>
<i>926271</i>	<i>AC1-105 C</i>	<i>3.18</i>
<i>926761</i>	<i>AC1-162 C</i>	<i>47.97</i>
<i>927261</i>	<i>AC1-222 C</i>	<i>1.82</i>

Appendix 2

(DVP - DVP) The 3SO JUSTICE-3COX DP 115 kV line (from bus 313858 to bus 314577 ckt 1) loads from 98.64% to 100.3% (**DC power flow**) of its load dump rating (202 MVA) for the line fault with failed breaker contingency outage of 'DVP_P4-2: 5602'. This project contributes approximately 5.95 MW to the thermal violation.

```

CONTINGENCY 'DVP_P4-2: 5602'                                /* CAROLINA 115 KV
  OPEN BRANCH FROM BUS 313723 TO BUS 314604 CKT 1          /* 3PECAN 115.00 -
3SEABORD 115.00
  OPEN BRANCH FROM BUS 314558 TO BUS 314587 CKT 1          /* 3BOYKINS
115.00 - 3MARGTSV 115.00
  OPEN BRANCH FROM BUS 314587 TO BUS 314604 CKT 1          /* 3MARGTSV
115.00 - 3SEABORD 115.00
  OPEN BUS 314587                                           /* ISLAND: 3MARGTSV 115.00
  OPEN BUS 314604                                           /* ISLAND: 3SEABORD 115.00
  OPEN BRANCH FROM BUS 314559 TO BUS 314571 CKT 1          /* 3CAROLNA
115.00 - 3EATON F 115.00
  OPEN BRANCH FROM BUS 314559 TO BUS 919690 CKT 1          /* 3CAROLNA
115.00 - AA2-053 TAP 115.00
  OPEN BRANCH FROM BUS 314559 TO BUS 314600 CKT 1          /* 3CAROLNA
115.00 - 3PLHITP 115.00
  OPEN BRANCH FROM BUS 314559 TO BUS 314561 CKT 1          /* 3CAROLNA
115.00 - 6CAROLNA 230.00
END
  
```

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315126	1ROARAP2	3.65
315128	1ROARAP4	3.51
314578	3HORNRTN	8.39
314582	3KELFORD	1.13
314603	3SCOT NK	7.6
932631	AC2-084 C	25.37
932632	AC2-084 E	12.49
934231	AD1-050 C	3.79
934232	AD1-050 E	2.07
936361	AD2-046 C O1	4.08

936362	AD2-046 E O1	1.87
936401	AD2-051 C O1	3.96
936402	AD2-051 E O1	1.7
LTF	AMIL	0.06
LTF	BAYOU	0.34
LTF	BIG_CAJUN1	0.54
LTF	BIG_CAJUN2	1.08
LTF	BLUEG	0.33
LTF	CALDERWOOD	0.2
LTF	CANNELTON	0.06
LTF	CARR	< 0.01
LTF	CATAWBA	0.2
LTF	CELEVELAND	0.56
LTF	CHEOAH	0.19
LTF	CHILHOWEE	0.06
LTF	CHOCTAW	0.37
LTF	CLIFTY	1.2
LTF	COTTONWOOD	1.34
LTF	DEARBORN	0.12
LTF	EDWARDS	0.1
LTF	ELMERSMITH	0.19
LTF	FARMERCITY	0.08
LTF	G-007A	0.04
LTF	GIBSON	0.12
LTF	HAMLET	0.85
LTF	MORGAN	0.59

<i>LTF</i>	<i>NEWTON</i>	<i>0.28</i>
<i>LTF</i>	<i>PRAIRIE</i>	<i>0.61</i>
<i>LTF</i>	<i>RENSSELAER</i>	<i>< 0.01</i>
<i>LTF</i>	<i>ROSETON</i>	<i>0.05</i>
<i>LTF</i>	<i>ROWAN</i>	<i>0.4</i>
<i>LTF</i>	<i>SANTEETLA</i>	<i>0.06</i>
<i>LTF</i>	<i>SMITHLAND</i>	<i>0.05</i>
<i>LTF</i>	<i>TATANKA</i>	<i>0.14</i>
<i>LTF</i>	<i>TILTON</i>	<i>0.12</i>
<i>LTF</i>	<i>TRIMBLE</i>	<i>0.06</i>
<i>LTF</i>	<i>TVA</i>	<i>0.25</i>
<i>LTF</i>	<i>UNIONPOWER</i>	<i>0.36</i>
<i>LTF</i>	<i>VFT</i>	<i>0.11</i>
<i>917331</i>	<i>Z2-043 C</i>	<i>0.59</i>
<i>917332</i>	<i>Z2-043 E</i>	<i>1.35</i>
<i>918491</i>	<i>AA1-063AC OP</i>	<i>3.74</i>
<i>918492</i>	<i>AA1-063AE OP</i>	<i>9.48</i>
<i>918561</i>	<i>AA1-072 C</i>	<i>0.09</i>
<i>918562</i>	<i>AA1-072 E</i>	<i>0.23</i>
<i>919692</i>	<i>AA2-053 E</i>	<i>1.7</i>
<i>920672</i>	<i>AA2-174 E</i>	<i>0.2</i>
<i>924401</i>	<i>AB2-089 C</i>	<i>1.72</i>
<i>924402</i>	<i>AB2-089 E</i>	<i>0.88</i>
<i>924501</i>	<i>AB2-099 C</i>	<i>0.24</i>
<i>924502</i>	<i>AB2-099 E</i>	<i>0.1</i>
<i>925781</i>	<i>AC1-054 C</i>	<i>3.55</i>

925782	AC1-054 E	1.64
926201	AC1-098 C	17.79
926202	AC1-098 E	10.6
926211	AC1-099 C	5.96
926212	AC1-099 E	3.5
926771	AC1-163 C	0.8
926772	AC1-163 E	0.37
927141	AC1-208 C	28.81
927142	AC1-208 E	12.79

Appendix 3

(DVP - DVP) The 6CAROLNA 230/115 kV transformer (from bus 314559 to bus 314561 ckt 1) loads from 111.01% to 112.98% (**DC power flow**) of its load dump rating (289 MVA) for the line fault with failed breaker contingency outage of 'DVP_P4-2: 7152'. This project contributes approximately 12.54 MW to the thermal violation.

CONTINGENCY 'DVP_P4-2: 7152'

OPEN BUS 314562
 OPEN BUS 314565
 OPEN BUS 314850
 OPEN BUS 314693
 OPEN BUS 314704
 OPEN BUS 314676
 OPEN BUS 314782
 OPEN BUS 314786
 OPEN BUS 314787
 OPEN BUS 314782
 OPEN BUS 314785
 OPEN BUS 314516
 OPEN BUS 314675
 END

/* CLUBHOUSE

/* CLUBHOUSE 115KV BUS
 /* LINE 71
 /* LINE 71
 /* LINE 71
 /* LINE 71
 /* LINE 71
 /* LINE 132
 /* LINE 132
 /* LINE 50
 /* LINE 50
 /* LINE 50
 /* LINE 71
 /* LINE 71

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315150	1BUGGS 1	7.69
315151	1BUGGS 2	7.69
315159	1KERR 2	1.64
315164	1KERR 7	1.61
315126	1ROARAP2	4.14
315128	1ROARAP4	3.98
315115	1S HAMPT1	1.65
314572	3EMPORIA	1.12
314578	3HORNRTN	8.17
314582	3KELFORD	0.51
314603	3SCOT NK	2.69

314617	3TUNIS	0.63
314539	3UNCAMP	1.86
314541	3WATKINS	0.65
932631	AC2-084 C	8.23
932632	AC2-084 E	4.05
934201	AD1-047 C	21.52
934202	AD1-047 E	14.34
934231	AD1-050 C	6.14
934232	AD1-050 E	3.36
936261	AD2-033 C	7.22
936262	AD2-033 E	4.81
936361	AD2-046 C O1	8.59
936362	AD2-046 E O1	3.95
936481	AD2-063 C O1	8.54
936482	AD2-063 E O1	5.69
936711	AD2-090 C O1	7.42
936712	AD2-090 E O1	4.94
LTF	CARR	0.03
LTF	CBM-S1	0.35
LTF	CBM-S2	0.52
LTF	CBM-W1	0.82
LTF	CBM-W2	1.88
LTF	CIN	0.2
LTF	CPL	0.12
LTF	G-007	0.13
LTF	IPL	0.12

<i>LTF</i>	<i>LGEE</i>	<i>0.04</i>
<i>LTF</i>	<i>MEC</i>	<i>0.41</i>
<i>LTF</i>	<i>MECS</i>	<i>0.18</i>
<i>LTF</i>	<i>O-066</i>	<i>0.81</i>
<i>LTF</i>	<i>RENSSELAER</i>	<i>0.02</i>
<i>LTF</i>	<i>ROSETON</i>	<i>0.15</i>
<i>900671</i>	<i>V4-068 C</i>	<i>0.11</i>
<i>900672</i>	<i>V4-068 E</i>	<i>0.31</i>
<i>LTF</i>	<i>WEC</i>	<i>0.05</i>
<i>907092</i>	<i>X1-038 E</i>	<i>4.64</i>
<i>917332</i>	<i>Z2-043 E</i>	<i>0.62</i>
<i>918491</i>	<i>AA1-063AC OP</i>	<i>3.39</i>
<i>918492</i>	<i>AA1-063AE OP</i>	<i>8.59</i>
<i>918562</i>	<i>AA1-072 E</i>	<i>0.1</i>
<i>919691</i>	<i>AA2-053 C</i>	<i>3.55</i>
<i>919692</i>	<i>AA2-053 E</i>	<i>8.2</i>
<i>919702</i>	<i>AA2-057 E</i>	<i>2.36</i>
<i>920041</i>	<i>AA2-088 C</i>	<i>1.52</i>
<i>920042</i>	<i>AA2-088 E</i>	<i>13.36</i>
<i>920592</i>	<i>AA2-165 E</i>	<i>0.31</i>
<i>920671</i>	<i>AA2-174 C</i>	<i>0.16</i>
<i>920672</i>	<i>AA2-174 E</i>	<i>0.95</i>
<i>930861</i>	<i>AB1-132 C</i>	<i>-13.27</i>
<i>931231</i>	<i>AB1-173 C</i>	<i>6.05</i>
<i>931232</i>	<i>AB1-173 E</i>	<i>2.82</i>
<i>931241</i>	<i>AB1-173AC</i>	<i>6.05</i>

931242	AB1-173AE	2.82
923801	AB2-015 C O1	7.5
923802	AB2-015 E O1	6.15
923911	AB2-031 C O1	6.01
923912	AB2-031 E O1	2.96
923991	AB2-040 C O1	19.72
923992	AB2-040 E O1	16.14
924021	AB2-043 C O1	1.97
924022	AB2-043 E O1	3.23
924161	AB2-060 C O1	5.6
924162	AB2-060 E O1	2.63
924301	AB2-077 C O1	1.26
924302	AB2-077 E O1	0.84
924311	AB2-078 C O1	1.26
924312	AB2-078 E O1	0.84
924321	AB2-079 C O1	1.26
924322	AB2-079 E O1	0.84
924401	AB2-089 C	2.79
924402	AB2-089 E	1.44
924411	AB2-090 C	2.48
924412	AB2-090 E	1.27
924501	AB2-099 C	0.34
924502	AB2-099 E	0.14
925171	AB2-174 C O1	18.83
925172	AB2-174 E O1	17.03
925221	AB2-176 C	1.02

925222	AB2-176 E	0.44
925781	AC1-054 C	10.56
925782	AC1-054 E	4.86
926201	AC1-098 C	5.77
926202	AC1-098 E	3.44
926211	AC1-099 C	1.93
926212	AC1-099 E	1.14
926771	AC1-163 C	1.12
926772	AC1-163 E	0.52
927141	AC1-208 C	13.69
927142	AC1-208 E	6.08

Appendix 4

(DVP - DVP) The 6CLUBHSE 230/115 kV transformer (from bus 314562 to bus 314563 ckt 1) loads from 142.66% to 147.6% (**DC power flow**) of its load dump rating (209 MVA) for the line fault with failed breaker contingency outage of 'DVP_P4-5: T122C'. This project contributes approximately 10.3 MW to the thermal violation.

CONTINGENCY 'DVP_P4-5: T122C'

OPEN BUS 314559

OPEN BUS 315126

OPEN BUS 315128

OPEN BRANCH FROM BUS 314559 TO BUS 314561 CKT 1

END

/* CAROLINA

/* CAROLINA 115KV BUS

/* ROANOKE RAPIDS GEN 1 AND 2

/* ROANOKE RAPIDS GEN 3 AND 4

/* TX. #4

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315150	1BUGGS 1	8.23
315151	1BUGGS 2	8.23
315159	1KERR 2	1.2
315164	1KERR 7	1.18
314572	3EMPORIA	1.99
314704	3LAWRENC	1.36
934201	AD1-047 C	38.12
934202	AD1-047 E	25.41
934231	AD1-050 C	3.55
934232	AD1-050 E	1.94
936261	AD2-033 C	11.57
936262	AD2-033 E	7.71
936361	AD2-046 C O1	7.05
936362	AD2-046 E O1	3.24
936481	AD2-063 C O1	13.69
936482	AD2-063 E O1	9.13
LTF	CARR	0.01

<i>LTF</i>	<i>CBM-S1</i>	<i>0.63</i>
<i>LTF</i>	<i>CBM-S2</i>	<i>0.84</i>
<i>LTF</i>	<i>CBM-W1</i>	<i>1.72</i>
<i>LTF</i>	<i>CBM-W2</i>	<i>3.48</i>
<i>LTF</i>	<i>CIN</i>	<i>0.39</i>
<i>LTF</i>	<i>CPLE</i>	<i>0.21</i>
<i>LTF</i>	<i>G-007</i>	<i>0.1</i>
<i>LTF</i>	<i>IPL</i>	<i>0.25</i>
<i>LTF</i>	<i>LGEE</i>	<i>0.09</i>
<i>LTF</i>	<i>MEC</i>	<i>0.79</i>
<i>LTF</i>	<i>MECS</i>	<i>0.44</i>
<i>LTF</i>	<i>O-066</i>	<i>0.65</i>
<i>LTF</i>	<i>RENSSELAER</i>	<i>< 0.01</i>
<i>LTF</i>	<i>ROSETON</i>	<i>0.06</i>
<i>LTF</i>	<i>WEC</i>	<i>0.11</i>
<i>931231</i>	<i>AB1-173 C</i>	<i>10.72</i>
<i>931232</i>	<i>AB1-173 E</i>	<i>5.</i>
<i>931241</i>	<i>AB1-173AC</i>	<i>10.72</i>
<i>931242</i>	<i>AB1-173AE</i>	<i>5.</i>
<i>923911</i>	<i>AB2-031 C O1</i>	<i>10.64</i>
<i>923912</i>	<i>AB2-031 E O1</i>	<i>5.24</i>
<i>923991</i>	<i>AB2-040 C O1</i>	<i>34.94</i>
<i>923992</i>	<i>AB2-040 E O1</i>	<i>28.59</i>
<i>924021</i>	<i>AB2-043 C O1</i>	<i>3.16</i>
<i>924022</i>	<i>AB2-043 E O1</i>	<i>5.18</i>
<i>924161</i>	<i>AB2-060 C O1</i>	<i>8.96</i>

924162	AB2-060 E O1	4.22
924301	AB2-077 C O1	1.94
924302	AB2-077 E O1	1.29
924311	AB2-078 C O1	1.94
924312	AB2-078 E O1	1.29
924321	AB2-079 C O1	1.94
924322	AB2-079 E O1	1.29
924401	AB2-089 C	1.61
924402	AB2-089 E	0.83
924411	AB2-090 C	3.98
924412	AB2-090 E	2.04
925171	AB2-174 C O1	33.35
925172	AB2-174 E O1	30.18
925221	AB2-176 C	1.64
925222	AB2-176 E	0.7
925611	AC1-036 C	0.76
925612	AC1-036 E	1.25
925781	AC1-054 C	5.42
925782	AC1-054 E	2.5

Appendix 5

(DVP - DVP) The 6CLUBHSE-6SAPONY 230 kV line (from bus 314563 to bus 314435 ckt 1) loads from 127.92% to 128.79% (**DC power flow**) of its load dump rating (637 MVA) for the line fault with failed breaker contingency outage of 'DVP_P4-2: 246T247'. This project contributes approximately 12.23 MW to the thermal violation.

```

CONTINGENCY 'DVP_P4-2: 246T247'                                /* SUFFOLK 230 KV
  OPEN BRANCH FROM BUS 314537 TO BUS 314575 CKT 1              /* 6SUFFOLK
230.00 - 6NUCO TP 230.00
  OPEN BRANCH FROM BUS 314569 TO BUS 314575 CKT 1              /* 6EARLEYS
230.00 - 6NUCO TP 230.00
  OPEN BRANCH FROM BUS 314575 TO BUS 314590 CKT 1              /* 6NUCO TP
230.00 - 6NUCOR 230.00
  OPEN BUS 314575                                                /* ISLAND: 6NUCO TP 230.00
  OPEN BUS 314590                                                /* ISLAND: 6NUCOR 230.00
  OPEN BRANCH FROM BUS 314537 TO BUS 314648 CKT 1              /* 6SUFFOLK
230.00 - 6SUNBURY 230.00
  OPEN BRANCH FROM BUS 314648 TO BUS 901080 CKT 1              /* 6SUNBURY
230.00 - W1-029 230.00
  OPEN BUS 314648                                                /* ISLAND: 6SUNBURY 230.00
END

```

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315150	1BUGGS 1	8.64
315151	1BUGGS 2	8.64
315131	1EDGECEMA	10.81
315132	1EDGECEMB	10.81
315139	1GASTONA	7.18
315141	1GASTONB	7.18
315126	1ROARAP2	2.57
315128	1ROARAP4	2.47
315136	1ROSEMG1	4.85
315138	1ROSEMG2	2.27
315137	1ROSEMS1	3.01

314557	3BETHELC	0.9
314554	3BTLEBRO	0.91
314566	3CRESWEL	1.69
314572	3EMPORIA	1.04
314578	3HORNRTN	5.4
314582	3KELFORD	1.09
314704	3LAWRENC	0.78
314603	3SCOT NK	4.39
314617	3TUNIS	1.
314541	3WATKINS	0.48
314620	6CASHIE	0.87
314574	6EVERETS	2.55
314594	6PLYMOTH	0.72
932631	AC2-084 C	11.81
932632	AC2-084 E	5.82
933991	AD1-023 C	12.48
933992	AD1-023 E	6.8
934201	AD1-047 C	17.56
934202	AD1-047 E	11.71
934231	AD1-050 C	5.08
934232	AD1-050 E	2.78
934331	AD1-057 C O1	15.84
934332	AD1-057 E O1	8.45
934521	AD1-076 C O1	47.19
934522	AD1-076 E O1	24.03
LTF	AD1-120	4.44

