Revised
Generation Interconnection
Feasibility Study Report

For

PJM Generation Interconnection Request
Queue Position AD2-195

Trowbridge-Pantego 115 kV
55.9 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 Washington County, North Carolina. The installed facilities will have a total capability of **80 MW** with **55.9 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

AD2-195 will interconnect with the ITO transmission system via a tap off of the Trowbridge-Pantego 115 line. No secondary POI was chosen.

Cost Summary

The AD2-195 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 AD2-195 project may be responsible for a contribution to the following costs:

Description	Total Cost
New System Upgrades	$ 124,950,000
Previously Identified Upgrades	$ 206,735,000
Total Costs	**$ 331,685,000**

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 AD2-195 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 AD2-195 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 Network Upgrades:

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
# 1,2	DVP: Line #246 Earleys – Nucor TP – Suffolk 230 kV: wreck and rebuild the line of 45 miles to 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.	**$110,950,000**
# 3	DVP: Line #189 Pantego – AB2-169 TAP 115 kV: wreck and rebuild the line of 7 miles to increase its line rating to 262 MVA (normal), 287 MVA (emergency), and 349 MVA (load dump). It is estimated to take 30-36 months to engineer, permit, and construct. A Va CPCN is required.	**$14,000,000**
6	DVP: Elmont 500 – 230 kV Tx#1: replace the 500-230 kV transformer #1 increase its line rating to 1134 MVA (normal), 1203 MVA (emergency), and 1365 MVA (load dump). It is estimated to take 24-30 months to engineer and construct.	**$17,500,000**
7,8,9	DVP: Line #238 Clubhouse to Sapony 230 kV: 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**
12	DVP: Line #218 Everetts-AD2-068 Tap 230 kV: wreck and rebuild the line of 18 miles to 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. A certificate from the NC PUC will most likely be required.	**$45,000,000**
13	DVP: Line #189 AB2-169 Tap – Five Points DP – Wharton 115 kV: wreck and rebuild the line of 24 miles to increase its line rating to 262 MVA (normal), 287 MVA (emergency), and 349 MVA (load dump). It is estimated to take 30-36 months to engineer, permit, and construct. A Va CPCN is required.	**$47,310,000**
14, 15, 16	DVP: Line #254 AB2-100 Tap – Lakeview 230 kV: wreck and rebuild the line of 16 miles to 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. A certificate from the NC PUC will most likely be required.	**$40,000,000**
17	DVP: Line #25 Pop Chap – Everetts 115 kV: replace relay in Everetts to increase its line rating to 263 MVA (normal), 287 MVA (emergency), and 349 MVA (load dump). It is estimated to take 14-16 months to engineer, permit and construct.	**$200,000**

Violation #	Upgrade Description	Upgrade Cost
18, 19	DVP: Line #2021 Elizabeth City – Shawboro 230 kV: wreck and rebuild the line of 8 miles to increase its line rating to 1047 MVA (normal), 1047 MVA (emergency), and 1204 MVA (load dump). It is estimated to take 30-36 months to engineer, permit, and construct. A Va CPCN is required.	**$25,700,000**
20, 21	DVP: Line #2131 Z1-036 – Tap S Hertford – Winfall 230 kV: wreck and rebuild the line of 8 miles to increase its line rating to 1047 MVA (normal), 1047 MVA (emergency), and 1204 MVA (load dump). It is estimated to take 30-36 months to engineer, permit, and construct. A Va CPCN is required.	**$19,875,000**
24,25,26	DVP: Line #254 AB2-100 Tap – Clubhouse 230 kV: wreck and rebuild the AB2-100 TAP-Clubhouse 230kV line of 2 miles to increase its line rating to 722 MVA (normal), 722 MVA (emergency), and 830 MVA (load dump). It is estimated to take 24-28 months to engineer, permit and construct. A Va CPCN is required.	**$5,000,000**
28,29	DVP/CPLE: The AD2-068 TAP-6GREENVILE T 230 kV line is a joint tie line between the Dominion Energy and Duke/Progress transmission systems. The VEPCO portion can be resolved by wrecking and rebuilding the line of 3 miles to 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. A certificate from the NC PUC will most likely be required. An affected systems study will need to be completed with Duke/Progress to determine upgrades required on the Duke/Progress system.	**$6,000,000**
	Total System Reinforcements	**$331,685,000**

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

The Queue Project AD2-195 was evaluated as a 80.0 MW (Capacity 55.9 MW) injection tapping the Trowbridge to Pantego 115kV line in the VAP area. Project AD2-195 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AD2-195 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
"313845	No Data
"314620	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
DVP_P1-2: LN 1020_B	CONTINGENCY 'DVP_P1-2: LN 1020_B' /*ADDED ON 4/19/2016 OPEN BRANCH FROM BUS 937440 TO BUS 314613 CKT 1 /* AD2-195 TAP 115.00 - 3TRWBRDG 115.00 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 2020	CONTINGENCY 'DVP_P1-2: LN 2020'		
	OPEN BRANCH FROM BUS 313851 TO BUS 314638 CKT 1		/* 6ECITYDP2 230.00 - 6ELIZ CT 230.00
	OPEN BRANCH FROM BUS 313851 TO BUS 314639 CKT 1		/* 6ECITYDP2 230.00 - 6TANGLEW 230.00
	OPEN BRANCH FROM BUS 314639 TO BUS 314651 CKT 1		/* 6TANGLEW 230.00 - 6WINFALL 230.00
	OPEN BUS 313851	/* ISLAND	
	OPEN BUS 314639	/* ISLAND	
	OPEN BUS 913391	/* ISLAND	
	OPEN BUS 913392	/* ISLAND	
	END		
DVP_P1-2: LN 2058	CONTINGENCY 'DVP_P1-2: LN 2058'		
	OPEN BRANCH FROM BUS 304222 TO BUS 313845 CKT 1		/* 6ROCKYMT230T230.00 - 6MORNSTR 230.00
	END		
DVP_P1-2: LN 2131_FSA	CONTINGENCY 'DVP_P1-2: LN 2131_FSA'		
	OPEN BRANCH FROM BUS 314203 TO BUS 314637 CKT 1		/* 6MACKEYS 230.00 - 6EDENTON 230.00
	OPEN BRANCH FROM BUS 314637 TO BUS 916040 CKT 1		/* 6EDENTON 230.00 - Z1-036 TAP 230.00
	OPEN BRANCH FROM BUS 314662 TO BUS 916040 CKT 1		/* ADDED BY JT FOR FULL FSA TAP REMOVAL
	OPEN BUS 314637	/* 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 2181	CONTINGENCY 'DVP_P1-2: LN 2181' OPEN BUS 304226 /* ISLAND: 6PA-RMOUNT#4115.00 OPEN BRANCH FROM BUS 304226 TO BUS 314591 CKT 1 /* 6PA-RMOUNT#4230.00 - 6NASH 230.00 OPEN BRANCH FROM BUS 313845 TO BUS 314591 CKT 1 /* 6HATHAWAY 230.00 - 6NASH 230.00 OPEN BUS 314591 /* ISLAND: 6NASH 230.00 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 247	CONTINGENCY 'DVP_P1-2: LN 247' 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 END

DVP_P1-2: LN 563	CONTINGENCY 'DVP_P1-2: LN 563' OPEN BRANCH FROM BUS 314902 TO BUS 314914 CKT 1 /* 8CARSON 500.00 - 8MDLTHAN 500.00 END
DVP_P4-2: 2014T2034	CONTINGENCY 'DVP_P4-2: 2014T2034' /* EARLEYS OPEN BRANCH FROM BUS 314569 TO BUS 314620 CKT 1 /* 2034 OPEN BRANCH FROM BUS 314620 TO BUS 933990 CKT 1 /* 2034 OPEN BRANCH FROM BUS 314569 TO BUS 314574 CKT 1 /* 2014 END
DVP_P4-2: 2020T2144	CONTINGENCY 'DVP_P4-2: 2020T2144' /* WINFALL 230 KV OPEN BRANCH FROM BUS 313851 TO BUS 314638 CKT 1 /* 6ECITYDP2 230.00 - 6ELIZ CT 230.00 OPEN BRANCH FROM BUS 313851 TO BUS 314639 CKT 1 /* 6ECITYDP2 230.00 - 6TANGLEW 230.00 OPEN BRANCH FROM BUS 314639 TO BUS 314651 CKT 1 /* 6TANGLEW 230.00 - 6WINFALL 230.00 OPEN BUS 313851 /* ISLAND: 6ECITYDP2 230.00 OPEN BUS 314639 /* ISLAND: 6TANGLEW 230.00 OPEN BUS 913391 /* ISLAND: Y1-086 C 230.00 OPEN BUS 913392 /* ISLAND: Y1-086 E 230.00 OPEN BUS 917121 /* ISLAND: Z2-027 C 230.00 OPEN BUS 917122 /* ISLAND: Z2-027 E 230.00 OPEN BRANCH FROM BUS 314651 TO BUS 901080 CKT 1 /* 6WINFALL 230.00 - W1-029 230.00 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: 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

	END
DVP_P4-2: 24742	CONTINGENCY 'DVP_P4-2: 24742' /* SUFFOLK 230 KV 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 OPEN BRANCH FROM BUS 314536 TO BUS 314537 CKT 1 /* 3SUFFOLK 115.00 - 6SUFFOLK 230.00 OPEN BRANCH FROM BUS 314537 TO BUS 314928 CKT 1 /* 6SUFFOLK 230.00 - 8SUFFOLK 500.00 REMOVE SWSHUNT FROM BUS 314537 END
DVP_P4-2: H2T557	CONTINGENCY 'DVP_P4-2: H2T557' /* ELMONT OPEN BRANCH FROM BUS 314908 TO BUS 314903 CKT 1 /*ELMONT TO CHICKAHOMINY (LINE 557) OPEN BRANCH FROM BUS 314903 TO BUS 314214 CKT 1 /*CHICKAHOMINY 500-230 (TX#1) OPEN BRANCH FROM BUS 314908 TO BUS 314218 CKT 2 /*ELMONT 500-230 (TX#2) END

DVP_P7-1: LN 2058-2181	CONTINGENCY 'DVP_P7-1: LN 2058-2181' OPEN BRANCH FROM BUS 304222 TO BUS 313845 CKT 1 /* 6ROCKYMT230T230.00 - 6HATHAWAY 230.00 OPEN BUS 304226 /* ISLAND: 6PA-RMOUNT#4115.00 OPEN BRANCH FROM BUS 304226 TO BUS 314591 CKT 1 /* 6PA-RMOUNT#4230.00 - 6NASH 230.00 OPEN BRANCH FROM BUS 313845 TO BUS 314591 CKT 1 /* 6HATHAWAY 230.00 - 6NASH 230.00 OPEN BUS 314591 /* ISLAND: 6NASH 230.00 END
DVP_P7-1: LN 25-2034_A	CONTINGENCY 'DVP_P7-1: LN 25-2034_A' /*REPLACED ON 4/19/2016 OPEN BRANCH FROM BUS 314573 TO BUS 314596 CKT 1 /* 3EVERETS 115.00 - 3POPLR C 115.00 OPEN BRANCH FROM BUS 314596 TO BUS 314614 CKT 1 /* 3POPLR C 115.00 - 3TROWBR2 115.00 OPEN BUS 314596 /* ISLAND OPEN BRANCH FROM BUS 314569 TO BUS 314620 CKT 1 /* 6EARLEYS 230.00 - 6CASHIE 230.00 OPEN BRANCH FROM BUS 314614 TO BUS 314616 CKT 1 /* 3TROWBR2 115.00 - 6TRWBRDG 230.00 OPEN BRANCH FROM BUS 314616 TO BUS 933990 CKT 1 /* 6TRWBRDG 230.00 - AD1-023 TAP 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 From	Bus To	Circuit	Power Flow	Loading % Initial	Loading % Final	Rating Type	Rating MVA	MW Contribution	Flowgate Appendix
1	N-1	DVP_P1-2: LN 2131A	DVP - DVP	6NUCO TP-6SUFFOLK 230 kV line	314575	314537	1	DC	97.19	100.34	ER	572	17.93	1
2	N-1	DVP_P1-2: LN 2131_FSA	DVP - DVP	6NUCO TP-6SUFFOLK 230 kV line	314575	314537	1	DC	96.91	100.05	ER	572	17.93	

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 From	Bus To	Circuit	Power Flow	Loading % Initial	Loading % Final	Rating Type	Rating MVA	MW Contribution	Flowgate Appendix
3	DCTL	DVP_P7-1: LN 25-2034_A	DVP - DVP	3PANTEGO-AB2-169 TAP 115 kV line	314592	925120	1	DC	97.89	126.17		91	25.73	2

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	Contingency Type	Contingency Name	Affected Area	Facility Description	Bus From	Bus To	Circuit	Power Flow	Loading % Initial	Loading % Final	Rating Type	Rating MVA	MW Contribution	Flowgate Appendix
4	N-1	"313845	DVP - CPLE	6MORNSTR-6ROCKYMT230T 230 kV line	313845	304222	1	DC	112.44	113.91	ER	374	5.5	3
5	N-1	DVP_P1-2: LN 2181	DVP - CPLE	6MORNSTR-6ROCKYMT230T 230 kV line	313845	304222	1	DC	108.65	110.12	ER	374	5.5	
6	LFFB	DVP_P4-2: H2T557	DVP - DVP	8ELMONT 500/230 kV transformer	314218	314908	1	DC	153.05	153.44		1051	11.13	4
7	LFFB	DVP_P4-2: 246T247	DVP - DVP	6CLUBHSE-6SAPONY 230 kV line	314563	314435	1	DC	135.21	136.09		637	12.35	5
8	LFFB	DVP_P4-2: 24662	DVP - DVP	6CLUBHSE-6SAPONY 230 kV line	314563	314435	1	DC	128.44	129.24		637	11.18	
9	LFFB	DVP_P4-2: 24682	DVP - DVP	6CLUBHSE-6SAPONY 230 kV line	314563	314435	1	DC	128.37	129.17		637	11.28	
10	N-1	DVP_P1-2: LN 2131A	DVP - DVP	6EARLEYS-6NUCO TP 230 kV line	314569	314575	1	DC	103.21	106.36	ER	572	17.93	6
11	N-1	DVP_P1-2: LN 2131_FSA	DVP - DVP	6EARLEYS-6NUCO TP 230 kV line	314569	314575	1	DC	102.95	106.09	ER	572	17.93	
12	DCTL	DVP_P7-1: LN 2058-2181	DVP - DVP	6EVERETS-AD2-068 TAP 230 kV line	314574	936530	1	DC	134.57	138.36		485	18.41	7
13	DCTL	DVP_P7-1: LN 25-2034_A	DVP - DVP	3FIVE PT-3WHARTON 115 kV line	314576	314622	1	DC	126.19	154.47		91	25.73	8
14	LFFB	DVP_P4-2: 246T247	DVP - DVP	6LAKEVEW-AB2-100 TAP 230 kV line	314583	924510	1	DC	130.4	132.98		459	11.81	9
15	N-1	DVP_P1-2: LN 246	DVP - DVP	6LAKEVEW-AB2-100 TAP 230 kV line	314583	924510	1	DC	109.45	111.46	ER	375	7.5	
16	N-1	DVP_P1-2: LN 2131A	DVP - DVP	6LAKEVEW-AB2-100 TAP 230 kV line	314583	924510	1	DC	104.95	107.11	ER	375	8.08	
17	LFFB	DVP_P4-2: 2014T2034	DVP - DVP	3POPLR C-3EVERETS 115 kV line	314596	314573	1	DC	118.16	126.67		239	20.34	10
18	LFFB	DVP_P4-2: 246T247	DVP - DVP	6ELIZ CT-6SHAWBRO 230 kV line	314638	314647	1	DC	135.38	139.05		699	25.62	11
19	LFFB	DVP_P4-2: 24742	DVP - DVP	6ELIZ CT-6SHAWBRO 230 kV line	31463	31464	1	DC	105.7	108.8		699	21.56	

