

***Generation Interconnection
Feasibility Study Report***

For

***PJM Generation Interconnection Request
Queue Position AD1-047***

***Brink 115kV
48 MW Capacity / 80 MW Energy***

February / 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.

General

The IC has proposed a solar generating facility located on Brink Rd, in Greensville County, VA. The installed facilities will have a total capability of 80 MW with 48 MW of this output being recognized by PJM as capacity. The proposed in-service date for this project is 12/01/2018.

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

Point of Interconnection

AD1-047 will interconnect with the ITO transmission system via a at the AB2-040 switching station adjacent to the Brink 115kV substation.

Cost Summary

The AD1-047 project will be responsible for the following costs:

Description	Total Cost
Attachment Facilities	\$1,550,000
Direct Connection Network Upgrades	\$0

Description	Total Cost
Non Direct Connection Network Upgrades	\$5,300,000
Total Costs	\$6,850,000

In addition, the AD1-047 project may be responsible for a contribution to the following costs:

Description	Total Cost
New System Upgrades	\$147,135,000
Previously Identified Upgrades	\$0
Total Costs	\$147,135,000

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. For New System Upgrades, the cost allocation rule differ depending on whether the minimum amount of upgrades to resolve a single reliability criteria violation will cost less than \$5,000,000. For upgrades estimated to cost less than \$5,000,000 the allocation of costs will not occur outside of the Queue in which the need for the Network Upgrade was identified. Cost allocation within the Queue will be contingent each Queue projects Distribution Factor on the overloaded facility. For upgrades estimated to cost \$5,000,000 or greater the allocation of costs 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.

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 AD1-029 Switching Station. The estimated cost for this work is \$1,000,000.

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

Non-Direct Connection Cost Estimate

Substation: Establish a four-breaker 115 kV ring bus to incorporate AB2-040 and AD1-047. The estimated cost of this work scope is \$4,500,000. It is estimated to take 24-36 months to complete this work.

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.

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
# 8	Wreck and rebuild the AB1-173 TAP-Trego 115kV line #130 of 2 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.	\$4,150,000
# 12 - 15	Replace the Clubhouse 230/115 kV transformer #1 increase its line rating to 276.8 MVA (normal), 292.4 MVA (emergency), and 328.7 MVA (load dump). It is estimated to take 14-16 months to engineer and construct.	\$5,500,000
# 19 - 21	Wreck and rebuild the Chestnut – Whitakers – Battleboro 115 kV line #1001 of 9 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 certificate from the NC PUC will most likely be required.	\$18,520,000
# 23, 24	Wreck and rebuild the South Justice – Cox DP – Chestnut 115 kV line #1024 of 6.5 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 certificate from the NC PUC will most likely be required.	\$12,860,000
# 25	Replace the Elmont 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
# 26, 27	Wreck and rebuild the Carson – Chaparal – Locks 230 kV line #249 of 10 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.	\$25,875,000
# 30	Wreck and rebuild the Carson – Chaparal – Locks 230 kV line #249 of 10 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.	\$5,500,000
# 33	Replace Earleys 230/115 kV transformer #1 to increase its rating to 276.8 MVA (normal), 292.4 MVA (emergency), and 328.7 MVA (load dump). Estimated to take 14-16 months to engineer and construct	\$5,500,000
# 34	Replace Earleys 230/115 kV transformer #2 to increase its rating to 276.8 MVA (normal), 292.4 MVA (emergency), and 328.7 MVA (load dump). Estimated to take 14-16 months to engineer and construct.	\$5,500,000
# 36, 37	Wreck and rebuild the South Justice – Cox DP – Chestnut 115 kV line #1024 of 6.5 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 certificate from the NC PUC will most likely be required.	\$12,860,000
# 42 - 45	Wreck and rebuild the Earleys – Aulander - Woodland 115 kV line #54 of 10 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.	\$19,480,000
# 46	Wreck and rebuild the AB2-100 TAP-Clubhouse 230kV line #254 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

Violation #	Upgrade Description	Upgrade Cost
# 47	<p>AEP: Increase East Danville – Danville 138 kV line ratings S/N : 439 MVA S/E :510 MVA</p> <p>(1) Danville Sw. CB M - Danville CB M needs to be replaced, Estimated cost: \$1 million.</p> <p>(2) Danville Risers - Replace Danville risers, Estimated cost: \$100,000.</p> <p>(3) 2.81 miles of conductor will need to reconductor / rebuild, expected cost of \$4.2 million.</p> <p>(4) E Danville 1 - An Engineering study need to be conducted to determine if the relay thermal limit settings can be adjusted to mitigate the overload, Estimated cost: \$25,000. New relay packages will be required if the settings cannot be adjusted, Estimated cost: \$600,000.</p> <p>(5) Danville2 - An Engineering study need to be conducted to determine if the relay thermal limit settings can be adjusted to mitigate the overload, Estimated Cost: \$25,000. New relay packages will be required if the settings cannot be adjusted, Estimated cost: \$600,000.</p> <p>(6) E Danville (RCTL) - An Engineering study need to be conducted to determine if the relay compliance trip limits settings can be adjusted to mitigate the overload, Estimated Cost: \$25,000. New relay packages will be required if the settings cannot be adjusted, Estimated cost: \$600,000.</p> <p>(7) Danville2 (RCTL) - An Engineering study need to be conducted to determine if the relay compliance trip limits settings can be adjusted to mitigate the overload, Estimated Cost: \$25,000. New relay packages will be required if the settings cannot be adjusted, Estimated cost: \$600,000.</p> <p>(8) Conductor Section 3 - 0.03 miles of conductor will need to reconductor / rebuild, Estimated cost: \$0.045 million.</p> <p>(9) Conductor Section 1 - 0.03 miles of conductor will need to reconductor / rebuild, Estimated cost: \$0.045 million.</p> <p>(10) E. Danville CB L - East Danville Circuit Breaker L needs to be replaced, estimated cost: \$1 million.</p> <p>An Approximate construction time would be 24 to 36 months after signing an interconnection agreement.</p>	\$8,890,000
Total Network Upgrades		\$147,135,000

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>

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

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

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

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

Revenue Metering and SCADA Requirements

PJM Requirements

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

Meteorological Data Reporting Requirement

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

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

Network Impacts

The Queue Project AD1-047 was evaluated as a 80.0 MW (Capacity 48.0 MW) injection at the AB2-040 POI 115kV substation in the ITO area. Project AD1-047 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AD1-047 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
AEP_P1-2_#1377	CONTINGENCY 'AEP_P1-2_#1377' OPEN BRANCH FROM BUS 242514 TO BUS 242520 CKT 1 / 242514 05J.FERR 765 242520 05J.FERR 500 1 OPEN BRANCH FROM BUS 242520 TO BUS 306719 CKT 1 / 242520 05J.FERR 500 306719 8ANTIOCH 500 1 END
AEP_P4_#7589_05J.FERR 765	CONTINGENCY 'AEP_P4_#7589_05J.FERR 765' OPEN BRANCH FROM BUS 242514 TO BUS 242520 CKT 1 / 242514 05J.FERR 765 242520 05J.FERR 500 1 OPEN BRANCH FROM BUS 242514 TO BUS 242684 CKT 2 / 242514 05J.FERR 765 242684 05J.FERR 138 2 OPEN BRANCH FROM BUS 242520 TO BUS 306719 CKT 1 / 242520 05J.FERR 500 306719 8ANTIOCH 500 1 END

Contingency Name	Description
DVP_P1-2: LN 1014	CONTINGENCY 'DVP_P1-2: LN 1014' OPEN BRANCH FROM BUS 314554 TO BUS 313844 CKT 1 /* 3BTLEBRO 115.00 - 3MORNSTR 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 2012	CONTINGENCY 'DVP_P1-2: LN 2012' OPEN BRANCH FROM BUS 314266 TO BUS 314569 CKT 1 /* 6NORTHAMPTON230.00 - 6EARLEYS 230.00 OPEN BRANCH FROM BUS 314266 TO BUS 314599 CKT 1 /* 6NORTHAMPTON230.00 - 6ROA VAL 230.00 OPEN BUS 314266 /* ISLAND END
DVP_P1-2: LN 2056-A	CONTINGENCY 'DVP_P1-2: LN 2056-A' OPEN BRANCH FROM BUS 313845 TO BUS 934330 CKT 1 /* 6HATHAWAY 230.00 - AD1-057 TAP 230.00 END
DVP_P1-2: LN 2056-B	CONTINGENCY 'DVP_P1-2: LN 2056-B' OPEN BRANCH FROM BUS 934330 TO BUS 314579 CKT 1 /* AD1- 057 TAP 230.00 - 6HORNRTN 230.00 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 2060	CONTINGENCY 'DVP_P1-2: LN 2060' OPEN BRANCH FROM BUS 314561 TO BUS 314599 CKT 1 /* 6CAROLNA 230.00 - 6ROA VAL 230.00 END
DVP_P1-2: LN 2126	CONTINGENCY 'DVP_P1-2: LN 2126' OPEN BRANCH FROM BUS 314203 TO BUS 314594 CKT 1 /* 6MACKEYS 230.00 - 6PLYMOTH 230.00 OPEN BRANCH FROM BUS 314594 TO BUS 314616 CKT 1 /* 6PLYMOTH 230.00 - 6TRWBRDG 230.00 OPEN BUS 314594 /* ISLAND END

Contingency Name	Description
DVP_P1-2: LN 2131	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 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 238	CONTINGENCY 'DVP_P1-2: LN 238' OPEN BRANCH FROM BUS 314282 TO BUS 314435 CKT 1 /* 6CARSON 230.00 - 6SAPONY 230.00 OPEN BRANCH FROM BUS 314435 TO BUS 314563 CKT 1 /* 6SAPONY 230.00 - 6CLUBHSE 230.00 OPEN BRANCH FROM BUS 314562 TO BUS 314563 CKT 1 /* 3CLUBHSE 115.00 - 6CLUBHSE 230.00 OPEN BUS 314435 /* ISLAND END
DVP_P1-2: LN 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_P1-3: 3CAROLNA-6CAROLNA	CONTINGENCY 'DVP_P1-3: 3CAROLNA-6CAROLNA' OPEN BRANCH FROM BUS 314559 TO BUS 314561 CKT 1 END

Contingency Name	Description
DVP_P4-2: 101002	CONTINGENCY 'DVP_P4-2: 101002' /* CAROLINA 115 KV OPEN BRANCH FROM BUS 313723 TO BUS 314259 CKT 1 /* 3PECAN 115.00 - 3CAROL56_1 115.00 OPEN BRANCH FROM BUS 314259 TO BUS 314559 CKT Z1 /* 3CAROL56_1 115.00 - 3CAROLNA 115.00 OPEN BRANCH FROM BUS 314259 TO BUS 314835 CKT 1 /* 3CAROL56_1 115.00 - 3CAROL_1 115.00 OPEN BUS 314259 /* ISLAND: 3CAROL56_1 115.00 OPEN BUS 314835 /* ISLAND: 3CAROL_1 115.00 OPEN BRANCH FROM BUS 314559 TO BUS 314571 CKT 1 /* 3CAROLNA 115.00 - 3EATON F 115.00 OPEN BRANCH FROM BUS 314559 TO BUS 919690 CKT 1 /* 3CAROLNA 115.00 - AA2-053 TAP 115.00 OPEN BRANCH FROM BUS 314559 TO BUS 314600 CKT 1 /* 3CAROLNA 115.00 - 3PLHITP 115.00 OPEN BRANCH FROM BUS 314559 TO BUS 314561 CKT 1 /* 3CAROLNA 115.00 - 6CAROLNA 230.00 END
DVP_P4-2: 201262	CONTINGENCY 'DVP_P4-2: 201262' /* EARLEYS OPEN BRANCH FROM BUS 314569 TO BUS 314266 CKT 1 /* 2012 OPEN BRANCH FROM BUS 314266 TO BUS 314599 CKT 1 /* 2012 OPEN BRANCH FROM BUS 314569 TO BUS 314568 CKT 1 /* TX. #3 END
DVP_P4-2: 2012TH4	CONTINGENCY 'DVP_P4-2: 2012TH4' /* EARLEYS OPEN BRANCH FROM BUS 314569 TO BUS 314266 CKT 1 /* 2012 OPEN BRANCH FROM BUS 314266 TO BUS 314599 CKT 1 /* 2012 OPEN BRANCH FROM BUS 314569 TO BUS 314568 CKT 2 /* TX. #4 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

Contingency Name	Description
DVP_P4-2: 2202	CONTINGENCY 'DVP_P4-2: 2202' /* CAROLINA OPEN BRANCH FROM BUS 314559 TO BUS 314571 CKT 1 /* LINE 22 OPEN BRANCH FROM BUS 314571 TO BUS 925780 CKT 1 /* LINE 22 OPEN BRANCH FROM BUS 314559 TO BUS 314259 CKT Z1 /* LINE 56 OPEN BRANCH FROM BUS 314559 TO BUS 919690 CKT 1 /* LINE 54 OPEN BRANCH FROM BUS 314559 TO BUS 314600 CKT 1 /* LINE 130 OPEN BRANCH FROM BUS 314559 TO BUS 314561 CKT 1 /* TX. #4 DECREASE BUS 314559 LOAD BY 100 PERCENT /* REMOVE ALL LOAD AT CAROLINA END
DVP_P4-2: 246T2034	CONTINGENCY 'DVP_P4-2: 246T2034' /* EARLEYS OPEN BRANCH FROM BUS 314569 TO BUS 314575 CKT 1 /* 246 OPEN BRANCH FROM BUS 314575 TO BUS 314537 CKT 1 /* 246 OPEN BRANCH FROM BUS 314575 TO BUS 314590 CKT 1 /* 246 - NUCOR OPEN BRANCH FROM BUS 314569 TO BUS 933450 CKT 1 /* 2034 END
DVP_P4-2: 246T247	CONTINGENCY 'DVP_P4-2: 246T247' /* SUFFOLK 230 KV OPEN BRANCH FROM BUS 314537 TO BUS 314575 CKT 1 /* 6SUFFOLK 230.00 - 6NUCO TP 230.00 OPEN BRANCH FROM BUS 314569 TO BUS 314575 CKT 1 /* 6EARLEYS 230.00 - 6NUCO TP 230.00 OPEN BRANCH FROM BUS 314575 TO BUS 314590 CKT 1 /* 6NUCO TP 230.00 - 6NUCOR 230.00 OPEN BUS 314575 /* ISLAND: 6NUCO TP 230.00 OPEN BUS 314590 /* ISLAND: 6NUCOR 230.00 OPEN BRANCH FROM BUS 314537 TO BUS 314648 CKT 1 /* 6SUFFOLK 230.00 - 6SUNBURY 230.00 OPEN BRANCH FROM BUS 314648 TO BUS 901080 CKT 1 /* 6SUNBURY 230.00 - W1-029 230.00 OPEN BUS 314648 /* ISLAND: 6SUNBURY 230.00 END
DVP_P4-2: 5402	CONTINGENCY 'DVP_P4-2: 5402' /* CAROLINA OPEN BRANCH FROM BUS 314559 TO BUS 919690 CKT 1 /* LINE 54 OPEN BRANCH FROM BUS 314559 TO BUS 314571 CKT 1 /* LINE 22 OPEN BRANCH FROM BUS 314559 TO BUS 314259 CKT Z1 /* LINE 56 OPEN BRANCH FROM BUS 314559 TO BUS 314600 CKT 1 /* LINE 130 OPEN BRANCH FROM BUS 314559 TO BUS 314561 CKT 1 /* TX. #4 DECREASE BUS 314559 LOAD BY 100 PERCENT /* REMOVE ALL LOAD AT CAROLINA END