<i>LTF</i>	<i>AD1-121</i>	<i>4.42</i>
<i>936261</i>	<i>AD2-033 C</i>	<i>9.73</i>
<i>936262</i>	<i>AD2-033 E</i>	<i>6.49</i>
<i>936361</i>	<i>AD2-046 C O1</i>	<i>8.38</i>
<i>936362</i>	<i>AD2-046 E O1</i>	<i>3.85</i>
<i>936401</i>	<i>AD2-051 C O1</i>	<i>11.34</i>
<i>936402</i>	<i>AD2-051 E O1</i>	<i>4.87</i>
<i>936481</i>	<i>AD2-063 C O1</i>	<i>11.53</i>
<i>936482</i>	<i>AD2-063 E O1</i>	<i>7.68</i>
<i>936531</i>	<i>AD2-068 C</i>	<i>4.92</i>
<i>936532</i>	<i>AD2-068 E</i>	<i>2.53</i>
<i>936701</i>	<i>AD2-089 C</i>	<i>8.13</i>
<i>936702</i>	<i>AD2-089 E</i>	<i>5.42</i>
<i>936711</i>	<i>AD2-090 C O1</i>	<i>5.56</i>
<i>936712</i>	<i>AD2-090 E O1</i>	<i>3.71</i>
<i>LTF</i>	<i>AD2-099</i>	<i>3.35</i>
<i>937441</i>	<i>AD2-195 C</i>	<i>8.63</i>
<i>937442</i>	<i>AD2-195 E</i>	<i>3.72</i>
<i>LTF</i>	<i>CARR</i>	<i>0.12</i>
<i>LTF</i>	<i>CBM-S1</i>	<i>5.43</i>
<i>LTF</i>	<i>CBM-S2</i>	<i>10.9</i>
<i>LTF</i>	<i>CBM-W1</i>	<i>12.02</i>
<i>LTF</i>	<i>CBM-W2</i>	<i>29.4</i>
<i>LTF</i>	<i>CIN</i>	<i>2.7</i>
<i>LTF</i>	<i>CPL</i>	<i>3.68</i>
<i>LTF</i>	<i>G-007</i>	<i>0.77</i>

<i>LTF</i>	<i>IPL</i>	<i>1.72</i>
<i>LTF</i>	<i>LGEE</i>	<i>0.58</i>
<i>LTF</i>	<i>MEC</i>	<i>6.07</i>
<i>LTF</i>	<i>MECS</i>	<i>2.72</i>
<i>LTF</i>	<i>O-066</i>	<i>4.92</i>
<i>LTF</i>	<i>RENSSELAER</i>	<i>0.09</i>
<i>LTF</i>	<i>ROSETON</i>	<i>0.68</i>
<i>900671</i>	<i>V4-068 C</i>	<i>0.11</i>
<i>900672</i>	<i>V4-068 E</i>	<i>0.33</i>
<i>LTF</i>	<i>WEC</i>	<i>0.74</i>
<i>917331</i>	<i>Z2-043 C</i>	<i>0.57</i>
<i>917332</i>	<i>Z2-043 E</i>	<i>1.31</i>
<i>917341</i>	<i>Z2-044 C</i>	<i>0.3</i>
<i>917342</i>	<i>Z2-044 E</i>	<i>0.7</i>
<i>917511</i>	<i>Z2-088 C OP1</i>	<i>1.01</i>
<i>917512</i>	<i>Z2-088 E OP1</i>	<i>4.28</i>
<i>918411</i>	<i>AA1-050</i>	<i>0.85</i>
<i>918491</i>	<i>AA1-063AC OP</i>	<i>2.23</i>
<i>918492</i>	<i>AA1-063AE OP</i>	<i>5.65</i>
<i>918511</i>	<i>AA1-065 C OP</i>	<i>2.12</i>
<i>918512</i>	<i>AA1-065 E OP</i>	<i>5.62</i>
<i>918531</i>	<i>AA1-067 C</i>	<i>0.33</i>
<i>918532</i>	<i>AA1-067 E</i>	<i>0.76</i>
<i>918561</i>	<i>AA1-072 C</i>	<i>0.09</i>
<i>918562</i>	<i>AA1-072 E</i>	<i>0.22</i>
<i>919691</i>	<i>AA2-053 C</i>	<i>2.58</i>

919692	AA2-053 E	5.95
919701	AA2-057 C	1.68
919702	AA2-057 E	4.51
LTF	AA2-074	2.5
920041	AA2-088 C	1.17
920042	AA2-088 E	10.3
920591	AA2-165 C	0.23
920592	AA2-165 E	0.6
920671	AA2-174 C	0.12
920672	AA2-174 E	0.69
920691	AA2-178 C	6.77
920692	AA2-178 E	2.9
930051	AB1-013 C	2.04
930052	AB1-013 E	13.67
930401	AB1-081 C	10.25
930402	AB1-081 E	4.39
930861	AB1-132 C	29.52
930862	AB1-132 E	12.65
931231	AB1-173 C	4.94
931232	AB1-173 E	2.31
931241	AB1-173AC	4.94
931242	AB1-173AE	2.31
923801	AB2-015 C O1	5.47
923802	AB2-015 E O1	4.49
923911	AB2-031 C O1	4.9
923912	AB2-031 E O1	2.41

923941	AB2-035 C	0.38
923942	AB2-035 E	0.16
923991	AB2-040 C O1	16.1
923992	AB2-040 E O1	13.17
924021	AB2-043 C O1	2.67
924022	AB2-043 E O1	4.39
924151	AB2-059 C O1	12.08
924152	AB2-059 E O1	6.22
924161	AB2-060 C O1	7.59
924162	AB2-060 E O1	3.57
924301	AB2-077 C O1	1.68
924302	AB2-077 E O1	1.12
924311	AB2-078 C O1	1.68
924312	AB2-078 E O1	1.12
924321	AB2-079 C O1	1.68
924322	AB2-079 E O1	1.12
924391	AB2-088 C	0.49
924392	AB2-088 E	0.23
924401	AB2-089 C	2.3
924402	AB2-089 E	1.19
924411	AB2-090 C	3.37
924412	AB2-090 E	1.73
924491	AB2-098 C	0.59
924492	AB2-098 E	0.25
924501	AB2-099 C	0.73
924502	AB2-099 E	0.31

924511	AB2-100 C	35.9
924512	AB2-100 E	17.68
925121	AB2-169 C	6.14
925122	AB2-169 E	5.51
925171	AB2-174 C O1	16.16
925172	AB2-174 E O1	14.62
925221	AB2-176 C	1.39
925222	AB2-176 E	0.59
925291	AB2-188 C O1	1.67
925292	AB2-188 E O1	0.75
925591	AC1-034 C	7.83
925592	AC1-034 E	5.9
925611	AC1-036 C	0.64
925612	AC1-036 E	1.04
925781	AC1-054 C	8.28
925782	AC1-054 E	3.81
926071	AC1-086 C	43.47
926072	AC1-086 E	19.78
926201	AC1-098 C	8.28
926202	AC1-098 E	4.94
926211	AC1-099 C	2.78
926212	AC1-099 E	1.63
926771	AC1-163 C	2.41
926772	AC1-163 E	1.13
927021	AC1-189 C	9.38
927022	AC1-189 E	4.67

<i>927141</i>	<i>AC1-208 C</i>	<i>13.11</i>
<i>927142</i>	<i>AC1-208 E</i>	<i>5.82</i>

Appendix 6

(DVP - DVP) The 3COX DP-3CHESTNUT 115 kV line (from bus 314577 to bus 313719 ckt 1) loads from 108.37% to 110.3% (**DC power flow**) of its load dump rating (174 MVA) for the line fault with failed breaker contingency outage of 'DVP_P4-2: 5602'. This project contributes approximately 5.95 MW to the thermal violation.

```

CONTINGENCY 'DVP_P4-2: 5602'                                /* CAROLINA 115 KV
  OPEN BRANCH FROM BUS 313723 TO BUS 314604 CKT 1          /* 3PECAN 115.00 -
3SEABORD 115.00
  OPEN BRANCH FROM BUS 314558 TO BUS 314587 CKT 1          /* 3BOYKINS
115.00 - 3MARGTSV 115.00
  OPEN BRANCH FROM BUS 314587 TO BUS 314604 CKT 1          /* 3MARGTSV
115.00 - 3SEABORD 115.00
  OPEN BUS 314587                                           /* ISLAND: 3MARGTSV 115.00
  OPEN BUS 314604                                           /* ISLAND: 3SEABORD 115.00
  OPEN BRANCH FROM BUS 314559 TO BUS 314571 CKT 1          /* 3CAROLNA
115.00 - 3EATON F 115.00
  OPEN BRANCH FROM BUS 314559 TO BUS 919690 CKT 1          /* 3CAROLNA
115.00 - AA2-053 TAP 115.00
  OPEN BRANCH FROM BUS 314559 TO BUS 314600 CKT 1          /* 3CAROLNA
115.00 - 3PLHITP 115.00
  OPEN BRANCH FROM BUS 314559 TO BUS 314561 CKT 1          /* 3CAROLNA
115.00 - 6CAROLNA 230.00
END
  
```

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315126	1ROARAP2	3.65
315128	1ROARAP4	3.51
314578	3HORNRTN	8.39
314582	3KELFORD	1.13
314603	3SCOT NK	7.6
932631	AC2-084 C	25.37
932632	AC2-084 E	12.49
934231	AD1-050 C	3.79
934232	AD1-050 E	2.07
936361	AD2-046 C O1	4.08

936362	AD2-046 E O1	1.87
936401	AD2-051 C O1	3.96
936402	AD2-051 E O1	1.7
LTF	AMIL	0.06
LTF	BAYOU	0.34
LTF	BIG_CAJUN1	0.54
LTF	BIG_CAJUN2	1.08
LTF	BLUEG	0.33
LTF	CALDERWOOD	0.2
LTF	CANNELTON	0.06
LTF	CARR	< 0.01
LTF	CATAWBA	0.2
LTF	CELEVELAND	0.56
LTF	CHEOAH	0.19
LTF	CHILHOWEE	0.06
LTF	CHOCTAW	0.37
LTF	CLIFTY	1.2
LTF	COTTONWOOD	1.34
LTF	DEARBORN	0.12
LTF	EDWARDS	0.1
LTF	ELMERSMITH	0.19
LTF	FARMERCITY	0.08
LTF	G-007A	0.04
LTF	GIBSON	0.12
LTF	HAMLET	0.85
LTF	MORGAN	0.59

<i>LTF</i>	<i>NEWTON</i>	<i>0.28</i>
<i>LTF</i>	<i>PRAIRIE</i>	<i>0.61</i>
<i>LTF</i>	<i>RENSSELAER</i>	<i>< 0.01</i>
<i>LTF</i>	<i>ROSETON</i>	<i>0.05</i>
<i>LTF</i>	<i>ROWAN</i>	<i>0.4</i>
<i>LTF</i>	<i>SANTEETLA</i>	<i>0.06</i>
<i>LTF</i>	<i>SMITHLAND</i>	<i>0.05</i>
<i>LTF</i>	<i>TATANKA</i>	<i>0.14</i>
<i>LTF</i>	<i>TILTON</i>	<i>0.12</i>
<i>LTF</i>	<i>TRIMBLE</i>	<i>0.06</i>
<i>LTF</i>	<i>TVA</i>	<i>0.25</i>
<i>LTF</i>	<i>UNIONPOWER</i>	<i>0.36</i>
<i>LTF</i>	<i>VFT</i>	<i>0.11</i>
<i>917331</i>	<i>Z2-043 C</i>	<i>0.59</i>
<i>917332</i>	<i>Z2-043 E</i>	<i>1.35</i>
<i>918491</i>	<i>AA1-063AC OP</i>	<i>3.74</i>
<i>918492</i>	<i>AA1-063AE OP</i>	<i>9.48</i>
<i>918561</i>	<i>AA1-072 C</i>	<i>0.09</i>
<i>918562</i>	<i>AA1-072 E</i>	<i>0.23</i>
<i>919692</i>	<i>AA2-053 E</i>	<i>1.7</i>
<i>920672</i>	<i>AA2-174 E</i>	<i>0.2</i>
<i>924401</i>	<i>AB2-089 C</i>	<i>1.72</i>
<i>924402</i>	<i>AB2-089 E</i>	<i>0.88</i>
<i>924501</i>	<i>AB2-099 C</i>	<i>0.24</i>
<i>924502</i>	<i>AB2-099 E</i>	<i>0.1</i>
<i>925781</i>	<i>AC1-054 C</i>	<i>3.55</i>

925782	AC1-054 E	1.64
926201	AC1-098 C	17.79
926202	AC1-098 E	10.6
926211	AC1-099 C	5.96
926212	AC1-099 E	3.5
926771	AC1-163 C	0.8
926772	AC1-163 E	0.37
927141	AC1-208 C	28.81
927142	AC1-208 E	12.79

Appendix 7

(DVP - DVP) The 6BUCKING-6BREMO 230 kV line (from bus 314677 to bus 314747 ckt 1) loads from 102.27% to 103.89% (**DC power flow**) of its emergency rating (572 MVA) for the single line contingency outage of 'DVP_P1-2: LN 556'. This project contributes approximately 9.26 MW to the thermal violation.

CONTINGENCY 'DVP_P1-2: LN 556'

OPEN BRANCH FROM BUS 314686 TO BUS 314906 CKT 1 /* 6CLOVER

230.00 - 8CLOVER 500.00

OPEN BRANCH FROM BUS 314686 TO BUS 314906 CKT 2 /* 6CLOVER

230.00 - 8CLOVER 500.00

OPEN BRANCH FROM BUS 314686 TO BUS 314906 CKT 3 /* 6CLOVER

230.00 - 8CLOVER 500.00

OPEN BRANCH FROM BUS 314906 TO BUS 314936 CKT 1 /* 8CLOVER

500.00 - 8BRAWLINGS 500.00

OPEN BUS 314906 /* ISLAND

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315150	1BUGGS 1	13.15
315151	1BUGGS 2	13.15
315153	1CLOVER1	24.28
315154	1CLOVER2	23.96
315159	1KERR 2	1.57
315164	1KERR 7	1.54
315266	1PLYWOOD A	1.68
314429	3JTRSVLE	1.06
932511	AC2-071 C	9.29
932761	AC2-100 C	3.81
932821	AC2-107 C	8.77
934231	AD1-050 C	4.18
934311	AD1-055 C	2.81
934341	AD1-058 C	4.15

934611	AD1-087 C O1	12.05
934621	AD1-088 C	29.92
LTF	AD1-120	4.52
LTF	AD1-121	4.56
934911	AD1-123 C	1.26
934991	AD1-131 C	1.36
935171	AD1-152 C O1	11.97
935221	AD1-157 C	3.75
935231	AD1-160 C	2.75
936261	AD2-033 C	21.51
936331	AD2-043 C	5.25
936361	AD2-046 C O1	9.26
936481	AD2-063 C O1	23.94
936651	AD2-082 C	4.2
LTF	AD2-099	3.05
937461	AD2-200 C	3.78
937481	AD2-202 C O1	3.32
LTF	CARR	0.16
LTF	CBM-S1	4.94
LTF	CBM-S2	10.59
LTF	CBM-W1	9.89
LTF	CBM-W2	26.29
LTF	CIN	2.23
LTF	CPL	3.41
LTF	IPL	1.42
LTF	LGEE	0.48

<i>LTF</i>	<i>MEC</i>	<i>5.22</i>
<i>LTF</i>	<i>MECS</i>	<i>2.03</i>
<i>LTF</i>	<i>RENSSELAER</i>	<i>0.12</i>
<i>LTF</i>	<i>ROSETON</i>	<i>0.9</i>
<i>LTF</i>	<i>WEC</i>	<i>0.62</i>
<i>LTF</i>	<i>AA2-074</i>	<i>2.32</i>
<i>924021</i>	<i>AB2-043 C O1</i>	<i>4.27</i>
<i>924031</i>	<i>AB2-045 C</i>	<i>1.75</i>
<i>924161</i>	<i>AB2-060 C O1</i>	<i>12.6</i>
<i>924301</i>	<i>AB2-077 C O1</i>	<i>2.66</i>
<i>924311</i>	<i>AB2-078 C O1</i>	<i>2.66</i>
<i>924321</i>	<i>AB2-079 C O1</i>	<i>2.66</i>
<i>924401</i>	<i>AB2-089 C</i>	<i>1.9</i>
<i>924411</i>	<i>AB2-090 C</i>	<i>5.38</i>
<i>925221</i>	<i>AB2-176 C</i>	<i>2.21</i>
<i>925611</i>	<i>AC1-036 C</i>	<i>1.79</i>
<i>925781</i>	<i>AC1-054 C</i>	<i>6.</i>
<i>925831</i>	<i>AC1-062</i>	<i>0.14</i>
<i>925991</i>	<i>AC1-075 C</i>	<i>4.93</i>
<i>926021</i>	<i>AC1-080 C</i>	<i>1.65</i>
<i>926271</i>	<i>AC1-105 C</i>	<i>6.74</i>
<i>926761</i>	<i>AC1-162 C</i>	<i>83.52</i>
<i>927251</i>	<i>AC1-221 C</i>	<i>1.66</i>
<i>927261</i>	<i>AC1-222 C</i>	<i>4.05</i>

Appendix 8

(DVP - DVP) The 6FARMVIL-6BUCKING 230 kV line (from bus 314692 to bus 314677 ckt 1) loads from 103.98% to 105.64% (**DC power flow**) of its emergency rating (559 MVA) for the single line contingency outage of 'DVP_P1-2: LN 556'. This project contributes approximately 9.27 MW to the thermal violation.