					8	7			1					
20	DCTL	DVP_P7-1: LN 25-2034_A	DVP - DVP	6S HERTFORD-6WINFALL 230 kV line	314662	314651	1	DC	105.33	111.37		897	54.18	12
21	LFFB	DVP_P4-2: 24682	DVP - DVP	6S HERTFORD-6WINFALL 230 kV line	314662	314651	1	DC	107.98	111.28		897	29.62	
22	LFFB	DVP_P4-2: 24682	DVP - DVP	Z1-036 TAP-6S HERTFORD 230 kV line	916040	314662	1	DC	109.32	112.63		897	29.62	13
23	DCTL	DVP_P7-1: LN 25-2034_A	DVP - DVP	Z1-036 TAP-6S HERTFORD 230 kV line	916040	314662	1	DC	106.55	112.59		897	54.18	
24	LFFB	DVP_P4-2: 246T247	DVP - DVP	AB2-100 TAP-6CLUBHSE 230 kV line	924510	314563	1	DC	144.2	146.79		459	11.81	14
25	N-1	DVP_P1-2: LN 246	DVP - DVP	AB2-100 TAP-6CLUBHSE 230 kV line	924510	314563	1	DC	120.79	122.8	ER	375	7.5	
26	N-1	DVP_P1-2: LN 130-A	DVP - DVP	AB2-100 TAP-6CLUBHSE 230 kV line	924510	314563	1	DC	115.77	117.36	ER	375	5.94	
27	DCTL	DVP_P7-1: LN 25-2034_A	DVP - DVP	AB2-169 TAP-3FIVE PT 115 kV line	925120	314576	1	DC	137.51	165.79		91	25.73	15
28	DCTL	DVP_P7-1: LN 2058-2181	DVP - CPLE	AD2-068 TAP-6GREENVILE T 230 kV line	936530	304451	1	DC	141.91	145.76	ER	478	18.41	16
29	LFFB	DVP_P4-2: 2020T2144	DVP - CPLE	AD2-068 TAP-6GREENVILE T 230 kV line	936530	304451	1	DC	119.15	122.28	ER	478	20.73	

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, 2	6NUCO TP-6SUFFOLK 230 kV line	DVP: Line #246 Earleys – Nucor TP – Suffolk 230 kV: wreck and rebuild the line of 45 miles to 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	**$110,950,000**
3	3PANTEGO-AB2-169 TAP 115 kV line	DVP: Line #189 Pantego – AB2-169 TAP 115 kV: wreck and rebuild the line of 7 miles to increase its line rating to 262 MVA (normal), 287 MVA (emergency), and 349 MVA (load dump). It is estimated to take 30-36 months to engineer, permit, and construct. A Va CPCN is required.	Pending	**$14,000,000**
			Total New Network Upgrades	**$124,950,000**

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	6MORNSTR-6ROCKYMT230T 230 kV	DVP / CPLE: This is a joint tie line with Duke/Progress Energy. The line limit is not overloaded on the PJM ITO portion of the line. The ratings are limited on Duke Energy's side. The latest update indicates the line ratings are 478 MVA (normal), 478 MVA (Emergency) and 478 MVA (load dump). An affected systems study will need to be completed with Duke/Progress to determine upgrades required on the Duke/Progress system.	-	-

Violation #	Overloaded Facility	Upgrade Description	Network Upgrade Number	Upgrade Cost
6	8ELMONT 500/230 kV transformer	DVP: Elmont 500 – 230 kV Tx#1: replace the 500-230 kV transformer #1 increase its line rating to 1134 MVA (normal), 1203 MVA (emergency), and 1365 MVA (load dump). It is estimated to take 24-30 months to engineer and construct.	Pending	**$17,500,000**
7, 8, 9	6CLUBHSE-6SAPONY 230 kV line	DVP: Line #238 Clubhouse to Sapony 230 kV: 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**
10, 11	6EARLEYS-6NUCO TP 230 kV line	Same as New Reinforcement for violations 1 and 2 above	-	-
12	6EVERETS-AD2-068 TAP 230 kV line	DVP: Line #218 Everetts-AD2-068 Tap 230 kV: wreck and rebuild the line of 18 miles to 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. A certificate from the NC PUC will most likely be required.	Pending	**$45,000,000**
13	3FIVE PT-3WHARTON 115 kV line	DVP: Line #189 AB2-169 Tap – Five Points DP – Wharton 115 kV: wreck and rebuild the line of 24 miles to increase its line rating to 262 MVA (normal), 287 MVA (emergency), and 349 MVA (load dump). It is estimated to take 30-36 months to engineer, permit, and construct. A Va CPCN is required.	Pending	**$47,310,000**
14, 15, 16	6LAKEVEW-AB2-100 TAP 230 kV line	DVP: Line #254 AB2-100 Tap – Lakeview 230 kV: wreck and rebuild the line of 16 miles to 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. A certificate from the NC PUC will most likely be required.	Pending	**$40,000,000**
17	3POPLR C-3EVERETS 115 kV line	DVP: Line #25 Pop Chap – Everetts 115 kV: replace relay in Everetts to increase its line rating to 263 MVA (normal), 287 MVA (emergency), and 349 MVA (load dump). It is estimated to take 14-16 months to engineer, permit and construct.	Pending	**$200,000**

Violation #	Overloaded Facility	Upgrade Description	Network Upgrade Number	Upgrade Cost
18, 19	6ELIZ CT-6SHAWBRO 230 kV line	DVP: Line #2021 Elizabeth City – Shawboro 230 kV: wreck and rebuild the line of 8 miles to increase its line rating to 1047 MVA (normal), 1047 MVA (emergency), and 1204 MVA (load dump). It is estimated to take 30-36 months to engineer, permit, and construct. A Va CPCN is required.	Pending	**$25,700,000**
20, 21	6S HERTFORD-6WINFALL 230 kV line	DVP: Line #2131 Z1-036 – Tap S Hertford – Winfall 230 kV: wreck and rebuild the line of 8 miles to increase its line rating to 1047 MVA (normal), 1047 MVA (emergency), and 1204 MVA (load dump). It is estimated to take 30-36 months to engineer, permit, and construct. A Va CPCN is required.	Pending	**$19,875,000**
22, 23	Z1-036 TAP-6S HERTFORD 230 kV line	Same reinforcement as for Violations 20 and 21 above.	-	-
24, 25, 26	AB2-100 TAP-6CLUBHSE 230 kV line	DVP: Line #254 AB2-100 Tap – Clubhouse 230 kV: wreck and rebuild the AB2-100 TAP-Clubhouse 230kV line of 2 miles to increase its line rating to 722 MVA (normal), 722 MVA (emergency), and 830 MVA (load dump). It is estimated to take 24-28 months to engineer, permit and construct. A Va CPCN is required.	Pending	**$5,000,000**
27	AB2-169 TAP-3FIVE PT 115 kV line	Same reinforcement as for Violation 13 above.	-	-
28, 29	AD2-068 TAP-6GREENVILE T 230 kV line	DVP/CPLE: The AD2-068 TAP-6GREENVILE T 230 kV line is a joint tie line between the Dominion Energy and Duke/Progress transmission systems. The VEPCO portion can be resolved by wrecking and rebuilding the line of 3 miles to 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. A certificate from the NC PUC will most likely be required. An affected systems study will need to be completed with Duke/Progress to determine upgrades required on the Duke/Progress system.	-	**$6,000,000**
			Total Previous Network Upgrades **(This project may have a contribution towards these reinforcements)**	**$206,735,000**

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	Contingency Type	Contingency Name	Affected Area	Bus Facility Description	Bus From	Bus To	Circuit	Power Flow	Loading % Initial	Loading % Final	Rating Type	Rating MVA	MW Contribution	Flowgate Appendix
30	N-1	"313845	DVP - CPLE	6MORNSTR-6ROCKYMT230T 230 kV line	313845	304222	1	DC	155.67	156.62	ER	374	7.87	
31	N-1	DVP_P1-2: LN 2058	DVP - DVP	6MORNSTR-6NASH 230 kV line	313845	314591	1	DC	134	135.79	ER	449	8.03	
32	N-1	DVP_P1-2: LN 246	DVP - DVP	6MACKEYS-6EDENTON 230 kV line	314203	314637	1	DC	108.29	112.36	ER	731	29.75	
33	N-1	DVP_P1-2: LN 563	DVP - DVP	6CHESTF B-6BASIN 230 kV line	314287	314276	1	DC	183.37	183.83	ER	449	4.51	
34	N-1	DVP_P1-2: LN 2131A	DVP - DVP	6SAPONY-6CARSON 230 kV line	314435	314282	1	DC	127.56	128.37	ER	679	12.1	
35	N-1	DVP_P1-2: LN 246	DVP - DVP	6CLUBHSE-6SAPONY 230 kV line	314563	314435	1	DC	136.5	137.35	ER	599	11.21	
36	Non	Non	DVP - DVP	6CLUBHSE-6SAPONY 230 kV line	314563	314435	1	DC	116.32	116.97	NR	599	8.1	
37	N-1	DVP_P1-2: LN 2131A	DVP - DVP	6EARLEYS-6NUCO TP 230 kV line	314569	314575	1	DC	166.89	171.07	ER	572	25.66	
38	Non	Non	DVP - DVP	6EARLEYS-6NUCO TP 230 kV line	314569	314575	1	DC	99.3	101.86	NR	572	14.58	
39	N-1	DVP_P1-2: LN 2131A	DVP - DVP	6EVERETS-AD2-068 TAP 230 kV line	314574	936530	1	DC	122.43	124.88	ER	449	20.71	
40	Non	Non	DVP - DVP	6EVERETS-AD2-068 TAP 230 kV line	314574	936530	1	DC	100.94	103.22	NR	449	16.13	
41	N-1	DVP_P1-2: LN 2131A	DVP - DVP	6NUCO TP-6SUFFOLK 230 kV line	314575	314537	1	DC	160.87	165.06	ER	572	25.66	
42	N-1	DVP_P1-2: LN 1020_B	DVP - DVP	3FIVE PT-3WHARTON 115 kV line	314576	314622	1	DC	45.79	153.51	ER	74	80	
43	N-1	DVP_P1-2: LN 2131A	DVP - DVP	6LAKEVEW-AB2-100 TAP 230 kV line	31458	92451	1	DC	159.8	161.2	ER	375	11.56	

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44	Non	Non	DVP - DVP	6LAKEVEW-AB2-100 TAP 230 kV line	314583	924510	1	DC	122.32	123.27	NR	375	7.84	
45	N-1	DVP_P1-2: LN 2058	DVP - CPLE	6NASH-6PA-RMOUNT#4 230 kV line	314591	304226	1	DC	123.09	124.8	ER	470	8.03	
46	N-1	"314620	DVP - DVP	3POPLR C-3EVERETS 115 kV line	314596	314573	1	DC	122.12	132.04	ER	225	22.3	
47	N-1	"314620	DVP - DVP	3TRWBRDG2-3POPLR C 115 kV line	314614	314596	1	DC	99.71	107.52	ER	286	22.3	
48	N-1	DVP_P1-2: LN 2131A	DVP - DVP	6TRWBRDG-AD1-023 TAP 230 kV line	314616	933990	1	DC	133.94	141.44	ER	572	42.88	
49	N-1	DVP_P1-2: LN 2131A	DVP - DVP	6CASHIE-6EARLEYS 230 kV line	314620	314569	1	DC	148.85	156.35	ER	572	42.88	
50	N-1	DVP_P1-2: LN 246	DVP - DVP	6EDENTON-Z1-036 TAP 230 kV line	314637	916040	1	DC	103.87	107.93	ER	733	29.75	
51	N-1	DVP_P1-2: LN 247	DVP - DVP	6ELIZ CT-6SHAWBRO 230 kV line	314638	314647	1	DC	129.08	132.83	ER	572	21.45	
52	N-1	DVP_P1-2: LN 2020	DVP - DVP	6SUNBURY-6SUFFOLK 230 kV line	314648	314537	1	DC	152.75	157.62	ER	449	19.92	
53	N-1	DVP_P1-2: LN 2020	DVP - DVP	6WINFALL-W1-029 230 kV line	314651	901080	1	DC	107.9	112.34	ER	449	19.94	
54	N-1	DVP_P1-2: LN 246	DVP - DVP	6S HERTFORD-6WINFALL 230 kV line	314662	314651	1	DC	131.88	135.94	ER	733	29.73	
55	Non	Non	DVP - DVP	6S HERTFORD-6WINFALL 230 kV line	314662	314651	1	DC	97.47	100.93	NR	733	25.3	
56	N-1	DVP_P1-2: LN 2020	DVP - DVP	W1-029-6SUNBURY 230 kV line	901080	314648	1	DC	154.64	159.08	ER	449	19.92	
57	N-1	DVP_P1-2: LN 246	DVP - DVP	Z1-036 TAP-6S HERTFORD 230 kV line	916040	314662	1	DC	133.52	137.58	ER	733	29.73	
58	Non	Non	DVP - DVP	Z1-036 TAP-6S HERTFORD 230 kV line	916040	314662	1	DC	100.77	104.22	NR	733	25.3	
59	N-1	DVP_P1-2: LN 130-A	DVP - DVP	AB2-100 TAP-6CLUBHSE 230 kV line	924510	314563	1	DC	171.74	174.01	ER	375	8.5	
60	Non	Non	DVP - DVP	AB2-100 TAP-6CLUBHSE 230 kV line	924510	314563	1	DC	137.81	138.75	NR	375	7.84	
61	N-1	DVP_P1-2: LN 1020_B	DVP - DVP	AB2-169 TAP-3FIVE PT 115 kV line	925120	314576	1	DC	59.66	167.38	ER	74	80	
62	N-1	DVP_P1-2: LN 2131A	DVP - DVP	AD1-023 TAP-6CASHIE 230 kV line	933990	314620	1	DC	150.53	158.04	ER	572	42.88	

63	N-1	DVP_P1-2: LN 2131A	DVP - CPLE	AD2-068 TAP-6GREENVILE T 230 kV line	936530	304451	1	DC	119.35	122.22	ER	478	20.71	
64	Non	Non	DVP - CPLE	AD2-068 TAP-6GREENVILE T 230 kV line	936530	304451	1	DC	99.62	102.25	NR	478	16.13	
65	N-1	AEP_P1-2_#1377	AEP - AEP	05EDAN 1-05DANVL2 138 kV line	242631	242620	1	DC	143.78	144.26	ER	415	4.49	

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

Appendices

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

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

Appendix 1

(DVP - DVP) The 6NUCO TP-6SUFFOLK 230 kV line (from bus 314575 to bus 314537 ckt 1) loads from 97.19% to 100.34% (**DC power flow**) of its emergency rating (572 MVA) for the single line contingency outage of 'DVP_P1-2: LN 2131A'. This project contributes approximately 17.93 MW to the thermal violation.