Contingency Name	Description
DVP_P4-2: 5602	CONTINGENCY 'DVP_P4-2: 5602' /* CAROLINA 115 KV OPEN BRANCH FROM BUS 313723 TO BUS 314604 CKT 1 /* 3PECAN 115.00 - 3SEABORD 115.00 OPEN BRANCH FROM BUS 314558 TO BUS 314587 CKT 1 /* 3BOYKINS 115.00 - 3MARGTSV 115.00 OPEN BRANCH FROM BUS 314587 TO BUS 314604 CKT 1 /* 3MARGTSV 115.00 - 3SEABORD 115.00 OPEN BUS 314587 /* ISLAND: 3MARGTSV 115.00 OPEN BUS 314604 /* ISLAND: 3SEABORD 115.00 OPEN BRANCH FROM BUS 314559 TO BUS 314571 CKT 1 /* 3CAROLNA 115.00 - 3EATON F 115.00 OPEN BRANCH FROM BUS 314559 TO BUS 919690 CKT 1 /* 3CAROLNA 115.00 - AA2-053 TAP 115.00 OPEN BRANCH FROM BUS 314559 TO BUS 314600 CKT 1 /* 3CAROLNA 115.00 - 3PLHITP 115.00 OPEN BRANCH FROM BUS 314559 TO BUS 314561 CKT 1 /* 3CAROLNA 115.00 - 6CAROLNA 230.00 END
DVP_P4-2: 562T563	CONTINGENCY 'DVP_P4-2: 562T563' /*CARSON OPEN BRANCH FROM BUS 314902 TO BUS 314923 CKT 1 /*CARSON TO MIDLOTHIAN OPEN BRANCH FROM BUS 314914 TO BUS 314902 CKT 1 /*CARSON 500.00 - 8SEPTA 500.00 END
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_P4-5: T122C	CONTINGENCY 'DVP_P4-5: T122C' /* CAROLINA OPEN BUS 314559 /* CAROLINA 115KV BUS OPEN BUS 315126 /* ROANOKE RAPIDS GEN 1 AND 2 OPEN BUS 315128 /* ROANOKE RAPIDS GEN 3 AND 4 OPEN BRANCH FROM BUS 314559 TO BUS 314561 CKT 1 /* TX. #4 END
DVP_P7-1: LN 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

Contingency Name	Description
DVP_P7-1: LN 54-2012_B	CONTINGENCY 'DVP_P7-1: LN 54-2012_B' OPEN BRANCH FROM BUS 919690 TO BUS 314581 CKT 1 /* AA2- 053 TAP 115.00 - 3JACKSON 115.00 OPEN BRANCH FROM BUS 314581 TO BUS 933460 CKT 1 /* 3JACKSON 115.00 - AC2-159 TAP 115.00 OPEN BUS 314581 /* ISLAND OPEN BRANCH FROM BUS 314266 TO BUS 314569 CKT 1 /* 6NORTHAMPTON230.00 - 6EARLEYS 230.00 OPEN BRANCH FROM BUS 314266 TO BUS 314599 CKT 1 /* 6NORTHAMPTON230.00 - 6ROA VAL 230.00 OPEN BUS 314266 /* ISLAND END
DVP_P7-1: LN 54-2012_C	CONTINGENCY 'DVP_P7-1: LN 54-2012_C' OPEN BRANCH FROM BUS 314568 TO BUS 314625 CKT 1 /* 3EARLEYS 115.00 - 3AULANDR 115.00 OPEN BRANCH FROM BUS 933460 TO BUS 314626 CKT 1 /* AC2- 159 TAP 115.00 - 3WOODLND 115.00 OPEN BRANCH FROM BUS 314625 TO BUS 314626 CKT 1 /* 3AULANDR 115.00 - 3WOODLND 115.00 OPEN BUS 314625 /* ISLAND OPEN BUS 314626 /* ISLAND OPEN BRANCH FROM BUS 314266 TO BUS 314569 CKT 1 /* 6NORTHAMPTON230.00 - 6EARLEYS 230.00 OPEN BRANCH FROM BUS 314266 TO BUS 314599 CKT 1 /* 6NORTHAMPTON230.00 - 6ROA VAL 230.00 OPEN BUS 314266 /* ISLAND END
DVP_P7-1: LN 56-2012	CONTINGENCY 'DVP_P7-1: LN 56-2012' OPEN BRANCH FROM BUS 313723 TO BUS 314604 CKT 1 /* 3PECAN 115.00 - 3SEABORD 115.00 OPEN BRANCH FROM BUS 314558 TO BUS 314587 CKT 1 /* 3BOYKINS 115.00 - 3MARGTSV 115.00 OPEN BRANCH FROM BUS 314587 TO BUS 314604 CKT 1 /* 3MARGTSV 115.00 - 3SEABORD 115.00 OPEN BUS 314587 /* ISLAND: 3MARGTSV 115.00 OPEN BUS 314604 /* ISLAND: 3SEABORD 115.00 OPEN BRANCH FROM BUS 314266 TO BUS 314569 CKT 1 /* 6NORTHAMPTON230.00 - 6EARLEYS 230.00 OPEN BRANCH FROM BUS 314266 TO BUS 314599 CKT 1 /* 6NORTHAMPTON230.00 - 6ROA VAL 230.00 OPEN BUS 314266 /* ISLAND: 6NORTHAMPTON230.00 END

Contingency Name	Description
DVP_P7-1: LN 56-2060	CONTINGENCY 'DVP_P7-1: LN 56-2060' OPEN BRANCH FROM BUS 313723 TO BUS 314604 CKT 1 /* 3PECAN 115.00 - 3SEABORD 115.00 OPEN BRANCH FROM BUS 314558 TO BUS 314587 CKT 1 /* 3BOYKINS 115.00 - 3MARGTSV 115.00 OPEN BRANCH FROM BUS 314587 TO BUS 314604 CKT 1 /* 3MARGTSV 115.00 - 3SEABORD 115.00 OPEN BUS 314587 /* ISLAND: 3MARGTSV 115.00 OPEN BUS 314604 /* ISLAND: 3SEABORD 115.00 OPEN BRANCH FROM BUS 314561 TO BUS 314599 CKT 1 /* 6CAROLNA 230.00 - 6ROA VAL 230.00 END
DVP_P7-1: LN 81-2056	CONTINGENCY 'DVP_P7-1: LN 81-2056' OPEN BRANCH FROM BUS 314559 TO BUS 314578 CKT 1 /* 3CAROLNA 115.00 - 3HORNRTN 115.00 OPEN BRANCH FROM BUS 314578 TO BUS 314598 CKT 1 /* 3HORNRTN 115.00 - 3ROAN DP 115.00 OPEN BRANCH FROM BUS 314598 TO BUS 314628 CKT 1 /* 3ROAN DP 115.00 - 3DARLINGT DP115.00 OPEN BUS 314578 /* ISLAND: 3HORNRTN 115.00 OPEN BUS 314598 /* ISLAND: 3ROAN DP 115.00 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 /* 6MORNSTR 230.00 - 6NASH 230.00 OPEN BRANCH FROM BUS 304226 TO BUS 304222 CKT 1 /* 6PA- RMOUNT#4230.00 - 6ROCKYMT230T OPEN BUS 304226 /* ISLAND OPEN BUS 314591 /* ISLAND: 6NASH 230.00 END

Summer Peak Analysis - 2021

Generator Deliverability

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

#	Contingency		Affected Area	Facility Description	Bus			Power Flow	Loading %		Rating		MW Contribution	Ref
	Type	Name			From	To	Cir.		Initial	Final	Type	MVA		
1	N-1	DVP_P1-2: LN 2181	DVP - CPLE	6MORNSTR- 6ROCKYMT230T 230 kV line	313845	304222	1	DC	97.53	99.06	ER	374	5.75	
2	N-1	DVP_P1-2: LN 2058	DVP - DVP	6MORNSTR-6NASH 230 kV line	313845	314591	1	DC	87.57	88.88	ER	449	5.87	1
3	N-1	DVP_P1-2: LN 2131A	DVP - DVP	6EARLEYS-6NUCO TP 230 kV line	314569	314575	1	DC	83.18	84.3	ER	572	6.39	2
4	N-1	DVP_P1-2: LN 2131_FSA	DVP - DVP	6EARLEYS-6NUCO TP 230 kV line	314569	314575	1	DC	82.49	83.61	ER	572	6.39	
5	N-1	DVP_P1-2: LN 2131A	DVP - DVP	6NUCO TP-6SUFFOLK 230 kV line	314575	314537	1	DC	77.16	78.28	ER	572	6.39	3
6	N-1	DVP_P1-2: LN 2131_FSA	DVP - DVP	6NUCO TP-6SUFFOLK 230 kV line	314575	314537	1	DC	76.45	77.57	ER	572	6.39	
7	N-1	DVP_P1-2: LN 130-A	DVP - DVP	6LAKEVEW-AB2-100 TAP 230 kV line	314583	924510	1	DC	89.79	92.47	ER	375	10.07	4
8	Non	Non	DVP - DVP	AB1-173 TAP-3TREGO 115 kV line	931230	314612	1	DC	84.9	134.96	NR	96	48	5
9	N-1	DVP_P1-2: LN 2060	DVP - DVP	AD1-057 TAP- 6MORNSTR 230 kV line	934330	313845	1	DC	93.64	95.51	ER	442	8.25	

#	Contingency		Affected Area	Facility Description	Bus			Power Flow	Loading %		Rating		MW Contribution	Ref
	Type	Name			From	To	Cir.		Initial	Final	Type	MVA		
10	N-1	DVP_P1-2: LN 2012	DVP - DVP	AD1-057 TAP- 6MORNSTR 230 kV line	934330	313845	1	DC	93.43	95.3	ER	442	8.25	

Multiple Facility Contingency

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

#	Contingency		Affected Area	Facility Description	Bus			Power Flow	Loading %		Rating		MW Contribution	Ref
	Type	Name			From	To	Cir.		Initial	Final	Type	MVA		
11	LFFB	DVP_P4-2: 2020T2144	DVP - DVP	6SAPONY-6CARSON 230 kV line	314435	314282	1	DC	91.49	94.85	LD	830	27.86	6
12	LFFB	DVP_P4-2: 2202	DVP - DVP	6CLUBHSE 230/115 kV transformer	314562	314563	1	DC	97.75	125.37	LD	209	63.44	
13	LFFB	DVP_P4-2: 5602	DVP - DVP	6CLUBHSE 230/115 kV transformer	314562	314563	1	DC	97.2	124.82	LD	209	63.44	
14	LFFB	DVP_P4-2: 5402	DVP - DVP	6CLUBHSE 230/115 kV transformer	314562	314563	1	DC	96.93	124.55	LD	209	63.44	
15	LFFB	DVP_P4-2: 101002	DVP - DVP	6CLUBHSE 230/115 kV transformer	314562	314563	1	DC	96.17	123.79	LD	209	63.44	
16	DCTL	DVP_P7-1: LN 54- 2012_C	DVP - DVP	6HORNRTN-AD1-057 TAP 230 kV line	314579	934330	1	DC	97.11	99.89	LD	541	14.99	7
17	DCTL	DVP_P7-1: LN 54- 2012_C	DVP - DVP	AD1-057 TAP- 6MORNSTR 230 kV line	934330	313845	1	DC	97.04	99.81	LD	541	14.99	8

#	Contingency		Affected Area	Facility Description	Bus			Power Flow	Loading %		Rating		MW Contribution	Ref
	Type	Name			From	To	Cir.		Initial	Final	Type	MVA		
18	DCTL	DVP_P7-1: LN 54- 2012_B	DVP - DVP	AD1-057 TAP- 6MORNSTR 230 kV line	934330	313845	1	DC	94.43	97.2	LD	541	14.99	

Short Circuit

(Summary of impacted circuit breakers)

New circuit breakers found to be over-duty:

None

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

None

Contribution to Previously Identified Overloads

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

#	Contingency		Affected Area	Facility Description	Bus			Power Flow	Loading %		Rating		MW Contribution	Ref
	Type	Name			From	To	Cir.		Initial	Final	Type	MVA		
19	N-1	DVP_P1-2: LN 2056-A	DVP - DVP	3CHESTNUT-3WITAKRS 115 kV line	313719	314623	1	DC	157.4	160.27	ER	134	3.86	9
20	N-1	DVP_P1-2: LN 2056-B	DVP - DVP	3CHESTNUT-3WITAKRS 115 kV line	313719	314623	1	DC	157.47	160.35	ER	134	3.86	
21	Non	Non	DVP - DVP	3CHESTNUT-3WITAKRS 115 kV line	313719	314623	1	DC	127.8	130.17	NR	123	2.92	