CONTINGENCY 'DVP_P1-2: LN 556'

OPEN BRANCH FROM BUS 314686 TO BUS 314906 CKT 1 /* 6CLOVER

230.00 - 8CLOVER 500.00

OPEN BRANCH FROM BUS 314686 TO BUS 314906 CKT 2 /* 6CLOVER

230.00 - 8CLOVER 500.00

OPEN BRANCH FROM BUS 314686 TO BUS 314906 CKT 3 /* 6CLOVER

230.00 - 8CLOVER 500.00

OPEN BRANCH FROM BUS 314906 TO BUS 314936 CKT 1 /* 8CLOVER

500.00 - 8BRAWLINGS 500.00

OPEN BUS 314906 /* ISLAND

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315150	1BUGGS 1	13.15
315151	1BUGGS 2	13.15
315153	1CLOVER1	24.28
315154	1CLOVER2	23.96
315159	1KERR 2	1.57
315164	1KERR 7	1.54
315266	1PLYWOOD A	1.68
314429	3JTRSVLE	1.06
932511	AC2-071 C	-4.01
932761	AC2-100 C	3.81
932821	AC2-107 C	8.78
934231	AD1-050 C	4.18
934311	AD1-055 C	2.81
934341	AD1-058 C	4.15

934611	AD1-087 C O1	12.05
934621	AD1-088 C	29.92
LTF	AD1-120	4.53
LTF	AD1-121	4.56
934911	AD1-123 C	1.26
934991	AD1-131 C	1.36
935171	AD1-152 C O1	11.98
935221	AD1-157 C	3.75
935231	AD1-160 C	2.75
936261	AD2-033 C	21.51
936331	AD2-043 C	5.25
936361	AD2-046 C O1	9.27
936481	AD2-063 C O1	23.95
936651	AD2-082 C	4.21
LTF	AD2-099	3.06
937461	AD2-200 C	3.78
937481	AD2-202 C O1	3.32
LTF	CARR	0.15
LTF	CBM-S1	4.96
LTF	CBM-S2	10.61
LTF	CBM-W1	9.97
LTF	CBM-W2	26.41
LTF	CIN	2.25
LTF	CPL	3.42
LTF	IPL	1.43
LTF	LGEE	0.49

<i>LTF</i>	<i>MEC</i>	5.25
<i>LTF</i>	<i>MECS</i>	2.06
<i>LTF</i>	<i>RENSSELAER</i>	0.12
<i>LTF</i>	<i>ROSETON</i>	0.89
<i>LTF</i>	<i>WEC</i>	0.62
<i>LTF</i>	<i>AA2-074</i>	2.32
924021	AB2-043 C O1	4.27
924161	AB2-060 C O1	12.61
924301	AB2-077 C O1	2.66
924311	AB2-078 C O1	2.66
924321	AB2-079 C O1	2.66
924401	AB2-089 C	1.9
924411	AB2-090 C	5.38
925221	AB2-176 C	2.22
925611	AC1-036 C	1.79
925781	AC1-054 C	6.
925831	AC1-062	0.14
925991	AC1-075 C	4.94
926021	AC1-080 C	1.65
926271	AC1-105 C	6.74
926761	AC1-162 C	83.53
927251	AC1-221 C	1.66
927261	AC1-222 C	4.05

Appendix 9

(DVP - CPLE) The 3KERR-3GW KING TAP 115 kV line (from bus 314702 to bus 304102 ckt 1) loads from 104.6% to 110.45% (**DC power flow**) of its emergency rating (199 MVA) for the line fault with failed breaker contingency outage of 'DVP_P4-5: T122C'. This project contributes approximately 26.17 MW to the thermal violation.

CONTINGENCY 'DVP_P4-5: T122C'

OPEN BUS 314559

OPEN BUS 315126

OPEN BUS 315128

OPEN BRANCH FROM BUS 314559 TO BUS 314561 CKT 1

END

/* CAROLINA

/* CAROLINA 115KV BUS

/* ROANOKE RAPIDS GEN 1 AND 2

/* ROANOKE RAPIDS GEN 3 AND 4

/* TX. #4

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315150	1BUGGS 1	15.37
315151	1BUGGS 2	15.37
315159	1KERR 2	3.45
315163	1KERR 6	3.4
315164	1KERR 7	3.4
934231	AD1-050 C	10.2
934232	AD1-050 E	5.57
935221	AD1-157 C	1.02
935222	AD1-157 E	0.68
935231	AD1-160 C	0.75
935232	AD1-160 E	1.03
936261	AD2-033 C	13.59
936262	AD2-033 E	9.06
936361	AD2-046 C O1	17.93
936362	AD2-046 E O1	8.24
936481	AD2-063 C O1	16.06
936482	AD2-063 E O1	10.71

936651	AD2-082 C	1.15
936652	AD2-082 E	0.56
LTF	AMIL	0.13
LTF	BAYOU	0.7
LTF	BIG_CAJUN1	1.11
LTF	BIG_CAJUN2	2.22
LTF	BLUEG	0.67
LTF	CALDERWOOD	0.42
LTF	CANNELTON	0.13
LTF	CARR	0.01
LTF	CATAWBA	0.43
LTF	CELEVELAND	1.21
LTF	CHEOAH	0.39
LTF	CHILHOWEE	0.13
LTF	CHOCTAW	0.75
LTF	CLIFTY	2.41
LTF	COTTONWOOD	2.74
LTF	DEARBORN	0.25
LTF	EDWARDS	0.21
LTF	ELMERSMITH	0.38
LTF	FARMERCITY	0.17
LTF	G-007A	0.14
LTF	GIBSON	0.23
LTF	HAMLET	1.65
LTF	MORGAN	1.21
LTF	NEWTON	0.57

<i>LTF</i>	<i>PRAIRIE</i>	<i>1.25</i>
<i>LTF</i>	<i>RENSSELAER</i>	<i>< 0.01</i>
<i>LTF</i>	<i>ROSETON</i>	<i>0.07</i>
<i>LTF</i>	<i>ROWAN</i>	<i>0.92</i>
<i>LTF</i>	<i>SANTEETLA</i>	<i>0.12</i>
<i>LTF</i>	<i>SMITHLAND</i>	<i>0.11</i>
<i>LTF</i>	<i>TATANKA</i>	<i>0.28</i>
<i>LTF</i>	<i>TILTON</i>	<i>0.25</i>
<i>LTF</i>	<i>TRIMBLE</i>	<i>0.13</i>
<i>LTF</i>	<i>TVA</i>	<i>0.51</i>
<i>LTF</i>	<i>UNIONPOWER</i>	<i>0.76</i>
<i>LTF</i>	<i>VFT</i>	<i>0.37</i>
<i>924021</i>	<i>AB2-043 C O1</i>	<i>3.7</i>
<i>924022</i>	<i>AB2-043 E O1</i>	<i>6.07</i>
<i>924161</i>	<i>AB2-060 C O1</i>	<i>10.52</i>
<i>924162</i>	<i>AB2-060 E O1</i>	<i>4.95</i>
<i>924301</i>	<i>AB2-077 C O1</i>	<i>2.39</i>
<i>924302</i>	<i>AB2-077 E O1</i>	<i>1.59</i>
<i>924311</i>	<i>AB2-078 C O1</i>	<i>2.39</i>
<i>924312</i>	<i>AB2-078 E O1</i>	<i>1.59</i>
<i>924321</i>	<i>AB2-079 C O1</i>	<i>2.39</i>
<i>924322</i>	<i>AB2-079 E O1</i>	<i>1.59</i>
<i>924401</i>	<i>AB2-089 C</i>	<i>4.63</i>
<i>924402</i>	<i>AB2-089 E</i>	<i>2.38</i>
<i>924411</i>	<i>AB2-090 C</i>	<i>4.66</i>
<i>924412</i>	<i>AB2-090 E</i>	<i>2.39</i>

925221	<i>AB2-176 C</i>	<i>1.92</i>
925222	<i>AB2-176 E</i>	<i>0.82</i>
925611	<i>AC1-036 C</i>	<i>0.9</i>
925612	<i>AC1-036 E</i>	<i>1.47</i>
925781	<i>AC1-054 C</i>	<i>15.59</i>
925782	<i>AC1-054 E</i>	<i>7.18</i>
926271	<i>AC1-105 C</i>	<i>2.93</i>
926272	<i>AC1-105 E</i>	<i>1.46</i>

Appendix 10

(DVP - DVP) The AC1-208 TAP-3SO JUSTICE 115 kV line (from bus 927140 to bus 313858 ckt 1) loads from 103.25% to 105.27% (**DC power flow**) of its load dump rating (202 MVA) for the line fault with failed breaker contingency outage of 'DVP_P4-2: 5602'. This project contributes approximately 9.01 MW to the thermal violation.

```
CONTINGENCY 'DVP_P4-2: 5602'                               /* CAROLINA 115 KV
  OPEN BRANCH FROM BUS 313723 TO BUS 314604 CKT 1          /* 3PECAN 115.00 -
3SEABORD 115.00
  OPEN BRANCH FROM BUS 314558 TO BUS 314587 CKT 1          /* 3BOYKINS
115.00 - 3MARGTSV 115.00
  OPEN BRANCH FROM BUS 314587 TO BUS 314604 CKT 1          /* 3MARGTSV
115.00 - 3SEABORD 115.00
  OPEN BUS 314587                                           /* ISLAND: 3MARGTSV 115.00
  OPEN BUS 314604                                           /* ISLAND: 3SEABORD 115.00
  OPEN BRANCH FROM BUS 314559 TO BUS 314571 CKT 1          /* 3CAROLNA
115.00 - 3EATON F 115.00
  OPEN BRANCH FROM BUS 314559 TO BUS 919690 CKT 1          /* 3CAROLNA
115.00 - AA2-053 TAP 115.00
  OPEN BRANCH FROM BUS 314559 TO BUS 314600 CKT 1          /* 3CAROLNA
115.00 - 3PLHITP 115.00
  OPEN BRANCH FROM BUS 314559 TO BUS 314561 CKT 1          /* 3CAROLNA
115.00 - 6CAROLNA 230.00
END
```

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315150	1BUGGS 1	5.33
315151	1BUGGS 2	5.33
315159	1KERR 2	1.19
315164	1KERR 7	1.17
315126	1ROARAP2	5.31
315128	1ROARAP4	5.11
314578	3HORNRTN	12.22
934231	AD1-050 C	5.63
934232	AD1-050 E	3.07
936361	AD2-046 C O1	6.17

936362	AD2-046 E O1	2.84
<i>LTF</i>	<i>AMIL</i>	<i>0.01</i>
<i>LTF</i>	<i>BAYOU</i>	<i>0.07</i>
<i>LTF</i>	<i>BIG_CAJUN1</i>	<i>0.1</i>
<i>LTF</i>	<i>BIG_CAJUN2</i>	<i>0.21</i>
<i>LTF</i>	<i>BLUEG</i>	<i>0.06</i>
<i>LTF</i>	<i>CALDERWOOD</i>	<i>0.03</i>
<i>LTF</i>	<i>CANNELTON</i>	<i>0.01</i>
<i>LTF</i>	<i>CARR</i>	<i>0.02</i>
<i>LTF</i>	<i>CATAWBA</i>	<i>0.04</i>
<i>LTF</i>	<i>CELEVELAND</i>	<i>0.1</i>
<i>LTF</i>	<i>CHEOAH</i>	<i>0.03</i>
<i>LTF</i>	<i>CHILHOWEE</i>	<i>0.01</i>
<i>LTF</i>	<i>CHOCTAW</i>	<i>0.07</i>
<i>LTF</i>	<i>CLIFTY</i>	<i>0.21</i>
<i>LTF</i>	<i>COTTONWOOD</i>	<i>0.25</i>
<i>LTF</i>	<i>DEARBORN</i>	<i>0.03</i>
<i>LTF</i>	<i>EDWARDS</i>	<i>0.02</i>
<i>LTF</i>	<i>ELMERSMITH</i>	<i>0.03</i>
<i>LTF</i>	<i>FARMERCITY</i>	<i>0.02</i>
<i>LTF</i>	<i>G-007</i>	<i>0.07</i>
<i>LTF</i>	<i>GIBSON</i>	<i>0.02</i>
<i>LTF</i>	<i>HAMLET</i>	<i>0.22</i>
<i>LTF</i>	<i>MORGAN</i>	<i>0.11</i>
<i>LTF</i>	<i>NEWTON</i>	<i>0.05</i>
<i>LTF</i>	<i>O-066</i>	<i>0.45</i>

<i>LTF</i>	<i>PRAIRIE</i>	<i>0.11</i>
<i>LTF</i>	<i>RENSSELAER</i>	<i>0.02</i>
<i>LTF</i>	<i>ROSETON</i>	<i>0.12</i>
<i>LTF</i>	<i>ROWAN</i>	<i>0.05</i>
<i>LTF</i>	<i>SANTEETLA</i>	<i>< 0.01</i>
<i>LTF</i>	<i>SMITHLAND</i>	<i>< 0.01</i>
<i>LTF</i>	<i>TATANKA</i>	<i>0.03</i>
<i>LTF</i>	<i>TILTON</i>	<i>0.02</i>
<i>LTF</i>	<i>TRIMBLE</i>	<i>0.01</i>
<i>LTF</i>	<i>TVA</i>	<i>0.04</i>
<i>LTF</i>	<i>UNIONPOWER</i>	<i>0.06</i>
<i>918491</i>	<i>AA1-063AC OP</i>	<i>5.44</i>
<i>918492</i>	<i>AA1-063AE OP</i>	<i>13.8</i>
<i>924021</i>	<i>AB2-043 C O1</i>	<i>1.27</i>
<i>924022</i>	<i>AB2-043 E O1</i>	<i>2.08</i>
<i>924161</i>	<i>AB2-060 C O1</i>	<i>3.6</i>
<i>924162</i>	<i>AB2-060 E O1</i>	<i>1.69</i>
<i>924301</i>	<i>AB2-077 C O1</i>	<i>0.82</i>
<i>924302</i>	<i>AB2-077 E O1</i>	<i>0.54</i>
<i>924311</i>	<i>AB2-078 C O1</i>	<i>0.82</i>
<i>924312</i>	<i>AB2-078 E O1</i>	<i>0.54</i>
<i>924321</i>	<i>AB2-079 C O1</i>	<i>0.82</i>
<i>924322</i>	<i>AB2-079 E O1</i>	<i>0.54</i>
<i>924401</i>	<i>AB2-089 C</i>	<i>2.55</i>
<i>924402</i>	<i>AB2-089 E</i>	<i>1.31</i>
<i>924411</i>	<i>AB2-090 C</i>	<i>1.59</i>

924412	AB2-090 E	0.82
925221	AB2-176 C	0.66
925222	AB2-176 E	0.28
925781	AC1-054 C	5.37
925782	AC1-054 E	2.47
927141	AC1-208 C	41.85
927142	AC1-208 E	18.58

Appendix 11

(DVP - CPLE) The AC1-221 TAP-6PERSON230 T 230 kV line (from bus 927250 to bus 304070 ckt 1) loads from 100.09% to 101.21% (**DC power flow**) of its emergency rating (718 MVA) for the single line contingency outage of 'DVP_P1-2: LN 556'. This project contributes approximately 8.56 MW to the thermal violation.

CONTINGENCY 'DVP_P1-2: LN 556'

OPEN BRANCH FROM BUS 314686 TO BUS 314906 CKT 1 /* 6CLOVER

230.00 - 8CLOVER 500.00

OPEN BRANCH FROM BUS 314686 TO BUS 314906 CKT 2 /* 6CLOVER

230.00 - 8CLOVER 500.00

OPEN BRANCH FROM BUS 314686 TO BUS 314906 CKT 3 /* 6CLOVER

230.00 - 8CLOVER 500.00

OPEN BRANCH FROM BUS 314906 TO BUS 314936 CKT 1 /* 8CLOVER

500.00 - 8BRAWLINGS 500.00

OPEN BUS 314906 /* ISLAND

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315150	1BUGGS 1	17.67
315151	1BUGGS 2	17.67
315153	1CLOVER1	42.46
315154	1CLOVER2	41.91
315159	1KERR 2	1.41
315164	1KERR 7	1.39
315266	1PLYWOOD A	3.72
314429	3JTRSVLE	0.61
932511	AC2-071 C	2.43
932761	AC2-100 C	26.97
932821	AC2-107 C	21.11
934311	AD1-055 C	6.99
934341	AD1-058 C	29.38
934611	AD1-087 C O1	26.89

934621	AD1-088 C	31.8
934911	AD1-123 C	3.15
934991	AD1-131 C	9.63
935171	AD1-152 C O1	26.72
935221	AD1-157 C	2.12
935231	AD1-160 C	1.56
936261	AD2-033 C	17.89
936331	AD2-043 C	13.04
936361	AD2-046 C O1	8.56
936481	AD2-063 C O1	20.59
936651	AD2-082 C	2.38
937461	AD2-200 C	4.02
937481	AD2-202 C O1	7.4
LTF	AMIL	0.46
LTF	BAYOU	2.62
LTF	BIG_CAJUN1	4.14
LTF	BIG_CAJUN2	8.34
LTF	BLUEG	2.31
LTF	CALDERWOOD	1.58
LTF	CANNELTON	0.45
LTF	CARR	0.04
LTF	CATAWBA	1.7
LTF	CELEVELAND	4.82
LTF	CHEOAH	1.48
LTF	CHILHOWEE	0.51
LTF	CHOCTAW	2.83

<i>LTF</i>	<i>CLIFTY</i>	<i>8.11</i>
<i>LTF</i>	<i>COTTONWOOD</i>	<i>10.23</i>
<i>LTF</i>	<i>DEARBORN</i>	<i>0.83</i>
<i>LTF</i>	<i>EDWARDS</i>	<i>0.73</i>
<i>LTF</i>	<i>ELMERSMITH</i>	<i>1.33</i>
<i>LTF</i>	<i>FARMERCITY</i>	<i>0.6</i>
<i>LTF</i>	<i>G-007A</i>	<i>0.4</i>
<i>LTF</i>	<i>GIBSON</i>	<i>0.82</i>
<i>LTF</i>	<i>HAMLET</i>	<i>6.39</i>
<i>LTF</i>	<i>MORGAN</i>	<i>4.56</i>
<i>LTF</i>	<i>NEWTON</i>	<i>2.03</i>
<i>LTF</i>	<i>PRAIRIE</i>	<i>4.5</i>
<i>LTF</i>	<i>RENSSELAER</i>	<i>0.03</i>
<i>LTF</i>	<i>ROSETON</i>	<i>0.22</i>
<i>LTF</i>	<i>ROWAN</i>	<i>3.76</i>
<i>LTF</i>	<i>SANTEETLA</i>	<i>0.44</i>
<i>LTF</i>	<i>SMITHLAND</i>	<i>0.41</i>
<i>LTF</i>	<i>TATANKA</i>	<i>1.</i>
<i>LTF</i>	<i>TILTON</i>	<i>0.86</i>
<i>LTF</i>	<i>TRIMBLE</i>	<i>0.44</i>
<i>LTF</i>	<i>TVA</i>	<i>1.9</i>
<i>LTF</i>	<i>UNIONPOWER</i>	<i>2.99</i>
<i>LTF</i>	<i>VFT</i>	<i>1.05</i>
<i>924021</i>	<i>AB2-043 C O1</i>	<i>4.29</i>
<i>924031</i>	<i>AB2-045 C</i>	<i>0.46</i>
<i>924161</i>	<i>AB2-060 C O1</i>	<i>12.36</i>

924301	AB2-077 C O1	2.76
924311	AB2-078 C O1	2.76
924321	AB2-079 C O1	2.76
924411	AB2-090 C	5.4
925221	AB2-176 C	2.22
925611	AC1-036 C	1.32
925831	AC1-062	0.08
925991	AC1-075 C	11.87
926021	AC1-080 C	3.97
926271	AC1-105 C	14.48
926761	AC1-162 C	56.7
927251	AC1-221 C	11.72
927261	AC1-222 C	10.07

Appendix 12

(DVP - DVP) The AD1-057 TAP-6MORNSTR 230 kV line (from bus 934330 to bus 313845 ckt 1) loads from 101.22% to 101.68% (**DC power flow**) of its load dump rating (541 MVA) for the tower line contingency outage of 'DVP_P7-1: LN 54-2012_B'. This project contributes approximately 5.5 MW to the thermal violation.