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

Bus Number	*Bus Name*	*Full Contribution*
315294	*1DOMTR10*	*4.18*
315292	*1DOMTR78*	*2.83*
315293	*1DOMTR9*	*2.31*
315131	*1EDGECMA*	*9.03*
315132	*1EDGECMB*	*9.03*
315139	*1GASTONA*	*3.41*
315141	*1GASTONB*	*3.41*
315159	*1KERR 2*	*0.75*
315163	*1KERR 6*	*0.73*
315164	*1KERR 7*	*0.73*
315126	*1ROARAP2*	*1.38*
315128	*1ROARAP4*	*1.33*
315136	*1ROSEMG1*	*2.41*
315138	*1ROSEMG2*	*1.13*
315137	*1ROSEMS1*	*1.49*
314704	*3LAWRENC*	*0.2*
932631	*AC2-084 C*	*11.32*

933991	*AD1-023 C*	*27.83*
934201	*AD1-047 C*	*6.39*
934231	*AD1-050 C*	*2.75*
934331	*AD1-057 C O1*	*10.19*
934521	*AD1-076 C O1*	*112.9*
LTF	*AD1-120*	*4.28*
LTF	*AD1-121*	*4.25*
936401	*AD2-051 C O1*	*16.62*
936531	*AD2-068 C*	*6.82*
936701	*AD2-089 C*	*8.51*
LTF	*AD2-099*	*3.34*
937441	*AD2-195 C*	*17.93*
LTF	*CARR*	*0.08*
LTF	*CBM-S1*	*5.3*
LTF	*CBM-S2*	*10.7*
LTF	*CBM-W1*	*11.88*
LTF	*CBM-W2*	*28.77*
LTF	*CIN*	*2.66*
LTF	*CPLE*	*3.69*
LTF	*IPL*	*1.7*
LTF	*LGEE*	*0.57*
LTF	*MEC*	*5.96*
LTF	*MECS*	*2.73*
LTF	*RENSSELAER*	*0.06*
LTF	*ROSETON*	*0.47*
900671	*V4-068 C*	*0.1*

LTF	*WEC*	*0.73*
916041	*Z1-036 C*	*2.36*
917331	*Z2-043 C*	*0.67*
917341	*Z2-044 C*	*0.24*
917511	*Z2-088 C OP1*	*1.06*
918411	*AA1-050*	*0.89*
918491	*AA1-063AC OP*	*1.26*
918511	*AA1-065 C OP*	*3.52*
918531	*AA1-067 C*	*0.46*
918561	*AA1-072 C*	*0.1*
919691	*AA2-053 C*	*1.77*
919701	*AA2-057 C*	*1.31*
LTF	*AA2-074*	*2.51*
920041	*AA2-088 C*	*0.73*
920591	*AA2-165 C*	*0.18*
920671	*AA2-174 C*	*0.08*
920691	*AA2-178 C*	*19.71*
930051	*AB1-013 C*	*5.95*
930401	*AB1-081 C*	*8.64*
930861	*AB1-132 C*	*15.16*
931231	*AB1-173 C*	*1.8*
931241	*AB1-173AC*	*1.8*
923911	*AB2-031 C O1*	*1.78*
923941	*AB2-035 C*	*0.4*
923991	*AB2-040 C O1*	*5.86*
924151	*AB2-059 C O1*	*10.18*

924391	*AB2-088 C*	*0.51*
924401	*AB2-089 C*	*1.25*
924491	*AB2-098 C*	*0.88*
924501	*AB2-099 C*	*0.99*
924511	*AB2-100 C*	*7.32*
925121	*AB2-169 C*	*11.96*
925171	*AB2-174 C O1*	*5.33*
925291	*AB2-188 C O1*	*4.86*
925591	*AC1-034 C*	*6.6*
925781	*AC1-054 C*	*4.54*
926071	*AC1-086 C*	*22.32*
926201	*AC1-098 C*	*7.94*
926211	*AC1-099 C*	*2.66*
926771	*AC1-163 C*	*3.28*
927021	*AC1-189 C*	*11.67*
927141	*AC1-208 C*	*9.96*

Appendix 2

(DVP - DVP) The 3PANTEGO-AB2-169 TAP 115 kV line (from bus 314592 to bus 925120 ckt 1) loads from 97.89% to 126.17% (**DC power flow**) of its load dump rating (91 MVA) for the tower line contingency outage of 'DVP_P7-1: LN 25-2034_A'. This project contributes approximately 25.73 MW to the thermal violation.

```
CONTINGENCY 'DVP_P7-1: LN 25-2034_A'                    /*REPLACED ON
4/19/2016
  OPEN BRANCH FROM BUS 314573 TO BUS 314596 CKT 1        /* 3EVERETS
115.00 - 3POPLR C 115.00
  OPEN BRANCH FROM BUS 314596 TO BUS 314614 CKT 1        /* 3POPLR C
115.00 - 3TROWBR2 115.00
  OPEN BUS 314596                                        /* ISLAND
  OPEN BRANCH FROM BUS 314569 TO BUS 314620 CKT 1        /* 6EARLEYS
230.00 - 6CASHIE 230.00
  OPEN BRANCH FROM BUS 314614 TO BUS 314616 CKT 1        /* 3TROWBR2
115.00 - 6TRWBRDG 230.00
  OPEN BRANCH FROM BUS 314616 TO BUS 933990 CKT 1        /* 6TRWBRDG
230.00 - AD1-023 TAP 230.00
  END
```

Bus Number	*Bus Name*	*Full Contribution*
315294	*1DOMTR10*	*2.78*
315292	*1DOMTR78*	*1.88*
315293	*1DOMTR9*	*1.53*
314566	*3CRESWEL*	*1.3*
314594	*6PLYMOTH*	*0.56*
934521	*AD1-076 C O1*	*37.19*
934522	*AD1-076 E O1*	*18.94*
937441	*AD2-195 C*	*17.98*
937442	*AD2-195 E*	*7.75*
LTF	*AMIL*	*0.06*
LTF	*BAYOU*	*0.31*
LTF	*BIG_CAJUN1*	*0.49*

LTF	*BIG_CAJUN2*	*0.98*
LTF	*BLUEG*	*0.31*
LTF	*CALDERWOOD*	*0.18*
LTF	*CANNELTON*	*0.06*
LTF	*CARR*	*< 0.01*
LTF	*CATAWBA*	*0.17*
LTF	*CELEVELAND*	*0.49*
LTF	*CHEOAH*	*0.17*
LTF	*CHILHOWEE*	*0.06*
LTF	*CHOCTAW*	*0.33*
LTF	*CLIFTY*	*1.12*
LTF	*COTTONWOOD*	*1.21*
LTF	*DEARBORN*	*0.11*
LTF	*EDWARDS*	*0.09*
LTF	*ELMERSMITH*	*0.17*
LTF	*FARMERCITY*	*0.07*
LTF	*G-007A*	*0.11*
LTF	*GIBSON*	*0.11*
LTF	*HAMLET*	*0.72*
LTF	*MORGAN*	*0.53*
LTF	*NEWTON*	*0.26*
LTF	*PRAIRIE*	*0.56*
LTF	*RENSSELAER*	*< 0.01*
LTF	*ROSETON*	*< 0.01*
LTF	*ROWAN*	*0.35*
LTF	*SANTEETLA*	*0.05*

LTF	*SMITHLAND*	*0.05*
LTF	*TATANKA*	*0.13*
LTF	*TILTON*	*0.11*
LTF	*TRIMBLE*	*0.06*
LTF	*TVA*	*0.22*
LTF	*UNIONPOWER*	*0.32*
LTF	*VFT*	*0.29*
916042	*Z1-036 E*	*16.14*
920691	*AA2-178 C*	*5.21*
920692	*AA2-178 E*	*2.23*
930051	*AB1-013 C*	*1.57*
930052	*AB1-013 E*	*10.53*
925281	*AB2-186 C*	*0.2*
925282	*AB2-186 E*	*0.08*
925291	*AB2-188 C O1*	*1.28*
925292	*AB2-188 E O1*	*0.58*

Appendix 3

(DVP - CPLE) The 6MORNSTR-6ROCKYMT230T 230 kV line (from bus 313845 to bus 304222 ckt 1) loads from 112.44% to 113.91% (**DC power flow**) of its emergency rating (374 MVA) for the single line contingency outage of '"313845'. This project contributes approximately 5.5 MW to the thermal violation.

CONTINGENCY '313845' 6MORNSTR 230 314591 6NASH 230 1
OPEN BRANCH FROM BUS 313845 TO BUS 314591 CKT 1
END

Bus Number	*Bus Name*	*Full Contribution*
315294	*1DOMTR10*	*1.22*
315292	*1DOMTR78*	*0.82*
315293	*1DOMTR9*	*0.67*
315131	*1EDGECMA*	*24.66*
315132	*1EDGECMB*	*24.66*
315139	*1GASTONA*	*3.54*
315141	*1GASTONB*	*3.54*
315126	*1ROARAP2*	*1.13*
315128	*1ROARAP4*	*1.09*
315136	*1ROSEMG1*	*2.96*
315138	*1ROSEMG2*	*1.38*
315137	*1ROSEMS1*	*1.83*
315115	*1S HAMPT1*	*0.78*
314704	*3LAWRENC*	*0.18*
932631	*AC2-084 C*	*8.4*
933991	*AD1-023 C*	*7.23*
934201	*AD1-047 C*	*5.75*
934231	*AD1-050 C*	*1.59*

934331	*AD1-057 C O1*	*19.74*
934521	*AD1-076 C O1*	*28.41*
936401	*AD2-051 C O1*	*6.11*
936701	*AD2-089 C*	*14.39*
936711	*AD2-090 C O1*	*3.69*
937441	*AD2-195 C*	*5.5*
LTF	*AMIL*	*0.38*
LTF	*BAYOU*	*2.*
LTF	*BIG_CAJUN1*	*3.15*
LTF	*BIG_CAJUN2*	*6.33*
LTF	*BLUEG*	*2.01*
LTF	*CALDERWOOD*	*1.18*
LTF	*CANNELTON*	*0.38*
LTF	*CARR*	*< 0.01*
LTF	*CATAWBA*	*1.15*
LTF	*CELEVELAND*	*3.28*
LTF	*CHEOAH*	*1.1*
LTF	*CHILHOWEE*	*0.38*
LTF	*CHOCTAW*	*2.14*
LTF	*CLIFTY*	*7.37*
LTF	*COTTONWOOD*	*7.82*
LTF	*DEARBORN*	*0.73*
LTF	*EDWARDS*	*0.62*
LTF	*ELMERSMITH*	*1.12*
LTF	*FARMERCITY*	*0.48*
LTF	*G-007A*	*0.77*

LTF	*GIBSON*	*0.7*
LTF	*HAMLET*	*4.56*
LTF	*MORGAN*	*3.46*
LTF	*NEWTON*	*1.69*
LTF	*PRAIRIE*	*3.65*
LTF	*RENSSELAER*	*< 0.01*
LTF	*ROSETON*	*< 0.01*
LTF	*ROWAN*	*2.42*
LTF	*SANTEETLA*	*0.33*
LTF	*SMITHLAND*	*0.32*
LTF	*TATANKA*	*0.82*
LTF	*TILTON*	*0.73*
LTF	*TRIMBLE*	*0.38*
LTF	*TVA*	*1.46*
LTF	*UNIONPOWER*	*2.1*
900671	*V4-068 C*	*0.06*
LTF	*VFT*	*2.05*
901081	*W1-029C*	*0.35*
916041	*Z1-036 C*	*0.42*
917331	*Z2-043 C*	*0.32*
917341	*Z2-044 C*	*0.28*
917511	*Z2-088 C OP1*	*1.46*
918411	*AA1-050*	*1.23*
918491	*AA1-063AC OP*	*1.05*
918511	*AA1-065 C OP*	*1.01*
918531	*AA1-067 C*	*0.22*

918561	*AA1-072 C*	*0.05*
919691	*AA2-053 C*	*1.16*
919701	*AA2-057 C*	*1.39*
920041	*AA2-088 C*	*0.64*
920591	*AA2-165 C*	*0.19*
920671	*AA2-174 C*	*0.05*
920691	*AA2-178 C*	*4.33*
930051	*AB1-013 C*	*1.31*
930401	*AB1-081 C*	*14.25*
930861	*AB1-132 C*	*15.73*
931231	*AB1-173 C*	*1.62*
931241	*AB1-173AC*	*1.62*
923801	*AB2-015 C O1*	*4.04*
923851	*AB2-025 C*	*0.17*
923911	*AB2-031 C O1*	*1.61*
923941	*AB2-035 C*	*0.67*
923991	*AB2-040 C O1*	*5.27*
924151	*AB2-059 C O1*	*16.8*
924391	*AB2-088 C*	*0.86*
924401	*AB2-089 C*	*0.72*
924491	*AB2-098 C*	*0.42*
924501	*AB2-099 C*	*0.4*
924511	*AB2-100 C*	*8.38*
925121	*AB2-169 C*	*4.01*
925171	*AB2-174 C O1*	*4.92*
925281	*AB2-186 C*	*0.21*

925291	*AB2-188 C O1*	*1.07*
925591	*AC1-034 C*	*10.88*
925781	*AC1-054 C*	*2.81*
926071	*AC1-086 C*	*23.16*
926201	*AC1-098 C*	*5.89*
926211	*AC1-099 C*	*1.98*
926771	*AC1-163 C*	*1.31*
927021	*AC1-189 C*	*12.13*
927141	*AC1-208 C*	*8.7*

Appendix 4

(DVP - DVP) The 8ELMONT 500/230 kV transformer (from bus 314218 to bus 314908 ckt 1) loads from 153.05% to 153.44% (**DC power flow**) of its load dump rating (1051 MVA) for the line fault with failed breaker contingency outage of 'DVP_P4-2: H2T557'. This project contributes approximately 11.13 MW to the thermal violation.