#	Contingency		Affected Area	Facility Description	Bus			Power Flow	Loading %		Rating		MW Contribution	Ref
	Type	Name			From	To	Cir.		Initial	Final	Type	MVA		
22	DCTL	DVP_P7-1: LN 81-2056	DVP - CPLE	6MORNSTR- 6ROCKYMT230T 230 kV line	313845	304222	1	DC	136.38	138.85	ER	374	9.22	10
23	N-1	DVP_P1-2: LN 2056-A	DVP - DVP	3SO JUSTICE-3COX DP 115 kV line	313858	314577	1	DC	106.6	108.94	ER	165	3.88	11
24	N-1	DVP_P1-2: LN 2056-B	DVP - DVP	3SO JUSTICE-3COX DP 115 kV line	313858	314577	1	DC	106.66	109	ER	165	3.88	
25	LFFB	DVP_P4-2: H2T557	DVP - DVP	8ELMONT 500/230 kV transformer	314218	314908	1	DC	123.21	123.63	LD	1051	11.25	12
26	LFFB	DVP_P4-2: 562T563	DVP - DVP	6CARSON-6CHRL249 230 kV line	314282	314285	1	DC	107.11	108.38	LD	684	9.56	13
27	LFFB	DVP_P4-2: 562T563	DVP - DVP	6CHRL249-6LOCKS 230 kV line	314285	314316	1	DC	104.3	105.58	LD	684	9.56	14
28	DCTL	DVP_P7-1: LN 2058- 2181	DVP - CPLE	3BTLEBRO- 3ROCKYMT115T 115 kV line	314554	304223	1	DC	438.46	441.93	ER	93	7.15	15
29	N-1	DVP_P1-2: LN 1014	DVP - CPLE	3BTLEBRO- 3ROCKYMT115T 115 kV line	314554	304223	1	DC	146.39	149.2	ER	93	2.62	
30	LFFB	DVP_P4-5: T122C	DVP - DVP	6CLUBHSE 230/115 kV transformer	314562	314563	1	DC	100.29	130.75	LD	209	63.52	16
31	LFFB	DVP_P4-2: 246T247	DVP - DVP	6CLUBHSE-6SAPONY 230 kV line	314563	314435	1	DC	120.03	124.64	LD	637	29.27	17
32	LFFB	DVP_P4-2: 246T2034	DVP - DVP	6CLUBHSE-6SAPONY 230 kV line	314563	314435	1	DC	122.55	127.34	LD	637	30.43	

#	Contingency		Affected Area	Facility Description	Bus			Power Flow	Loading %		Rating		MW Contribution	Ref
	Type	Name			From	To	Cir.		Initial	Final	Type	MVA		
33	LFFB	DVP_P4-2: 2012TH4	DVP - DVP	6EARLEYS 230/115 kV transformer	314568	314569	1	DC	125.95	127.6	LD	208	7.62	18
34	LFFB	DVP_P4-2: 201262	DVP - DVP	6EARLEYS 230/115 kV transformer	314568	314569	2	DC	114.72	116.23	LD	228	7.62	19
35	DCTL	DVP_P7-1: LN 2058-2181	DVP - CPLE	6EVERETS-6GREENVILE T 230 kV line	314574	304451	1	DC	118.24	118.91	ER	478	7.14	20
36	N-1	DVP_P1-2: LN 2056-A	DVP - DVP	3COX DP-3CHESTNUT 115 kV line	314577	313719	1	DC	123.24	126.12	ER	134	3.88	21
37	N-1	DVP_P1-2: LN 2056-B	DVP - DVP	3COX DP-3CHESTNUT 115 kV line	314577	313719	1	DC	123.31	126.2	ER	134	3.88	
38	Non	Non	DVP - DVP	3TREGO-3TREGOTP 115 kV line	314612	314615	1	DC	172.87	279.26	NR	45	48	22
39	N-1	DVP_P1-2: LN 2056-A	DVP - DVP	3WITAKRS-3BTLEBRO 115 kV line	314623	314554	1	DC	158.18	161.06	ER	134	3.86	23
40	N-1	DVP_P1-2: LN 2056-B	DVP - DVP	3WITAKRS-3BTLEBRO 115 kV line	314623	314554	1	DC	158.26	161.13	ER	134	3.86	
41	Non	Non	DVP - DVP	3WITAKRS-3BTLEBRO 115 kV line	314623	314554	1	DC	128.7	131.07	NR	123	2.92	
42	DCTL	DVP_P7-1: LN 56-2060	DVP - DVP	3AULANDR-3EARLEYS 115 kV line	314625	314568	1	DC	121.29	123.68	LD	136	7.19	24
43	DCTL	DVP_P7-1: LN 56-2012	DVP - DVP	3AULANDR-3EARLEYS 115 kV line	314625	314568	1	DC	120.63	123.01	LD	136	7.19	
44	DCTL	DVP_P7-1: LN 56-2060	DVP - DVP	3WOODLND-3AULANDR 115 kV line	314626	314625	1	DC	126.44	128.82	LD	136	7.19	25

#	Contingency		Affected Area	Facility Description	Bus			Power Flow	Loading %		Rating		MW Contribution	Ref
	Type	Name			From	To	Cir.		Initial	Final	Type	MVA		
45	DCTL	DVP_P7-1: LN 56-2012	DVP - DVP	3WOODLND-3AULANDR 115 kV line	314626	314625	1	DC	125.78	128.16	LD	136	7.19	
46	N-1	DVP_P1-2: LN 130-A	DVP - DVP	AB2-100 TAP-6CLUBHSE 230 kV line	924510	314563	1	DC	100.34	103.02	ER	375	10.07	26
47	LFFB	AEP_P4_#7 589_05J.FE RR 765	AEP - AEP	05EDAN 1-05DANVL2 138 kV line	242631	242620	1	DC	108.49	108.98	ER	415	4.58	27

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	6MORNSTR- 6ROCKYMT230T 230 kV line	The limiting element isn't on the VEPCO facilities. The external Duke / Progress Energy (i.e. Non-PJM) Transmission Owner, will not evaluate this violation until the impact study phase.	na	\$0

Violation #	Overloaded Facility	Upgrade Description	Network Upgrade Number	Upgrade Cost
# 2	6MORNSTR-6NASH 230 kV line	Wreck and rebuild the Hathaway – Nash 230 kV line #2181 of 1 miles to increase its line rating to 722 MVA (normal), 722 MVA (emergency), and 830 MVA (load dump). It is estimated to take 30-36 months to engineer, permit, and construct. A certificate from the NC PUC will most likely be required.	Pending	\$2,250,000
# 3, 4	6EARLEYS-6NUCO TP 230 kV line	Wreck and rebuild the Earleys – Nucor TP – Suffolk 230 kV line #246 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 certificate from the NC PUC will most likely be required.	Pending	\$110,950,000
# 5, 6	6NUCO TP- 6SUFFOLK 230 kV line			
# 7	6LAKEVEW-AB2-100 TAP 230 kV line	Wreck and rebuild the AB2-100 Tap – Lakeview 230 kV line #254 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
# 8	AB1-173 TAP- 3TREGO 115 kV line	Wreck and rebuild the AB1-173 TAP-Trego 115kV line #130 of 2 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	\$4,150,000
# 9, 10, 17, 18	AD1-057 TAP- 6MORNSTR 230 kV line	Wreck and rebuild the AD1-057 – Morning Star 230 kV line #2056 of 15 miles to increase its line rating to 722 MVA (normal), 722 MVA (emergency), and 830 MVA (load dump). It is estimated to take 30-36 months to engineer, permit, and construct. A certificate from the NC PUC will most likely be required.	Pending	\$36,000,000
# 11	6SAPONY-6CARSON 230 kV line	Wreck and rebuild the Sapony to Carson 230 kV line #238 of 12 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 and construct.	Pending	\$29,425,000
# 12 – 15	6CLUBHSE 230/115 kV transformer	Replace the Clubhouse 230/115 kV transformer #1 increase its line rating to 276.8 MVA (normal), 292.4 MVA (emergency), and 328.7 MVA (load dump). It is estimated to take 14-16 months to engineer and construct.	Pending	\$5,500,000
# 16	6HORNRTN-AD1-057 TAP 230 kV line	Wreck and rebuild the Hornertown – AD1-057 Tap 230kV line of 14 miles to increase its line rating to 722 MVA (normal), 722 MVA (emergency), and 830 MVA (load dump). It is estimated to take 30-36 months to engineer, permit, and construct.	Pending	\$36,000,000
Total New Network Upgrades				\$264,275,000

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
# 19 – 21	3CHESTNUT-3WITAKRS 115 kV line	Wreck and rebuild the Chestnut – Whitakers – Battleboro 115 kV line #1001 of 9 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 certificate from the NC PUC will most likely be required.	Pending	\$18,520,000
# 22	6MORNSTR-6ROCKYMT230T 230 kV line	The limiting element isn't on the VEPCO facilities. The external Duke / Progress Energy (i.e. Non-PJM) Transmission Owner, will not evaluate this violation until the impact study phase.	na	\$0
# 23, 24	3SO JUSTICE-3COX DP 115 kV line	Wreck and rebuild the South Justice – Cox DP – Chestnut 115 kV line #1024 of 6.5 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 certificate from the NC PUC will most likely be required.	Pending	\$12,860,000
# 25	8ELMONT 500/230 kV transformer	Replace the Elmont 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
# 26	6CARSON-6CHRL249 230 kV line	Wreck and rebuild the Carson – Chaparal – Locks 230 kV line #249 of 10 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	\$25,875,000
# 27	6CHRL249-6LOCKS 230 kV line			
# 28, 29	3BTLEBRO-3ROCKYMT115T 115 kV line	The limiting element isn't on the VEPCO facilities. The external Duke / Progress Energy (i.e. Non-PJM) Transmission Owner, will not evaluate this violation until the impact study phase.	na	\$0
# 30	6CLUBHSE 230/115 kV transformer	Replace the Clubhouse 230/115 kV transformer #1 increase its line rating to 276.8 MVA (normal), 292.4 MVA (emergency), and 328.7 MVA (load dump). It is estimated to take 14-16 months to engineer and construct.	Pending	\$5,500,000

Violation #	Overloaded Facility	Upgrade Description	Network Upgrade Number	Upgrade Cost
# 31, 32	6CLUBHSE-6SAPONY 230 kV line	Clubhouse to Sapony 230 kV Line #238 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
# 33	6EARLEYS 230/115 kV transformer	Replace Earleys 230/115 kV transformer #1 to increase its rating to 276.8 MVA (normal), 292.4 MVA (emergency), and 328.7 MVA (load dump). Estimated to take 14-16 months to engineer and construct.	Pending	\$5,500,000
# 34	6EARLEYS 230/115 kV transformer	Replace Earleys 230/115 kV transformer #2 to increase its rating to 276.8 MVA (normal), 292.4 MVA (emergency), and 328.7 MVA (load dump). Estimated to take 14-16 months to engineer and construct.	Pending	\$5,500,000
# 35	6EVERETS-6GREENVILLE T 230 kV line	The limiting element isn't on the VEPCO facilities. The external Duke / Progress Energy (i.e. Non-PJM) Transmission Owner, will not evaluate this violation until the impact study phase.	na	\$0
# 36, 37	3COX DP-3CHESTNUT 115 kV line	Wreck and rebuild the South Justice – Cox DP – Chestnut 115 kV line #1024 of 6.5 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 certificate from the NC PUC will most likely be required.	Pending	\$12,860,000
# 38	3TREGO-3TREGOTP 115 kV line	Rebuild Clubhouse - Carolina 115 kV Line #130 (17.8 miles) to current standards with summer emergency rating of 353 MVA. The in-service date is 12/31/2019.	b2649	
# 39 – 41	3WITAKRS-3BTLEBRO 115 kV line	The limiting element isn't on the VEPCO facilities. The external Duke / Progress Energy (i.e. Non-PJM) Transmission Owner, will not evaluate this violation until the impact study phase.	na	\$0
# 42, 43	3AULANDR-3EARLEYS 115 kV line	Wreck and rebuild the Earleys – Aulander - Woodland 115 kV line #54 of 10 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	\$19,480,000
# 44, 45	3WOODLND-3AULANDR 115 kV line			
# 46	AB2-100 TAP-6CLUBHSE 230 kV line	Wreck and rebuild the AB2-100 TAP-Clubhouse 230kV line #254 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

Violation #	Overloaded Facility	Upgrade Description	Network Upgrade Number	Upgrade Cost
# 37	05EDAN 1-05DANVL2 138 kV line	<p>AEP: Current ratings S/N : 275 MVA S/E : 361 MVA, New rating: S/N : 439 MVA S/E :510 MVA</p> <p>(1) Danville Sw. CB M - Danville CB M needs to be replaced, Estimated cost: \$1 million.</p> <p>(2) Danville Risers - Replace Danville risers, Estimated cost: \$100,000.</p> <p>(3) 2.81 miles of conductor will need to reconductor / rebuild, expected cost of \$4.2 million.</p> <p>(4) E Danville 1 - An Engineering study need to be conducted to determine if the relay thermal limit settings can be adjusted to mitigate the overload, Estimated cost: \$25,000. New relay packages will be required if the settings cannot be adjusted, Estimated cost: \$600,000.</p> <p>(5) Danville2 - An Engineering study need to be conducted to determine if the relay thermal limit settings can be adjusted to mitigate the overload, Estimated Cost: \$25,000. New relay packages will be required if the settings cannot be adjusted, Estimated cost: \$600,000.</p> <p>(6) E Danville (RCTL) - An Engineering study need to be conducted to determine if the relay compliance trip limits settings can be adjusted to mitigate the overload, Estimated Cost: \$25,000. New relay packages will be required if the settings cannot be adjusted, Estimated cost: \$600,000.</p> <p>(7) Danville2 (RCTL) - An Engineering study need to be conducted to determine if the relay compliance trip limits settings can be adjusted to mitigate the overload, Estimated Cost: \$25,000. New relay packages will be required if the settings cannot be adjusted, Estimated cost: \$600,000.</p> <p>(8) Conductor Section 3 - 0.03 miles of conductor will need to reconductor / rebuild, Estimated cost: \$0.045 million.</p> <p>(9) Conductor Section 1 - 0.03 miles of conductor will need to reconductor / rebuild, Estimated cost: \$0.045 million.</p> <p>(10) E. Danville CB L - East Danville Circuit Breaker L needs to be replaced, estimated cost: \$1 million.</p> <p>An Approximate construction time would be 24 to 36 months after signing an interconnection agreement.</p>	Pending	\$8,890,000
Total New Network Upgrades				\$137,625,000