CONTINGENCY 'DVP_P7-1: LN 54-2012_B'

OPEN BRANCH FROM BUS 919690 TO BUS 314581 CKT 1 /* AA2-053 TAP
115.00 - 3JACKSON 115.00
OPEN BRANCH FROM BUS 314581 TO BUS 314626 CKT 1 /* 3JACKSON
115.00 - 3WOODLND 115.00
OPEN BRANCH FROM BUS 314625 TO BUS 314626 CKT 1 /* 3AULANDR
115.00 - 3WOODLND 115.00
OPEN BUS 314581 /* ISLAND
OPEN BUS 314625 /* ISLAND
OPEN BUS 314626 /* ISLAND
OPEN BRANCH FROM BUS 314266 TO BUS 314569 CKT 1 /*
6NORTHAMPTON230.00 - 6EARLEYS 230.00
OPEN BRANCH FROM BUS 314266 TO BUS 314599 CKT 1 /*
6NORTHAMPTON230.00 - 6ROA VAL 230.00
OPEN BUS 314266 /* ISLAND
END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315139	1GASTONA	7.36
315141	1GASTONB	7.36
315126	1ROARAP2	1.74
315128	1ROARAP4	1.68
315136	1ROSEMG1	6.07
315138	1ROSEMG2	2.84
315137	1ROSEMS1	3.76
314572	3EMPORIA	0.47
314578	3HORNRTN	3.18
314704	3LAWRENC	0.33
934201	AD1-047 C	9.

934202	AD1-047 E	6.
934231	AD1-050 C	2.6
934232	AD1-050 E	1.42
934331	AD1-057 C O1	36.49
934332	AD1-057 E O1	19.46
936361	AD2-046 C O1	3.77
936362	AD2-046 E O1	1.73
936711	AD2-090 C O1	2.91
936712	AD2-090 E O1	1.94
LTF	AMIL	0.32
LTF	BAYOU	1.71
LTF	BIG_CAJUN1	2.7
LTF	BIG_CAJUN2	5.42
LTF	BLUEG	1.66
LTF	CALDERWOOD	1.
LTF	CANNELTON	0.32
LTF	CARR	< 0.01
LTF	CATAWBA	0.99
LTF	CELEVELAND	2.8
LTF	CHEOAH	0.94
LTF	CHILHOWEE	0.33
LTF	CHOCTAW	1.84
LTF	CLIFTY	6.05
LTF	COTTONWOOD	6.69
LTF	DEARBORN	0.6
LTF	EDWARDS	0.52

<i>LTF</i>	<i>ELMERSMITH</i>	<i>0.94</i>
<i>LTF</i>	<i>FARMERCITY</i>	<i>0.41</i>
<i>LTF</i>	<i>G-007A</i>	<i>0.62</i>
<i>LTF</i>	<i>GIBSON</i>	<i>0.58</i>
<i>LTF</i>	<i>HAMLET</i>	<i>4.07</i>
<i>LTF</i>	<i>MORGAN</i>	<i>2.96</i>
<i>LTF</i>	<i>NEWTON</i>	<i>1.42</i>
<i>LTF</i>	<i>PRAIRIE</i>	<i>3.08</i>
<i>LTF</i>	<i>RENSSELAER</i>	<i>< 0.01</i>
<i>LTF</i>	<i>ROSETON</i>	<i>0.01</i>
<i>LTF</i>	<i>ROWAN</i>	<i>2.02</i>
<i>LTF</i>	<i>SANTEETLA</i>	<i>0.28</i>
<i>LTF</i>	<i>SMITHLAND</i>	<i>0.27</i>
<i>LTF</i>	<i>TATANKA</i>	<i>0.69</i>
<i>LTF</i>	<i>TILTON</i>	<i>0.61</i>
<i>LTF</i>	<i>TRIMBLE</i>	<i>0.32</i>
<i>LTF</i>	<i>TVA</i>	<i>1.24</i>
<i>LTF</i>	<i>UNIONPOWER</i>	<i>1.79</i>
<i>LTF</i>	<i>VFT</i>	<i>1.66</i>
<i>918491</i>	<i>AA1-063AC OP</i>	<i>1.39</i>
<i>918492</i>	<i>AA1-063AE OP</i>	<i>3.53</i>
<i>919691</i>	<i>AA2-053 C</i>	<i>1.84</i>
<i>919692</i>	<i>AA2-053 E</i>	<i>4.25</i>
<i>920042</i>	<i>AA2-088 E</i>	<i>5.1</i>
<i>920671</i>	<i>AA2-174 C</i>	<i>0.08</i>
<i>920672</i>	<i>AA2-174 E</i>	<i>0.49</i>

930861	AB1-132 C	30.23
930862	AB1-132 E	12.96
931231	AB1-173 C	2.53
931232	AB1-173 E	1.18
931241	AB1-173AC	2.53
931242	AB1-173AE	1.18
923851	AB2-025 C	0.31
923852	AB2-025 E	0.76
923911	AB2-031 C O1	2.51
923912	AB2-031 E O1	1.24
923991	AB2-040 C O1	8.25
923992	AB2-040 E O1	6.75
924401	AB2-089 C	1.18
924402	AB2-089 E	0.61
924511	AB2-100 C	15.32
924512	AB2-100 E	7.54
925171	AB2-174 C O1	7.86
925172	AB2-174 E O1	7.11
925781	AC1-054 C	4.46
925782	AC1-054 E	2.05
926071	AC1-086 C	44.52
926072	AC1-086 E	20.26

Appendix 13

(AEP - AEP) The 05EDAN 1-05DANVL2 138 kV line (from bus 242631 to bus 242620 ckt 1) loads from 133.15% to 133.76% (**DC power flow**) of its emergency rating (415 MVA) for the line fault with failed breaker contingency outage of 'AEP_P4_#7589_05J.FERR 765'. This project contributes approximately 5.6 MW to the thermal violation.

CONTINGENCY 'AEP_P4_#7589_05J.FERR 765'

OPEN BRANCH FROM BUS 242514 TO BUS 242520 CKT 1 / 242514 05J.FERR
765 242520 05J.FERR 500 1

OPEN BRANCH FROM BUS 242514 TO BUS 242684 CKT 2 / 242514 05J.FERR
765 242684 05J.FERR 138 2

OPEN BRANCH FROM BUS 242520 TO BUS 306719 CKT 1 / 242520 05J.FERR
500 306719 8ANTIOCH 500 1

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
244012	05PINNACLE	-2.08
315150	1BUGGS 1	4.75
315151	1BUGGS 2	4.75
315131	1EDGECEMA	4.26
315132	1EDGECEMB	4.26
314557	3BETHEL C	0.35
314554	3BTLEBRO	0.37
314572	3EMPORIA	0.14
314578	3HORNRTN	1.22
314582	3KELFORD	0.3
314603	3SCOT NK	1.24
314617	3TUNIS	0.28
314620	6CASHIE	0.27
314574	6EVERETS	0.98
314594	6PLYMOTH	0.26

932631	AC2-084 C	3.43
932632	AC2-084 E	1.69
932701	AC2-093 C	24.45
932702	AC2-093 E	13.99
932761	AC2-100 C	3.67
932762	AC2-100 E	1.79
932821	AC2-107 C	3.49
932822	AC2-107 E	1.63
933941	AD1-017 C	0.84
933942	AD1-017 E	1.37
933991	AD1-023 C	4.11
933992	AD1-023 E	2.24
934201	AD1-047 C	2.75
934202	AD1-047 E	1.83
934231	AD1-050 C	2.02
934232	AD1-050 E	1.1
934311	AD1-055 C	1.07
934312	AD1-055 E	0.28
934331	AD1-057 C O1	4.11
934332	AD1-057 E O1	2.19
934341	AD1-058 C	3.99
934342	AD1-058 E	1.01
934521	AD1-076 C O1	16.75
934522	AD1-076 E O1	8.53
934611	AD1-087 C O1	3.38
934612	AD1-087 E O1	1.59

934621	AD1-088 C	4.01
934622	AD1-088 E	1.88
LTF	AD1-120	7.56
LTF	AD1-121	7.62
934911	AD1-123 C	0.47
934912	AD1-123 E	0.24
934991	AD1-131 C	1.31
934992	AD1-131 E	0.87
935171	AD1-152 C O1	3.36
935172	AD1-152 E O1	2.24
935221	AD1-157 C	0.46
935222	AD1-157 E	0.31
935231	AD1-160 C	0.34
935232	AD1-160 E	0.47
936161	AD2-022 C O1	10.78
936162	AD2-022 E O1	6.47
936171	AD2-023 C O1	6.2
936172	AD2-023 E O1	3.37
936261	AD2-033 C	4.76
936262	AD2-033 E	3.17
936331	AD2-043 C	2.
936332	AD2-043 E	2.37
936361	AD2-046 C O1	3.84
936362	AD2-046 E O1	1.76
936401	AD2-051 C O1	2.97
936402	AD2-051 E O1	1.27

936481	AD2-063 C O1	5.55
936482	AD2-063 E O1	3.7
936531	AD2-068 C	2.28
936532	AD2-068 E	1.17
936641	AD2-081 C	2.56
936642	AD2-081 E	1.15
936651	AD2-082 C	0.52
936652	AD2-082 E	0.25
936701	AD2-089 C	3.17
936702	AD2-089 E	2.12
936711	AD2-090 C O1	2.13
936712	AD2-090 E O1	1.42
LTF	AD2-099	4.99
937441	AD2-195 C	3.15
937442	AD2-195 E	1.36
937461	AD2-200 C	0.51
937462	AD2-200 E	0.24
937481	AD2-202 C O1	0.93
937482	AD2-202 E O1	0.47
LTF	AMIL	0.17
LTF	BLUEG	2.05
LTF	CANNELTON	0.27
LTF	CARR	0.07
LTF	CBM-S1	1.16
LTF	CBM-S2	16.95
LTF	CBM-W2	3.27

<i>LTF</i>	<i>CLIFTY</i>	<i>10.69</i>
<i>LTF</i>	<i>CPL</i>	<i>5.58</i>
<i>LTF</i>	<i>DEARBORN</i>	<i>0.97</i>
<i>LTF</i>	<i>EDWARDS</i>	<i>0.44</i>
<i>LTF</i>	<i>ELMERSMITH</i>	<i>0.7</i>
<i>LTF</i>	<i>FARMERCITY</i>	<i>0.12</i>
<i>LTF</i>	<i>G-007A</i>	<i>0.82</i>
<i>LTF</i>	<i>GIBSON</i>	<i>0.58</i>
<i>LTF</i>	<i>NEWTON</i>	<i>0.95</i>
<i>LTF</i>	<i>PRAIRIE</i>	<i>0.83</i>
<i>LTF</i>	<i>RENSSELAER</i>	<i>0.05</i>
<i>LTF</i>	<i>ROSETON</i>	<i>0.36</i>
<i>LTF</i>	<i>TATANKA</i>	<i>0.33</i>
<i>LTF</i>	<i>TILTON</i>	<i>0.6</i>
<i>LTF</i>	<i>TRIMBLE</i>	<i>0.4</i>
<i>900672</i>	<i>V4-068 E</i>	<i>0.1</i>
<i>LTF</i>	<i>VFT</i>	<i>2.17</i>
<i>917332</i>	<i>Z2-043 E</i>	<i>0.36</i>
<i>917342</i>	<i>Z2-044 E</i>	<i>0.26</i>
<i>917512</i>	<i>Z2-088 E OP1</i>	<i>1.67</i>
<i>918492</i>	<i>AA1-063AE OP</i>	<i>1.37</i>
<i>918512</i>	<i>AA1-065 E OP</i>	<i>1.46</i>
<i>918532</i>	<i>AA1-067 E</i>	<i>0.29</i>
<i>918562</i>	<i>AA1-072 E</i>	<i>0.06</i>
<i>919692</i>	<i>AA2-053 E</i>	<i>1.33</i>
<i>919702</i>	<i>AA2-057 E</i>	<i>1.51</i>

<i>LTF</i>	<i>AA2-074</i>	<i>3.79</i>
<i>920042</i>	<i>AA2-088 E</i>	<i>3.28</i>
<i>920592</i>	<i>AA2-165 E</i>	<i>0.2</i>
<i>920672</i>	<i>AA2-174 E</i>	<i>0.15</i>
<i>930401</i>	<i>AB1-081 C</i>	<i>4.1</i>
<i>930402</i>	<i>AB1-081 E</i>	<i>1.76</i>
<i>930861</i>	<i>AB1-132 C</i>	<i>4.94</i>
<i>930862</i>	<i>AB1-132 E</i>	<i>2.12</i>
<i>931231</i>	<i>AB1-173 C</i>	<i>0.77</i>
<i>931232</i>	<i>AB1-173 E</i>	<i>0.36</i>
<i>931241</i>	<i>AB1-173AC</i>	<i>0.77</i>
<i>931242</i>	<i>AB1-173AE</i>	<i>0.36</i>
<i>923911</i>	<i>AB2-031 C O1</i>	<i>0.77</i>
<i>923912</i>	<i>AB2-031 E O1</i>	<i>0.38</i>
<i>923941</i>	<i>AB2-035 C</i>	<i>0.15</i>
<i>923942</i>	<i>AB2-035 E</i>	<i>0.06</i>
<i>923991</i>	<i>AB2-040 C O1</i>	<i>2.52</i>
<i>923992</i>	<i>AB2-040 E O1</i>	<i>2.06</i>
<i>924021</i>	<i>AB2-043 C O1</i>	<i>1.22</i>
<i>924022</i>	<i>AB2-043 E O1</i>	<i>2.</i>
<i>924151</i>	<i>AB2-059 C O1</i>	<i>4.83</i>
<i>924152</i>	<i>AB2-059 E O1</i>	<i>2.49</i>
<i>924161</i>	<i>AB2-060 C O1</i>	<i>3.48</i>
<i>924162</i>	<i>AB2-060 E O1</i>	<i>1.64</i>
<i>924301</i>	<i>AB2-077 C O1</i>	<i>0.78</i>
<i>924302</i>	<i>AB2-077 E O1</i>	<i>0.52</i>

924311	AB2-078 C O1	0.78
924312	AB2-078 E O1	0.52
924321	AB2-079 C O1	0.78
924322	AB2-079 E O1	0.52
924391	AB2-088 C	0.19
924392	AB2-088 E	0.09
924401	AB2-089 C	0.91
924402	AB2-089 E	0.47
924411	AB2-090 C	1.53
924412	AB2-090 E	0.79
924491	AB2-098 C	0.23
924492	AB2-098 E	0.1
924501	AB2-099 C	0.2
924502	AB2-099 E	0.08
924511	AB2-100 C	3.51
924512	AB2-100 E	1.73
925121	AB2-169 C	2.27
925122	AB2-169 E	2.03
925171	AB2-174 C O1	2.38
925172	AB2-174 E O1	2.16
925221	AB2-176 C	0.63
925222	AB2-176 E	0.27
925591	AC1-034 C	3.13
925592	AC1-034 E	2.36
925611	AC1-036 C	0.33
925612	AC1-036 E	0.54

925781	AC1-054 C	3.04
925782	AC1-054 E	1.4
925991	AC1-075 C	1.96
925992	AC1-075 E	1.11
926021	AC1-080 C	0.66
926022	AC1-080 E	0.37
926051	AC1-083 C	4.18
926052	AC1-083 E	6.83
926071	AC1-086 C	7.28
926072	AC1-086 E	3.31
926201	AC1-098 C	2.4
926202	AC1-098 E	1.43
926211	AC1-099 C	0.81
926212	AC1-099 E	0.47
926271	AC1-105 C	2.39
926272	AC1-105 E	1.19
926771	AC1-163 C	0.65
926772	AC1-163 E	0.3
927021	AC1-189 C	3.63
927022	AC1-189 E	1.81
927141	AC1-208 C	3.55
927142	AC1-208 E	1.58
927251	AC1-221 C	1.59
927252	AC1-221 E	1.59
927261	AC1-222 C	1.54
927262	AC1-222 E	1.47

Attachment 3.

Flowgate Appendices – Option 2

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. All New Service Queue Requests, through the end of the Queue under study, that are contributors to a flowgate will be listed in the Appendices. Please note that there may be contributors that are subsequently queued after the queue under study that are not listed in the Appendices. Although this information is not used "as is" for cost allocation purposes, it can be used to gauge the impact of other projects/generators.

It should be noted the project/generator MW contributions presented in the body of the report and appendices sections are full contributions, whereas the loading percentages reported in the body of the report, take into consideration the commercial probability of each project as well as the ramping impact of "Adder" contributions.

Appendix 1

(DVP - DVP) The 6BREMIST-6MTEAGLE 230 kV line (from bus 313867 to bus 314765 ckt 1) loads from 99.41% to 100.21% (**DC power flow**) of its emergency rating (662 MVA) for the single line contingency outage of 'DVP_P1-2: LN 2027-A'. This project contributes approximately 5.61 MW to the thermal violation.