CONTINGENCY 'DVP_P4-2: H2T557' /* ELMONT
OPEN BRANCH FROM BUS 314908 TO BUS 314903 CKT 1 /*ELMONT TO CHICKAHOMINY (LINE 557)
OPEN BRANCH FROM BUS 314903 TO BUS 314214 CKT 1 /*CHICKAHOMINY 500-230 (TX#1)
OPEN BRANCH FROM BUS 314908 TO BUS 314218 CKT 2 /*ELMONT 500-230 (TX#2)
END

Bus Number	*Bus Name*	*Full Contribution*
315053	*1BELMED1*	*25.63*
315054	*1BELMED2*	*25.63*
315055	*1BELMED3*	*21.27*
315058	*1CHESTF3*	*27.13*
315059	*1CHESTF4*	*43.98*
315067	*1DARBY 1*	*4.37*
315068	*1DARBY 2*	*4.38*
315069	*1DARBY 3*	*4.39*
315070	*1DARBY 4*	*4.4*
315043	*1FOUR RIVERA*	*5.82*
315044	*1FOUR RIVERB*	*4.5*
315045	*1FOUR RIVERC*	*5.82*
315046	*1FOUR RIVERD*	*4.5*
315047	*1FOUR RIVERE*	*4.5*
315048	*1FOUR RIVERF*	*5.82*

315074	*1HOPCGN1*	*11.31*
315075	*1HOPCGN2*	*11.16*
315083	*1SPRUNCA*	*14.98*
315084	*1SPRUNCB*	*14.98*
315085	*1SPRUNCC*	*11.11*
315086	*1SPRUNCD*	*11.11*
315073	*1STONECA*	*9.38*
315090	*1YORKTN1*	*31.01*
315091	*1YORKTN2*	*32.18*
314566	*3CRESWEL*	*2.11*
314572	*3EMPORIA*	*0.36*
314315	*3LOCKS E*	*1.66*
314617	*3TUNIS*	*0.72*
314539	*3UNCAMP*	*2.2*
314541	*3WATKINS*	*0.62*
314620	*6CASHIE*	*0.72*
314229	*6MT RD221*	*1.41*
314236	*6NRTHEST*	*0.32*
314189	*6PAPERMILL*	*8.84*
314594	*6PLYMOTH*	*0.74*
314250	*6ROCKVILLE*	*0.35*
314256	*6ROCKVILLE E*	*1.16*
314648	*6SUNBURY*	*0.81*
314651	*6WINFALL*	*1.59*
932041	*AC2-012 C*	*9.65*
932042	*AC2-012 E*	*15.74*

932501	*AC2-070 C*	*2.91*
932502	*AC2-070 E*	*1.2*
932531	*AC2-073 C*	*3.11*
932532	*AC2-073 E*	*1.57*
932581	*AC2-078 C*	*4.76*
932582	*AC2-078 E*	*7.77*
932591	*AC2-079 C*	*5.81*
932592	*AC2-079 E*	*9.48*
932831	*AC2-110 C*	*1.75*
932832	*AC2-110 E*	*2.85*
933061	*AC2-130*	*3.49*
933071	*AC2-131 1*	*2.36*
933081	*AC2-131 2*	*1.07*
933111	*AC2-132 1*	*1.24*
933121	*AC2-132 2*	*0.64*
933261	*AC2-137 C*	*3.16*
933262	*AC2-137 E*	*2.03*
933271	*AC2-138 C*	*0.87*
933272	*AC2-138 E*	*1.09*
933291	*AC2-141 C*	*27.25*
933292	*AC2-141 E*	*11.63*
933471	*AC2-161 C*	*2.48*
933472	*AC2-161 E*	*1.28*
933481	*AC2-162 C*	*4.17*
933482	*AC2-162 E*	*2.15*
933731	*AC2-196 C*	*1.66*

933732	*AC2-196 E*	*1.11*
933991	*AD1-023 C*	*11.33*
933992	*AD1-023 E*	*6.17*
934011	*AD1-025 C O1*	*20.87*
934012	*AD1-025 E O1*	*12.36*
934061	*AD1-033 C O1*	*6.98*
934062	*AD1-033 E O1*	*4.66*
934141	*AD1-041 C O1*	*6.75*
934142	*AD1-041 E O1*	*4.5*
934191	*AD1-046 C*	*4.73*
934192	*AD1-046 E*	*3.15*
934201	*AD1-047 C*	*6.77*
934202	*AD1-047 E*	*4.52*
934211	*AD1-048 C*	*3.83*
934212	*AD1-048 E*	*1.93*
934391	*AD1-063 C*	*2.1*
934392	*AD1-063 E*	*1.4*
934521	*AD1-076 C O1*	*47.05*
934522	*AD1-076 E O1*	*23.96*
934571	*AD1-082 C O1*	*8.29*
934572	*AD1-082 E O1*	*4.73*
934781	*AD1-105 C*	*8.11*
934782	*AD1-105 E*	*5.63*
LTF	*AD1-120*	*5.98*
LTF	*AD1-121*	*5.94*
935111	*AD1-144 C*	*1.68*

935112	*AD1-144 E*	*0.92*
935161	*AD1-151 C O1*	*19.94*
935162	*AD1-151 E O1*	*13.29*
935211	*AD1-156 C*	*2.56*
935212	*AD1-156 E*	*1.71*
936041	*AD2-007*	*2.22*
936051	*AD2-008 C*	*3.63*
936052	*AD2-008 E*	*7.91*
936151	*AD2-021*	*0.36*
936241	*AD2-030 C*	*2.89*
936242	*AD2-030 E*	*1.48*
936301	*AD2-039 C*	*1.75*
936302	*AD2-039 E*	*2.85*
936341	*AD2-044 C*	*0.27*
936342	*AD2-044 E*	*0.31*
936391	*AD2-049 C*	*1.89*
936392	*AD2-049 E*	*1.89*
936401	*AD2-051 C O1*	*7.36*
936402	*AD2-051 E O1*	*3.16*
936581	*AD2-073 C*	*2.25*
936582	*AD2-073 E*	*1.11*
936591	*AD2-074 C*	*6.55*
936592	*AD2-074 E*	*10.68*
936661	*AD2-085 C*	*3.51*
936662	*AD2-085 E*	*5.73*
936711	*AD2-090 C O1*	*6.4*

936712	*AD2-090 E O1*	*4.26*
LTF	*AD2-099*	*4.57*
937221	*AD2-160 C O1*	*5.42*
937222	*AD2-160 E O1*	*2.84*
937251	*AD2-164*	*5.15*
937441	*AD2-195 C*	*7.78*
937442	*AD2-195 E*	*3.35*
937541	*AD2-215 C*	*1.7*
937542	*AD2-215 E*	*0.9*
LTF	*CARR*	*0.65*
LTF	*CBM-S1*	*4.02*
LTF	*CBM-S2*	*13.98*
LTF	*CBM-W1*	*0.84*
LTF	*CBM-W2*	*18.98*
LTF	*CIN*	*0.26*
LTF	*CLIFTY*	*1.24*
LTF	*CPLE*	*4.79*
LTF	*DEARBORN*	*0.43*
LTF	*G-007*	*2.25*
LTF	*IPL*	*0.14*
LTF	*LGEE*	*0.07*
LTF	*MEC*	*2.24*
LTF	*O-066*	*14.38*
LTF	*RENSSELAER*	*0.51*
LTF	*ROSETON*	*3.71*
292791	*U1-032 E*	*4.88*

297087	*V2-040*	*0.24*
900672	*V4-068 E*	*0.26*
901082	*W1-029E*	*41.96*
LTF	*WEC*	*0.09*
907092	*X1-038 E*	*5.49*
913392	*Y1-086 E*	*2.*
916042	*Z1-036 E*	*40.98*
916192	*Z1-068 E*	*1.76*
917122	*Z2-027 E*	*0.97*
918492	*AA1-063AE OP*	*3.36*
918512	*AA1-065 E OP*	*3.75*
918691	*AA1-083*	*1.02*
919152	*AA1-139 E*	*5.94*
919211	*AA1-145*	*17.36*
919692	*AA2-053 E*	*3.07*
LTF	*AA2-074*	*3.26*
920042	*AA2-088 E*	*9.19*
920672	*AA2-174 E*	*0.35*
920691	*AA2-178 C*	*8.45*
920692	*AA2-178 E*	*3.62*
930051	*AB1-013 C*	*2.55*
930052	*AB1-013 E*	*17.08*
930121	*AB1-027 C*	*0.76*
930122	*AB1-027 E*	*1.9*
930861	*AB1-132 C*	*11.82*
930862	*AB1-132 E*	*5.07*

931231	*AB1-173 C*	*1.9*
931232	*AB1-173 E*	*0.89*
931241	*AB1-173AC*	*1.9*
931242	*AB1-173AE*	*0.89*
923801	*AB2-015 C O1*	*7.75*
923802	*AB2-015 E O1*	*6.36*
923831	*AB2-022 C*	*2.11*
923832	*AB2-022 E*	*1.13*
923842	*AB2-024 E*	*1.49*
923852	*AB2-025 E*	*1.09*
923862	*AB2-026 E*	*0.88*
923911	*AB2-031 C O1*	*1.89*
923912	*AB2-031 E O1*	*0.93*
923991	*AB2-040 C O1*	*6.21*
923992	*AB2-040 E O1*	*5.08*
924061	*AB2-050*	*1.02*
924071	*AB2-051*	*129.26*
924241	*AB2-068 O1*	*178.5*
924501	*AB2-099 C*	*0.5*
924502	*AB2-099 E*	*0.21*
924511	*AB2-100 C*	*10.52*
924512	*AB2-100 E*	*5.18*
924811	*AB2-134 C O1*	*15.91*
924812	*AB2-134 E O1*	*15.11*
925051	*AB2-160 C O1*	*7.19*
925052	*AB2-160 E O1*	*11.74*

925061	*AB2-161 C O1*	*3.64*
925062	*AB2-161 E O1*	*5.94*
925171	*AB2-174 C O1*	*5.98*
925172	*AB2-174 E O1*	*5.41*
925281	*AB2-186 C*	*0.55*
925282	*AB2-186 E*	*0.24*
925291	*AB2-188 C O1*	*2.08*
925292	*AB2-188 E O1*	*0.94*
925331	*AB2-190 C*	*24.81*
925332	*AB2-190 E*	*10.63*
925522	*AC1-027 E*	*1.07*
925692	*AC1-045 E*	*0.92*
925861	*AC1-065 C*	*4.37*
925862	*AC1-065 E*	*7.13*
926071	*AC1-086 C*	*17.41*
926072	*AC1-086 E*	*7.92*
926291	*AC1-107*	*269.44*
926411	*AC1-112 C*	*0.59*
926412	*AC1-112 E*	*1.93*
926472	*AC1-118 E*	*1.08*
926551	*AC1-134*	*14.85*
926662	*AC1-147 E*	*1.25*
926741	*AC1-159*	*62.33*
926751	*AC1-161 C*	*27.25*
926752	*AC1-161 E*	*11.63*
926771	*AC1-163 C*	*1.63*

926772	*AC1-163 E*	*0.76*
926781	*AC1-164 C*	*58.53*
926782	*AC1-164 E*	*26.3*
927041	*AC1-191 C*	*17.49*
927042	*AC1-191 E*	*8.71*
927221	*AC1-216 C O1*	*12.14*
927222	*AC1-216 E O1*	*9.55*

Appendix 5

(DVP - DVP) The 6CLUBHSE-6SAPONY 230 kV line (from bus 314563 to bus 314435 ckt 1) loads from 135.21% to 136.09% (**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 12.35 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

Bus Number	*Bus Name*	*Full Contribution*
315150	*1BUGGS 1*	*8.64*
315151	*1BUGGS 2*	*8.64*
315131	*1EDGECMA*	*10.81*
315132	*1EDGECMB*	*10.81*
315139	*1GASTONA*	*6.65*
315141	*1GASTONB*	*6.65*
315126	*1ROARAP2*	*2.38*
315128	*1ROARAP4*	*2.29*
315136	*1ROSEMG1*	*4.49*
315138	*1ROSEMG2*	*2.1*
315137	*1ROSEMS1*	*2.78*

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*	*0.72*
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*	*12.49*
933992	*AD1-023 E*	*6.8*
934201	*AD1-047 C*	*17.57*
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*	*47.2*
934522	*AD1-076 E O1*	*24.04*
LTF	*AD1-120*	*4.44*

LTF	*AD1-121*	*4.42*
936261	*AD2-033 C*	*9.73*
936262	*AD2-033 E*	*6.49*
936361	*AD2-046 C O1*	*8.38*
936362	*AD2-046 E O1*	*3.85*
936401	*AD2-051 C O1*	*11.34*
936402	*AD2-051 E O1*	*4.87*
936481	*AD2-063 C O1*	*11.53*
936482	*AD2-063 E O1*	*7.69*
936531	*AD2-068 C*	*4.92*
936532	*AD2-068 E*	*2.53*
936701	*AD2-089 C*	*8.13*
936702	*AD2-089 E*	*5.42*
936711	*AD2-090 C O1*	*5.56*
936712	*AD2-090 E O1*	*3.71*
LTF	*AD2-099*	*3.35*
937441	*AD2-195 C*	*8.63*
937442	*AD2-195 E*	*3.72*
LTF	*CARR*	*0.11*
LTF	*CBM-S1*	*5.45*
LTF	*CBM-S2*	*10.91*
LTF	*CBM-W1*	*12.07*
LTF	*CBM-W2*	*29.49*
LTF	*CIN*	*2.71*
LTF	*CPLE*	*3.68*
LTF	*G-007*	*0.77*

LTF	*IPL*	*1.73*
LTF	*LGEE*	*0.59*
LTF	*MEC*	*6.09*
LTF	*MECS*	*2.73*
LTF	*O-066*	*4.89*
LTF	*RENSSELAER*	*0.09*
LTF	*ROSETON*	*0.67*
900671	*V4-068 C*	*0.1*
900672	*V4-068 E*	*0.33*
LTF	*WEC*	*0.74*
917331	*Z2-043 C*	*0.52*
917332	*Z2-043 E*	*1.31*
917341	*Z2-044 C*	*0.28*
917342	*Z2-044 E*	*0.7*
917511	*Z2-088 C OP1*	*0.93*
917512	*Z2-088 E OP1*	*4.29*
918411	*AA1-050*	*0.79*
918491	*AA1-063AC OP*	*2.06*
918492	*AA1-063AE OP*	*5.65*
918511	*AA1-065 C OP*	*1.96*
918512	*AA1-065 E OP*	*5.62*
918531	*AA1-067 C*	*0.31*
918532	*AA1-067 E*	*0.76*
918561	*AA1-072 C*	*0.08*
918562	*AA1-072 E*	*0.22*
919691	*AA2-053 C*	*2.38*

919692	*AA2-053 E*	*5.95*
919701	*AA2-057 C*	*1.55*
919702	*AA2-057 E*	*4.52*
LTF	*AA2-074*	*2.51*
920041	*AA2-088 C*	*1.09*
920042	*AA2-088 E*	*10.3*
920591	*AA2-165 C*	*0.21*
920592	*AA2-165 E*	*0.6*
920671	*AA2-174 C*	*0.11*
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*	*13.68*
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*	*5.48*
923802	*AB2-015 E O1*	*4.49*
923911	*AB2-031 C O1*	*4.9*
923912	*AB2-031 E O1*	*2.42*

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*	*2.68*
924022	*AB2-043 E O1*	*4.39*
924151	*AB2-059 C O1*	*12.09*
924152	*AB2-059 E O1*	*6.23*
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*	*2.31*
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*	*0.26*
924501	*AB2-099 C*	*0.73*
924502	*AB2-099 E*	*0.31*

924511	*AB2-100 C*	*35.91*
924512	*AB2-100 E*	*17.69*
925121	*AB2-169 C*	*6.15*
925122	*AB2-169 E*	*5.52*
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*	*5.91*
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*	*19.79*
926201	*AC1-098 C*	*8.29*
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*	*9.39*
927022	*AC1-189 E*	*4.68*

927141	*AC1-208 C*	*13.11*
927142	*AC1-208 E*	*5.82*

Appendix 6

(DVP - DVP) The 6EARLEYS-6NUCO TP 230 kV line (from bus 314569 to bus 314575 ckt 1) loads from 103.21% to 106.36% (**DC power flow**) of its emergency rating (572 MVA) for the single line contingency outage of 'DVP_P1-2: LN 2131A'. This project contributes approximately 17.93 MW to the thermal violation.