Potential Congestion due to Local Energy Deliverability

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

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

#	Contingency		Affected Area	Facility Description	Bus		Circuit	Power Flow	Loading %		Rating		MW Contribution
	Type	Name			From	To			Initial	Final	Type	MVA	
48	N-1	DVP_P1-2: LN 2056-B	DVP - DVP	3CHESTNUT-3WITAKRS 115 kV line	313719	314623	1	DC	199.08	201.24	ER	134	6.44
49	N-1	DVP_P1-2: LN 2181	DVP - CPL	6MORNSTR-6ROCKYMT230T 230 kV line	313845	304222	1	DC	136.14	138.61	ER	374	9.59
50	N-1	DVP_P1-2: LN 2058	DVP - DVP	6MORNSTR-6NASH 230 kV line	313845	314591	1	DC	120.72	122.82	ER	449	9.78
51	N-1	DVP_P1-2: LN 2056-B	DVP - DVP	3SO JUSTICE-3COX DP 115 kV line	313858	314577	1	DC	136.9	138.61	ER	165	6.46
52	N-1	DVP_P1-2: LN 563	DVP - DVP	6CARSON-6CHRL249 230 kV line	314282	314285	1	DC	97.38	98.61	ER	559	9.03
53	N-1	DVP_P1-2: LN 563	DVP - DVP	6CHESTF B-6BASIN 230 kV line	314287	314276	1	DC	150.51	151.12	ER	449	5.96
54	N-1	DVP_P1-2: LN 2131A	DVP - DVP	6SAPONY-6CARSON 230 kV line	314435	314282	1	DC	111.64	115.75	ER	679	27.85
55	N-1	DVP_P1-3: 3CAROLN A- 6CAROLN A	DVP - DVP	3UNCAMP-3HOLLAND 115 kV line	314539	314527	1	DC	104.15	105.55	ER	225	6.96

#	Contingency		Affected Area	Facility Description	Bus			Power Flow	Loading %		Rating		MW Contribution
	Type	Name			From	To	Circuit		Initial	Final	Type	MVA	
56	N-1	DVP_P1-2: LN 130-A	DVP - DVP	6CAROLNA 230/115 kV transformer	314559	314561	1	DC	134.14	149.1	ER	240	35.88
57	Non	Non	DVP - DVP	6CAROLNA 230/115 kV transformer	314559	314561	1	DC	97.76	105.06	NR	227	16.53
58	N-1	DVP_P1-2: LN 238	DVP - DVP	6CAROLNA-6ROA VAL 230 kV line	314561	314599	1	DC	94.42	96.77	ER	548	12.86
59	N-1	DVP_P1-3: 3CAROLN A- 6CAROLN A	DVP - DVP	6CLUBHSE 230/115 kV transformer	314562	314563	1	DC	110.94	130	ER	183	34.98
60	N-1	DVP_P1-2: LN 2126	DVP - DVP	6CLUBHSE-6SAPONY 230 kV line	314563	314435	1	DC	116.01	120.67	ER	599	27.86
61	Non	Non	DVP - DVP	6CLUBHSE-6SAPONY 230 kV line	314563	314435	1	DC	103.77	108.33	NR	599	27.16
62	N-1	DVP_P1-2: LN 2131A	DVP - DVP	6EARLEYS-6NUCO TP 230 kV line	314569	314575	1	DC	137.49	138.31	ER	572	10.65
63	Non	Non	DVP - DVP	6EARLEYS-6NUCO TP 230 kV line	314569	314575	1	DC	85.16	85.85	NR	572	8.73
64	N-1	DVP_P1-2: LN 2131	DVP - CPLE	6EVERETS-6GREENVILE T 230 kV line	314574	304451	1	DC	83.07	83.56	ER	478	5.16
65	N-1	DVP_P1-2: LN 2131A	DVP - DVP	6NUCO TP-6SUFFOLK 230 kV line	314575	314537	1	DC	131.47	132.29	ER	572	10.65
66	N-1	DVP_P1-2: LN 2056-B	DVP - DVP	3COX DP-3CHESTNUT 115 kV line	314577	313719	1	DC	160.53	162.64	ER	134	6.46

#	Contingency		Affected Area	Facility Description	Bus			Power Flow	Loading %		Rating		MW Contribution
	Type	Name			From	To	Circuit		Initial	Final	Type	MVA	
67	N-1	DVP_P1-2: LN 2060	DVP - DVP	6HORNRTN-AD1-057 TAP 230 kV line	314579	934330	1	DC	110.42	113.53	ER	442	13.76
68	N-1	DVP_P1-2: LN 130-A	DVP - DVP	6LAKEVEW-AB2-100 TAP 230 kV line	314583	924510	1	DC	131.02	135.5	ER	375	16.78
69	N-1	DVP_P1-2: LN 2058	DVP - CPLE	6NASH-6PA-RMOUNT#4 230 kV line	314591	304226	1	DC	110.39	112.39	ER	470	9.78
70	N-1	DVP_P1-2: LN 238	DVP - DVP	6ROA VAL- 6NORTHAMPTON 230 kV line	314599	314266	1	DC	94.39	96.73	ER	548	12.86
71	Non	Non	DVP - DVP	3TREGO-3TREGOTP 115 kV line	314612	314615	1	DC	295.21	472.52	NR	45	80
72	Non	Non	DVP - DVP	3BRINKDP-AB1-173 TAP 115 kV line	314619	931230	1	DC	80.31	163.75	NR	96	80
73	N-1	DVP_P1-3: 3CAROLN A- 6CAROLN A	DVP - DVP	3AULANDR-3EARLEYS 115 kV line	314625	314568	1	DC	112.84	115.89	ER	111	7.49
74	N-1	DVP_P1-3: 3CAROLN A- 6CAROLN A	DVP - DVP	3WOODLND-3AULANDR 115 kV line	314626	314625	1	DC	119.15	122.2	ER	111	7.49
75	N-1	DVP_P1-2: LN 130-A	DVP - DVP	AB2-100 TAP-6CLUBHSE 230 kV line	924510	314563	1	DC	146.76	151.25	ER	375	16.78

#	Contingency		Affected Area	Facility Description	Bus			Power Flow	Loading %		Rating		MW Contribution
	Type	Name			From	To	Circuit		Initial	Final	Type	MVA	
76	N-1	DVP_P1-3: 3CAROLN A- 6CAROLN A	DVP - DVP	AC1-208 TAP-3SO JUSTICE 115 kV line	927140	313858	1	DC	103.14	108.66	ER	165	9.13
77	Non	Non	DVP - DVP	AB1-173 TAP-3TREGO 115 kV line	931230	314612	1	DC	142.47	225.91	NR	96	80
78	N-1	DVP_P1-2: LN 238	DVP - DVP	AD1-057 TAP-6MORNSTR 230 kV line	934330	313845	1	DC	110.26	113.22	ER	442	13.12
79	N-1	AEP_P1- 2_#1377	AEP - AEP	05EDAN 1-05DANVL2 138 kV line	242631	242620	1	DC	108.46	108.96	ER	415	4.58

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.

Flowgate Appendices – Option 1

Appendices

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

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

Appendix 1

(DVP - DVP) The 6MORNSTR-6NASH 230 kV line (from bus 313845 to bus 314591 ckt 1) loads from 87.57% to 88.88% (**DC power flow**) of its emergency rating (449 MVA) for the single line contingency outage of 'DVP_P1-2: LN 2058'. This project contributes approximately 5.87 MW to the thermal violation.

CONTINGENCY 'DVP_P1-2: LN 2058'

OPEN BRANCH FROM BUS 304222 TO BUS 313845 CKT 1 /*

6ROCKYMT230T230.00 - 6MORNSTR 230.00

END

Bus Number	Bus Name	Full Contribution
315294	1DOMTR10	1.42
315292	1DOMTR78	0.96
315293	1DOMTR9	0.78
315131	1EDGECEMA	25.16
315132	1EDGECEMB	25.16
315139	1GASTONA	4.12
315141	1GASTONB	4.12
315126	1ROARAP2	1.32
315128	1ROARAP4	1.27
315136	1ROSEMG1	3.44
315138	1ROSEMG2	1.61
315137	1ROSEMS1	2.14
315115	1S HAMPT1	0.91
314704	3LAWRENC	0.21
932631	AC2-084 C	8.57
933451	AC2-158 C	3.5
933461	AC2-159 C	5.08
933711	AC2-194 C	0.35
933991	AD1-023 C	7.37
934041	AD1-029 C	10.6
934201	AD1-047 C	5.87
934231	AD1-050 C	1.62
934331	AD1-057 C O1	20.13
934521	AD1-076 C O1	28.97
LTF	AMIL	0.39
LTF	BAYOU	2.04
LTF	BIG_CAJUN1	3.21
LTF	BIG_CAJUN2	6.46
LTF	BLUEG	2.05
LTF	CALDERWOOD	1.2
LTF	CANNELTON	0.39

LTF	CARR	< 0.01
LTF	CATAWBA	1.18
LTF	CELEVELAND	3.34
LTF	CHEOAH	1.12
LTF	CHILHOWEE	0.39
LTF	CHOCTAW	2.19
LTF	CLIFTY	7.53
LTF	COTTONWOOD	7.98
LTF	DEARBORN	0.75
LTF	EDWARDS	0.63
LTF	ELMERSMITH	1.14
LTF	FARMERCITY	0.49
LTF	G-007A	0.78
LTF	GIBSON	0.72
LTF	HAMLET	4.66
LTF	MORGAN	3.53
LTF	NEWTON	1.73
LTF	O-066A	0.36
LTF	PRAIRIE	3.73
LTF	ROWAN	2.47
LTF	SANTEETLA	0.33
LTF	SMITHLAND	0.33
LTF	TATANKA	0.84
LTF	TILTON	0.75
LTF	TRIMBLE	0.39
LTF	TVA	1.49
LTF	UNIONPOWER	2.14
900671	V4-068 C	0.07
LTF	VFT	2.08
901081	W1-029C	0.41
LTF	X1-078	0.6
913391	Y1-086 C	0.08
916041	Z1-036 C	0.48
917121	Z2-027 C	0.14
917331	Z2-043 C	0.37
917341	Z2-044 C	0.33
917511	Z2-088 C OP1	1.7
917591	Z2-099 C	0.12
918411	AA1-050	1.43
918491	AA1-063AC OP	1.22
918511	AA1-065 C OP	1.18
918531	AA1-067 C	0.25
918561	AA1-072 C	0.06
919691	AA2-053 C	1.35
919701	AA2-057 C	1.62

919731	AA2-059 C	0.09
919821	AA2-068 C	0.46
920021	AA2-086 C	0.06
920041	AA2-088 C	0.75
920591	AA2-165 C	0.22
920631	AA2-169 C	1.08
920671	AA2-174 C	0.06
920691	AA2-178 C	4.42
930051	AB1-013 C	1.33
930401	AB1-081 C	14.54
930861	AB1-132 C	16.04
931231	AB1-173 C	1.65
931241	AB1-173AC	1.65
923801	AB2-015 C O1	4.12
923851	AB2-025 C	0.2
923911	AB2-031 C O1	1.64
923941	AB2-035 C	0.68
923991	AB2-040 C O1	5.38
924151	AB2-059 C O1	17.13
924381	AB2-087 C	0.4
924391	AB2-088 C	0.88
924401	AB2-089 C	0.73
924491	AB2-098 C	0.43
924501	AB2-099 C	0.41
924511	AB2-100 C	8.55
925121	AB2-169 C	4.09
925171	AB2-174 C O1	5.02
925281	AB2-186 C	0.21
925291	AB2-188 C O1	1.09
925591	AC1-034 C	13.94
925781	AC1-054 C	2.86
926071	AC1-086 C	23.63
926201	AC1-098 C	6.01
926211	AC1-099 C	2.01
926771	AC1-163 C	1.34
927021	AC1-189 C	12.37
927111	AC1-206 C	6.91
927141	AC1-208 C	8.88

Appendix 2

(DVP - DVP) The 6EARLEYS-6NUCO TP 230 kV line (from bus 314569 to bus 314575 ckt 1) loads from 83.18% to 84.3% (**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 6.39 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	4.77
315292	1DOMTR78	3.23
315293	1DOMTR9	2.63
315131	1EDGECEMA	9.02
315132	1EDGECEMB	9.02
315139	1GASTONA	3.89
315141	1GASTONB	3.89
315159	1KERR 2	0.85
315163	1KERR 6	0.84
315164	1KERR 7	0.84
315126	1ROARAP2	1.58
315128	1ROARAP4	1.52
315136	1ROSEMG1	2.75
315138	1ROSEMG2	1.29
315137	1ROSEMS1	1.7
314704	3LAWRENC	0.23
932631	AC2-084 C	11.32
933451	AC2-158 C	12.21
933461	AC2-159 C	9.55
933991	AD1-023 C	27.83
934041	AD1-029 C	14.
934201	AD1-047 C	6.39
934231	AD1-050 C	2.75
934331	AD1-057 C O1	10.19
934521	AD1-076 C O1	112.89
LTF	AD1-120	4.28

LTF	AD1-121	4.25
LTF	CARR	0.09
LTF	CBM-S1	5.29
LTF	CBM-S2	10.69
LTF	CBM-W1	11.82
LTF	CBM-W2	28.65
LTF	CIN	2.65
LTF	CPL	3.68
LTF	IPL	1.69
LTF	LGEE	0.57
LTF	MEC	5.94
LTF	MECS	2.71
LTF	RENSSELAER	0.07
LTF	ROSETON	0.5
900671	V4-068 C	0.11
LTF	WEC	0.73
916041	Z1-036 C	2.69
917331	Z2-043 C	0.76
917341	Z2-044 C	0.27
917511	Z2-088 C OP1	1.21
917591	Z2-099 C	0.13
918411	AA1-050	1.02
918491	AA1-063AC OP	1.44
918511	AA1-065 C OP	4.02
918531	AA1-067 C	0.52
918561	AA1-072 C	0.11
919691	AA2-053 C	2.02
919701	AA2-057 C	1.49
919731	AA2-059 C	0.47
919821	AA2-068 C	0.5
LTF	AA2-074	2.51
920021	AA2-086 C	0.07
920041	AA2-088 C	0.83
920591	AA2-165 C	0.2
920631	AA2-169 C	1.56
920671	AA2-174 C	0.09
920691	AA2-178 C	19.71
930051	AB1-013 C	5.95
930401	AB1-081 C	8.64
930861	AB1-132 C	15.15
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
924381	AB2-087 C	1.08
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	7.31
925121	AB2-169 C	11.96
925171	AB2-174 C O1	5.33
925291	AB2-188 C O1	4.86
925591	AC1-034 C	8.09
925781	AC1-054 C	4.54
926071	AC1-086 C	22.31
926201	AC1-098 C	7.94
926211	AC1-099 C	2.66
926771	AC1-163 C	3.28
927021	AC1-189 C	11.67
927111	AC1-206 C	5.79
927141	AC1-208 C	9.96