CONTINGENCY 'DVP_P1-2: LN 2027-A'

OPEN BRANCH FROM BUS 314310 TO BUS 314322 CKT 1 /* 6JUDES F 230.00
- 6MDLTHAN 230.00

OPEN BRANCH FROM BUS 314310 TO BUS 314333 CKT 1 /* 6JUDES F 230.00
- 6POWHATN 230.00

OPEN BRANCH FROM BUS 314333 TO BUS 933500 CKT 1 /* 6POWHATN
230.00 - AC2-165 TAP 230.00

OPEN BUS 314310 /* ISLAND

OPEN BUS 314333 /* ISLAND

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315191	1BEARGRDN G1	15.61
315192	1BEARGRDN G2	15.61
315193	1BEARGRDN S1	32.13
315170	1BREMO 3	29.99
315171	1BREMO 4	65.89
315150	1BUGGS 1	7.21
315151	1BUGGS 2	7.21
315153	1CLOVER1	8.06
315154	1CLOVER2	7.95
315159	1KERR 2	0.92
315164	1KERR 7	0.9
314429	3JTRSVLE	0.66
932511	AC2-071 C	6.19
933501	AC2-165 C	37.8
934231	AD1-050 C	2.5

934611	AD1-087 C O1	4.26
934621	AD1-088 C	14.58
934911	AD1-123 C	0.55
935171	AD1-152 C O1	4.23
935221	AD1-157 C	2.33
935231	AD1-160 C	1.71
936261	AD2-033 C	12.87
936361	AD2-046 C O2	5.61
936481	AD2-063 C O2	17.45
936651	AD2-082 C	2.61
937461	AD2-200 C	1.84
937481	AD2-202 C O2	1.47
LTF	CARR	0.22
LTF	CBM-S1	2.63
LTF	CBM-S2	6.62
LTF	CBM-W1	3.53
LTF	CBM-W2	13.37
LTF	CIN	0.84
LTF	CPL	2.16
LTF	IPL	0.53
LTF	LGEE	0.19
LTF	MEC	2.3
LTF	MECS	0.32
LTF	RENSSELAER	0.18
LTF	ROSETON	1.29
LTF	WEC	0.23

<i>LTF</i>	<i>AA2-074</i>	<i>1.47</i>
<i>920291</i>	<i>AA2-127</i>	<i>3.42</i>
<i>924021</i>	<i>AB2-043 C O1</i>	<i>2.49</i>
<i>924031</i>	<i>AB2-045 C</i>	<i>1.17</i>
<i>924161</i>	<i>AB2-060 C O1</i>	<i>7.38</i>
<i>924301</i>	<i>AB2-077 C O1</i>	<i>1.54</i>
<i>924311</i>	<i>AB2-078 C O1</i>	<i>1.54</i>
<i>924321</i>	<i>AB2-079 C O1</i>	<i>1.54</i>
<i>924401</i>	<i>AB2-089 C</i>	<i>1.13</i>
<i>924411</i>	<i>AB2-090 C</i>	<i>3.14</i>
<i>925221</i>	<i>AB2-176 C</i>	<i>1.29</i>
<i>925611</i>	<i>AC1-036 C</i>	<i>1.09</i>
<i>925781</i>	<i>AC1-054 C</i>	<i>3.63</i>
<i>925831</i>	<i>AC1-062</i>	<i>0.09</i>
<i>926271</i>	<i>AC1-105 C</i>	<i>3.18</i>
<i>926761</i>	<i>AC1-162 C</i>	<i>47.97</i>

Appendix 2

(DVP - DVP) The 3SO JUSTICE-3COX DP 115 kV line (from bus 313858 to bus 314577 ckt 1) loads from 98.64% to 100.56% (**DC power flow**) of its load dump rating (202 MVA) for the line fault with failed breaker contingency outage of 'DVP_P4-2: 5602'. This project contributes approximately 5.71 MW to the thermal violation.

```

CONTINGENCY 'DVP_P4-2: 5602'                                /* CAROLINA 115 KV
  OPEN BRANCH FROM BUS 313723 TO BUS 314604 CKT 1          /* 3PECAN 115.00 -
3SEABORD 115.00
  OPEN BRANCH FROM BUS 314558 TO BUS 314587 CKT 1          /* 3BOYKINS
115.00 - 3MARGTSV 115.00
  OPEN BRANCH FROM BUS 314587 TO BUS 314604 CKT 1          /* 3MARGTSV
115.00 - 3SEABORD 115.00
  OPEN BUS 314587                                           /* ISLAND: 3MARGTSV 115.00
  OPEN BUS 314604                                           /* ISLAND: 3SEABORD 115.00
  OPEN BRANCH FROM BUS 314559 TO BUS 314571 CKT 1          /* 3CAROLNA
115.00 - 3EATON F 115.00
  OPEN BRANCH FROM BUS 314559 TO BUS 919690 CKT 1          /* 3CAROLNA
115.00 - AA2-053 TAP 115.00
  OPEN BRANCH FROM BUS 314559 TO BUS 314600 CKT 1          /* 3CAROLNA
115.00 - 3PLHITP 115.00
  OPEN BRANCH FROM BUS 314559 TO BUS 314561 CKT 1          /* 3CAROLNA
115.00 - 6CAROLNA 230.00
END
  
```

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315126	1ROARAP2	3.65
315128	1ROARAP4	3.51
314578	3HORNRTN	8.39
314582	3KELFORD	1.13
314603	3SCOT NK	7.6
932631	AC2-084 C	25.37
932632	AC2-084 E	12.49
934231	AD1-050 C	3.79
934232	AD1-050 E	2.07
936361	AD2-046 C O2	3.91

936362	AD2-046 E O2	1.8
<i>LTF</i>	<i>AMIL</i>	<i>0.06</i>
<i>LTF</i>	<i>BAYOU</i>	<i>0.34</i>
<i>LTF</i>	<i>BIG_CAJUN1</i>	<i>0.54</i>
<i>LTF</i>	<i>BIG_CAJUN2</i>	<i>1.08</i>
<i>LTF</i>	<i>BLUEG</i>	<i>0.33</i>
<i>LTF</i>	<i>CALDERWOOD</i>	<i>0.2</i>
<i>LTF</i>	<i>CANNELTON</i>	<i>0.06</i>
<i>LTF</i>	<i>CARR</i>	<i>< 0.01</i>
<i>LTF</i>	<i>CATAWBA</i>	<i>0.2</i>
<i>LTF</i>	<i>CELEVELAND</i>	<i>0.56</i>
<i>LTF</i>	<i>CHEOAH</i>	<i>0.19</i>
<i>LTF</i>	<i>CHILHOWEE</i>	<i>0.06</i>
<i>LTF</i>	<i>CHOCTAW</i>	<i>0.37</i>
<i>LTF</i>	<i>CLIFTY</i>	<i>1.2</i>
<i>LTF</i>	<i>COTTONWOOD</i>	<i>1.34</i>
<i>LTF</i>	<i>DEARBORN</i>	<i>0.12</i>
<i>LTF</i>	<i>EDWARDS</i>	<i>0.1</i>
<i>LTF</i>	<i>ELMERSMITH</i>	<i>0.19</i>
<i>LTF</i>	<i>FARMERCITY</i>	<i>0.08</i>
<i>LTF</i>	<i>G-007A</i>	<i>0.04</i>
<i>LTF</i>	<i>GIBSON</i>	<i>0.12</i>
<i>LTF</i>	<i>HAMLET</i>	<i>0.85</i>
<i>LTF</i>	<i>MORGAN</i>	<i>0.59</i>
<i>LTF</i>	<i>NEWTON</i>	<i>0.28</i>
<i>LTF</i>	<i>PRAIRIE</i>	<i>0.61</i>

<i>LTF</i>	<i>RENSSELAER</i>	<i>< 0.01</i>
<i>LTF</i>	<i>ROSETON</i>	<i>0.05</i>
<i>LTF</i>	<i>ROWAN</i>	<i>0.4</i>
<i>LTF</i>	<i>SANTEETLA</i>	<i>0.06</i>
<i>LTF</i>	<i>SMITHLAND</i>	<i>0.05</i>
<i>LTF</i>	<i>TATANKA</i>	<i>0.14</i>
<i>LTF</i>	<i>TILTON</i>	<i>0.12</i>
<i>LTF</i>	<i>TRIMBLE</i>	<i>0.06</i>
<i>LTF</i>	<i>TVA</i>	<i>0.25</i>
<i>LTF</i>	<i>UNIONPOWER</i>	<i>0.36</i>
<i>LTF</i>	<i>VFT</i>	<i>0.11</i>
<i>917331</i>	<i>Z2-043 C</i>	<i>0.59</i>
<i>917332</i>	<i>Z2-043 E</i>	<i>1.35</i>
<i>918491</i>	<i>AA1-063AC OP</i>	<i>3.74</i>
<i>918492</i>	<i>AA1-063AE OP</i>	<i>9.48</i>
<i>918561</i>	<i>AA1-072 C</i>	<i>0.09</i>
<i>918562</i>	<i>AA1-072 E</i>	<i>0.23</i>
<i>919692</i>	<i>AA2-053 E</i>	<i>1.7</i>
<i>920672</i>	<i>AA2-174 E</i>	<i>0.2</i>
<i>924401</i>	<i>AB2-089 C</i>	<i>1.72</i>
<i>924402</i>	<i>AB2-089 E</i>	<i>0.88</i>
<i>924501</i>	<i>AB2-099 C</i>	<i>0.24</i>
<i>924502</i>	<i>AB2-099 E</i>	<i>0.1</i>
<i>925781</i>	<i>AC1-054 C</i>	<i>3.55</i>
<i>925782</i>	<i>AC1-054 E</i>	<i>1.64</i>
<i>926201</i>	<i>AC1-098 C</i>	<i>17.79</i>

926202	<i>AC1-098 E</i>	<i>10.6</i>
926211	<i>AC1-099 C</i>	<i>5.96</i>
926212	<i>AC1-099 E</i>	<i>3.5</i>
926771	<i>AC1-163 C</i>	<i>0.8</i>
926772	<i>AC1-163 E</i>	<i>0.37</i>
927141	<i>AC1-208 C</i>	<i>28.81</i>
927142	<i>AC1-208 E</i>	<i>12.79</i>

Appendix 3

(DVP - DVP) The 6CAROLNA 230/115 kV transformer (from bus 314559 to bus 314561 ckt 1) loads from 111.1% to 113.08% (**DC power flow**) of its load dump rating (289 MVA) for the line fault with failed breaker contingency outage of 'DVP_P4-2: 7152'. This project contributes approximately 12.12 MW to the thermal violation.

CONTINGENCY 'DVP_P4-2: 7152'

OPEN BUS 314562
OPEN BUS 314565
OPEN BUS 314850
OPEN BUS 314693
OPEN BUS 314704
OPEN BUS 314676
OPEN BUS 314782
OPEN BUS 314786
OPEN BUS 314787
OPEN BUS 314782
OPEN BUS 314785
OPEN BUS 314516
OPEN BUS 314675
END

/* CLUBHOUSE

/* CLUBHOUSE 115KV BUS
/* LINE 71
/* LINE 71
/* LINE 71
/* LINE 71
/* LINE 71
/* LINE 132
/* LINE 132
/* LINE 50
/* LINE 50
/* LINE 50
/* LINE 71
/* LINE 71

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315150	1BUGGS 1	7.69
315151	1BUGGS 2	7.69
315159	1KERR 2	1.64
315164	1KERR 7	1.61
315126	1ROARAP2	4.14
315128	1ROARAP4	3.98
315115	1S HAMPT1	1.65
314572	3EMPORIA	1.12
314578	3HORNRTN	8.17
314582	3KELFORD	0.51
314603	3SCOT NK	2.69

314617	3TUNIS	0.63
314539	3UNCAMP	1.86
314541	3WATKINS	0.65
932631	AC2-084 C	8.23
932632	AC2-084 E	4.05
934201	AD1-047 C	21.52
934202	AD1-047 E	14.34
934231	AD1-050 C	6.14
934232	AD1-050 E	3.36
936261	AD2-033 C	7.22
936262	AD2-033 E	4.81
936361	AD2-046 C O2	8.3
936362	AD2-046 E O2	3.82
936711	AD2-090 C O2	7.69
936712	AD2-090 E O2	5.12
LTF	CARR	0.03
LTF	CBM-S1	0.35
LTF	CBM-S2	0.52
LTF	CBM-W1	0.82
LTF	CBM-W2	1.88
LTF	CIN	0.2
LTF	CPL	0.12
LTF	G-007	0.13
LTF	IPL	0.12
LTF	LGEE	0.04
LTF	MEC	0.41

<i>LTF</i>	<i>MECS</i>	<i>0.18</i>
<i>LTF</i>	<i>O-066</i>	<i>0.81</i>
<i>LTF</i>	<i>RENSSELAER</i>	<i>0.02</i>
<i>LTF</i>	<i>ROSETON</i>	<i>0.15</i>
<i>900671</i>	<i>V4-068 C</i>	<i>0.11</i>
<i>900672</i>	<i>V4-068 E</i>	<i>0.31</i>
<i>LTF</i>	<i>WEC</i>	<i>0.05</i>
<i>907092</i>	<i>X1-038 E</i>	<i>4.64</i>
<i>917332</i>	<i>Z2-043 E</i>	<i>0.62</i>
<i>918491</i>	<i>AA1-063AC OP</i>	<i>3.39</i>
<i>918492</i>	<i>AA1-063AE OP</i>	<i>8.59</i>
<i>918562</i>	<i>AA1-072 E</i>	<i>0.1</i>
<i>919691</i>	<i>AA2-053 C</i>	<i>3.55</i>
<i>919692</i>	<i>AA2-053 E</i>	<i>8.2</i>
<i>919702</i>	<i>AA2-057 E</i>	<i>2.36</i>
<i>920041</i>	<i>AA2-088 C</i>	<i>1.52</i>
<i>920042</i>	<i>AA2-088 E</i>	<i>13.36</i>
<i>920592</i>	<i>AA2-165 E</i>	<i>0.31</i>
<i>920671</i>	<i>AA2-174 C</i>	<i>0.16</i>
<i>920672</i>	<i>AA2-174 E</i>	<i>0.95</i>
<i>930861</i>	<i>AB1-132 C</i>	<i>-13.27</i>
<i>931231</i>	<i>AB1-173 C</i>	<i>6.05</i>
<i>931232</i>	<i>AB1-173 E</i>	<i>2.82</i>
<i>931241</i>	<i>AB1-173AC</i>	<i>6.05</i>
<i>931242</i>	<i>AB1-173AE</i>	<i>2.82</i>
<i>923801</i>	<i>AB2-015 C O1</i>	<i>7.5</i>

923802	AB2-015 E O1	6.15
923911	AB2-031 C O1	6.01
923912	AB2-031 E O1	2.96
923991	AB2-040 C O1	19.72
923992	AB2-040 E O1	16.14
924021	AB2-043 C O1	1.97
924022	AB2-043 E O1	3.23
924161	AB2-060 C O1	5.6
924162	AB2-060 E O1	2.63
924301	AB2-077 C O1	1.26
924302	AB2-077 E O1	0.84
924311	AB2-078 C O1	1.26
924312	AB2-078 E O1	0.84
924321	AB2-079 C O1	1.26
924322	AB2-079 E O1	0.84
924401	AB2-089 C	2.79
924402	AB2-089 E	1.44
924411	AB2-090 C	2.48
924412	AB2-090 E	1.27
924501	AB2-099 C	0.34
924502	AB2-099 E	0.14
925171	AB2-174 C O1	18.83
925172	AB2-174 E O1	17.03
925221	AB2-176 C	1.02
925222	AB2-176 E	0.44
925611	AC1-036 C	0.48

925612	AC1-036 E	0.78
925781	AC1-054 C	10.56
925782	AC1-054 E	4.86
926201	AC1-098 C	5.77
926202	AC1-098 E	3.44
926211	AC1-099 C	1.93
926212	AC1-099 E	1.14
926771	AC1-163 C	1.12
926772	AC1-163 E	0.52
927141	AC1-208 C	13.69
927142	AC1-208 E	6.08

Appendix 4

(DVP - DVP) The 6CLUBHSE 230/115 kV transformer (from bus 314562 to bus 314563 ckt 1) loads from 142.66% to 147.74% (**DC power flow**) of its load dump rating (209 MVA) for the line fault with failed breaker contingency outage of 'DVP_P4-5: T122C'. This project contributes approximately 10.6 MW to the thermal violation.

CONTINGENCY 'DVP_P4-5: T122C'

OPEN BUS 314559

OPEN BUS 315126

OPEN BUS 315128

OPEN BRANCH FROM BUS 314559 TO BUS 314561 CKT 1

END

/* CAROLINA

/* CAROLINA 115KV BUS

/* ROANOKE RAPIDS GEN 1 AND 2

/* ROANOKE RAPIDS GEN 3 AND 4

/* TX. #4

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315150	1BUGGS 1	8.23
315151	1BUGGS 2	8.23
315159	1KERR 2	1.2
315164	1KERR 7	1.18
314572	3EMPORIA	1.99
314704	3LAWRENC	1.36
934201	AD1-047 C	38.12
934202	AD1-047 E	25.41
934231	AD1-050 C	3.55
934232	AD1-050 E	1.94
936261	AD2-033 C	11.57
936262	AD2-033 E	7.71
936361	AD2-046 C O2	7.26
936362	AD2-046 E O2	3.34
937481	AD2-202 C O2	1.52
937482	AD2-202 E O2	0.77
LTF	CARR	0.01

<i>LTF</i>	<i>CBM-S1</i>	<i>0.63</i>
<i>LTF</i>	<i>CBM-S2</i>	<i>0.84</i>
<i>LTF</i>	<i>CBM-W1</i>	<i>1.72</i>
<i>LTF</i>	<i>CBM-W2</i>	<i>3.48</i>
<i>LTF</i>	<i>CIN</i>	<i>0.39</i>
<i>LTF</i>	<i>CPLE</i>	<i>0.21</i>
<i>LTF</i>	<i>G-007</i>	<i>0.1</i>
<i>LTF</i>	<i>IPL</i>	<i>0.25</i>
<i>LTF</i>	<i>LGEE</i>	<i>0.09</i>
<i>LTF</i>	<i>MEC</i>	<i>0.79</i>
<i>LTF</i>	<i>MECS</i>	<i>0.44</i>
<i>LTF</i>	<i>O-066</i>	<i>0.65</i>
<i>LTF</i>	<i>RENSSELAER</i>	<i>< 0.01</i>
<i>LTF</i>	<i>ROSETON</i>	<i>0.06</i>
<i>LTF</i>	<i>WEC</i>	<i>0.11</i>
<i>931231</i>	<i>AB1-173 C</i>	<i>10.72</i>
<i>931232</i>	<i>AB1-173 E</i>	<i>5.</i>
<i>931241</i>	<i>AB1-173AC</i>	<i>10.72</i>
<i>931242</i>	<i>AB1-173AE</i>	<i>5.</i>
<i>923911</i>	<i>AB2-031 C O1</i>	<i>10.64</i>
<i>923912</i>	<i>AB2-031 E O1</i>	<i>5.24</i>
<i>923991</i>	<i>AB2-040 C O1</i>	<i>34.94</i>
<i>923992</i>	<i>AB2-040 E O1</i>	<i>28.59</i>
<i>924021</i>	<i>AB2-043 C O1</i>	<i>3.16</i>
<i>924022</i>	<i>AB2-043 E O1</i>	<i>5.18</i>
<i>924161</i>	<i>AB2-060 C O1</i>	<i>8.96</i>

924162	AB2-060 E O1	4.22
924301	AB2-077 C O1	1.94
924302	AB2-077 E O1	1.29
924311	AB2-078 C O1	1.94
924312	AB2-078 E O1	1.29
924321	AB2-079 C O1	1.94
924322	AB2-079 E O1	1.29
924401	AB2-089 C	1.61
924402	AB2-089 E	0.83
924411	AB2-090 C	3.98
924412	AB2-090 E	2.04
925171	AB2-174 C O1	33.35
925172	AB2-174 E O1	30.18
925221	AB2-176 C	1.64
925222	AB2-176 E	0.7
925611	AC1-036 C	0.76
925612	AC1-036 E	1.25
925781	AC1-054 C	5.42
925782	AC1-054 E	2.5