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

Bus Number	*Bus Name*	*Full Contribution*
315294	*1DOMTR10*	*4.18*
315292	*1DOMTR78*	*2.83*
315293	*1DOMTR9*	*2.31*
315131	*1EDGECMA*	*9.03*
315132	*1EDGECMB*	*9.03*
315139	*1GASTONA*	*3.41*
315141	*1GASTONB*	*3.41*
315159	*1KERR 2*	*0.75*
315163	*1KERR 6*	*0.73*
315164	*1KERR 7*	*0.73*
315126	*1ROARAP2*	*1.38*
315128	*1ROARAP4*	*1.33*
315136	*1ROSEMG1*	*2.41*
315138	*1ROSEMG2*	*1.13*
315137	*1ROSEMS1*	*1.49*
314704	*3LAWRENC*	*0.2*

932631	*AC2-084 C*	*11.32*
933991	*AD1-023 C*	*27.83*
934201	*AD1-047 C*	*6.39*
934231	*AD1-050 C*	*2.75*
934331	*AD1-057 C O1*	*10.19*
934521	*AD1-076 C O1*	*112.9*
LTF	*AD1-120*	*4.28*
LTF	*AD1-121*	*4.25*
936401	*AD2-051 C O1*	*16.62*
936531	*AD2-068 C*	*6.82*
936701	*AD2-089 C*	*8.51*
LTF	*AD2-099*	*3.34*
937441	*AD2-195 C*	*17.93*
LTF	*CARR*	*0.08*
LTF	*CBM-S1*	*5.3*
LTF	*CBM-S2*	*10.7*
LTF	*CBM-W1*	*11.88*
LTF	*CBM-W2*	*28.77*
LTF	*CIN*	*2.66*
LTF	*CPLE*	*3.69*
LTF	*IPL*	*1.7*
LTF	*LGEE*	*0.57*
LTF	*MEC*	*5.96*
LTF	*MECS*	*2.73*
LTF	*RENSSELAER*	*0.06*
LTF	*ROSETON*	*0.47*

900671	*V4-068 C*	*0.1*
LTF	*WEC*	*0.73*
916041	*Z1-036 C*	*2.36*
917331	*Z2-043 C*	*0.67*
917341	*Z2-044 C*	*0.24*
917511	*Z2-088 C OP1*	*1.06*
918411	*AA1-050*	*0.89*
918491	*AA1-063AC OP*	*1.26*
918511	*AA1-065 C OP*	*3.52*
918531	*AA1-067 C*	*0.46*
918561	*AA1-072 C*	*0.1*
919691	*AA2-053 C*	*1.77*
919701	*AA2-057 C*	*1.31*
LTF	*AA2-074*	*2.51*
920041	*AA2-088 C*	*0.73*
920591	*AA2-165 C*	*0.18*
920671	*AA2-174 C*	*0.08*
920691	*AA2-178 C*	*19.71*
930051	*AB1-013 C*	*5.95*
930401	*AB1-081 C*	*8.64*
930861	*AB1-132 C*	*15.16*
931231	*AB1-173 C*	*1.8*
931241	*AB1-173AC*	*1.8*
923911	*AB2-031 C O1*	*1.78*
923941	*AB2-035 C*	*0.4*
923991	*AB2-040 C O1*	*5.86*

924151	*AB2-059 C O1*	*10.18*
924391	*AB2-088 C*	*0.51*
924401	*AB2-089 C*	*1.25*
924491	*AB2-098 C*	*0.88*
924501	*AB2-099 C*	*0.99*
924511	*AB2-100 C*	*7.32*
925121	*AB2-169 C*	*11.96*
925171	*AB2-174 C O1*	*5.33*
925291	*AB2-188 C O1*	*4.86*
925591	*AC1-034 C*	*6.6*
925781	*AC1-054 C*	*4.54*
926071	*AC1-086 C*	*22.32*
926201	*AC1-098 C*	*7.94*
926211	*AC1-099 C*	*2.66*
926771	*AC1-163 C*	*3.28*
927021	*AC1-189 C*	*11.67*
927141	*AC1-208 C*	*9.96*

Appendix 7

(DVP - DVP) The 6EVERETS-AD2-068 TAP 230 kV line (from bus 314574 to bus 936530 ckt 1) loads from 134.57% to 138.36% (**DC power flow**) of its load dump rating (485 MVA) for the tower line contingency outage of 'DVP_P7-1: LN 2058-2181'. This project contributes approximately 18.41 MW to the thermal violation.

CONTINGENCY 'DVP_P7-1: LN 2058-2181'
OPEN BRANCH FROM BUS 304222 TO BUS 313845 CKT 1 /* 6ROCKYMT230T230.00 - 6HATHAWAY 230.00
OPEN BUS 304226 /* ISLAND: 6PA-RMOUNT#4115.00
OPEN BRANCH FROM BUS 304226 TO BUS 314591 CKT 1 /* 6PA-RMOUNT#4230.00 - 6NASH 230.00
OPEN BRANCH FROM BUS 313845 TO BUS 314591 CKT 1 /* 6HATHAWAY 230.00 - 6NASH 230.00
OPEN BUS 314591 /* ISLAND: 6NASH 230.00
END

Bus Number	*Bus Name*	*Full Contribution*
315294	*1DOMTR10*	*2.74*
315292	*1DOMTR78*	*1.85*
315293	*1DOMTR9*	*1.51*
315131	*1EDGECMA*	*9.28*
315132	*1EDGECMB*	*9.28*
315136	*1ROSEMG1*	*1.74*
315138	*1ROSEMG2*	*0.81*
315137	*1ROSEMS1*	*1.08*
314557	*3BETHELC*	*1.14*
314554	*3BTLEBRO*	*0.43*
314566	*3CRESWEL*	*2.04*
314572	*3EMPORIA*	*0.21*
314578	*3HORNRTN*	*2.04*
314582	*3KELFORD*	*0.72*

314603	*3SCOT NK*	*2.51*
314617	*3TUNIS*	*0.7*
314539	*3UNCAMP*	*1.18*
314541	*3WATKINS*	*0.36*
314620	*6CASHIE*	*0.88*
314574	*6EVERETS*	*5.39*
314594	*6PLYMOTH*	*0.83*
314648	*6SUNBURY*	*0.4*
314651	*6WINFALL*	*0.97*
932631	*AC2-084 C*	*6.16*
932632	*AC2-084 E*	*3.04*
933991	*AD1-023 C*	*13.46*
933992	*AD1-023 E*	*7.33*
934201	*AD1-047 C*	*4.28*
934202	*AD1-047 E*	*2.86*
934331	*AD1-057 C O1*	*8.8*
934332	*AD1-057 E O1*	*4.69*
934521	*AD1-076 C O1*	*54.73*
934522	*AD1-076 E O1*	*27.87*
936401	*AD2-051 C O1*	*8.4*
936402	*AD2-051 E O1*	*3.61*
936701	*AD2-089 C*	*10.3*
936702	*AD2-089 E*	*6.87*
936711	*AD2-090 C O1*	*3.91*
936712	*AD2-090 E O1*	*2.61*
937441	*AD2-195 C*	*12.87*

937442	*AD2-195 E*	*5.55*
LTF	*AMIL*	*0.48*
LTF	*BAYOU*	*2.64*
LTF	*BIG_CAJUN1*	*4.17*
LTF	*BIG_CAJUN2*	*8.38*
LTF	*BLUEG*	*2.5*
LTF	*CALDERWOOD*	*1.54*
LTF	*CANNELTON*	*0.48*
LTF	*CATAWBA*	*1.51*
LTF	*CBM-N*	*< 0.01*
LTF	*CELEVELAND*	*4.27*
LTF	*CHEOAH*	*1.44*
LTF	*CHILHOWEE*	*0.5*
LTF	*CHOCTAW*	*2.84*
LTF	*CLIFTY*	*9.04*
LTF	*COTTONWOOD*	*10.32*
LTF	*DEARBORN*	*0.89*
LTF	*EDWARDS*	*0.78*
LTF	*ELMERSMITH*	*1.41*
LTF	*FARMERCITY*	*0.62*
LTF	*G-007A*	*1.04*
LTF	*GIBSON*	*0.88*
LTF	*HAMLET*	*6.47*
LTF	*MORGAN*	*4.57*
LTF	*NEWTON*	*2.15*
LTF	*NYISO*	*0.06*

LTF	*PRAIRIE*	*4.68*
LTF	*ROWAN*	*2.99*
LTF	*SANTEETLA*	*0.43*
LTF	*SMITHLAND*	*0.42*
LTF	*TATANKA*	*1.05*
LTF	*TILTON*	*0.92*
LTF	*TRIMBLE*	*0.47*
LTF	*TVA*	*1.92*
LTF	*UNIONPOWER*	*2.74*
900672	*V4-068 E*	*0.21*
LTF	*VFT*	*2.76*
901082	*W1-029E*	*23.37*
907092	*X1-038 E*	*2.96*
913392	*Y1-086 E*	*1.05*
916042	*Z1-036 E*	*29.11*
917122	*Z2-027 E*	*0.51*
917331	*Z2-043 C*	*0.34*
917332	*Z2-043 E*	*0.86*
917342	*Z2-044 E*	*0.33*
917511	*Z2-088 C OP1*	*1.33*
917512	*Z2-088 E OP1*	*6.13*
918411	*AA1-050*	*1.12*
918492	*AA1-063AE OP*	*2.44*
918511	*AA1-065 C OP*	*1.69*
918512	*AA1-065 E OP*	*4.84*
918531	*AA1-067 C*	*0.65*

918532	*AA1-067 E*	*1.62*
918561	*AA1-072 C*	*0.05*
918562	*AA1-072 E*	*0.14*
919692	*AA2-053 E*	*2.58*
919702	*AA2-057 E*	*2.12*
920042	*AA2-088 E*	*6.24*
920592	*AA2-165 E*	*0.28*
920672	*AA2-174 E*	*0.3*
920691	*AA2-178 C*	*8.16*
920692	*AA2-178 E*	*3.5*
930051	*AB1-013 C*	*2.46*
930052	*AB1-013 E*	*16.47*
930401	*AB1-081 C*	*5.63*
930402	*AB1-081 E*	*2.41*
930861	*AB1-132 C*	*10.35*
930862	*AB1-132 E*	*4.44*
931231	*AB1-173 C*	*1.21*
931232	*AB1-173 E*	*0.56*
931241	*AB1-173AC*	*1.21*
931242	*AB1-173AE*	*0.56*
923801	*AB2-015 C O1*	*4.39*
923802	*AB2-015 E O1*	*3.6*
923831	*AB2-022 C*	*1.02*
923832	*AB2-022 E*	*0.55*
923911	*AB2-031 C O1*	*1.2*
923912	*AB2-031 E O1*	*0.59*

923941	*AB2-035 C*	*0.48*
923942	*AB2-035 E*	*0.21*
923991	*AB2-040 C O1*	*3.93*
923992	*AB2-040 E O1*	*3.21*
924151	*AB2-059 C O1*	*6.64*
924152	*AB2-059 E O1*	*3.42*
924391	*AB2-088 C*	*0.62*
924392	*AB2-088 E*	*0.3*
924491	*AB2-098 C*	*1.26*
924492	*AB2-098 E*	*0.54*
924501	*AB2-099 C*	*0.53*
924502	*AB2-099 E*	*0.23*
924511	*AB2-100 C*	*5.85*
924512	*AB2-100 E*	*2.88*
925121	*AB2-169 C*	*10.01*
925122	*AB2-169 E*	*8.99*
925171	*AB2-174 C O1*	*3.64*
925172	*AB2-174 E O1*	*3.29*
925281	*AB2-186 C*	*0.37*
925282	*AB2-186 E*	*0.16*
925291	*AB2-188 C O1*	*2.01*
925292	*AB2-188 E O1*	*0.9*
925591	*AC1-034 C*	*4.3*
925592	*AC1-034 E*	*3.24*
926071	*AC1-086 C*	*15.25*
926072	*AC1-086 E*	*6.94*

926201	*AC1-098 C*	*4.32*
926202	*AC1-098 E*	*2.58*
926211	*AC1-099 C*	*1.45*
926212	*AC1-099 E*	*0.85*
LTF	*AC1-133*	*22.48*
926771	*AC1-163 C*	*1.74*
926772	*AC1-163 E*	*0.81*
927021	*AC1-189 C*	*15.45*
927022	*AC1-189 E*	*7.7*
927141	*AC1-208 C*	*5.74*
927142	*AC1-208 E*	*2.55*

Appendix 8

(DVP - DVP) The 3FIVE PT-3WHARTON 115 kV line (from bus 314576 to bus 314622 ckt 1) loads from 126.19% to 154.47% (**DC power flow**) of its load dump rating (91 MVA) for the tower line contingency outage of 'DVP_P7-1: LN 25-2034_A'. This project contributes approximately 25.73 MW to the thermal violation.