Appendix 3

(DVP - DVP) The 6NUCO TP-6SUFFOLK 230 kV line (from bus 314575 to bus 314537 ckt 1) loads from 77.16% to 78.28% (**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 6.39 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	4.77
315292	1DOMTR78	3.23
315293	1DOMTR9	2.63
315131	1EDGECEMA	9.02
315132	1EDGECEMB	9.02
315139	1GASTONA	3.89
315141	1GASTONB	3.89
315159	1KERR 2	0.85
315163	1KERR 6	0.84
315164	1KERR 7	0.84
315126	1ROARAP2	1.58
315128	1ROARAP4	1.52
315136	1ROSEMG1	2.75
315138	1ROSEMG2	1.29
315137	1ROSEMS1	1.7
314704	3LAWRENC	0.23
932631	AC2-084 C	11.32
933451	AC2-158 C	12.21
933461	AC2-159 C	9.55
933991	AD1-023 C	27.83
934041	AD1-029 C	14.
934201	AD1-047 C	6.39
934231	AD1-050 C	2.75
934331	AD1-057 C O1	10.19
934521	AD1-076 C O1	112.89
LTF	AD1-120	4.28

LTF	AD1-121	4.25
LTF	CARR	0.09
LTF	CBM-S1	5.29
LTF	CBM-S2	10.69
LTF	CBM-W1	11.82
LTF	CBM-W2	28.65
LTF	CIN	2.65
LTF	CPL	3.68
LTF	IPL	1.69
LTF	LGEE	0.57
LTF	MEC	5.94
LTF	MECS	2.71
LTF	RENSSELAER	0.07
LTF	ROSETON	0.5
900671	V4-068 C	0.11
LTF	WEC	0.73
916041	Z1-036 C	2.69
917331	Z2-043 C	0.76
917341	Z2-044 C	0.27
917511	Z2-088 C OP1	1.21
917591	Z2-099 C	0.13
918411	AA1-050	1.02
918491	AA1-063AC OP	1.44
918511	AA1-065 C OP	4.02
918531	AA1-067 C	0.52
918561	AA1-072 C	0.11
919691	AA2-053 C	2.02
919701	AA2-057 C	1.49
919731	AA2-059 C	0.47
919821	AA2-068 C	0.5
LTF	AA2-074	2.51
920021	AA2-086 C	0.07
920041	AA2-088 C	0.83
920591	AA2-165 C	0.2
920631	AA2-169 C	1.56
920671	AA2-174 C	0.09
920691	AA2-178 C	19.71
930051	AB1-013 C	5.95
930401	AB1-081 C	8.64
930861	AB1-132 C	15.15
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
924381	AB2-087 C	1.08
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	7.31
925121	AB2-169 C	11.96
925171	AB2-174 C O1	5.33
925291	AB2-188 C O1	4.86
925591	AC1-034 C	8.09
925781	AC1-054 C	4.54
926071	AC1-086 C	22.31
926201	AC1-098 C	7.94
926211	AC1-099 C	2.66
926771	AC1-163 C	3.28
927021	AC1-189 C	11.67
927111	AC1-206 C	5.79
927141	AC1-208 C	9.96

Appendix 4

(DVP - DVP) The 6LAKEVEW-AB2-100 TAP 230 kV line (from bus 314583 to bus 924510 ckt 1) loads from 89.79% to 92.47% (**DC power flow**) of its emergency rating (375 MVA) for the single line contingency outage of 'DVP_P1-2: LN 130-A'. This project contributes approximately 10.07 MW to the thermal violation.

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

```

Bus Number	Bus Name	Full Contribution
315294	1DOMTR10	1.51
315292	1DOMTR78	1.02
315293	1DOMTR9	0.83
315131	1EDGECEMA	9.35
315132	1EDGECEMB	9.35
315139	1GASTONA	7.38
315141	1GASTONB	7.38
315159	1KERR 2	0.55
315163	1KERR 6	0.54
315164	1KERR 7	0.54
315126	1ROARAP2	2.05
315128	1ROARAP4	1.97
315136	1ROSEMG1	4.94
315138	1ROSEMG2	2.32
315137	1ROSEMS1	3.07
315115	1S HAMPT1	1.08
932631	AC2-084 C	9.

933451	AC2-158 C	4.32
933461	AC2-159 C	7.23
933991	AD1-023 C	8.3
934041	AD1-029 C	11.14
934201	AD1-047 C	10.07
934231	AD1-050 C	2.27
934331	AD1-057 C O1	14.72
934521	AD1-076 C O1	31.3
LTF	CARR	0.09
LTF	CBM-S1	3.78
LTF	CBM-S2	7.85
LTF	CBM-W1	8.13
LTF	CBM-W2	20.35
LTF	CIN	1.83
LTF	CPL	2.69
LTF	IPL	1.16
LTF	LGEE	0.39
LTF	MEC	4.16
LTF	MECS	1.81
LTF	RENSSELAER	0.07
LTF	ROSETON	0.5
900671	V4-068 C	0.09
LTF	WEC	0.5
917331	Z2-043 C	0.43
917341	Z2-044 C	0.26
917511	Z2-088 C OP1	0.86
917591	Z2-099 C	0.15
918411	AA1-050	0.72
918491	AA1-063AC OP	1.79
918511	AA1-065 C OP	1.49
918531	AA1-067 C	0.26
918561	AA1-072 C	0.06
919691	AA2-053 C	2.02
919701	AA2-057 C	1.42
919731	AA2-059 C	0.08
919821	AA2-068 C	0.46
LTF	AA2-074	1.83
920021	AA2-086 C	0.08
920041	AA2-088 C	0.97
920591	AA2-165 C	0.19
920631	AA2-169 C	1.59
920671	AA2-174 C	0.09
920691	AA2-178 C	4.4
930051	AB1-013 C	1.33
930401	AB1-081 C	8.66

930861	AB1-132 C	28.71
931231	AB1-173 C	2.83
931241	AB1-173AC	2.83
923801	AB2-015 C O1	4.69
923911	AB2-031 C O1	2.81
923941	AB2-035 C	0.31
923991	AB2-040 C O1	9.23
924151	AB2-059 C O1	10.2
924381	AB2-087 C	0.51
924391	AB2-088 C	0.4
924401	AB2-089 C	1.03
924491	AB2-098 C	0.44
924501	AB2-099 C	0.52
925121	AB2-169 C	4.3
925171	AB2-174 C O1	8.81
925291	AB2-188 C O1	1.08
925591	AC1-034 C	6.36
925781	AC1-054 C	4.11
926071	AC1-086 C	42.28
926201	AC1-098 C	6.31
926211	AC1-099 C	2.12
926771	AC1-163 C	1.71
927021	AC1-189 C	7.36
927141	AC1-208 C	10.09

Appendix 5

(DVP - DVP) The AB1-173 TAP-3TREGO 115 kV line (from bus 931230 to bus 314612 ckt 1) loads from 84.9% to 134.96% (**DC power flow**) of its normal rating (96 MVA) for non-contingency condition. This project contributes approximately 48.0 MW to the thermal violation.

Bus Number	Bus Name	Full Contribution
934201	AD1-047 C	48.
931231	AB1-173 C	13.5
931241	AB1-173AC	13.5
923911	AB2-031 C O1	13.4
923991	AB2-040 C O1	44.

Appendix 6

(DVP - DVP) The 6SAPONY-6CARSON 230 kV line (from bus 314435 to bus 314282 ckt 1) loads from 91.49% to 94.85% (**DC power flow**) of its load dump rating (830 MVA) for the line fault with failed breaker contingency outage of 'DVP_P4-2: 2020T2144'. This project contributes approximately 27.86 MW to the thermal violation.