Appendix 5

(DVP - DVP) The 6CLUBHSE-6SAPONY 230 kV line (from bus 314563 to bus 314435 ckt 1) loads from 127.92% to 128.79% (**DC power flow**) of its load dump rating (637 MVA) for the line fault with failed breaker contingency outage of 'DVP_P4-2: 246T247'. This project contributes approximately 12.14 MW to the thermal violation.

```
CONTINGENCY 'DVP_P4-2: 246T247'                /* SUFFOLK 230 KV
  OPEN BRANCH FROM BUS 314537 TO BUS 314575 CKT 1    /* 6SUFFOLK
230.00 - 6NUCO TP 230.00
  OPEN BRANCH FROM BUS 314569 TO BUS 314575 CKT 1    /* 6EARLEYS
230.00 - 6NUCO TP 230.00
  OPEN BRANCH FROM BUS 314575 TO BUS 314590 CKT 1    /* 6NUCO TP
230.00 - 6NUCOR 230.00
  OPEN BUS 314575                                /* ISLAND: 6NUCO TP 230.00
  OPEN BUS 314590                                /* ISLAND: 6NUCOR 230.00
  OPEN BRANCH FROM BUS 314537 TO BUS 314648 CKT 1    /* 6SUFFOLK
230.00 - 6SUNBURY 230.00
  OPEN BRANCH FROM BUS 314648 TO BUS 901080 CKT 1    /* 6SUNBURY
230.00 - W1-029 230.00
  OPEN BUS 314648                                /* ISLAND: 6SUNBURY 230.00
END
```

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315150	1BUGGS 1	8.64
315151	1BUGGS 2	8.64
315131	1EDGECEMA	10.81
315132	1EDGECEMB	10.81
315139	1GASTONA	7.18
315141	1GASTONB	7.18
315126	1ROARAP2	2.57
315128	1ROARAP4	2.47
315136	1ROSEMG1	4.85
315138	1ROSEMG2	2.27
315137	1ROSEMS1	3.01

314557	3BETHELC	0.9
314554	3BTLEBRO	0.91
314566	3CRESWEL	1.69
314572	3EMPORIA	1.04
314578	3HORNRTN	5.4
314582	3KELFORD	1.09
314704	3LAWRENC	0.78
314603	3SCOT NK	4.39
314617	3TUNIS	1.
314541	3WATKINS	0.48
314620	6CASHIE	0.87
314574	6EVERETS	2.55
314594	6PLYMOTH	0.72
932631	AC2-084 C	11.81
932632	AC2-084 E	5.82
933991	AD1-023 C	12.48
933992	AD1-023 E	6.8
934201	AD1-047 C	17.56
934202	AD1-047 E	11.71
934231	AD1-050 C	5.08
934232	AD1-050 E	2.78
934331	AD1-057 C O1	15.84
934332	AD1-057 E O1	8.45
934521	AD1-076 C O1	47.19
934522	AD1-076 E O1	24.03
LTF	AD1-120	4.44

<i>LTF</i>	<i>AD1-121</i>	<i>4.42</i>
<i>936261</i>	<i>AD2-033 C</i>	<i>9.73</i>
<i>936262</i>	<i>AD2-033 E</i>	<i>6.49</i>
<i>936361</i>	<i>AD2-046 C O2</i>	<i>8.31</i>
<i>936362</i>	<i>AD2-046 E O2</i>	<i>3.82</i>
<i>936401</i>	<i>AD2-051 C O2</i>	<i>11.97</i>
<i>936402</i>	<i>AD2-051 E O2</i>	<i>5.14</i>
<i>936531</i>	<i>AD2-068 C</i>	<i>4.92</i>
<i>936532</i>	<i>AD2-068 E</i>	<i>2.53</i>
<i>936701</i>	<i>AD2-089 C</i>	<i>8.13</i>
<i>936702</i>	<i>AD2-089 E</i>	<i>5.42</i>
<i>936711</i>	<i>AD2-090 C O2</i>	<i>5.8</i>
<i>936712</i>	<i>AD2-090 E O2</i>	<i>3.86</i>
<i>LTF</i>	<i>AD2-099</i>	<i>3.35</i>
<i>937441</i>	<i>AD2-195 C</i>	<i>8.63</i>
<i>937442</i>	<i>AD2-195 E</i>	<i>3.72</i>
<i>LTF</i>	<i>CARR</i>	<i>0.12</i>
<i>LTF</i>	<i>CBM-S1</i>	<i>5.43</i>
<i>LTF</i>	<i>CBM-S2</i>	<i>10.9</i>
<i>LTF</i>	<i>CBM-W1</i>	<i>12.02</i>
<i>LTF</i>	<i>CBM-W2</i>	<i>29.4</i>
<i>LTF</i>	<i>CIN</i>	<i>2.7</i>
<i>LTF</i>	<i>CPL</i>	<i>3.68</i>
<i>LTF</i>	<i>G-007</i>	<i>0.77</i>
<i>LTF</i>	<i>IPL</i>	<i>1.72</i>
<i>LTF</i>	<i>LGEE</i>	<i>0.58</i>

<i>LTF</i>	<i>MEC</i>	<i>6.07</i>
<i>LTF</i>	<i>MECS</i>	<i>2.72</i>
<i>LTF</i>	<i>O-066</i>	<i>4.92</i>
<i>LTF</i>	<i>RENSSELAER</i>	<i>0.09</i>
<i>LTF</i>	<i>ROSETON</i>	<i>0.68</i>
<i>900671</i>	<i>V4-068 C</i>	<i>0.11</i>
<i>900672</i>	<i>V4-068 E</i>	<i>0.33</i>
<i>LTF</i>	<i>WEC</i>	<i>0.74</i>
<i>917331</i>	<i>Z2-043 C</i>	<i>0.57</i>
<i>917332</i>	<i>Z2-043 E</i>	<i>1.31</i>
<i>917341</i>	<i>Z2-044 C</i>	<i>0.3</i>
<i>917342</i>	<i>Z2-044 E</i>	<i>0.7</i>
<i>917511</i>	<i>Z2-088 C OP1</i>	<i>1.01</i>
<i>917512</i>	<i>Z2-088 E OP1</i>	<i>4.28</i>
<i>918411</i>	<i>AA1-050</i>	<i>0.85</i>
<i>918491</i>	<i>AA1-063AC OP</i>	<i>2.23</i>
<i>918492</i>	<i>AA1-063AE OP</i>	<i>5.65</i>
<i>918511</i>	<i>AA1-065 C OP</i>	<i>2.12</i>
<i>918512</i>	<i>AA1-065 E OP</i>	<i>5.62</i>
<i>918531</i>	<i>AA1-067 C</i>	<i>0.33</i>
<i>918532</i>	<i>AA1-067 E</i>	<i>0.76</i>
<i>918561</i>	<i>AA1-072 C</i>	<i>0.09</i>
<i>918562</i>	<i>AA1-072 E</i>	<i>0.22</i>
<i>919691</i>	<i>AA2-053 C</i>	<i>2.58</i>
<i>919692</i>	<i>AA2-053 E</i>	<i>5.95</i>
<i>919701</i>	<i>AA2-057 C</i>	<i>1.68</i>

919702	AA2-057 E	4.51
LTF	AA2-074	2.5
920041	AA2-088 C	1.17
920042	AA2-088 E	10.3
920591	AA2-165 C	0.23
920592	AA2-165 E	0.6
920671	AA2-174 C	0.12
920672	AA2-174 E	0.69
920691	AA2-178 C	6.77
920692	AA2-178 E	2.9
930051	AB1-013 C	2.04
930052	AB1-013 E	13.67
930401	AB1-081 C	10.25
930402	AB1-081 E	4.39
930861	AB1-132 C	29.52
930862	AB1-132 E	12.65
931231	AB1-173 C	4.94
931232	AB1-173 E	2.31
931241	AB1-173AC	4.94
931242	AB1-173AE	2.31
923801	AB2-015 C O1	5.47
923802	AB2-015 E O1	4.49
923911	AB2-031 C O1	4.9
923912	AB2-031 E O1	2.41
923941	AB2-035 C	0.38
923942	AB2-035 E	0.16

923991	AB2-040 C O1	16.1
923992	AB2-040 E O1	13.17
924021	AB2-043 C O1	2.67
924022	AB2-043 E O1	4.39
924151	AB2-059 C O1	12.08
924152	AB2-059 E O1	6.22
924161	AB2-060 C O1	7.59
924162	AB2-060 E O1	3.57
924301	AB2-077 C O1	1.68
924302	AB2-077 E O1	1.12
924311	AB2-078 C O1	1.68
924312	AB2-078 E O1	1.12
924321	AB2-079 C O1	1.68
924322	AB2-079 E O1	1.12
924391	AB2-088 C	0.49
924392	AB2-088 E	0.23
924401	AB2-089 C	2.3
924402	AB2-089 E	1.19
924411	AB2-090 C	3.37
924412	AB2-090 E	1.73
924491	AB2-098 C	0.59
924492	AB2-098 E	0.25
924501	AB2-099 C	0.73
924502	AB2-099 E	0.31
924511	AB2-100 C	35.9
924512	AB2-100 E	17.68

925121	AB2-169 C	6.14
925122	AB2-169 E	5.51
925171	AB2-174 C O1	16.16
925172	AB2-174 E O1	14.62
925221	AB2-176 C	1.39
925222	AB2-176 E	0.59
925291	AB2-188 C O1	1.67
925292	AB2-188 E O1	0.75
925591	AC1-034 C	7.83
925592	AC1-034 E	5.9
925611	AC1-036 C	0.64
925612	AC1-036 E	1.04
925781	AC1-054 C	8.28
925782	AC1-054 E	3.81
926071	AC1-086 C	43.47
926072	AC1-086 E	19.78
926201	AC1-098 C	8.28
926202	AC1-098 E	4.94
926211	AC1-099 C	2.78
926212	AC1-099 E	1.63
926771	AC1-163 C	2.41
926772	AC1-163 E	1.13
927021	AC1-189 C	9.38
927022	AC1-189 E	4.67
927141	AC1-208 C	13.11
927142	AC1-208 E	5.82

Appendix 6

(DVP - DVP) The 3COX DP-3CHESTNUT 115 kV line (from bus 314577 to bus 313719 ckt 1) loads from 108.37% to 110.6% (**DC power flow**) of its load dump rating (174 MVA) for the line fault with failed breaker contingency outage of 'DVP_P4-2: 5602'. This project contributes approximately 5.71 MW to the thermal violation.

```

CONTINGENCY 'DVP_P4-2: 5602'                                /* CAROLINA 115 KV
  OPEN BRANCH FROM BUS 313723 TO BUS 314604 CKT 1          /* 3PECAN 115.00 -
3SEABORD 115.00
  OPEN BRANCH FROM BUS 314558 TO BUS 314587 CKT 1          /* 3BOYKINS
115.00 - 3MARGTSV 115.00
  OPEN BRANCH FROM BUS 314587 TO BUS 314604 CKT 1          /* 3MARGTSV
115.00 - 3SEABORD 115.00
  OPEN BUS 314587                                           /* ISLAND: 3MARGTSV 115.00
  OPEN BUS 314604                                           /* ISLAND: 3SEABORD 115.00
  OPEN BRANCH FROM BUS 314559 TO BUS 314571 CKT 1          /* 3CAROLNA
115.00 - 3EATON F 115.00
  OPEN BRANCH FROM BUS 314559 TO BUS 919690 CKT 1          /* 3CAROLNA
115.00 - AA2-053 TAP 115.00
  OPEN BRANCH FROM BUS 314559 TO BUS 314600 CKT 1          /* 3CAROLNA
115.00 - 3PLHITP 115.00
  OPEN BRANCH FROM BUS 314559 TO BUS 314561 CKT 1          /* 3CAROLNA
115.00 - 6CAROLNA 230.00
END
  
```

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315126	1ROARAP2	3.65
315128	1ROARAP4	3.51
314578	3HORNRTN	8.39
314582	3KELFORD	1.13
314603	3SCOT NK	7.6
932631	AC2-084 C	25.37
932632	AC2-084 E	12.49
934231	AD1-050 C	3.79
934232	AD1-050 E	2.07
936361	AD2-046 C O2	3.91

936362	AD2-046 E O2	1.8
<i>LTF</i>	<i>AMIL</i>	<i>0.06</i>
<i>LTF</i>	<i>BAYOU</i>	<i>0.34</i>
<i>LTF</i>	<i>BIG_CAJUN1</i>	<i>0.54</i>
<i>LTF</i>	<i>BIG_CAJUN2</i>	<i>1.08</i>
<i>LTF</i>	<i>BLUEG</i>	<i>0.33</i>
<i>LTF</i>	<i>CALDERWOOD</i>	<i>0.2</i>
<i>LTF</i>	<i>CANNELTON</i>	<i>0.06</i>
<i>LTF</i>	<i>CARR</i>	<i>< 0.01</i>
<i>LTF</i>	<i>CATAWBA</i>	<i>0.2</i>
<i>LTF</i>	<i>CELEVELAND</i>	<i>0.56</i>
<i>LTF</i>	<i>CHEOAH</i>	<i>0.19</i>
<i>LTF</i>	<i>CHILHOWEE</i>	<i>0.06</i>
<i>LTF</i>	<i>CHOCTAW</i>	<i>0.37</i>
<i>LTF</i>	<i>CLIFTY</i>	<i>1.2</i>
<i>LTF</i>	<i>COTTONWOOD</i>	<i>1.34</i>
<i>LTF</i>	<i>DEARBORN</i>	<i>0.12</i>
<i>LTF</i>	<i>EDWARDS</i>	<i>0.1</i>
<i>LTF</i>	<i>ELMERSMITH</i>	<i>0.19</i>
<i>LTF</i>	<i>FARMERCITY</i>	<i>0.08</i>
<i>LTF</i>	<i>G-007A</i>	<i>0.04</i>
<i>LTF</i>	<i>GIBSON</i>	<i>0.12</i>
<i>LTF</i>	<i>HAMLET</i>	<i>0.85</i>
<i>LTF</i>	<i>MORGAN</i>	<i>0.59</i>
<i>LTF</i>	<i>NEWTON</i>	<i>0.28</i>
<i>LTF</i>	<i>PRAIRIE</i>	<i>0.61</i>

<i>LTF</i>	<i>RENSSELAER</i>	<i>< 0.01</i>
<i>LTF</i>	<i>ROSETON</i>	<i>0.05</i>
<i>LTF</i>	<i>ROWAN</i>	<i>0.4</i>
<i>LTF</i>	<i>SANTEETLA</i>	<i>0.06</i>
<i>LTF</i>	<i>SMITHLAND</i>	<i>0.05</i>
<i>LTF</i>	<i>TATANKA</i>	<i>0.14</i>
<i>LTF</i>	<i>TILTON</i>	<i>0.12</i>
<i>LTF</i>	<i>TRIMBLE</i>	<i>0.06</i>
<i>LTF</i>	<i>TVA</i>	<i>0.25</i>
<i>LTF</i>	<i>UNIONPOWER</i>	<i>0.36</i>
<i>LTF</i>	<i>VFT</i>	<i>0.11</i>
<i>917331</i>	<i>Z2-043 C</i>	<i>0.59</i>
<i>917332</i>	<i>Z2-043 E</i>	<i>1.35</i>
<i>918491</i>	<i>AA1-063AC OP</i>	<i>3.74</i>
<i>918492</i>	<i>AA1-063AE OP</i>	<i>9.48</i>
<i>918561</i>	<i>AA1-072 C</i>	<i>0.09</i>
<i>918562</i>	<i>AA1-072 E</i>	<i>0.23</i>
<i>919692</i>	<i>AA2-053 E</i>	<i>1.7</i>
<i>920672</i>	<i>AA2-174 E</i>	<i>0.2</i>
<i>924401</i>	<i>AB2-089 C</i>	<i>1.72</i>
<i>924402</i>	<i>AB2-089 E</i>	<i>0.88</i>
<i>924501</i>	<i>AB2-099 C</i>	<i>0.24</i>
<i>924502</i>	<i>AB2-099 E</i>	<i>0.1</i>
<i>925781</i>	<i>AC1-054 C</i>	<i>3.55</i>
<i>925782</i>	<i>AC1-054 E</i>	<i>1.64</i>
<i>926201</i>	<i>AC1-098 C</i>	<i>17.79</i>

926202	<i>AC1-098 E</i>	<i>10.6</i>
926211	<i>AC1-099 C</i>	<i>5.96</i>
926212	<i>AC1-099 E</i>	<i>3.5</i>
926771	<i>AC1-163 C</i>	<i>0.8</i>
926772	<i>AC1-163 E</i>	<i>0.37</i>
927141	<i>AC1-208 C</i>	<i>28.81</i>
927142	<i>AC1-208 E</i>	<i>12.79</i>

Appendix 7

(DVP - DVP) The 6BUCKING-6BREMO 230 kV line (from bus 314677 to bus 314747 ckt 1) loads from 102.27% to 103.95% (**DC power flow**) of its emergency rating (572 MVA) for the single line contingency outage of 'DVP_P1-2: LN 556'. This project contributes approximately 9.57 MW to the thermal violation.