CONTINGENCY 'DVP_P7-1: LN 25-2034_A' /*REPLACED ON 4/19/2016
OPEN BRANCH FROM BUS 314573 TO BUS 314596 CKT 1 /* 3EVERETS 115.00 - 3POPLR C 115.00
OPEN BRANCH FROM BUS 314596 TO BUS 314614 CKT 1 /* 3POPLR C 115.00 - 3TROWBR2 115.00
OPEN BUS 314596 /* ISLAND
OPEN BRANCH FROM BUS 314569 TO BUS 314620 CKT 1 /* 6EARLEYS 230.00 - 6CASHIE 230.00
OPEN BRANCH FROM BUS 314614 TO BUS 314616 CKT 1 /* 3TROWBR2 115.00 - 6TRWBRDG 230.00
OPEN BRANCH FROM BUS 314616 TO BUS 933990 CKT 1 /* 6TRWBRDG 230.00 - AD1-023 TAP 230.00
END

Bus Number	*Bus Name*	*Full Contribution*
315294	*1DOMTR10*	*2.78*
315292	*1DOMTR78*	*1.88*
315293	*1DOMTR9*	*1.53*
314566	*3CRESWEL*	*1.3*
314594	*6PLYMOTH*	*0.56*
934521	*AD1-076 C O1*	*37.19*
934522	*AD1-076 E O1*	*18.94*
937441	*AD2-195 C*	*17.98*
937442	*AD2-195 E*	*7.75*
LTF	*AMIL*	*0.06*
LTF	*BAYOU*	*0.31*
LTF	*BIG_CAJUN1*	*0.49*

LTF	*BIG_CAJUN2*	*0.98*
LTF	*BLUEG*	*0.31*
LTF	*CALDERWOOD*	*0.18*
LTF	*CANNELTON*	*0.06*
LTF	*CARR*	*< 0.01*
LTF	*CATAWBA*	*0.17*
LTF	*CELEVELAND*	*0.49*
LTF	*CHEOAH*	*0.17*
LTF	*CHILHOWEE*	*0.06*
LTF	*CHOCTAW*	*0.33*
LTF	*CLIFTY*	*1.12*
LTF	*COTTONWOOD*	*1.21*
LTF	*DEARBORN*	*0.11*
LTF	*EDWARDS*	*0.09*
LTF	*ELMERSMITH*	*0.17*
LTF	*FARMERCITY*	*0.07*
LTF	*G-007A*	*0.11*
LTF	*GIBSON*	*0.11*
LTF	*HAMLET*	*0.72*
LTF	*MORGAN*	*0.53*
LTF	*NEWTON*	*0.26*
LTF	*PRAIRIE*	*0.56*
LTF	*RENSSELAER*	*< 0.01*
LTF	*ROSETON*	*< 0.01*
LTF	*ROWAN*	*0.35*
LTF	*SANTEETLA*	*0.05*

LTF	*SMITHLAND*	*0.05*
LTF	*TATANKA*	*0.13*
LTF	*TILTON*	*0.11*
LTF	*TRIMBLE*	*0.06*
LTF	*TVA*	*0.22*
LTF	*UNIONPOWER*	*0.32*
LTF	*VFT*	*0.29*
916042	*Z1-036 E*	*16.14*
920691	*AA2-178 C*	*5.21*
920692	*AA2-178 E*	*2.23*
930051	*AB1-013 C*	*1.57*
930052	*AB1-013 E*	*10.53*
925121	*AB2-169 C*	*19.*
925122	*AB2-169 E*	*17.05*
925281	*AB2-186 C*	*0.2*
925282	*AB2-186 E*	*0.08*
925291	*AB2-188 C O1*	*1.28*
925292	*AB2-188 E O1*	*0.58*

Appendix 9

(DVP - DVP) The 6LAKEVEW-AB2-100 TAP 230 kV line (from bus 314583 to bus 924510 ckt 1) loads from 130.4% to 132.98% (**DC power flow**) of its load dump rating (459 MVA) for the line fault with failed breaker contingency outage of 'DVP_P4-2: 246T247'. This project contributes approximately 11.81 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

Bus Number	*Bus Name*	*Full Contribution*
315294	*1DOMTR10*	*1.86*
315131	*1EDGECMA*	*10.47*
315132	*1EDGECMB*	*10.47*
315139	*1GASTONA*	*6.95*
315141	*1GASTONB*	*6.95*
315126	*1ROARAP2*	*1.43*
315128	*1ROARAP4*	*1.37*
315136	*1ROSEMG1*	*4.67*
315138	*1ROSEMG2*	*2.19*
315137	*1ROSEMS1*	*2.9*
314557	*3BETHELC*	*0.87*

314554	*3BTLEBRO*	*0.84*
314566	*3CRESWEL*	*1.63*
314578	*3HORNRTN*	*3.35*
314582	*3KELFORD*	*0.91*
314603	*3SCOT NK*	*3.55*
314617	*3TUNIS*	*0.81*
314541	*3WATKINS*	*0.32*
314620	*6CASHIE*	*0.83*
314574	*6EVERETS*	*2.43*
314594	*6PLYMOTH*	*0.69*
932631	*AC2-084 C*	*9.33*
932632	*AC2-084 E*	*4.6*
933991	*AD1-023 C*	*11.94*
933992	*AD1-023 E*	*6.5*
934331	*AD1-057 C O1*	*16.08*
934332	*AD1-057 E O1*	*8.58*
934521	*AD1-076 C O1*	*45.26*
934522	*AD1-076 E O1*	*23.05*
LTF	*AD1-120*	*3.74*
LTF	*AD1-121*	*3.72*
936401	*AD2-051 C O1*	*9.84*
936402	*AD2-051 E O1*	*4.22*
936531	*AD2-068 C*	*4.66*
936532	*AD2-068 E*	*2.4*
936701	*AD2-089 C*	*7.83*
936702	*AD2-089 E*	*5.22*

936711	*AD2-090 C O1*	*3.74*
936712	*AD2-090 E O1*	*2.5*
LTF	*AD2-099*	*2.89*
937441	*AD2-195 C*	*8.25*
937442	*AD2-195 E*	*3.56*
LTF	*CARR*	*0.09*
LTF	*CBM-S1*	*4.49*
LTF	*CBM-S2*	*9.26*
LTF	*CBM-W1*	*9.78*
LTF	*CBM-W2*	*24.29*
LTF	*CIN*	*2.19*
LTF	*CPLE*	*3.18*
LTF	*G-007*	*0.61*
LTF	*IPL*	*1.4*
LTF	*LGEE*	*0.47*
LTF	*MEC*	*4.97*
LTF	*MECS*	*2.19*
LTF	*O-066*	*3.89*
LTF	*RENSSELAER*	*0.07*
LTF	*ROSETON*	*0.54*
900672	*V4-068 E*	*0.24*
LTF	*WEC*	*0.6*
916042	*Z1-036 E*	*21.79*
917331	*Z2-043 C*	*0.44*
917332	*Z2-043 E*	*1.1*
917341	*Z2-044 C*	*0.24*

917342	*Z2-044 E*	*0.61*
917511	*Z2-088 C OP1*	*0.9*
917512	*Z2-088 E OP1*	*4.12*
918411	*AA1-050*	*0.76*
918491	*AA1-063AC OP*	*1.28*
918492	*AA1-063AE OP*	*3.51*
918511	*AA1-065 C OP*	*1.86*
918512	*AA1-065 E OP*	*5.34*
918531	*AA1-067 C*	*0.29*
918532	*AA1-067 E*	*0.73*
918561	*AA1-072 C*	*0.07*
918562	*AA1-072 E*	*0.18*
919691	*AA2-053 C*	*1.55*
919692	*AA2-053 E*	*3.86*
919701	*AA2-057 C*	*1.28*
919702	*AA2-057 E*	*3.73*
LTF	*AA2-074*	*2.16*
920042	*AA2-088 E*	*6.94*
920591	*AA2-165 C*	*0.17*
920592	*AA2-165 E*	*0.49*
920671	*AA2-174 C*	*0.07*
920672	*AA2-174 E*	*0.45*
920691	*AA2-178 C*	*6.54*
920692	*AA2-178 E*	*2.8*
930051	*AB1-013 C*	*1.97*
930052	*AB1-013 E*	*13.2*

930401	*AB1-081 C*	*9.52*
930402	*AB1-081 E*	*4.08*
930861	*AB1-132 C*	*30.89*
930862	*AB1-132 E*	*13.24*
923941	*AB2-035 C*	*0.37*
923942	*AB2-035 E*	*0.16*
924151	*AB2-059 C O1*	*11.22*
924152	*AB2-059 E O1*	*5.78*
924391	*AB2-088 C*	*0.47*
924392	*AB2-088 E*	*0.23*
924491	*AB2-098 C*	*0.57*
924492	*AB2-098 E*	*0.24*
924501	*AB2-099 C*	*0.61*
924502	*AB2-099 E*	*0.26*
925121	*AB2-169 C*	*5.87*
925122	*AB2-169 E*	*5.27*
925281	*AB2-186 C*	*0.27*
925282	*AB2-186 E*	*0.12*
925291	*AB2-188 C O1*	*1.61*
925292	*AB2-188 E O1*	*0.72*
925591	*AC1-034 C*	*7.27*
925592	*AC1-034 E*	*5.48*
925781	*AC1-054 C*	*3.71*
925782	*AC1-054 E*	*1.71*
926071	*AC1-086 C*	*45.49*
926072	*AC1-086 E*	*20.7*

926201	*AC1-098 C*	*6.55*
926202	*AC1-098 E*	*3.9*
926211	*AC1-099 C*	*2.19*
926212	*AC1-099 E*	*1.29*
926771	*AC1-163 C*	*2.03*
926772	*AC1-163 E*	*0.95*
927021	*AC1-189 C*	*8.99*
927022	*AC1-189 E*	*4.48*
927141	*AC1-208 C*	*9.41*
927142	*AC1-208 E*	*4.18*

Appendix 10

(DVP - DVP) The 3POPLR C-3EVERETS 115 kV line (from bus 314596 to bus 314573 ckt 1) loads from 118.16% to 126.67% (**DC power flow**) of its load dump rating (239 MVA) for the line fault with failed breaker contingency outage of 'DVP_P4-2: 2014T2034'. This project contributes approximately 20.34 MW to the thermal violation.

CONTINGENCY 'DVP_P4-2: 2014T2034' /* EARLEYS
OPEN BRANCH FROM BUS 314569 TO BUS 314620 CKT 1 /* 2034
OPEN BRANCH FROM BUS 314620 TO BUS 933990 CKT 1 /* 2034
OPEN BRANCH FROM BUS 314569 TO BUS 314574 CKT 1 /* 2014
END

Bus Number	*Bus Name*	*Full Contribution*
315294	*1DOMTR10*	*4.39*
315292	*1DOMTR78*	*2.97*
315293	*1DOMTR9*	*2.42*
314566	*3CRESWEL*	*2.76*
314594	*6PLYMOTH*	*1.18*
314648	*6SUNBURY*	*0.34*
314651	*6WINFALL*	*1.05*
933991	*AD1-023 C*	*18.97*
933992	*AD1-023 E*	*10.33*
934521	*AD1-076 C O1*	*78.29*
934522	*AD1-076 E O1*	*39.86*
937441	*AD2-195 C*	*14.21*
937442	*AD2-195 E*	*6.13*
LTF	*AMIL*	*0.17*
LTF	*BAYOU*	*0.91*
LTF	*BIG_CAJUN1*	*1.44*
LTF	*BIG_CAJUN2*	*2.9*

LTF	*BLUEG*	*0.88*
LTF	*CALDERWOOD*	*0.54*
LTF	*CANNELTON*	*0.17*
LTF	*CATAWBA*	*0.52*
LTF	*CBM-N*	*< 0.01*
LTF	*CELEVELAND*	*1.48*
LTF	*CHEOAH*	*0.5*
LTF	*CHILHOWEE*	*0.17*
LTF	*CHOCTAW*	*0.98*
LTF	*CLIFTY*	*3.22*
LTF	*COTTONWOOD*	*3.57*
LTF	*DEARBORN*	*0.32*
LTF	*EDWARDS*	*0.27*
LTF	*ELMERSMITH*	*0.5*
LTF	*FARMERCITY*	*0.22*
LTF	*G-007A*	*0.38*
LTF	*GIBSON*	*0.31*
LTF	*HAMLET*	*2.18*
LTF	*MORGAN*	*1.58*
LTF	*NEWTON*	*0.75*
LTF	*NYISO*	*0.03*
LTF	*PRAIRIE*	*1.64*
LTF	*ROWAN*	*1.05*
LTF	*SANTEETLA*	*0.15*
LTF	*SMITHLAND*	*0.15*
LTF	*TATANKA*	*0.37*

LTF	*TILTON*	*0.32*
LTF	*TRIMBLE*	*0.17*
LTF	*TVA*	*0.66*
LTF	*UNIONPOWER*	*0.95*
LTF	*VFT*	*1.01*
901082	*W1-029E*	*23.47*
913392	*Y1-086 E*	*1.07*
916041	*Z1-036 C*	*0.89*
916042	*Z1-036 E*	*34.83*
917122	*Z2-027 E*	*0.52*
920691	*AA2-178 C*	*11.05*
920692	*AA2-178 E*	*4.74*
930051	*AB1-013 C*	*3.33*
930052	*AB1-013 E*	*22.31*
923831	*AB2-022 C*	*0.99*
923832	*AB2-022 E*	*0.53*
925121	*AB2-169 C*	*4.79*
925122	*AB2-169 E*	*4.3*
925281	*AB2-186 C*	*0.42*
925282	*AB2-186 E*	*0.18*
925291	*AB2-188 C O1*	*2.72*
925292	*AB2-188 E O1*	*1.22*

Appendix 11

(DVP - DVP) The 6ELIZ CT-6SHAWBRO 230 kV line (from bus 314638 to bus 314647 ckt 1) loads from 135.38% to 139.05% (**DC power flow**) of its load dump rating (699 MVA) for the line fault with failed breaker contingency outage of 'DVP_P4-2: 246T247'. This project contributes approximately 25.62 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

Bus Number	*Bus Name*	*Full Contribution*
315294	*1DOMTR10*	*4.3*
315292	*1DOMTR78*	*2.91*
315293	*1DOMTR9*	*2.37*
315139	*1GASTONA*	*1.96*
315141	*1GASTONB*	*1.96*
315136	*1ROSEMG1*	*1.39*
315138	*1ROSEMG2*	*0.65*
315137	*1ROSEMS1*	*0.86*
314557	*3BETHELC*	*0.6*
314566	*3CRESWEL*	*6.73*
314582	*3KELFORD*	*0.78*

314603	*3SCOT NK*	*2.7*
314617	*3TUNIS*	*0.7*
314620	*6CASHIE*	*1.59*
314574	*6EVERETS*	*2.49*
314594	*6PLYMOTH*	*2.03*
314651	*6WINFALL*	*6.57*
932631	*AC2-084 C*	*6.53*
932632	*AC2-084 E*	*3.22*
933991	*AD1-023 C*	*27.52*
933992	*AD1-023 E*	*14.98*
934521	*AD1-076 C O1*	*125.49*
934522	*AD1-076 E O1*	*63.9*
936401	*AD2-051 C O1*	*9.29*
936402	*AD2-051 E O1*	*3.99*
936531	*AD2-068 C*	*4.44*
936532	*AD2-068 E*	*2.29*
936701	*AD2-089 C*	*5.4*
936702	*AD2-089 E*	*3.6*
937441	*AD2-195 C*	*17.9*
937442	*AD2-195 E*	*7.72*
LTF	*CARR*	*0.06*
LTF	*CBM-S1*	*3.23*
LTF	*CBM-S2*	*6.65*
LTF	*CBM-W1*	*7.09*
LTF	*CBM-W2*	*17.48*
LTF	*CIN*	*1.59*

LTF	*CPLE*	*2.31*
LTF	*G-007*	*0.43*
LTF	*IPL*	*1.01*
LTF	*LGEE*	*0.34*
LTF	*MEC*	*3.59*
LTF	*MECS*	*1.6*
LTF	*O-066*	*2.71*
LTF	*RENSSELAER*	*0.05*
LTF	*ROSETON*	*0.36*
900671	*V4-068 C*	*0.06*
900672	*V4-068 E*	*0.18*
901081	*W1-029C*	*4.4*
901082	*W1-029E*	*171.42*
LTF	*WEC*	*0.44*
913391	*Y1-086 C*	*0.95*
913392	*Y1-086 E*	*8.99*
916041	*Z1-036 C*	*4.05*
916042	*Z1-036 E*	*157.71*
917121	*Z2-027 C*	*1.75*
917122	*Z2-027 E*	*4.35*
917331	*Z2-043 C*	*0.38*
917332	*Z2-043 E*	*0.94*
917511	*Z2-088 C OP1*	*0.68*
917512	*Z2-088 E OP1*	*3.1*
918411	*AA1-050*	*0.57*
918511	*AA1-065 C OP*	*1.95*