```

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
  
```

Bus Number	Bus Name	Full Contribution
315131	1EDGECEMA	9.72
315132	1EDGECEMB	9.72
315139	1GASTONA	7.07
315141	1GASTONB	7.07
315126	1ROARAP2	2.51
315128	1ROARAP4	2.41
315136	1ROSEMG1	4.76
315138	1ROSEMG2	2.23
315137	1ROSEMS1	2.95
314557	3BETHEL C	0.79
314554	3BTLEBRO	0.82
314566	3CRESWEL	2.18
314572	3EMPORIA	1.
314578	3HORNRTN	4.97
314582	3KELFORD	0.9
314704	3LAWRENC	0.79

314603	3SCOT NK	3.76
314617	3TUNIS	0.84
314541	3WATKINS	0.46
314620	6CASHIE	0.79
314574	6EVERETS	2.14
314594	6PLYMOTH	0.78
314651	6WINFALL	1.56
932631	AC2-084 C	10.32
932632	AC2-084 E	5.08
933451	AC2-158 C	5.16
933452	AC2-158 E	5.16
933461	AC2-159 C	8.61
933462	AC2-159 E	8.61
933711	AC2-194 C	0.97
933712	AC2-194 E	1.56
933991	AD1-023 C	12.16
933992	AD1-023 E	6.62
934041	AD1-029 C	12.76
934042	AD1-029 E	8.41
934201	AD1-047 C	16.72
934202	AD1-047 E	11.15
934231	AD1-050 C	4.72
934232	AD1-050 E	2.58
934331	AD1-057 C O1	14.55
934332	AD1-057 E O1	7.76
934521	AD1-076 C O1	49.94
934522	AD1-076 E O1	25.43
LTF	AD1-120	3.93
LTF	AD1-121	3.91
LTF	CARR	0.11
LTF	CBM-S1	4.8
LTF	CBM-S2	9.64
LTF	CBM-W1	10.58
LTF	CBM-W2	25.91
LTF	CIN	2.38
LTF	CPL	3.25
LTF	G-007	0.7
LTF	IPL	1.52
LTF	LGEE	0.51
LTF	MEC	5.35
LTF	MECS	2.38
LTF	O-066	2.34
LTF	RENSSELAER	0.09
LTF	ROSETON	0.65
900671	V4-068 C	0.1

900672	V4-068 E	0.29
LTF	WEC	0.65
916041	Z1-036 C	1.19
916042	Z1-036 E	40.68
917331	Z2-043 C	0.5
917332	Z2-043 E	1.08
917341	Z2-044 C	0.29
917342	Z2-044 E	0.62
917511	Z2-088 C OP1	0.93
917512	Z2-088 E OP1	3.73
917591	Z2-099 C	0.18
917592	Z2-099 E	0.41
918411	AA1-050	0.78
918491	AA1-063AC OP	2.17
918492	AA1-063AE OP	5.21
918511	AA1-065 C OP	1.68
918512	AA1-065 E OP	4.22
918532	AA1-067 E	0.64
918561	AA1-072 C	0.07
918562	AA1-072 E	0.18
919691	AA2-053 C	2.45
919692	AA2-053 E	5.36
919701	AA2-057 C	1.58
919702	AA2-057 E	4.03
919731	AA2-059 C	0.21
919732	AA2-059 E	0.5
919821	AA2-068 C	0.53
919822	AA2-068 E	1.24
LTF	AA2-074	2.21
920021	AA2-086 C	0.1
920022	AA2-086 E	0.22
920041	AA2-088 C	1.14
920042	AA2-088 E	9.49
920591	AA2-165 C	0.22
920592	AA2-165 E	0.53
920631	AA2-169 C	2.6
920632	AA2-169 E	1.19
920671	AA2-174 C	0.11
920672	AA2-174 E	0.62
920691	AA2-178 C	8.72
920692	AA2-178 E	3.74
930051	AB1-013 C	2.63
930052	AB1-013 E	17.61
930401	AB1-081 C	9.2
930402	AB1-081 E	3.94

930861	AB1-132 C	27.5
930862	AB1-132 E	11.79
931231	AB1-173 C	4.7
931232	AB1-173 E	2.19
931241	AB1-173AC	4.7
931242	AB1-173AE	2.19
923851	AB2-025 C	2.01
923852	AB2-025 E	4.59
923911	AB2-031 C O1	4.67
923912	AB2-031 E O1	2.3
923941	AB2-035 C	0.33
923942	AB2-035 E	0.14
923991	AB2-040 C O1	15.33
923992	AB2-040 E O1	12.54
924021	AB2-043 C O1	2.52
924022	AB2-043 E O1	4.14
924151	AB2-059 C O1	10.84
924152	AB2-059 E O1	5.58
924161	AB2-060 C O1	7.16
924162	AB2-060 E O1	3.37
924301	AB2-077 C O1	1.58
924302	AB2-077 E O1	1.05
924311	AB2-078 C O1	1.58
924312	AB2-078 E O1	1.05
924321	AB2-079 C O1	1.58
924322	AB2-079 E O1	1.05
924381	AB2-087 C	0.59
924382	AB2-087 E	0.28
924391	AB2-088 C	0.43
924392	AB2-088 E	0.21
924401	AB2-089 C	2.14
924402	AB2-089 E	1.1
924411	AB2-090 C	3.18
924412	AB2-090 E	1.63
924491	AB2-098 C	0.5
924492	AB2-098 E	0.21
924501	AB2-099 C	0.6
924502	AB2-099 E	0.26
924511	AB2-100 C	34.93
924512	AB2-100 E	17.2
925121	AB2-169 C	5.84
925122	AB2-169 E	5.24
925171	AB2-174 C O1	15.46
925172	AB2-174 E O1	13.98
925221	AB2-176 C	1.31

925222	AB2-176 E	0.56
925281	AB2-186 C	0.54
925282	AB2-186 E	0.23
925291	AB2-188 C O1	2.15
925292	AB2-188 E O1	0.97
925591	AC1-034 C	6.79
925592	AC1-034 E	5.13
925781	AC1-054 C	7.68
925782	AC1-054 E	3.54
926071	AC1-086 C	40.5
926072	AC1-086 E	18.43
926201	AC1-098 C	7.24
926202	AC1-098 E	4.31
926211	AC1-099 C	2.43
926212	AC1-099 E	1.42
926771	AC1-163 C	1.96
926772	AC1-163 E	0.92
927021	AC1-189 C	8.08
927022	AC1-189 E	4.02
927111	AC1-206 C	31.48
927112	AC1-206 E	14.88
927141	AC1-208 C	11.81
927142	AC1-208 E	5.25

Appendix 7

(DVP - DVP) The 6HORNRTN-AD1-057 TAP 230 kV line (from bus 314579 to bus 934330 ckt 1) loads from 97.11% to 99.89% (**DC power flow**) of its load dump rating (541 MVA) for the tower line contingency outage of 'DVP_P7-1: LN 54-2012_C'. This project contributes approximately 14.99 MW to the thermal violation.

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

OPEN BRANCH FROM BUS 314568 TO BUS 314625 CKT 1 /* 3EARLEYS
115.00 - 3AULANDR 115.00

OPEN BRANCH FROM BUS 933460 TO BUS 314626 CKT 1 /* AC2-159 TAP
115.00 - 3WOODLND 115.00

OPEN BRANCH FROM BUS 314625 TO BUS 314626 CKT 1 /* 3AULANDR
115.00 - 3WOODLND 115.00

OPEN BUS 314625 /* ISLAND

OPEN BUS 314626 /* ISLAND

OPEN BRANCH FROM BUS 314266 TO BUS 314569 CKT 1 /*
6NORTHAMPTON230.00 - 6EARLEYS 230.00

OPEN BRANCH FROM BUS 314266 TO BUS 314599 CKT 1 /*
6NORTHAMPTON230.00 - 6ROA VAL 230.00

OPEN BUS 314266 /* ISLAND

END

Bus Number	Bus Name	Full Contribution
315139	1GASTONA	7.77
315141	1GASTONB	7.77
315126	1ROARAP2	1.84
315128	1ROARAP4	1.77
315136	1ROSEMG1	6.4
315138	1ROSEMG2	3.
315137	1ROSEMS1	3.97
314572	3EMPORIA	0.47
314578	3HORNRTN	3.18
314704	3LAWRENC	0.35
933461	AC2-159 C	7.55
933462	AC2-159 E	7.55
934201	AD1-047 C	8.99
934202	AD1-047 E	6.
934231	AD1-050 C	2.59
934232	AD1-050 E	1.42
LTF	AMIL	0.32

LTF	BAYOU	1.72
LTF	BIG_CAJUN1	2.71
LTF	BIG_CAJUN2	5.46
LTF	BLUEG	1.68
LTF	CALDERWOOD	1.01
LTF	CANNELTON	0.32
LTF	CARR	< 0.01
LTF	CATAWBA	0.99
LTF	CELEVELAND	2.81
LTF	CHEOAH	0.94
LTF	CHILHOWEE	0.33
LTF	CHOCTAW	1.85
LTF	CLIFTY	6.13
LTF	COTTONWOOD	6.73
LTF	DEARBORN	0.61
LTF	EDWARDS	0.52
LTF	ELMERSMITH	0.94
LTF	FARMERCITY	0.41
LTF	G-007A	0.6
LTF	GIBSON	0.59
LTF	HAMLET	4.08
LTF	MORGAN	2.98
LTF	NEWTON	1.43
LTF	O-066A	0.27
LTF	PRAIRIE	3.1
LTF	RENSSELAER	< 0.01
LTF	ROSETON	0.02
LTF	ROWAN	2.02
LTF	SANTEETLA	0.28
LTF	SMITHLAND	0.27
LTF	TATANKA	0.7
LTF	TILTON	0.61
LTF	TRIMBLE	0.32
LTF	TVA	1.25
LTF	UNIONPOWER	1.8
LTF	VFT	1.59
LTF	X1-078	0.46
917592	Z2-099 E	0.22
918491	AA1-063AC OP	1.47
918492	AA1-063AE OP	3.53
919691	AA2-053 C	1.94
919692	AA2-053 E	4.24
920022	AA2-086 E	0.12
920042	AA2-088 E	5.09
920631	AA2-169 C	1.61

920632	AA2-169 E	0.74
920671	AA2-174 C	0.09
920672	AA2-174 E	0.49
930861	AB1-132 C	30.22
930862	AB1-132 E	12.95
931231	AB1-173 C	2.53
931232	AB1-173 E	1.18
931241	AB1-173AC	2.53
931242	AB1-173AE	1.18
923851	AB2-025 C	0.33
923852	AB2-025 E	0.76
923911	AB2-031 C O1	2.51
923912	AB2-031 E O1	1.24
923991	AB2-040 C O1	8.24
923992	AB2-040 E O1	6.75
924401	AB2-089 C	1.18
924402	AB2-089 E	0.61
924511	AB2-100 C	15.31
924512	AB2-100 E	7.54
925171	AB2-174 C O1	7.86
925172	AB2-174 E O1	7.11
925781	AC1-054 C	4.45
925782	AC1-054 E	2.05
926071	AC1-086 C	44.5
926072	AC1-086 E	20.25
927111	AC1-206 C	12.24
927112	AC1-206 E	5.79

Appendix 8

(DVP - DVP) The AD1-057 TAP-6MORNSTR 230 kV line (from bus 934330 to bus 313845 ckt 1) loads from 97.04% to 99.81% (**DC power flow**) of its load dump rating (541 MVA) for the tower line contingency outage of 'DVP_P7-1: LN 54-2012_C'. This project contributes approximately 14.99 MW to the thermal violation.

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

OPEN BRANCH FROM BUS 314568 TO BUS 314625 CKT 1 /* 3EARLEYS
115.00 - 3AULANDR 115.00

OPEN BRANCH FROM BUS 933460 TO BUS 314626 CKT 1 /* AC2-159 TAP
115.00 - 3WOODLND 115.00

OPEN BRANCH FROM BUS 314625 TO BUS 314626 CKT 1 /* 3AULANDR
115.00 - 3WOODLND 115.00

OPEN BUS 314625 /* ISLAND

OPEN BUS 314626 /* ISLAND

OPEN BRANCH FROM BUS 314266 TO BUS 314569 CKT 1 /*
6NORTHAMPTON230.00 - 6EARLEYS 230.00

OPEN BRANCH FROM BUS 314266 TO BUS 314599 CKT 1 /*
6NORTHAMPTON230.00 - 6ROA VAL 230.00

OPEN BUS 314266 /* ISLAND

END

Bus Number	Bus Name	Full Contribution
315139	1GASTONA	7.77
315141	1GASTONB	7.77
315126	1ROARAP2	1.84
315128	1ROARAP4	1.77
315136	1ROSEMG1	6.4
315138	1ROSEMG2	3.
315137	1ROSEMS1	3.97
314572	3EMPORIA	0.47
314578	3HORNRTN	3.18
314704	3LAWRENC	0.35
933461	AC2-159 C	7.55
933462	AC2-159 E	7.55
934201	AD1-047 C	8.99
934202	AD1-047 E	6.
934231	AD1-050 C	2.59
934232	AD1-050 E	1.42
934331	AD1-057 C O1	36.48

934332	AD1-057 E O1	19.46
LTF	AMIL	0.32
LTF	BAYOU	1.72
LTF	BIG_CAJUN1	2.71
LTF	BIG_CAJUN2	5.46
LTF	BLUEG	1.68
LTF	CALDERWOOD	1.01
LTF	CANNELTON	0.32
LTF	CARR	< 0.01
LTF	CATAWBA	0.99
LTF	CELEVELAND	2.81
LTF	CHEOAH	0.94
LTF	CHILHOWEE	0.33
LTF	CHOCTAW	1.85
LTF	CLIFTY	6.13
LTF	COTTONWOOD	6.73
LTF	DEARBORN	0.61
LTF	EDWARDS	0.52
LTF	ELMERSMITH	0.94
LTF	FARMERCITY	0.41
LTF	G-007A	0.6
LTF	GIBSON	0.59
LTF	HAMLET	4.08
LTF	MORGAN	2.98
LTF	NEWTON	1.43
LTF	O-066A	0.27
LTF	PRAIRIE	3.1
LTF	RENSSELAER	< 0.01
LTF	ROSETON	0.02
LTF	ROWAN	2.02
LTF	SANTEETLA	0.28
LTF	SMITHLAND	0.27
LTF	TATANKA	0.7
LTF	TILTON	0.61
LTF	TRIMBLE	0.32
LTF	TVA	1.25
LTF	UNIONPOWER	1.8
LTF	VFT	1.59
LTF	X1-078	0.46
917592	Z2-099 E	0.22
918491	AA1-063AC OP	1.47
918492	AA1-063AE OP	3.53
919691	AA2-053 C	1.94
919692	AA2-053 E	4.24
920022	AA2-086 E	0.12

920042	AA2-088 E	5.09
920631	AA2-169 C	1.61
920632	AA2-169 E	0.74
920671	AA2-174 C	0.09
920672	AA2-174 E	0.49
930861	AB1-132 C	30.22
930862	AB1-132 E	12.95
931231	AB1-173 C	2.53
931232	AB1-173 E	1.18
931241	AB1-173AC	2.53
931242	AB1-173AE	1.18
923851	AB2-025 C	0.33
923852	AB2-025 E	0.76
923911	AB2-031 C O1	2.51
923912	AB2-031 E O1	1.24
923991	AB2-040 C O1	8.24
923992	AB2-040 E O1	6.75
924401	AB2-089 C	1.18
924402	AB2-089 E	0.61
924511	AB2-100 C	15.31
924512	AB2-100 E	7.54
925171	AB2-174 C O1	7.86
925172	AB2-174 E O1	7.11
925781	AC1-054 C	4.45
925782	AC1-054 E	2.05
926071	AC1-086 C	44.5
926072	AC1-086 E	20.25
927111	AC1-206 C	12.24
927112	AC1-206 E	5.79

Appendix 9

(DVP - DVP) The 3CHESTNUT-3WITAKRS 115 kV line (from bus 313719 to bus 314623 ckt 1) loads from 157.4% to 160.27% (**DC power flow**) of its emergency rating (134 MVA) for the single line contingency outage of 'DVP_P1-2: LN 2056-A'. This project contributes approximately 3.86 MW to the thermal violation.

CONTINGENCY 'DVP_P1-2: LN 2056-A'

OPEN BRANCH FROM BUS 313845 TO BUS 934330 CKT 1 /* 6HATHAWAY
230.00 - AD1-057 TAP 230.00

END

Bus Number	Bus Name	Full Contribution
315139	1GASTONA	1.25
315141	1GASTONB	1.25
315126	1ROARAP2	1.08
315128	1ROARAP4	1.03
315136	1ROSEMG1	0.9
315138	1ROSEMG2	0.42
315137	1ROSEMS1	0.56
315115	1S HAMPT1	0.61
932631	AC2-084 C	20.11
933461	AC2-159 C	3.85
934041	AD1-029 C	24.87
934201	AD1-047 C	3.86
934331	AD1-057 C O1	3.54
LTF	AMIL	0.15
LTF	BAYOU	0.79
LTF	BIG_CAJUN1	1.24
LTF	BIG_CAJUN2	2.5
LTF	BLUEG	0.78
LTF	CALDERWOOD	0.46
LTF	CANNELTON	0.15
LTF	CARR	< 0.01
LTF	CATAWBA	0.45
LTF	CELEVELAND	1.28
LTF	CHEOAH	0.43
LTF	CHILHOWEE	0.15
LTF	CHOCTAW	0.85
LTF	CLIFTY	2.86
LTF	COTTONWOOD	3.09
LTF	DEARBORN	0.29

LTF	EDWARDS	0.24
LTF	ELMERSMITH	0.44
LTF	FARMERCITY	0.19
LTF	G-007A	0.24
LTF	GIBSON	0.27
LTF	HAMLET	1.85
LTF	MORGAN	1.37
LTF	NEWTON	0.66
LTF	O-066A	0.11
LTF	PRAIRIE	1.43
LTF	RENSSELAER	< 0.01
LTF	ROSETON	0.03
LTF	ROWAN	0.93
LTF	SANTEETLA	0.13
LTF	SMITHLAND	0.13
LTF	TATANKA	0.32
LTF	TILTON	0.29
LTF	TRIMBLE	0.15
LTF	TVA	0.58
LTF	UNIONPOWER	0.82
900671	V4-068 C	0.05
LTF	VFT	0.64
LTF	X1-078	0.19
917331	Z2-043 C	0.53
917591	Z2-099 C	0.09
918491	AA1-063AC OP	0.96
918561	AA1-072 C	0.08
919691	AA2-053 C	1.07
919701	AA2-057 C	5.17
919821	AA2-068 C	1.19
920021	AA2-086 C	0.04
920041	AA2-088 C	0.54
920591	AA2-165 C	0.71
920631	AA2-169 C	0.91
920671	AA2-174 C	0.05
930861	AB1-132 C	4.85
931231	AB1-173 C	1.09
931241	AB1-173AC	1.09
923801	AB2-015 C O1	2.72
923911	AB2-031 C O1	1.08
923991	AB2-040 C O1	3.54
924381	AB2-087 C	0.28
924501	AB2-099 C	0.28
925171	AB2-174 C O1	3.11
925781	AC1-054 C	2.47

926071	AC1-086 C	7.15
926201	AC1-098 C	14.11
926211	AC1-099 C	4.73
926771	AC1-163 C	0.93
927141	AC1-208 C	19.6

Appendix 10

(DVP - CPLE) The 6MORNSTR-6ROCKYMT230T 230 kV line (from bus 313845 to bus 304222 ckt 1) loads from 136.38% to 138.85% (**DC power flow**) of its emergency rating (374 MVA) for the tower line contingency outage of 'DVP_P7-1: LN 81-2056'. This project contributes approximately 9.22 MW to the thermal violation.

CONTINGENCY 'DVP_P7-1: LN 81-2056'

OPEN BRANCH FROM BUS 314559 TO BUS 314578 CKT 1 /* 3CAROLNA
115.00 - 3HORNRTN 115.00

OPEN BRANCH FROM BUS 314578 TO BUS 314598 CKT 1 /* 3HORNRTN
115.00 - 3ROAN DP 115.00

OPEN BRANCH FROM BUS 314598 TO BUS 314628 CKT 1 /* 3ROAN DP
115.00 - 3DARLINGT DP115.00

OPEN BUS 314578 /* ISLAND: 3HORNRTN 115.00

OPEN BUS 314598 /* ISLAND: 3ROAN DP 115.00

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 /* 6MORNSTR
230.00 - 6NASH 230.00

OPEN BRANCH FROM BUS 304226 TO BUS 304222 CKT 1 /* 6PA-
RMOUNT#4230.00 - 6ROCKYMT230T

OPEN BUS 304226 /* ISLAND

OPEN BUS 314591 /* ISLAND: 6NASH 230.00

END

Bus Number	Bus Name	Full Contribution
315131	1EDGECEMA	24.8
315132	1EDGECEMB	24.8
315139	1GASTONA	4.01
315141	1GASTONB	4.01
315126	1ROARAP2	1.22
315128	1ROARAP4	1.18
315136	1ROSEMG1	3.36
315138	1ROSEMG2	1.57
315137	1ROSEMS1	2.09
314557	3BETHEL	1.61
314554	3BTLEBRO	1.08
314566	3CRESWEL	1.09
314572	3EMPORIA	0.27
314582	3KELFORD	0.7

314603	3SCOT NK	3.23
314617	3TUNIS	0.55
314541	3WATKINS	0.33
314620	6CASHIE	0.49
314574	6EVERETS	1.81
314594	6PLYMOTH	0.44
932631	AC2-084 C	9.38
932632	AC2-084 E	4.62
933451	AC2-158 C	3.44
933452	AC2-158 E	3.44
933461	AC2-159 C	4.87
933462	AC2-159 E	4.87
933991	AD1-023 C	7.25
933992	AD1-023 E	3.95
934041	AD1-029 C	11.6
934042	AD1-029 E	7.65
934201	AD1-047 C	5.53
934202	AD1-047 E	3.69
934331	AD1-057 C O1	19.78
934332	AD1-057 E O1	10.55
934521	AD1-076 C O1	28.49
934522	AD1-076 E O1	14.51
LTF	AMIL	0.38
LTF	BAYOU	1.98
LTF	BIG_CAJUN1	3.12
LTF	BIG_CAJUN2	6.28
LTF	BLUEG	1.99
LTF	CALDERWOOD	1.17
LTF	CANNELTON	0.38
LTF	CARR	< 0.01
LTF	CATAWBA	1.14
LTF	CELEVELAND	3.25
LTF	CHEOAH	1.09
LTF	CHILHOWEE	0.38
LTF	CHOCTAW	2.13
LTF	CLIFTY	7.32
LTF	COTTONWOOD	7.76
LTF	DEARBORN	0.72
LTF	EDWARDS	0.61
LTF	ELMERSMITH	1.11
LTF	FARMERCITY	0.48
LTF	G-007A	0.76
LTF	GIBSON	0.69
LTF	HAMLET	4.52
LTF	MORGAN	3.43

LTF	NEWTON	1.68
LTF	O-066A	0.35
LTF	PRAIRIE	3.62
LTF	ROWAN	2.4
LTF	SANTEETLA	0.32
LTF	SMITHLAND	0.32
LTF	TATANKA	0.82
LTF	TILTON	0.73
LTF	TRIMBLE	0.38
LTF	TVA	1.45
LTF	UNIONPOWER	2.08
900671	V4-068 C	0.07
900672	V4-068 E	0.18
LTF	VFT	2.03
LTF	X1-078	0.59
917331	Z2-043 C	0.38
917332	Z2-043 E	0.84
917341	Z2-044 C	0.34
917342	Z2-044 E	0.75
917511	Z2-088 C OP1	1.68
917512	Z2-088 E OP1	6.74
917592	Z2-099 E	0.25
918411	AA1-050	1.41
918491	AA1-063AC OP	1.14
918492	AA1-063AE OP	2.74
918511	AA1-065 C OP	1.16
918512	AA1-065 E OP	2.92
918531	AA1-067 C	0.25
918532	AA1-067 E	0.54
918561	AA1-072 C	0.06
918562	AA1-072 E	0.14
919691	AA2-053 C	1.27
919692	AA2-053 E	2.78
919701	AA2-057 C	1.72
919702	AA2-057 E	4.39
919821	AA2-068 C	0.51
919822	AA2-068 E	1.19
920022	AA2-086 E	0.14
920042	AA2-088 E	5.93
920591	AA2-165 C	0.23
920592	AA2-165 E	0.58
920671	AA2-174 C	0.06
920672	AA2-174 E	0.32
920691	AA2-178 C	4.34
920692	AA2-178 E	1.86

930051	AB1-013 C	1.31
930052	AB1-013 E	8.77
930401	AB1-081 C	14.55
930402	AB1-081 E	6.23
930861	AB1-132 C	15.61
930862	AB1-132 E	6.69
931231	AB1-173 C	1.56
931232	AB1-173 E	0.73
931241	AB1-173AC	1.56
931242	AB1-173AE	0.73
923801	AB2-015 C O1	3.93
923802	AB2-015 E O1	3.23
923911	AB2-031 C O1	1.54
923912	AB2-031 E O1	0.76
923941	AB2-035 C	0.68
923942	AB2-035 E	0.29
923991	AB2-040 C O1	5.07
923992	AB2-040 E O1	4.15
924151	AB2-059 C O1	17.14
924152	AB2-059 E O1	8.83
924381	AB2-087 C	0.4
924382	AB2-087 E	0.19
924391	AB2-088 C	0.87
924392	AB2-088 E	0.42
924491	AB2-098 C	0.42
924492	AB2-098 E	0.18
924501	AB2-099 C	0.4
924502	AB2-099 E	0.17
924511	AB2-100 C	8.29
924512	AB2-100 E	4.08
925121	AB2-169 C	4.03
925122	AB2-169 E	3.62
925171	AB2-174 C O1	4.74
925172	AB2-174 E O1	4.29
925291	AB2-188 C O1	1.07
925292	AB2-188 E O1	0.48
925591	AC1-034 C	13.75
925592	AC1-034 E	10.37
926071	AC1-086 C	22.99
926072	AC1-086 E	10.47
926201	AC1-098 C	6.58
926202	AC1-098 E	3.92
926211	AC1-099 C	2.2
926212	AC1-099 E	1.29
926771	AC1-163 C	1.32

926772	AC1-163 E	0.62
927021	AC1-189 C	12.21
927022	AC1-189 E	6.08
927111	AC1-206 C	6.69
927112	AC1-206 E	3.16
927141	AC1-208 C	10.44
927142	AC1-208 E	4.63

Appendix 11

(DVP - DVP) The 3SO JUSTICE-3COX DP 115 kV line (from bus 313858 to bus 314577 ckt 1) loads from 106.6% to 108.94% (**DC power flow**) of its emergency rating (165 MVA) for the single line contingency outage of 'DVP_P1-2: LN 2056-A'. This project contributes approximately 3.88 MW to the thermal violation.

CONTINGENCY 'DVP_P1-2: LN 2056-A'

OPEN BRANCH FROM BUS 313845 TO BUS 934330 CKT 1 /* 6HATHAWAY
230.00 - AD1-057 TAP 230.00

END

Bus Number	Bus Name	Full Contribution
315139	1GASTONA	1.25
315141	1GASTONB	1.25
315126	1ROARAP2	1.08
315128	1ROARAP4	1.04
315136	1ROSEMG1	0.9
315138	1ROSEMG2	0.42
315137	1ROSEMS1	0.56
315115	1S HAMPT1	0.62
932631	AC2-084 C	20.12
933461	AC2-159 C	3.86
934041	AD1-029 C	24.89
934201	AD1-047 C	3.88
934331	AD1-057 C O1	3.56
LTF	AMIL	0.14
LTF	BAYOU	0.76
LTF	BIG_CAJUN1	1.2
LTF	BIG_CAJUN2	2.42
LTF	BLUEG	0.74
LTF	CALDERWOOD	0.45
LTF	CANNELTON	0.14
LTF	CATAWBA	0.44
LTF	CBM-N	< 0.01
LTF	CELEVELAND	1.26
LTF	CHEOAH	0.42
LTF	CHILHOWEE	0.15
LTF	CHOCTAW	0.82
LTF	CLIFTY	2.67
LTF	COTTONWOOD	2.98
LTF	DEARBORN	0.26

LTF	EDWARDS	0.23
LTF	ELMERSMITH	0.41
LTF	FARMERCITY	0.18
LTF	G-007A	0.3
LTF	GIBSON	0.26
LTF	HAMLET	1.82
LTF	MORGAN	1.32
LTF	NEWTON	0.63
LTF	NYISO	0.02
LTF	O-066A	0.14
LTF	PRAIRIE	1.36
LTF	ROWAN	0.91
LTF	SANTEETLA	0.12
LTF	SMITHLAND	0.12
LTF	TATANKA	0.31
LTF	TILTON	0.27
LTF	TRIMBLE	0.14
LTF	TVA	0.55
LTF	UNIONPOWER	0.8
900671	V4-068 C	0.05
LTF	VFT	0.81
LTF	X1-078	0.24
917331	Z2-043 C	0.53
917591	Z2-099 C	0.09
918491	AA1-063AC OP	0.96
918561	AA1-072 C	0.08
919691	AA2-053 C	1.07
919821	AA2-068 C	1.19
920021	AA2-086 C	0.04
920041	AA2-088 C	0.54
920631	AA2-169 C	0.91
920671	AA2-174 C	0.05
930861	AB1-132 C	4.88
931231	AB1-173 C	1.09
931241	AB1-173AC	1.09
923801	AB2-015 C O1	2.73
923911	AB2-031 C O1	1.08
923991	AB2-040 C O1	3.55
924381	AB2-087 C	0.28
924501	AB2-099 C	0.28
925171	AB2-174 C O1	3.12
925781	AC1-054 C	2.48
926071	AC1-086 C	7.18
926201	AC1-098 C	14.12
926211	AC1-099 C	4.73

926771	AC1-163 C	0.93
927141	AC1-208 C	19.61

Appendix 12

(DVP - DVP) The 8ELMONT 500/230 kV transformer (from bus 314218 to bus 314908 ckt 1) loads from 123.21% to 123.63% (**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 11.25 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
315067	1DARBY 1	4.99
315068	1DARBY 2	4.99
315069	1DARBY 3	5.01
315070	1DARBY 4	5.01
315043	1FOUR RIVERA	6.63
315044	1FOUR RIVERB	5.13
315045	1FOUR RIVERC	6.63
315046	1FOUR RIVERD	5.13
315047	1FOUR RIVERE	5.13
315048	1FOUR RIVERF	6.63
315074	1HOPCGN1	11.28
315075	1HOPCGN2	11.14
315083	1SPRUNCA	14.95
315084	1SPRUNCB	14.95
315085	1SPRUNCC	11.08
315086	1SPRUNCD	11.08
315073	1STONECA	9.36
314566	3CRESWEL	2.11
314572	3EMPORIA	0.36
314315	3LOCKS E	1.65
314617	3TUNIS	0.71
314539	3UNCAMP	2.19
314541	3WATKINS	0.61
314620	6CASHIE	0.72
314229	6MT RD221	1.41

314236	6NRTHEST	0.37
314189	6PAPERMILL	8.82
314594	6PLYMOTH	0.73
314250	6ROCKVILLE	0.4
314256	6ROCKVILLE E	1.15
314648	6SUNBURY	0.81
314651	6WINFALL	1.59
932041	AC2-012 C	9.62
932042	AC2-012 E	15.7
932501	AC2-070 C	2.9
932502	AC2-070 E	1.2
932531	AC2-073 C	3.1
932532	AC2-073 E	1.56
932581	AC2-078 C	4.75
932582	AC2-078 E	7.75
932591	AC2-079 C	6.82
932592	AC2-079 E	11.13
932831	AC2-110 C	1.74
932832	AC2-110 E	2.84
933061	AC2-130	3.48
933071	AC2-131 1	2.36
933081	AC2-131 2	1.07
933111	AC2-132 1	1.24
933121	AC2-132 2	0.63
933261	AC2-137 C	3.16
933262	AC2-137 E	2.05
933271	AC2-138 C	0.87
933272	AC2-138 E	1.09
933291	AC2-141 C	27.16
933292	AC2-141 E	11.59
933451	AC2-158 C	4.63
933452	AC2-158 E	4.63
933471	AC2-161 C	2.47
933472	AC2-161 E	1.27
933481	AC2-162 C	4.17
933482	AC2-162 E	2.15
933711	AC2-194 C	0.98
933712	AC2-194 E	1.59
933731	AC2-196 C	1.66
933732	AC2-196 E	1.1
933991	AD1-023 C	11.29
933992	AD1-023 E	6.14
934011	AD1-025 C O1	20.82
934012	AD1-025 E O1	12.33
934061	AD1-033 C O1	6.96

934062	AD1-033 E O1	4.64
934071	AD1-034 C O1	10.6
934072	AD1-034 E O1	6.87
934141	AD1-041 C O1	6.74
934142	AD1-041 E O1	4.49
934191	AD1-046 C	4.71
934192	AD1-046 E	3.14
934201	AD1-047 C	6.75
934202	AD1-047 E	4.5
934211	AD1-048 C	3.82
934212	AD1-048 E	1.93
934391	AD1-063 C	2.1
934392	AD1-063 E	1.4
934521	AD1-076 C O1	46.88
934522	AD1-076 E O1	23.87
934571	AD1-082 C O1	8.27
934572	AD1-082 E O1	4.72
934781	AD1-105 C	8.08
934782	AD1-105 E	5.62
LTF	AD1-120	5.93
LTF	AD1-121	5.89
935111	AD1-144 C	1.68
935112	AD1-144 E	0.92
935161	AD1-151 C O1	19.89
935162	AD1-151 E O1	13.26
935211	AD1-156 C	2.56
935212	AD1-156 E	1.71
LTF	CARR	0.67
LTF	CBM-S1	3.86
LTF	CBM-S2	13.84
LTF	CBM-W1	0.21
LTF	CBM-W2	17.91
LTF	CIN	0.13
LTF	CLIFTY	1.62
LTF	CPL	4.75
LTF	DEARBORN	0.47
LTF	G-007	2.31
LTF	IPL	0.06
LTF	LGEE	0.05
LTF	MEC	1.99
LTF	O-066	7.73
LTF	RENSSELAER	0.53
LTF	ROSETON	3.84
292791	U1-032 E	4.87
297087	V2-040	0.28

900672	V4-068 E	0.26
901082	W1-029E	41.82
LTF	WEC	0.06
907092	X1-038 E	5.47
913392	Y1-086 E	1.99
916042	Z1-036 E	40.84
916192	Z1-068 E	1.76
917122	Z2-027 E	0.96
917592	Z2-099 E	0.38
918492	AA1-063AE OP	3.35
918512	AA1-065 E OP	3.74
918691	AA1-083	1.16
919152	AA1-139 E	5.92
919211	AA1-145	19.79
919732	AA2-059 E	0.5
LTF	AA2-074	3.23
920022	AA2-086 E	0.21
920042	AA2-088 E	9.15
920691	AA2-178 C	8.43
920692	AA2-178 E	3.61
930051	AB1-013 C	2.54
930052	AB1-013 E	17.02
930121	AB1-027 C	0.87
930122	AB1-027 E	1.89
930861	AB1-132 C	11.78
930862	AB1-132 E	5.05
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	7.73
923802	AB2-015 E O1	6.34
923831	AB2-022 C	2.1
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	1.88
923912	AB2-031 E O1	0.93
923991	AB2-040 C O1	6.19
923992	AB2-040 E O1	5.06
924061	AB2-050	1.16
924071	AB2-051	128.86
924241	AB2-068 O1	177.95
924381	AB2-087 C	0.48

924382	AB2-087 E	0.22
924501	AB2-099 C	0.49
924502	AB2-099 E	0.21
924511	AB2-100 C	10.48
924512	AB2-100 E	5.16
924811	AB2-134 C O1	15.87
924812	AB2-134 E O1	15.6
925051	AB2-160 C O1	7.18
925052	AB2-160 E O1	11.71
925061	AB2-161 C O1	3.63
925062	AB2-161 E O1	5.92
925171	AB2-174 C O1	5.96
925172	AB2-174 E O1	5.39
925281	AB2-186 C	0.55
925282	AB2-186 E	0.24
925291	AB2-188 C O1	2.08
925292	AB2-188 E O1	0.93
925331	AB2-190 C	24.76
925332	AB2-190 E	10.61
925522	AC1-027 E	1.07
925692	AC1-045 E	0.92
925861	AC1-065 C	4.36
925862	AC1-065 E	7.11
926071	AC1-086 C	17.34
926072	AC1-086 E	7.89
926291	AC1-107	268.61
926411	AC1-112 C	0.68
926412	AC1-112 E	1.93
926441	AC1-115 C	1.01
926442	AC1-115 E	1.64
926472	AC1-118 E	1.07
926551	AC1-134	14.83
926662	AC1-147 E	1.25
926741	AC1-159	62.13
926751	AC1-161 C	27.16
926752	AC1-161 E	11.59
926771	AC1-163 C	1.63
926772	AC1-163 E	0.76
926781	AC1-164 C	58.41
926782	AC1-164 E	26.24
927041	AC1-191 C	17.46
927042	AC1-191 E	8.7
927111	AC1-206 C	9.15
927112	AC1-206 E	4.32
927221	AC1-216 C O1	12.11

927222	AC1-216 E O1	9.53
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Appendix 13

(DVP - DVP) The 6CARSON-6CHRL249 230 kV line (from bus 314282 to bus 314285 ckt 1) loads from 107.11% to 108.38% (**DC power flow**) of its load dump rating (684 MVA) for the line fault with failed breaker contingency outage of 'DVP_P4-2: 562T563'. This project contributes approximately 9.56 MW to the thermal violation.