CONTINGENCY 'DVP_P1-2: LN 556'

OPEN BRANCH FROM BUS 314686 TO BUS 314906 CKT 1 /* 6CLOVER

230.00 - 8CLOVER 500.00

OPEN BRANCH FROM BUS 314686 TO BUS 314906 CKT 2 /* 6CLOVER

230.00 - 8CLOVER 500.00

OPEN BRANCH FROM BUS 314686 TO BUS 314906 CKT 3 /* 6CLOVER

230.00 - 8CLOVER 500.00

OPEN BRANCH FROM BUS 314906 TO BUS 314936 CKT 1 /* 8CLOVER

500.00 - 8BRAWLINGS 500.00

OPEN BUS 314906 /* ISLAND

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315150	1BUGGS 1	13.15
315151	1BUGGS 2	13.15
315153	1CLOVER1	24.28
315154	1CLOVER2	23.96
315159	1KERR 2	1.57
315164	1KERR 7	1.54
315266	1PLYWOOD A	1.68
314429	3JTRSVLE	1.06
932511	AC2-071 C	9.29
932761	AC2-100 C	3.81
932821	AC2-107 C	8.77
934231	AD1-050 C	4.18
934311	AD1-055 C	2.81
934341	AD1-058 C	4.15

934611	AD1-087 C O1	12.05
934621	AD1-088 C	29.92
LTF	AD1-120	4.52
LTF	AD1-121	4.56
934911	AD1-123 C	1.26
934991	AD1-131 C	1.36
935171	AD1-152 C O1	11.97
935221	AD1-157 C	3.75
935231	AD1-160 C	2.75
936261	AD2-033 C	21.51
936331	AD2-043 C	5.25
936361	AD2-046 C O2	9.57
936481	AD2-063 C O2	35.8
936651	AD2-082 C	4.2
LTF	AD2-099	3.05
937461	AD2-200 C	3.78
937481	AD2-202 C O2	2.8
LTF	CARR	0.16
LTF	CBM-S1	4.94
LTF	CBM-S2	10.59
LTF	CBM-W1	9.89
LTF	CBM-W2	26.29
LTF	CIN	2.23
LTF	CPL	3.41
LTF	IPL	1.42
LTF	LGEE	0.48

<i>LTF</i>	<i>MEC</i>	5.22
<i>LTF</i>	<i>MECS</i>	2.03
<i>LTF</i>	<i>RENSSELAER</i>	0.12
<i>LTF</i>	<i>ROSETON</i>	0.9
<i>LTF</i>	<i>WEC</i>	0.62
<i>LTF</i>	<i>AA2-074</i>	2.32
924021	AB2-043 C O1	4.27
924031	AB2-045 C	1.75
924161	AB2-060 C O1	12.6
924301	AB2-077 C O1	2.66
924311	AB2-078 C O1	2.66
924321	AB2-079 C O1	2.66
924401	AB2-089 C	1.9
924411	AB2-090 C	5.38
925221	AB2-176 C	2.21
925611	AC1-036 C	1.79
925781	AC1-054 C	6.
925831	AC1-062	0.14
925991	AC1-075 C	4.93
926021	AC1-080 C	1.65
926271	AC1-105 C	6.74
926761	AC1-162 C	83.52
927251	AC1-221 C	1.66
927261	AC1-222 C	4.05

Appendix 8

(DVP - DVP) The 6FARMVIL-6BUCKING 230 kV line (from bus 314692 to bus 314677 ckt 1) loads from 103.98% to 105.69% (**DC power flow**) of its emergency rating (559 MVA) for the single line contingency outage of 'DVP_P1-2: LN 556'. This project contributes approximately 9.58 MW to the thermal violation.

CONTINGENCY 'DVP_P1-2: LN 556'

OPEN BRANCH FROM BUS 314686 TO BUS 314906 CKT 1 /* 6CLOVER

230.00 - 8CLOVER 500.00

OPEN BRANCH FROM BUS 314686 TO BUS 314906 CKT 2 /* 6CLOVER

230.00 - 8CLOVER 500.00

OPEN BRANCH FROM BUS 314686 TO BUS 314906 CKT 3 /* 6CLOVER

230.00 - 8CLOVER 500.00

OPEN BRANCH FROM BUS 314906 TO BUS 314936 CKT 1 /* 8CLOVER

500.00 - 8BRAWLINGS 500.00

OPEN BUS 314906 /* ISLAND

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315150	1BUGGS 1	13.15
315151	1BUGGS 2	13.15
315153	1CLOVER1	24.28
315154	1CLOVER2	23.96
315159	1KERR 2	1.57
315164	1KERR 7	1.54
315266	1PLYWOOD A	1.68
314429	3JTRSVLE	1.06
932511	AC2-071 C	-4.01
932761	AC2-100 C	3.81
932821	AC2-107 C	8.78
934231	AD1-050 C	4.18
934311	AD1-055 C	2.81
934341	AD1-058 C	4.15

934611	AD1-087 C O1	12.05
934621	AD1-088 C	29.92
LTF	AD1-120	4.53
LTF	AD1-121	4.56
934911	AD1-123 C	1.26
934991	AD1-131 C	1.36
935171	AD1-152 C O1	11.98
935221	AD1-157 C	3.75
935231	AD1-160 C	2.75
936261	AD2-033 C	21.51
936331	AD2-043 C	5.25
936361	AD2-046 C O2	9.58
936481	AD2-063 C O2	35.81
936651	AD2-082 C	4.21
LTF	AD2-099	3.06
937461	AD2-200 C	3.78
937481	AD2-202 C O2	2.8
LTF	CARR	0.15
LTF	CBM-S1	4.96
LTF	CBM-S2	10.61
LTF	CBM-W1	9.97
LTF	CBM-W2	26.41
LTF	CIN	2.25
LTF	CPL	3.42
LTF	IPL	1.43
LTF	LGEE	0.49

<i>LTF</i>	<i>MEC</i>	5.25
<i>LTF</i>	<i>MECS</i>	2.06
<i>LTF</i>	<i>RENSSELAER</i>	0.12
<i>LTF</i>	<i>ROSETON</i>	0.89
<i>LTF</i>	<i>WEC</i>	0.62
<i>LTF</i>	<i>AA2-074</i>	2.32
924021	AB2-043 C O1	4.27
924161	AB2-060 C O1	12.61
924301	AB2-077 C O1	2.66
924311	AB2-078 C O1	2.66
924321	AB2-079 C O1	2.66
924401	AB2-089 C	1.9
924411	AB2-090 C	5.38
925221	AB2-176 C	2.22
925611	AC1-036 C	1.79
925781	AC1-054 C	6.
925831	AC1-062	0.14
925991	AC1-075 C	4.94
926021	AC1-080 C	1.65
926271	AC1-105 C	6.74
926761	AC1-162 C	83.53
927251	AC1-221 C	1.66
927261	AC1-222 C	4.05

Appendix 9

(DVP - CPLE) The 3KERR-3GW KING TAP 115 kV line (from bus 314702 to bus 304102 ckt 1) loads from 104.57% to 110.14% (**DC power flow**) of its emergency rating (199 MVA) for the line fault with failed breaker contingency outage of 'DVP_P4-5: T122C'. This project contributes approximately 25.13 MW to the thermal violation.

CONTINGENCY 'DVP_P4-5: T122C'

OPEN BUS 314559

OPEN BUS 315126

OPEN BUS 315128

OPEN BRANCH FROM BUS 314559 TO BUS 314561 CKT 1

END

/* CAROLINA

/* CAROLINA 115KV BUS

/* ROANOKE RAPIDS GEN 1 AND 2

/* ROANOKE RAPIDS GEN 3 AND 4

/* TX. #4

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315150	1BUGGS 1	15.37
315151	1BUGGS 2	15.37
315159	1KERR 2	3.45
315163	1KERR 6	3.4
315164	1KERR 7	3.4
934231	AD1-050 C	10.2
934232	AD1-050 E	5.57
935221	AD1-157 C	1.02
935222	AD1-157 E	0.68
935231	AD1-160 C	0.75
935232	AD1-160 E	1.03
936261	AD2-033 C	13.59
936262	AD2-033 E	9.06
936361	AD2-046 C O2	17.21
936362	AD2-046 E O2	7.91
936651	AD2-082 C	1.15
936652	AD2-082 E	0.56

937481	AD2-202 C O2	1.8
937482	AD2-202 E O2	0.91
LTF	AMIL	0.13
LTF	BAYOU	0.7
LTF	BIG_CAJUN1	1.11
LTF	BIG_CAJUN2	2.22
LTF	BLUEG	0.67
LTF	CALDERWOOD	0.42
LTF	CANNELTON	0.13
LTF	CARR	0.01
LTF	CATAWBA	0.43
LTF	CELEVELAND	1.21
LTF	CHEOAH	0.39
LTF	CHILHOWEE	0.13
LTF	CHOCTAW	0.75
LTF	CLIFTY	2.41
LTF	COTTONWOOD	2.74
LTF	DEARBORN	0.25
LTF	EDWARDS	0.21
LTF	ELMERSMITH	0.38
LTF	FARMERCITY	0.17
LTF	G-007A	0.14
LTF	GIBSON	0.23
LTF	HAMLET	1.65
LTF	MORGAN	1.21
LTF	NEWTON	0.57

<i>LTF</i>	<i>PRAIRIE</i>	<i>1.25</i>
<i>LTF</i>	<i>RENSSELAER</i>	<i>< 0.01</i>
<i>LTF</i>	<i>ROSETON</i>	<i>0.07</i>
<i>LTF</i>	<i>ROWAN</i>	<i>0.92</i>
<i>LTF</i>	<i>SANTEETLA</i>	<i>0.12</i>
<i>LTF</i>	<i>SMITHLAND</i>	<i>0.11</i>
<i>LTF</i>	<i>TATANKA</i>	<i>0.28</i>
<i>LTF</i>	<i>TILTON</i>	<i>0.25</i>
<i>LTF</i>	<i>TRIMBLE</i>	<i>0.13</i>
<i>LTF</i>	<i>TVA</i>	<i>0.51</i>
<i>LTF</i>	<i>UNIONPOWER</i>	<i>0.76</i>
<i>LTF</i>	<i>VFT</i>	<i>0.37</i>
<i>924021</i>	<i>AB2-043 C O1</i>	<i>3.7</i>
<i>924022</i>	<i>AB2-043 E O1</i>	<i>6.07</i>
<i>924161</i>	<i>AB2-060 C O1</i>	<i>10.52</i>
<i>924162</i>	<i>AB2-060 E O1</i>	<i>4.95</i>
<i>924301</i>	<i>AB2-077 C O1</i>	<i>2.39</i>
<i>924302</i>	<i>AB2-077 E O1</i>	<i>1.59</i>
<i>924311</i>	<i>AB2-078 C O1</i>	<i>2.39</i>
<i>924312</i>	<i>AB2-078 E O1</i>	<i>1.59</i>
<i>924321</i>	<i>AB2-079 C O1</i>	<i>2.39</i>
<i>924322</i>	<i>AB2-079 E O1</i>	<i>1.59</i>
<i>924401</i>	<i>AB2-089 C</i>	<i>4.63</i>
<i>924402</i>	<i>AB2-089 E</i>	<i>2.38</i>
<i>924411</i>	<i>AB2-090 C</i>	<i>4.66</i>
<i>924412</i>	<i>AB2-090 E</i>	<i>2.39</i>

925221	AB2-176 C	1.92
925222	AB2-176 E	0.82
925611	AC1-036 C	0.9
925612	AC1-036 E	1.47
925781	AC1-054 C	15.59
925782	AC1-054 E	7.18
926271	AC1-105 C	2.93
926272	AC1-105 E	1.46

Appendix 10

(DVP - DVP) The AC1-208 TAP-3SO JUSTICE 115 kV line (from bus 927140 to bus 313858 ckt 1) loads from 103.25% to 105.19% (**DC power flow**) of its load dump rating (202 MVA) for the line fault with failed breaker contingency outage of 'DVP_P4-2: 5602'. This project contributes approximately 8.65 MW to the thermal violation.

```
CONTINGENCY 'DVP_P4-2: 5602'                                /* CAROLINA 115 KV
  OPEN BRANCH FROM BUS 313723 TO BUS 314604 CKT 1          /* 3PECAN 115.00 -
3SEABORD 115.00
  OPEN BRANCH FROM BUS 314558 TO BUS 314587 CKT 1          /* 3BOYKINS
115.00 - 3MARGTSV 115.00
  OPEN BRANCH FROM BUS 314587 TO BUS 314604 CKT 1          /* 3MARGTSV
115.00 - 3SEABORD 115.00
  OPEN BUS 314587                                           /* ISLAND: 3MARGTSV 115.00
  OPEN BUS 314604                                           /* ISLAND: 3SEABORD 115.00
  OPEN BRANCH FROM BUS 314559 TO BUS 314571 CKT 1          /* 3CAROLNA
115.00 - 3EATON F 115.00
  OPEN BRANCH FROM BUS 314559 TO BUS 919690 CKT 1          /* 3CAROLNA
115.00 - AA2-053 TAP 115.00
  OPEN BRANCH FROM BUS 314559 TO BUS 314600 CKT 1          /* 3CAROLNA
115.00 - 3PLHITP 115.00
  OPEN BRANCH FROM BUS 314559 TO BUS 314561 CKT 1          /* 3CAROLNA
115.00 - 6CAROLNA 230.00
END
```

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315150	1BUGGS 1	5.33
315151	1BUGGS 2	5.33
315159	1KERR 2	1.19
315164	1KERR 7	1.17
315126	1ROARAP2	5.31
315128	1ROARAP4	5.11
314578	3HORNRTN	12.22
934231	AD1-050 C	5.63
934232	AD1-050 E	3.07
936361	AD2-046 C O2	5.92

936362	AD2-046 E O2	2.72
<i>LTF</i>	<i>AMIL</i>	<i>0.01</i>
<i>LTF</i>	<i>BAYOU</i>	<i>0.07</i>
<i>LTF</i>	<i>BIG_CAJUN1</i>	<i>0.1</i>
<i>LTF</i>	<i>BIG_CAJUN2</i>	<i>0.21</i>
<i>LTF</i>	<i>BLUEG</i>	<i>0.06</i>
<i>LTF</i>	<i>CALDERWOOD</i>	<i>0.03</i>
<i>LTF</i>	<i>CANNELTON</i>	<i>0.01</i>
<i>LTF</i>	<i>CARR</i>	<i>0.02</i>
<i>LTF</i>	<i>CATAWBA</i>	<i>0.04</i>
<i>LTF</i>	<i>CELEVELAND</i>	<i>0.1</i>
<i>LTF</i>	<i>CHEOAH</i>	<i>0.03</i>
<i>LTF</i>	<i>CHILHOWEE</i>	<i>0.01</i>
<i>LTF</i>	<i>CHOCTAW</i>	<i>0.07</i>
<i>LTF</i>	<i>CLIFTY</i>	<i>0.21</i>
<i>LTF</i>	<i>COTTONWOOD</i>	<i>0.25</i>
<i>LTF</i>	<i>DEARBORN</i>	<i>0.03</i>
<i>LTF</i>	<i>EDWARDS</i>	<i>0.02</i>
<i>LTF</i>	<i>ELMERSMITH</i>	<i>0.03</i>
<i>LTF</i>	<i>FARMERCITY</i>	<i>0.02</i>
<i>LTF</i>	<i>G-007</i>	<i>0.07</i>
<i>LTF</i>	<i>GIBSON</i>	<i>0.02</i>
<i>LTF</i>	<i>HAMLET</i>	<i>0.22</i>
<i>LTF</i>	<i>MORGAN</i>	<i>0.11</i>
<i>LTF</i>	<i>NEWTON</i>	<i>0.05</i>
<i>LTF</i>	<i>O-066</i>	<i>0.45</i>

<i>LTF</i>	<i>PRAIRIE</i>	<i>0.11</i>
<i>LTF</i>	<i>RENSSELAER</i>	<i>0.02</i>
<i>LTF</i>	<i>ROSETON</i>	<i>0.12</i>
<i>LTF</i>	<i>ROWAN</i>	<i>0.05</i>
<i>LTF</i>	<i>SANTEETLA</i>	<i>< 0.01</i>
<i>LTF</i>	<i>SMITHLAND</i>	<i>< 0.01</i>
<i>LTF</i>	<i>TATANKA</i>	<i>0.03</i>
<i>LTF</i>	<i>TILTON</i>	<i>0.02</i>
<i>LTF</i>	<i>TRIMBLE</i>	<i>0.01</i>
<i>LTF</i>	<i>TVA</i>	<i>0.04</i>
<i>LTF</i>	<i>UNIONPOWER</i>	<i>0.06</i>
<i>918491</i>	<i>AA1-063AC OP</i>	<i>5.44</i>
<i>918492</i>	<i>AA1-063AE OP</i>	<i>13.8</i>
<i>924021</i>	<i>AB2-043 C O1</i>	<i>1.27</i>
<i>924022</i>	<i>AB2-043 E O1</i>	<i>2.08</i>
<i>924161</i>	<i>AB2-060 C O1</i>	<i>3.6</i>
<i>924162</i>	<i>AB2-060 E O1</i>	<i>1.69</i>
<i>924301</i>	<i>AB2-077 C O1</i>	<i>0.82</i>
<i>924302</i>	<i>AB2-077 E O1</i>	<i>0.54</i>
<i>924311</i>	<i>AB2-078 C O1</i>	<i>0.82</i>
<i>924312</i>	<i>AB2-078 E O1</i>	<i>0.54</i>
<i>924321</i>	<i>AB2-079 C O1</i>	<i>0.82</i>
<i>924322</i>	<i>AB2-079 E O1</i>	<i>0.54</i>
<i>924401</i>	<i>AB2-089 C</i>	<i>2.55</i>
<i>924402</i>	<i>AB2-089 E</i>	<i>1.31</i>
<i>924411</i>	<i>AB2-090 C</i>	<i>1.59</i>

924412	AB2-090 E	0.82
925221	AB2-176 C	0.66
925222	AB2-176 E	0.28
925781	AC1-054 C	5.37
925782	AC1-054 E	2.47
927141	AC1-208 C	41.85
927142	AC1-208 E	18.58

Appendix 11

(DVP - CPLE) The AC1-221 TAP-6PERSON230 T 230 kV line (from bus 927250 to bus 304070 ckt 1) loads from 100.14% to 101.32% (**DC power flow**) of its emergency rating (718 MVA) for the single line contingency outage of 'DVP_P1-2: LN 556'. This project contributes approximately 8.94 MW to the thermal violation.