918512	*AA1-065 E OP*	*5.58*
918531	*AA1-067 C*	*0.3*
918532	*AA1-067 E*	*0.75*
918561	*AA1-072 C*	*0.06*
918562	*AA1-072 E*	*0.16*
919691	*AA2-053 C*	*1.01*
919692	*AA2-053 E*	*2.52*
919701	*AA2-057 C*	*0.78*
919702	*AA2-057 E*	*2.26*
LTF	*AA2-074*	*1.57*
920591	*AA2-165 C*	*0.11*
920592	*AA2-165 E*	*0.3*
920671	*AA2-174 C*	*0.05*
920672	*AA2-174 E*	*0.29*
920691	*AA2-178 C*	*26.93*
920692	*AA2-178 E*	*11.54*
930051	*AB1-013 C*	*8.13*
930052	*AB1-013 E*	*54.4*
930861	*AB1-132 C*	*8.69*
930862	*AB1-132 E*	*3.72*
923831	*AB2-022 C*	*9.92*
923832	*AB2-022 E*	*5.34*
923941	*AB2-035 C*	*0.25*
923942	*AB2-035 E*	*0.11*
924391	*AB2-088 C*	*0.32*
924392	*AB2-088 E*	*0.16*

924491	*AB2-098 C*	*0.58*
924492	*AB2-098 E*	*0.25*
924501	*AB2-099 C*	*0.56*
924502	*AB2-099 E*	*0.24*
925121	*AB2-169 C*	*11.25*
925122	*AB2-169 E*	*10.1*
925281	*AB2-186 C*	*2.19*
925282	*AB2-186 E*	*0.94*
925291	*AB2-188 C O1*	*6.64*
925292	*AB2-188 E O1*	*2.98*
926071	*AC1-086 C*	*12.79*
926072	*AC1-086 E*	*5.82*
926201	*AC1-098 C*	*4.58*
926202	*AC1-098 E*	*2.73*
926211	*AC1-099 C*	*1.54*
926212	*AC1-099 E*	*0.9*
926771	*AC1-163 C*	*1.84*
926772	*AC1-163 E*	*0.86*
927021	*AC1-189 C*	*7.54*
927022	*AC1-189 E*	*3.75*
927141	*AC1-208 C*	*5.8*
927142	*AC1-208 E*	*2.58*

Appendix 12

(DVP - DVP) The 6S HERTFORD-6WINFALL 230 kV line (from bus 314662 to bus 314651 ckt 1) loads from 105.33% to 111.37% (**DC power flow**) of its load dump rating (897 MVA) for the tower line contingency outage of 'DVP_P7-1: LN 25-2034_A'. This project contributes approximately 54.18 MW to the thermal violation.

CONTINGENCY 'DVP_P7-1: LN 25-2034_A' /*REPLACED ON 4/19/2016
OPEN BRANCH FROM BUS 314573 TO BUS 314596 CKT 1 /* 3EVERETS 115.00 - 3POPLR C 115.00
OPEN BRANCH FROM BUS 314596 TO BUS 314614 CKT 1 /* 3POPLR C 115.00 - 3TROWBR2 115.00
OPEN BUS 314596 /* ISLAND
OPEN BRANCH FROM BUS 314569 TO BUS 314620 CKT 1 /* 6EARLEYS 230.00 - 6CASHIE 230.00
OPEN BRANCH FROM BUS 314614 TO BUS 314616 CKT 1 /* 3TROWBR2 115.00 - 6TRWBRDG 230.00
OPEN BRANCH FROM BUS 314616 TO BUS 933990 CKT 1 /* 6TRWBRDG 230.00 - AD1-023 TAP 230.00
END

Bus Number	*Bus Name*	*Full Contribution*
315294	*1DOMTR10*	*9.92*
315292	*1DOMTR78*	*6.71*
315293	*1DOMTR9*	*5.47*
314566	*3CRESWEL*	*12.68*
314594	*6PLYMOTH*	*4.43*
934521	*AD1-076 C O1*	*283.16*
934522	*AD1-076 E O1*	*144.18*
937441	*AD2-195 C*	*37.86*
937442	*AD2-195 E*	*16.32*
LTF	*CARR*	*0.04*
LTF	*CBM-S1*	*0.47*
LTF	*CBM-S2*	*1.24*

LTF	*CBM-W1*	*0.71*
LTF	*CBM-W2*	*2.45*
LTF	*CIN*	*0.16*
LTF	*CPLE*	*0.45*
LTF	*G-007*	*0.16*
LTF	*IPL*	*0.1*
LTF	*LGEE*	*0.04*
LTF	*MEC*	*0.43*
LTF	*MECS*	*0.09*
LTF	*O-066*	*1.04*
LTF	*RENSSELAER*	*0.03*
LTF	*ROSETON*	*0.22*
LTF	*WEC*	*0.05*
916041	*Z1-036 C*	*6.28*
916042	*Z1-036 E*	*244.88*
920691	*AA2-178 C*	*50.73*
920692	*AA2-178 E*	*21.74*
930051	*AB1-013 C*	*15.31*
930052	*AB1-013 E*	*102.45*
925121	*AB2-169 C*	*19.96*
925122	*AB2-169 E*	*17.91*
925281	*AB2-186 C*	*3.3*
925282	*AB2-186 E*	*1.41*
925291	*AB2-188 C O1*	*12.5*
925292	*AB2-188 E O1*	*5.62*

Appendix 13

(DVP - DVP) The Z1-036 TAP-6S HERTFORD 230 kV line (from bus 916040 to bus 314662 ckt 1) loads from 109.32% to 112.63% (**DC power flow**) of its load dump rating (897 MVA) for the line fault with failed breaker contingency outage of 'DVP_P4-2: 24682'. This project contributes approximately 29.62 MW to the thermal violation.

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

Bus Number	*Bus Name*	*Full Contribution*
315294	*1DOMTR10*	*4.98*
315292	*1DOMTR78*	*3.36*
315293	*1DOMTR9*	*2.74*
315131	*1EDGECMA*	*6.42*
315132	*1EDGECMB*	*6.42*
315139	*1GASTONA*	*2.25*
315141	*1GASTONB*	*2.25*
315136	*1ROSEMG1*	*1.6*
315138	*1ROSEMG2*	*0.75*
315137	*1ROSEMS1*	*0.99*
314557	*3BETHELC*	*0.69*
314554	*3BTLEBRO*	*0.54*
314566	*3CRESWEL*	*7.79*
314578	*3HORNRTN*	*2.2*

314582	*3KELFORD*	*0.9*
314603	*3SCOT NK*	*3.1*
314617	*3TUNIS*	*0.8*
314620	*6CASHIE*	*1.83*
314574	*6EVERETS*	*2.87*
314594	*6PLYMOTH*	*2.34*
932631	*AC2-084 C*	*7.52*
932632	*AC2-084 E*	*3.7*
933991	*AD1-023 C*	*31.82*
933992	*AD1-023 E*	*17.32*
934331	*AD1-057 C O1*	*7.*
934332	*AD1-057 E O1*	*3.74*
934521	*AD1-076 C O1*	*145.12*
934522	*AD1-076 E O1*	*73.89*
936401	*AD2-051 C O1*	*10.69*
936402	*AD2-051 E O1*	*4.59*
936531	*AD2-068 C*	*5.14*
936532	*AD2-068 E*	*2.65*
936701	*AD2-089 C*	*6.24*
936702	*AD2-089 E*	*4.16*
LTF	*AD2-099*	*2.43*
937441	*AD2-195 C*	*20.7*
937442	*AD2-195 E*	*8.92*
LTF	*CARR*	*0.06*
LTF	*CBM-S1*	*3.83*
LTF	*CBM-S2*	*7.77*

LTF	*CBM-W1*	*8.54*
LTF	*CBM-W2*	*20.76*
LTF	*CIN*	*1.91*
LTF	*CPLE*	*2.69*
LTF	*G-007*	*0.46*
LTF	*IPL*	*1.22*
LTF	*LGEE*	*0.41*
LTF	*MEC*	*4.29*
LTF	*MECS*	*1.95*
LTF	*O-066*	*2.92*
LTF	*RENSSELAER*	*0.05*
LTF	*ROSETON*	*0.35*
900671	*V4-068 C*	*0.06*
900672	*V4-068 E*	*0.21*
LTF	*WEC*	*0.53*
916041	*Z1-036 C*	*4.68*
916042	*Z1-036 E*	*182.47*
917331	*Z2-043 C*	*0.43*
917332	*Z2-043 E*	*1.08*
917341	*Z2-044 C*	*0.16*
917342	*Z2-044 E*	*0.41*
917511	*Z2-088 C OP1*	*0.78*
917512	*Z2-088 E OP1*	*3.58*
918411	*AA1-050*	*0.66*
918511	*AA1-065 C OP*	*2.25*
918512	*AA1-065 E OP*	*6.44*

918531	*AA1-067 C*	*0.35*
918532	*AA1-067 E*	*0.86*
918561	*AA1-072 C*	*0.07*
918562	*AA1-072 E*	*0.18*
919691	*AA2-053 C*	*1.16*
919692	*AA2-053 E*	*2.9*
919701	*AA2-057 C*	*0.9*
919702	*AA2-057 E*	*2.6*
LTF	*AA2-074*	*1.83*
920591	*AA2-165 C*	*0.12*
920592	*AA2-165 E*	*0.34*
920671	*AA2-174 C*	*0.05*
920672	*AA2-174 E*	*0.33*
920691	*AA2-178 C*	*31.16*
920692	*AA2-178 E*	*13.35*
930051	*AB1-013 C*	*9.4*
930052	*AB1-013 E*	*62.92*
930401	*AB1-081 C*	*6.09*
930402	*AB1-081 E*	*2.61*
930861	*AB1-132 C*	*10.01*
930862	*AB1-132 E*	*4.29*
923941	*AB2-035 C*	*0.29*
923942	*AB2-035 E*	*0.12*
924151	*AB2-059 C O1*	*7.18*
924152	*AB2-059 E O1*	*3.7*
924391	*AB2-088 C*	*0.37*

924392	*AB2-088 E*	*0.18*
924491	*AB2-098 C*	*0.67*
924492	*AB2-098 E*	*0.29*
924501	*AB2-099 C*	*0.64*
924502	*AB2-099 E*	*0.27*
925121	*AB2-169 C*	*13.01*
925122	*AB2-169 E*	*11.67*
925291	*AB2-188 C O1*	*7.68*
925292	*AB2-188 E O1*	*3.45*
925591	*AC1-034 C*	*4.65*
925592	*AC1-034 E*	*3.51*
926071	*AC1-086 C*	*14.74*
926072	*AC1-086 E*	*6.71*
926201	*AC1-098 C*	*5.27*
926202	*AC1-098 E*	*3.14*
926211	*AC1-099 C*	*1.77*
926212	*AC1-099 E*	*1.04*
926771	*AC1-163 C*	*2.11*
926772	*AC1-163 E*	*0.99*
927021	*AC1-189 C*	*8.71*
927022	*AC1-189 E*	*4.34*
927141	*AC1-208 C*	*6.67*
927142	*AC1-208 E*	*2.96*

Appendix 14

(DVP - DVP) The AB2-100 TAP-6CLUBHSE 230 kV line (from bus 924510 to bus 314563 ckt 1) loads from 144.2% to 146.79% (**DC power flow**) of its load dump rating (459 MVA) for the line fault with failed breaker contingency outage of 'DVP_P4-2: 246T247'. This project contributes approximately 11.81 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

Bus Number	*Bus Name*	*Full Contribution*
315294	*1DOMTR10*	*1.86*
315131	*1EDGECMA*	*10.47*
315132	*1EDGECMB*	*10.47*
315139	*1GASTONA*	*6.95*
315141	*1GASTONB*	*6.95*
315126	*1ROARAP2*	*1.43*
315128	*1ROARAP4*	*1.37*
315136	*1ROSEMG1*	*4.67*
315138	*1ROSEMG2*	*2.19*
315137	*1ROSEMS1*	*2.9*
314557	*3BETHELC*	*0.87*

314554	*3BTLEBRO*	*0.84*
314566	*3CRESWEL*	*1.63*
314578	*3HORNRTN*	*3.35*
314582	*3KELFORD*	*0.91*
314603	*3SCOT NK*	*3.55*
314617	*3TUNIS*	*0.81*
314541	*3WATKINS*	*0.32*
314620	*6CASHIE*	*0.83*
314574	*6EVERETS*	*2.43*
314594	*6PLYMOTH*	*0.69*
932631	*AC2-084 C*	*9.33*
932632	*AC2-084 E*	*4.6*
933991	*AD1-023 C*	*11.94*
933992	*AD1-023 E*	*6.5*
934331	*AD1-057 C O1*	*16.08*
934332	*AD1-057 E O1*	*8.58*
934521	*AD1-076 C O1*	*45.26*
934522	*AD1-076 E O1*	*23.05*
LTF	*AD1-120*	*3.74*
LTF	*AD1-121*	*3.72*
936401	*AD2-051 C O1*	*9.84*
936402	*AD2-051 E O1*	*4.22*
936531	*AD2-068 C*	*4.66*
936532	*AD2-068 E*	*2.4*
936701	*AD2-089 C*	*7.83*
936702	*AD2-089 E*	*5.22*

936711	*AD2-090 C O1*	*3.74*
936712	*AD2-090 E O1*	*2.5*
LTF	*AD2-099*	*2.89*
937441	*AD2-195 C*	*8.25*
937442	*AD2-195 E*	*3.56*
LTF	*CARR*	*0.09*
LTF	*CBM-S1*	*4.49*
LTF	*CBM-S2*	*9.26*
LTF	*CBM-W1*	*9.78*
LTF	*CBM-W2*	*24.29*
LTF	*CIN*	*2.19*
LTF	*CPLE*	*3.18*
LTF	*G-007*	*0.61*
LTF	*IPL*	*1.4*
LTF	*LGEE*	*0.47*
LTF	*MEC*	*4.97*
LTF	*MECS*	*2.19*
LTF	*O-066*	*3.89*
LTF	*RENSSELAER*	*0.07*
LTF	*ROSETON*	*0.54*
900672	*V4-068 E*	*0.24*
LTF	*WEC*	*0.6*
916042	*Z1-036 E*	*21.79*
917331	*Z2-043 C*	*0.44*
917332	*Z2-043 E*	*1.1*
917341	*Z2-044 C*	*0.24*