```
CONTINGENCY 'DVP_P4-2: 562T563'                /*CARSON
  OPEN BRANCH FROM BUS 314902 TO BUS 314923 CKT 1    /*CARSON TO
MIDLOTHIAN
  OPEN BRANCH FROM BUS 314914 TO BUS 314902 CKT 1    /*CARSON 500.00
- 8SEPTA 500.00
END
```

Bus Number	Bus Name	Full Contribution
315105	1BRUNSWICKS1	11.25
315131	1EDGECEMA	4.76
315132	1EDGECEMB	4.76
315139	1GASTONA	2.46
315141	1GASTONB	2.46
315136	1ROSEMG1	1.7
315138	1ROSEMG2	0.8
315137	1ROSEMS1	1.06
315073	1STONECA	-2.58
314557	3BETHEL C	0.39
314554	3BTLEBRO	0.41
314572	3EMPORIA	0.33
314578	3HORNRTN	1.92
314582	3KELFORD	0.39
314704	3LAWRENC	0.28
314603	3SCOT NK	1.62
314617	3TUNIS	0.36
314541	3WATKINS	0.24
314620	6CASHIE	0.31
314574	6EVERETS	1.06
932631	AC2-084 C	4.46
932632	AC2-084 E	2.2
932701	AC2-093 C	40.57
932702	AC2-093 E	23.21
932761	AC2-100 C	2.16
932762	AC2-100 E	1.05
933451	AC2-158 C	2.15

933452	AC2-158 E	2.15
933461	AC2-159 C	3.44
933462	AC2-159 E	3.44
934041	AD1-029 C	5.52
934042	AD1-029 E	3.64
934201	AD1-047 C	5.74
934202	AD1-047 E	3.82
934231	AD1-050 C	2.37
934232	AD1-050 E	1.3
934311	AD1-055 C	1.03
934312	AD1-055 E	0.27
934331	AD1-057 C O1	5.88
934332	AD1-057 E O1	3.14
934341	AD1-058 C	2.35
934342	AD1-058 E	0.6
934611	AD1-087 C O1	3.97
934612	AD1-087 E O1	1.85
934621	AD1-088 C O1	5.56
934622	AD1-088 E O1	2.61
LTF	AD1-120	5.26
LTF	AD1-121	5.24
934911	AD1-123 C	0.45
934912	AD1-123 E	0.23
934991	AD1-131 C	0.77
934992	AD1-131 E	0.51
935171	AD1-152 C O1	3.68
935172	AD1-152 E O1	2.45
935211	AD1-156 C	1.
935212	AD1-156 E	0.67
LTF	CARR	0.18
LTF	CBM-S1	6.32
LTF	CBM-S2	12.36
LTF	CBM-W1	13.62
LTF	CBM-W2	33.97
LTF	CIN	3.08
LTF	CPL	3.87
LTF	G-007	1.04
LTF	IPL	1.96
LTF	LGEE	0.66
LTF	MEC	6.96
LTF	MECS	3.01
LTF	O-066	3.47
LTF	RENSSELAER	0.14
LTF	ROSETON	1.04
292791	U1-032 E	-1.34

900672	V4-068 E	0.13
LTF	WEC	0.84
916301	Z1-086 C	33.
916302	Z1-086 E	5.26
917332	Z2-043 E	0.46
917342	Z2-044 E	0.3
917512	Z2-088 E OP1	1.84
917592	Z2-099 E	0.18
918492	AA1-063AE OP	2.09
918512	AA1-065 E OP	1.82
918532	AA1-067 E	0.32
918562	AA1-072 E	0.08
919692	AA2-053 E	2.08
919702	AA2-057 E	1.84
919822	AA2-068 E	0.54
LTF	AA2-074	2.63
920022	AA2-086 E	0.1
920042	AA2-088 E	4.33
920592	AA2-165 E	0.24
920631	AA2-169 C	1.18
920632	AA2-169 E	0.54
920672	AA2-174 E	0.24
930401	AB1-081 C	4.55
930402	AB1-081 E	1.95
930861	AB1-132 C	9.57
930862	AB1-132 E	4.1
931231	AB1-173 C	1.61
931232	AB1-173 E	0.75
931241	AB1-173AC	1.61
931242	AB1-173AE	0.75
923851	AB2-025 C	0.57
923852	AB2-025 E	1.3
923911	AB2-031 C O1	1.6
923912	AB2-031 E O1	0.79
923941	AB2-035 C	0.16
923942	AB2-035 E	0.07
923991	AB2-040 C O1	5.26
923992	AB2-040 E O1	4.3
924021	AB2-043 C O1	1.43
924022	AB2-043 E O1	2.34
924151	AB2-059 C O1	5.37
924152	AB2-059 E O1	2.76
924161	AB2-060 C O1	4.07
924162	AB2-060 E O1	1.92
924301	AB2-077 C O1	0.91

924302	AB2-077 E O1	0.6
924311	AB2-078 C O1	0.91
924312	AB2-078 E O1	0.6
924321	AB2-079 C O1	0.91
924322	AB2-079 E O1	0.6
924381	AB2-087 C	0.25
924382	AB2-087 E	0.12
924391	AB2-088 C	0.21
924392	AB2-088 E	0.1
924401	AB2-089 C	1.08
924402	AB2-089 E	0.55
924411	AB2-090 C	1.8
924412	AB2-090 E	0.92
924491	AB2-098 C	0.25
924492	AB2-098 E	0.11
924501	AB2-099 C	0.26
924502	AB2-099 E	0.11
924511	AB2-100 C	10.65
924512	AB2-100 E	5.25
925121	AB2-169 C	2.45
925122	AB2-169 E	2.2
925171	AB2-174 C O1	5.21
925172	AB2-174 E O1	4.72
925221	AB2-176 C	0.74
925222	AB2-176 E	0.32
925591	AC1-034 C	3.33
925592	AC1-034 E	2.52
925611	AC1-036 C	0.37
925612	AC1-036 E	0.61
925781	AC1-054 C	3.71
925782	AC1-054 E	1.71
926071	AC1-086 C	14.1
926072	AC1-086 E	6.42
926201	AC1-098 C	3.13
926202	AC1-098 E	1.86
926211	AC1-099 C	1.05
926212	AC1-099 E	0.62
926271	AC1-105 C	2.38
926272	AC1-105 E	1.19
926771	AC1-163 C	0.84
926772	AC1-163 E	0.39
927021	AC1-189 C	3.98
927022	AC1-189 E	1.98
927111	AC1-206 C	9.5
927112	AC1-206 E	4.49

927141	AC1-208 C	4.92
927142	AC1-208 E	2.19
927251	AC1-221 C	0.94
927252	AC1-221 E	0.94
927261	AC1-222 C	1.48
927262	AC1-222 E	1.41

Appendix 14

(DVP - DVP) The 6CHRL249-6LOCKS 230 kV line (from bus 314285 to bus 314316 ckt 1) loads from 104.3% to 105.58% (**DC power flow**) of its load dump rating (684 MVA) for the line fault with failed breaker contingency outage of 'DVP_P4-2: 562T563'. This project contributes approximately 9.56 MW to the thermal violation.