CONTINGENCY 'DVP_P1-2: LN 556'

OPEN BRANCH FROM BUS 314686 TO BUS 314906 CKT 1 /* 6CLOVER
230.00 - 8CLOVER 500.00
OPEN BRANCH FROM BUS 314686 TO BUS 314906 CKT 2 /* 6CLOVER
230.00 - 8CLOVER 500.00
OPEN BRANCH FROM BUS 314686 TO BUS 314906 CKT 3 /* 6CLOVER
230.00 - 8CLOVER 500.00
OPEN BRANCH FROM BUS 314906 TO BUS 314936 CKT 1 /* 8CLOVER
500.00 - 8BRAWLINGS 500.00
OPEN BUS 314906 /* ISLAND
END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315150	1BUGGS 1	17.67
315151	1BUGGS 2	17.67
315153	1CLOVER1	42.46
315154	1CLOVER2	41.91
315159	1KERR 2	1.41
315164	1KERR 7	1.39
315266	1PLYWOOD A	3.72
314429	3JTRSVLE	0.61
932511	AC2-071 C	2.43
932761	AC2-100 C	26.97
932821	AC2-107 C	21.11
934311	AD1-055 C	6.99
934341	AD1-058 C	29.38
934611	AD1-087 C O1	26.89

934621	AD1-088 C	31.8
934911	AD1-123 C	3.15
934991	AD1-131 C	9.63
935171	AD1-152 C O1	26.72
935221	AD1-157 C	2.12
935231	AD1-160 C	1.56
936261	AD2-033 C	17.89
936331	AD2-043 C	13.04
936361	AD2-046 C O2	8.94
936481	AD2-063 C O2	38.06
936651	AD2-082 C	2.38
937461	AD2-200 C	4.02
937481	AD2-202 C O2	4.48
LTF	AMIL	0.46
LTF	BAYOU	2.62
LTF	BIG_CAJUN1	4.14
LTF	BIG_CAJUN2	8.34
LTF	BLUEG	2.31
LTF	CALDERWOOD	1.58
LTF	CANNELTON	0.45
LTF	CARR	0.04
LTF	CATAWBA	1.7
LTF	CELEVELAND	4.82
LTF	CHEOAH	1.48
LTF	CHILHOWEE	0.51
LTF	CHOCTAW	2.83

<i>LTF</i>	<i>CLIFTY</i>	<i>8.11</i>
<i>LTF</i>	<i>COTTONWOOD</i>	<i>10.23</i>
<i>LTF</i>	<i>DEARBORN</i>	<i>0.83</i>
<i>LTF</i>	<i>EDWARDS</i>	<i>0.73</i>
<i>LTF</i>	<i>ELMERSMITH</i>	<i>1.33</i>
<i>LTF</i>	<i>FARMERCITY</i>	<i>0.6</i>
<i>LTF</i>	<i>G-007A</i>	<i>0.4</i>
<i>LTF</i>	<i>GIBSON</i>	<i>0.82</i>
<i>LTF</i>	<i>HAMLET</i>	<i>6.39</i>
<i>LTF</i>	<i>MORGAN</i>	<i>4.56</i>
<i>LTF</i>	<i>NEWTON</i>	<i>2.03</i>
<i>LTF</i>	<i>PRAIRIE</i>	<i>4.5</i>
<i>LTF</i>	<i>RENSSELAER</i>	<i>0.03</i>
<i>LTF</i>	<i>ROSETON</i>	<i>0.22</i>
<i>LTF</i>	<i>ROWAN</i>	<i>3.76</i>
<i>LTF</i>	<i>SANTEETLA</i>	<i>0.44</i>
<i>LTF</i>	<i>SMITHLAND</i>	<i>0.41</i>
<i>LTF</i>	<i>TATANKA</i>	<i>1.</i>
<i>LTF</i>	<i>TILTON</i>	<i>0.86</i>
<i>LTF</i>	<i>TRIMBLE</i>	<i>0.44</i>
<i>LTF</i>	<i>TVA</i>	<i>1.9</i>
<i>LTF</i>	<i>UNIONPOWER</i>	<i>2.99</i>
<i>LTF</i>	<i>VFT</i>	<i>1.05</i>
<i>924021</i>	<i>AB2-043 C O1</i>	<i>4.29</i>
<i>924031</i>	<i>AB2-045 C</i>	<i>0.46</i>
<i>924161</i>	<i>AB2-060 C O1</i>	<i>12.36</i>

924301	AB2-077 C O1	2.76
924311	AB2-078 C O1	2.76
924321	AB2-079 C O1	2.76
924411	AB2-090 C	5.4
925221	AB2-176 C	2.22
925611	AC1-036 C	1.32
925831	AC1-062	0.08
925991	AC1-075 C	11.87
926021	AC1-080 C	3.97
926271	AC1-105 C	14.48
926761	AC1-162 C	56.7
927251	AC1-221 C	11.72
927261	AC1-222 C	10.07

Appendix 12

(DVP - DVP) The AD1-057 TAP-6MORNSTR 230 kV line (from bus 934330 to bus 313845 ckt 1) loads from 100.43% to 100.89% (**DC power flow**) of its load dump rating (541 MVA) for the tower line contingency outage of 'DVP_P7-1: LN 56-2060'. This project contributes approximately 5.48 MW to the thermal violation.

CONTINGENCY 'DVP_P7-1: LN 56-2060'

OPEN BRANCH FROM BUS 313723 TO BUS 314604 CKT 1 /* 3PECAN 115.00 -
3SEABORD 115.00

OPEN BRANCH FROM BUS 314558 TO BUS 314587 CKT 1 /* 3BOYKINS
115.00 - 3MARGTSV 115.00

OPEN BRANCH FROM BUS 314587 TO BUS 314604 CKT 1 /* 3MARGTSV
115.00 - 3SEABORD 115.00

OPEN BUS 314587 /* ISLAND: 3MARGTSV 115.00

OPEN BUS 314604 /* ISLAND: 3SEABORD 115.00

OPEN BRANCH FROM BUS 314561 TO BUS 314599 CKT 1 /* 6CAROLNA
230.00 - 6ROA VAL 230.00

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315139	1GASTONA	7.38
315141	1GASTONB	7.38
315126	1ROARAP2	1.75
315128	1ROARAP4	1.69
315136	1ROSEMG1	6.09
315138	1ROSEMG2	2.85
315137	1ROSEMS1	3.78
314572	3EMPORIA	0.47
314578	3HORNRTN	3.21
314704	3LAWRENC	0.33
934201	AD1-047 C	9.04
934202	AD1-047 E	6.03
934231	AD1-050 C	2.62

934232	AD1-050 E	1.43
934331	AD1-057 C O1	36.62
934332	AD1-057 E O1	19.53
936361	AD2-046 C O2	3.75
936362	AD2-046 E O2	1.73
LTF	AMIL	0.31
LTF	BAYOU	1.67
LTF	BIG_CAJUN1	2.63
LTF	BIG_CAJUN2	5.29
LTF	BLUEG	1.62
LTF	CALDERWOOD	0.98
LTF	CANNELTON	0.31
LTF	CARR	< 0.01
LTF	CATAWBA	0.96
LTF	CELEVELAND	2.73
LTF	CHEOAH	0.91
LTF	CHILHOWEE	0.32
LTF	CHOCTAW	1.79
LTF	CLIFTY	5.91
LTF	COTTONWOOD	6.53
LTF	DEARBORN	0.59
LTF	EDWARDS	0.5
LTF	ELMERSMITH	0.91
LTF	FARMERCITY	0.4
LTF	G-007A	0.6
LTF	GIBSON	0.57

<i>LTF</i>	<i>HAMLET</i>	<i>3.97</i>
<i>LTF</i>	<i>MORGAN</i>	<i>2.89</i>
<i>LTF</i>	<i>NEWTON</i>	<i>1.38</i>
<i>LTF</i>	<i>PRAIRIE</i>	<i>3.</i>
<i>LTF</i>	<i>RENSSELAER</i>	<i>< 0.01</i>
<i>LTF</i>	<i>ROSETON</i>	<i>0.01</i>
<i>LTF</i>	<i>ROWAN</i>	<i>1.97</i>
<i>LTF</i>	<i>SANTEETLA</i>	<i>0.27</i>
<i>LTF</i>	<i>SMITHLAND</i>	<i>0.27</i>
<i>LTF</i>	<i>TATANKA</i>	<i>0.67</i>
<i>LTF</i>	<i>TILTON</i>	<i>0.59</i>
<i>LTF</i>	<i>TRIMBLE</i>	<i>0.31</i>
<i>LTF</i>	<i>TVA</i>	<i>1.21</i>
<i>LTF</i>	<i>UNIONPOWER</i>	<i>1.75</i>
<i>LTF</i>	<i>VFT</i>	<i>1.61</i>
<i>918491</i>	<i>AA1-063AC OP</i>	<i>1.8</i>
<i>918492</i>	<i>AA1-063AE OP</i>	<i>4.56</i>
<i>919691</i>	<i>AA2-053 C</i>	<i>1.44</i>
<i>919692</i>	<i>AA2-053 E</i>	<i>3.31</i>
<i>920671</i>	<i>AA2-174 C</i>	<i>0.07</i>
<i>920672</i>	<i>AA2-174 E</i>	<i>0.38</i>
<i>930861</i>	<i>AB1-132 C</i>	<i>30.34</i>
<i>930862</i>	<i>AB1-132 E</i>	<i>13.</i>
<i>931231</i>	<i>AB1-173 C</i>	<i>2.54</i>
<i>931232</i>	<i>AB1-173 E</i>	<i>1.19</i>
<i>931241</i>	<i>AB1-173AC</i>	<i>2.54</i>

931242	AB1-173AE	1.19
923851	AB2-025 C	0.31
923852	AB2-025 E	0.76
923911	AB2-031 C O1	2.52
923912	AB2-031 E O1	1.24
923991	AB2-040 C O1	8.29
923992	AB2-040 E O1	6.78
924401	AB2-089 C	1.19
924402	AB2-089 E	0.61
924511	AB2-100 C	15.36
924512	AB2-100 E	7.57
925171	AB2-174 C O1	7.9
925172	AB2-174 E O1	7.14
925781	AC1-054 C	4.49
925782	AC1-054 E	2.07
926071	AC1-086 C	44.67
926072	AC1-086 E	20.33

Appendix 13

(AEP - AEP) The 05EDAN 1-05DANVL2 138 kV line (from bus 242631 to bus 242620 ckt 1) loads from 133.13% to 133.73% (**DC power flow**) of its emergency rating (415 MVA) for the line fault with failed breaker contingency outage of 'AEP_P4_#7589_05J.FERR 765'. This project contributes approximately 5.56 MW to the thermal violation.

CONTINGENCY 'AEP_P4_#7589_05J.FERR 765'

OPEN BRANCH FROM BUS 242514 TO BUS 242520 CKT 1 / 242514 05J.FERR
765 242520 05J.FERR 500 1

OPEN BRANCH FROM BUS 242514 TO BUS 242684 CKT 2 / 242514 05J.FERR
765 242684 05J.FERR 138 2

OPEN BRANCH FROM BUS 242520 TO BUS 306719 CKT 1 / 242520 05J.FERR
500 306719 8ANTIOCH 500 1

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
244012	05PINNACLE	-2.08
315150	1BUGGS 1	4.75
315151	1BUGGS 2	4.75
315131	1EDGECEMA	4.26
315132	1EDGECEMB	4.26
314557	3BETHEL C	0.35
314554	3BTLEBRO	0.37
314572	3EMPORIA	0.14
314578	3HORNRTN	1.22
314582	3KELFORD	0.3
314603	3SCOT NK	1.24
314617	3TUNIS	0.28
314620	6CASHIE	0.27
314574	6EVERETS	0.98
314594	6PLYMOTH	0.26

932631	AC2-084 C	3.43
932632	AC2-084 E	1.69
932701	AC2-093 C	24.45
932702	AC2-093 E	13.99
932761	AC2-100 C	3.67
932762	AC2-100 E	1.79
932821	AC2-107 C	3.49
932822	AC2-107 E	1.63
933941	AD1-017 C	0.84
933942	AD1-017 E	1.37
933991	AD1-023 C	4.11
933992	AD1-023 E	2.24
934201	AD1-047 C	2.75
934202	AD1-047 E	1.83
934231	AD1-050 C	2.02
934232	AD1-050 E	1.1
934311	AD1-055 C	1.07
934312	AD1-055 E	0.28
934331	AD1-057 C O1	4.11
934332	AD1-057 E O1	2.19
934341	AD1-058 C	3.99
934342	AD1-058 E	1.01
934521	AD1-076 C O1	16.75
934522	AD1-076 E O1	8.53
934611	AD1-087 C O1	3.38
934612	AD1-087 E O1	1.59

934621	AD1-088 C	4.01
934622	AD1-088 E	1.88
LTF	AD1-120	7.56
LTF	AD1-121	7.62
934911	AD1-123 C	0.47
934912	AD1-123 E	0.24
934991	AD1-131 C	1.31
934992	AD1-131 E	0.87
935171	AD1-152 C O1	3.36
935172	AD1-152 E O1	2.24
935221	AD1-157 C	0.46
935222	AD1-157 E	0.31
935231	AD1-160 C	0.34
935232	AD1-160 E	0.47
936161	AD2-022 C O2	10.63
936162	AD2-022 E O2	6.38
936171	AD2-023 C O2	6.29
936172	AD2-023 E O2	3.41
936261	AD2-033 C	4.76
936262	AD2-033 E	3.17
936331	AD2-043 C	2.
936332	AD2-043 E	2.37
936361	AD2-046 C O2	3.81
936362	AD2-046 E O2	1.75
936401	AD2-051 C O2	2.93
936402	AD2-051 E O2	1.26

936481	AD2-063 C O2	4.79
936482	AD2-063 E O2	3.2
936531	AD2-068 C	2.28
936532	AD2-068 E	1.17
936641	AD2-081 C	2.56
936642	AD2-081 E	1.15
936651	AD2-082 C	0.52
936652	AD2-082 E	0.25
936701	AD2-089 C	3.17
936702	AD2-089 E	2.12
936711	AD2-090 C O2	2.14
936712	AD2-090 E O2	1.43
LTF	AD2-099	4.99
937441	AD2-195 C	3.15
937442	AD2-195 E	1.36
937461	AD2-200 C	0.51
937462	AD2-200 E	0.24
937481	AD2-202 C O2	0.9
937482	AD2-202 E O2	0.45
LTF	AMIL	0.17
LTF	BLUEG	2.05
LTF	CANNELTON	0.27
LTF	CARR	0.07
LTF	CBM-S1	1.16
LTF	CBM-S2	16.95
LTF	CBM-W2	3.27

<i>LTF</i>	<i>CLIFTY</i>	<i>10.69</i>
<i>LTF</i>	<i>CPL</i>	<i>5.58</i>
<i>LTF</i>	<i>DEARBORN</i>	<i>0.97</i>
<i>LTF</i>	<i>EDWARDS</i>	<i>0.44</i>
<i>LTF</i>	<i>ELMERSMITH</i>	<i>0.7</i>
<i>LTF</i>	<i>FARMERCITY</i>	<i>0.12</i>
<i>LTF</i>	<i>G-007A</i>	<i>0.82</i>
<i>LTF</i>	<i>GIBSON</i>	<i>0.58</i>
<i>LTF</i>	<i>NEWTON</i>	<i>0.95</i>
<i>LTF</i>	<i>PRAIRIE</i>	<i>0.83</i>
<i>LTF</i>	<i>RENSSELAER</i>	<i>0.05</i>
<i>LTF</i>	<i>ROSETON</i>	<i>0.36</i>
<i>LTF</i>	<i>TATANKA</i>	<i>0.33</i>
<i>LTF</i>	<i>TILTON</i>	<i>0.6</i>
<i>LTF</i>	<i>TRIMBLE</i>	<i>0.4</i>
<i>900672</i>	<i>V4-068 E</i>	<i>0.1</i>
<i>LTF</i>	<i>VFT</i>	<i>2.17</i>
<i>917332</i>	<i>Z2-043 E</i>	<i>0.36</i>
<i>917342</i>	<i>Z2-044 E</i>	<i>0.26</i>
<i>917512</i>	<i>Z2-088 E OP1</i>	<i>1.67</i>
<i>918492</i>	<i>AA1-063AE OP</i>	<i>1.37</i>
<i>918512</i>	<i>AA1-065 E OP</i>	<i>1.46</i>
<i>918532</i>	<i>AA1-067 E</i>	<i>0.29</i>
<i>918562</i>	<i>AA1-072 E</i>	<i>0.06</i>
<i>919692</i>	<i>AA2-053 E</i>	<i>1.33</i>
<i>919702</i>	<i>AA2-057 E</i>	<i>1.51</i>

<i>LTF</i>	<i>AA2-074</i>	<i>3.79</i>
<i>920042</i>	<i>AA2-088 E</i>	<i>3.28</i>
<i>920592</i>	<i>AA2-165 E</i>	<i>0.2</i>
<i>920672</i>	<i>AA2-174 E</i>	<i>0.15</i>
<i>930401</i>	<i>AB1-081 C</i>	<i>4.1</i>
<i>930402</i>	<i>AB1-081 E</i>	<i>1.76</i>
<i>930861</i>	<i>AB1-132 C</i>	<i>4.94</i>
<i>930862</i>	<i>AB1-132 E</i>	<i>2.12</i>
<i>931231</i>	<i>AB1-173 C</i>	<i>0.77</i>
<i>931232</i>	<i>AB1-173 E</i>	<i>0.36</i>
<i>931241</i>	<i>AB1-173AC</i>	<i>0.77</i>
<i>931242</i>	<i>AB1-173AE</i>	<i>0.36</i>
<i>923911</i>	<i>AB2-031 C O1</i>	<i>0.77</i>
<i>923912</i>	<i>AB2-031 E O1</i>	<i>0.38</i>
<i>923941</i>	<i>AB2-035 C</i>	<i>0.15</i>
<i>923942</i>	<i>AB2-035 E</i>	<i>0.06</i>
<i>923991</i>	<i>AB2-040 C O1</i>	<i>2.52</i>
<i>923992</i>	<i>AB2-040 E O1</i>	<i>2.06</i>
<i>924021</i>	<i>AB2-043 C O1</i>	<i>1.22</i>
<i>924022</i>	<i>AB2-043 E O1</i>	<i>2.</i>
<i>924151</i>	<i>AB2-059 C O1</i>	<i>4.83</i>
<i>924152</i>	<i>AB2-059 E O1</i>	<i>2.49</i>
<i>924161</i>	<i>AB2-060 C O1</i>	<i>3.48</i>
<i>924162</i>	<i>AB2-060 E O1</i>	<i>1.64</i>
<i>924301</i>	<i>AB2-077 C O1</i>	<i>0.78</i>
<i>924302</i>	<i>AB2-077 E O1</i>	<i>0.52</i>

924311	AB2-078 C O1	0.78
924312	AB2-078 E O1	0.52
924321	AB2-079 C O1	0.78
924322	AB2-079 E O1	0.52
924391	AB2-088 C	0.19
924392	AB2-088 E	0.09
924401	AB2-089 C	0.91
924402	AB2-089 E	0.47
924411	AB2-090 C	1.53
924412	AB2-090 E	0.79
924491	AB2-098 C	0.23
924492	AB2-098 E	0.1
924501	AB2-099 C	0.2
924502	AB2-099 E	0.08
924511	AB2-100 C	3.51
924512	AB2-100 E	1.73
925121	AB2-169 C	2.27
925122	AB2-169 E	2.03
925171	AB2-174 C O1	2.38
925172	AB2-174 E O1	2.16
925221	AB2-176 C	0.63
925222	AB2-176 E	0.27
925591	AC1-034 C	3.13
925592	AC1-034 E	2.36
925611	AC1-036 C	0.33
925612	AC1-036 E	0.54

925781	AC1-054 C	3.04
925782	AC1-054 E	1.4
925991	AC1-075 C	1.96
925992	AC1-075 E	1.11
926021	AC1-080 C	0.66
926022	AC1-080 E	0.37
926051	AC1-083 C	4.18
926052	AC1-083 E	6.83
926071	AC1-086 C	7.28
926072	AC1-086 E	3.31
926201	AC1-098 C	2.4
926202	AC1-098 E	1.43
926211	AC1-099 C	0.81
926212	AC1-099 E	0.47
926271	AC1-105 C	2.39
926272	AC1-105 E	1.19
926771	AC1-163 C	0.65
926772	AC1-163 E	0.3
927021	AC1-189 C	3.63
927022	AC1-189 E	1.81
927141	AC1-208 C	3.55
927142	AC1-208 E	1.58
927251	AC1-221 C	1.59
927252	AC1-221 E	1.59
927261	AC1-222 C	1.54
927262	AC1-222 E	1.47