917342	*Z2-044 E*	*0.61*
917511	*Z2-088 C OP1*	*0.9*
917512	*Z2-088 E OP1*	*4.12*
918411	*AA1-050*	*0.76*
918491	*AA1-063AC OP*	*1.28*
918492	*AA1-063AE OP*	*3.51*
918511	*AA1-065 C OP*	*1.86*
918512	*AA1-065 E OP*	*5.34*
918531	*AA1-067 C*	*0.29*
918532	*AA1-067 E*	*0.73*
918561	*AA1-072 C*	*0.07*
918562	*AA1-072 E*	*0.18*
919691	*AA2-053 C*	*1.55*
919692	*AA2-053 E*	*3.86*
919701	*AA2-057 C*	*1.28*
919702	*AA2-057 E*	*3.73*
LTF	*AA2-074*	*2.16*
920042	*AA2-088 E*	*6.94*
920591	*AA2-165 C*	*0.17*
920592	*AA2-165 E*	*0.49*
920671	*AA2-174 C*	*0.07*
920672	*AA2-174 E*	*0.45*
920691	*AA2-178 C*	*6.54*
920692	*AA2-178 E*	*2.8*
930051	*AB1-013 C*	*1.97*
930052	*AB1-013 E*	*13.2*

930401	*AB1-081 C*	*9.52*
930402	*AB1-081 E*	*4.08*
930861	*AB1-132 C*	*30.89*
930862	*AB1-132 E*	*13.24*
923941	*AB2-035 C*	*0.37*
923942	*AB2-035 E*	*0.16*
924151	*AB2-059 C O1*	*11.22*
924152	*AB2-059 E O1*	*5.78*
924391	*AB2-088 C*	*0.47*
924392	*AB2-088 E*	*0.23*
924491	*AB2-098 C*	*0.57*
924492	*AB2-098 E*	*0.24*
924501	*AB2-099 C*	*0.61*
924502	*AB2-099 E*	*0.26*
924511	*AB2-100 C*	*42.68*
924512	*AB2-100 E*	*21.02*
925121	*AB2-169 C*	*5.87*
925122	*AB2-169 E*	*5.27*
925291	*AB2-188 C O1*	*1.61*
925292	*AB2-188 E O1*	*0.72*
925591	*AC1-034 C*	*7.27*
925592	*AC1-034 E*	*5.48*
925781	*AC1-054 C*	*3.71*
925782	*AC1-054 E*	*1.71*
926071	*AC1-086 C*	*45.49*
926072	*AC1-086 E*	*20.7*

926201	*AC1-098 C*	*6.55*
926202	*AC1-098 E*	*3.9*
926211	*AC1-099 C*	*2.19*
926212	*AC1-099 E*	*1.29*
926771	*AC1-163 C*	*2.03*
926772	*AC1-163 E*	*0.95*
927021	*AC1-189 C*	*8.99*
927022	*AC1-189 E*	*4.48*
927141	*AC1-208 C*	*9.41*
927142	*AC1-208 E*	*4.18*

Appendix 15

(DVP - DVP) The AB2-169 TAP-3FIVE PT 115 kV line (from bus 925120 to bus 314576 ckt 1) loads from 137.51% to 165.79% (**DC power flow**) of its load dump rating (91 MVA) for the tower line contingency outage of 'DVP_P7-1: LN 25-2034_A'. This project contributes approximately 25.73 MW to the thermal violation.

CONTINGENCY 'DVP_P7-1: LN 25-2034_A' /*REPLACED ON 4/19/2016
OPEN BRANCH FROM BUS 314573 TO BUS 314596 CKT 1 /* 3EVERETS 115.00 - 3POPLR C 115.00
OPEN BRANCH FROM BUS 314596 TO BUS 314614 CKT 1 /* 3POPLR C 115.00 - 3TROWBR2 115.00
OPEN BUS 314596 /* ISLAND
OPEN BRANCH FROM BUS 314569 TO BUS 314620 CKT 1 /* 6EARLEYS 230.00 - 6CASHIE 230.00
OPEN BRANCH FROM BUS 314614 TO BUS 314616 CKT 1 /* 3TROWBR2 115.00 - 6TRWBRDG 230.00
OPEN BRANCH FROM BUS 314616 TO BUS 933990 CKT 1 /* 6TRWBRDG 230.00 - AD1-023 TAP 230.00
END

Bus Number	*Bus Name*	*Full Contribution*
315294	*1DOMTR10*	*2.78*
315292	*1DOMTR78*	*1.88*
315293	*1DOMTR9*	*1.53*
314566	*3CRESWEL*	*1.3*
314594	*6PLYMOTH*	*0.56*
934521	*AD1-076 C O1*	*37.19*
934522	*AD1-076 E O1*	*18.94*
937441	*AD2-195 C*	*17.98*
937442	*AD2-195 E*	*7.75*
LTF	*AMIL*	*0.06*
LTF	*BAYOU*	*0.31*
LTF	*BIG_CAJUN1*	*0.49*

LTF	*BIG_CAJUN2*	*0.98*
LTF	*BLUEG*	*0.31*
LTF	*CALDERWOOD*	*0.18*
LTF	*CANNELTON*	*0.06*
LTF	*CARR*	*< 0.01*
LTF	*CATAWBA*	*0.17*
LTF	*CELEVELAND*	*0.49*
LTF	*CHEOAH*	*0.17*
LTF	*CHILHOWEE*	*0.06*
LTF	*CHOCTAW*	*0.33*
LTF	*CLIFTY*	*1.12*
LTF	*COTTONWOOD*	*1.21*
LTF	*DEARBORN*	*0.11*
LTF	*EDWARDS*	*0.09*
LTF	*ELMERSMITH*	*0.17*
LTF	*FARMERCITY*	*0.07*
LTF	*G-007A*	*0.11*
LTF	*GIBSON*	*0.11*
LTF	*HAMLET*	*0.72*
LTF	*MORGAN*	*0.53*
LTF	*NEWTON*	*0.26*
LTF	*PRAIRIE*	*0.56*
LTF	*RENSSELAER*	*< 0.01*
LTF	*ROSETON*	*< 0.01*
LTF	*ROWAN*	*0.35*
LTF	*SANTEETLA*	*0.05*

LTF	*SMITHLAND*	*0.05*
LTF	*TATANKA*	*0.13*
LTF	*TILTON*	*0.11*
LTF	*TRIMBLE*	*0.06*
LTF	*TVA*	*0.22*
LTF	*UNIONPOWER*	*0.32*
LTF	*VFT*	*0.29*
916042	*Z1-036 E*	*16.14*
920691	*AA2-178 C*	*5.21*
920692	*AA2-178 E*	*2.23*
930051	*AB1-013 C*	*1.57*
930052	*AB1-013 E*	*10.53*
925121	*AB2-169 C*	*19.*
925122	*AB2-169 E*	*17.05*
925281	*AB2-186 C*	*0.2*
925282	*AB2-186 E*	*0.08*
925291	*AB2-188 C O1*	*1.28*
925292	*AB2-188 E O1*	*0.58*

Appendix 16

(DVP - CPLE) The AD2-068 TAP-6GREENVILE T 230 kV line (from bus 936530 to bus 304451 ckt 1) loads from 141.91% to 145.76% (**DC power flow**) of its emergency rating (478 MVA) for the tower line contingency outage of 'DVP_P7-1: LN 2058-2181'. This project contributes approximately 18.41 MW to the thermal violation.

CONTINGENCY 'DVP_P7-1: LN 2058-2181'
OPEN BRANCH FROM BUS 304222 TO BUS 313845 CKT 1 /* 6ROCKYMT230T230.00 - 6HATHAWAY 230.00
OPEN BUS 304226 /* ISLAND: 6PA-RMOUNT#4115.00
OPEN BRANCH FROM BUS 304226 TO BUS 314591 CKT 1 /* 6PA-RMOUNT#4230.00 - 6NASH 230.00
OPEN BRANCH FROM BUS 313845 TO BUS 314591 CKT 1 /* 6HATHAWAY 230.00 - 6NASH 230.00
OPEN BUS 314591 /* ISLAND: 6NASH 230.00
END

Bus Number	*Bus Name*	*Full Contribution*
315294	*1DOMTR10*	*2.74*
315292	*1DOMTR78*	*1.85*
315293	*1DOMTR9*	*1.51*
315131	*1EDGECMA*	*9.28*
315132	*1EDGECMB*	*9.28*
315136	*1ROSEMG1*	*1.74*
315138	*1ROSEMG2*	*0.81*
315137	*1ROSEMS1*	*1.08*
314557	*3BETHELC*	*1.14*
314554	*3BTLEBRO*	*0.43*
314566	*3CRESWEL*	*2.04*
314572	*3EMPORIA*	*0.21*
314578	*3HORNRTN*	*2.04*
314582	*3KELFORD*	*0.72*

314603	*3SCOT NK*	*2.51*
314617	*3TUNIS*	*0.7*
314539	*3UNCAMP*	*1.18*
314541	*3WATKINS*	*0.36*
314620	*6CASHIE*	*0.88*
314574	*6EVERETS*	*5.39*
314594	*6PLYMOTH*	*0.83*
314648	*6SUNBURY*	*0.4*
314651	*6WINFALL*	*0.97*
932631	*AC2-084 C*	*6.16*
932632	*AC2-084 E*	*3.04*
933991	*AD1-023 C*	*13.46*
933992	*AD1-023 E*	*7.33*
934201	*AD1-047 C*	*4.28*
934202	*AD1-047 E*	*2.86*
934331	*AD1-057 C O1*	*8.8*
934332	*AD1-057 E O1*	*4.69*
934521	*AD1-076 C O1*	*54.73*
934522	*AD1-076 E O1*	*27.87*
936401	*AD2-051 C O1*	*8.4*
936402	*AD2-051 E O1*	*3.61*
936531	*AD2-068 C*	*17.02*
936532	*AD2-068 E*	*8.77*
936701	*AD2-089 C*	*10.3*
936702	*AD2-089 E*	*6.87*
936711	*AD2-090 C O1*	*3.91*

936712	*AD2-090 E O1*	*2.61*
937441	*AD2-195 C*	*12.87*
937442	*AD2-195 E*	*5.55*
LTF	*AMIL*	*0.48*
LTF	*BAYOU*	*2.64*
LTF	*BIG_CAJUN1*	*4.17*
LTF	*BIG_CAJUN2*	*8.38*
LTF	*BLUEG*	*2.5*
LTF	*CALDERWOOD*	*1.54*
LTF	*CANNELTON*	*0.48*
LTF	*CATAWBA*	*1.51*
LTF	*CBM-N*	*< 0.01*
LTF	*CELEVELAND*	*4.27*
LTF	*CHEOAH*	*1.44*
LTF	*CHILHOWEE*	*0.5*
LTF	*CHOCTAW*	*2.84*
LTF	*CLIFTY*	*9.04*
LTF	*COTTONWOOD*	*10.32*
LTF	*DEARBORN*	*0.89*
LTF	*EDWARDS*	*0.78*
LTF	*ELMERSMITH*	*1.41*
LTF	*FARMERCITY*	*0.62*
LTF	*G-007A*	*1.04*
LTF	*GIBSON*	*0.88*
LTF	*HAMLET*	*6.47*
LTF	*MORGAN*	*4.57*

LTF	*NEWTON*	*2.15*
LTF	*NYISO*	*0.06*
LTF	*PRAIRIE*	*4.68*
LTF	*ROWAN*	*2.99*
LTF	*SANTEETLA*	*0.43*
LTF	*SMITHLAND*	*0.42*
LTF	*TATANKA*	*1.05*
LTF	*TILTON*	*0.92*
LTF	*TRIMBLE*	*0.47*
LTF	*TVA*	*1.92*
LTF	*UNIONPOWER*	*2.74*
900672	*V4-068 E*	*0.21*
LTF	*VFT*	*2.76*
901082	*W1-029E*	*23.37*
907092	*X1-038 E*	*2.96*
913392	*Y1-086 E*	*1.05*
916042	*Z1-036 E*	*29.11*
917122	*Z2-027 E*	*0.51*
917331	*Z2-043 C*	*0.34*
917332	*Z2-043 E*	*0.86*
917342	*Z2-044 E*	*0.33*
917511	*Z2-088 C OP1*	*1.33*
917512	*Z2-088 E OP1*	*6.13*
918411	*AA1-050*	*1.12*
918492	*AA1-063AE OP*	*2.44*
918511	*AA1-065 C OP*	*1.69*

918512	*AA1-065 E OP*	*4.84*
918531	*AA1-067 C*	*0.65*
918532	*AA1-067 E*	*1.62*
918561	*AA1-072 C*	*0.05*
918562	*AA1-072 E*	*0.14*
919692	*AA2-053 E*	*2.58*
919702	*AA2-057 E*	*2.12*
920042	*AA2-088 E*	*6.24*
920592	*AA2-165 E*	*0.28*
920672	*AA2-174 E*	*0.3*
920691	*AA2-178 C*	*8.16*
920692	*AA2-178 E*	*3.5*
930051	*AB1-013 C*	*2.46*
930052	*AB1-013 E*	*16.47*
930401	*AB1-081 C*	*5.63*
930402	*AB1-081 E*	*2.41*
930861	*AB1-132 C*	*10.35*
930862	*AB1-132 E*	*4.44*
931231	*AB1-173 C*	*1.21*
931232	*AB1-173 E*	*0.56*
931241	*AB1-173AC*	*1.21*
931242	*AB1-173AE*	*0.56*
923801	*AB2-015 C O1*	*4.39*
923802	*AB2-015 E O1*	*3.6*
923831	*AB2-022 C*	*1.02*
923832	*AB2-022 E*	*0.55*

923911	*AB2-031 C O1*	*1.2*
923912	*AB2-031 E O1*	*0.59*
923941	*AB2-035 C*	*0.48*
923942	*AB2-035 E*	*0.21*
923991	*AB2-040 C O1*	*3.93*
923992	*AB2-040 E O1*	*3.21*
924151	*AB2-059 C O1*	*6.64*
924152	*AB2-059 E O1*	*3.42*
924391	*AB2-088 C*	*0.62*
924392	*AB2-088 E*	*0.3*
924491	*AB2-098 C*	*1.26*
924492	*AB2-098 E*	*0.54*
924501	*AB2-099 C*	*0.53*
924502	*AB2-099 E*	*0.23*
924511	*AB2-100 C*	*5.85*
924512	*AB2-100 E*	*2.88*
925121	*AB2-169 C*	*10.01*
925122	*AB2-169 E*	*8.99*
925171	*AB2-174 C O1*	*3.64*
925172	*AB2-174 E O1*	*3.29*
925281	*AB2-186 C*	*0.37*
925282	*AB2-186 E*	*0.16*
925291	*AB2-188 C O1*	*2.01*
925292	*AB2-188 E O1*	*0.9*
925591	*AC1-034 C*	*4.3*
925592	*AC1-034 E*	*3.24*

926071	*AC1-086 C*	*15.25*
926072	*AC1-086 E*	*6.94*
926201	*AC1-098 C*	*4.32*
926202	*AC1-098 E*	*2.58*
926211	*AC1-099 C*	*1.45*
926212	*AC1-099 E*	*0.85*
LTF	*AC1-133*	*22.48*
926771	*AC1-163 C*	*1.74*
926772	*AC1-163 E*	*0.81*
927021	*AC1-189 C*	*15.45*
927022	*AC1-189 E*	*7.7*
927141	*AC1-208 C*	*5.74*
927142	*AC1-208 E*	*2.55*