```
CONTINGENCY 'DVP_P4-2: 562T563'                /*CARSON
  OPEN BRANCH FROM BUS 314902 TO BUS 314923 CKT 1    /*CARSON TO
MIDLOTHIAN
  OPEN BRANCH FROM BUS 314914 TO BUS 314902 CKT 1    /*CARSON 500.00
- 8SEPTA 500.00
END
```

Bus Number	Bus Name	Full Contribution
315105	1BRUNSWICKS1	11.25
315131	1EDGECEMA	4.76
315132	1EDGECEMB	4.76
315139	1GASTONA	2.46
315141	1GASTONB	2.46
315136	1ROSEMG1	1.7
315138	1ROSEMG2	0.8
315137	1ROSEMS1	1.06
315073	1STONECA	-2.58
314557	3BETHEL C	0.39
314554	3BTLEBRO	0.41
314572	3EMPORIA	0.33
314578	3HORNRTN	1.92
314582	3KELFORD	0.39
314704	3LAWRENC	0.28
314603	3SCOT NK	1.62
314617	3TUNIS	0.36
314541	3WATKINS	0.24
314620	6CASHIE	0.31
314574	6EVERETS	1.06
932631	AC2-084 C	4.46
932632	AC2-084 E	2.2
932701	AC2-093 C	40.57
932702	AC2-093 E	23.21
932761	AC2-100 C	2.16
932762	AC2-100 E	1.05
933451	AC2-158 C	2.15

933452	AC2-158 E	2.15
933461	AC2-159 C	3.44
933462	AC2-159 E	3.44
934041	AD1-029 C	5.52
934042	AD1-029 E	3.64
934201	AD1-047 C	5.74
934202	AD1-047 E	3.82
934231	AD1-050 C	2.37
934232	AD1-050 E	1.3
934311	AD1-055 C	1.03
934312	AD1-055 E	0.27
934331	AD1-057 C O1	5.88
934332	AD1-057 E O1	3.14
934341	AD1-058 C	2.35
934342	AD1-058 E	0.6
934611	AD1-087 C O1	3.97
934612	AD1-087 E O1	1.85
934621	AD1-088 C O1	5.56
934622	AD1-088 E O1	2.61
LTF	AD1-120	5.26
LTF	AD1-121	5.24
934911	AD1-123 C	0.45
934912	AD1-123 E	0.23
934991	AD1-131 C	0.77
934992	AD1-131 E	0.51
935171	AD1-152 C O1	3.68
935172	AD1-152 E O1	2.45
935211	AD1-156 C	1.
935212	AD1-156 E	0.67
LTF	CARR	0.18
LTF	CBM-S1	6.32
LTF	CBM-S2	12.36
LTF	CBM-W1	13.62
LTF	CBM-W2	33.97
LTF	CIN	3.08
LTF	CPL	3.87
LTF	G-007	1.04
LTF	IPL	1.96
LTF	LGEE	0.66
LTF	MEC	6.96
LTF	MECS	3.01
LTF	O-066	3.47
LTF	RENSSELAER	0.14
LTF	ROSETON	1.04
292791	U1-032 E	-1.34

900672	V4-068 E	0.13
LTF	WEC	0.84
916301	Z1-086 C	33.
916302	Z1-086 E	5.26
917332	Z2-043 E	0.46
917342	Z2-044 E	0.3
917512	Z2-088 E OP1	1.84
917592	Z2-099 E	0.18
918492	AA1-063AE OP	2.09
918512	AA1-065 E OP	1.82
918532	AA1-067 E	0.32
918562	AA1-072 E	0.08
919692	AA2-053 E	2.08
919702	AA2-057 E	1.84
919822	AA2-068 E	0.54
LTF	AA2-074	2.63
920022	AA2-086 E	0.1
920042	AA2-088 E	4.33
920592	AA2-165 E	0.24
920631	AA2-169 C	1.18
920632	AA2-169 E	0.54
920672	AA2-174 E	0.24
930401	AB1-081 C	4.55
930402	AB1-081 E	1.95
930861	AB1-132 C	9.57
930862	AB1-132 E	4.1
931231	AB1-173 C	1.61
931232	AB1-173 E	0.75
931241	AB1-173AC	1.61
931242	AB1-173AE	0.75
923851	AB2-025 C	0.57
923852	AB2-025 E	1.3
923911	AB2-031 C O1	1.6
923912	AB2-031 E O1	0.79
923941	AB2-035 C	0.16
923942	AB2-035 E	0.07
923991	AB2-040 C O1	5.26
923992	AB2-040 E O1	4.3
924021	AB2-043 C O1	1.43
924022	AB2-043 E O1	2.34
924151	AB2-059 C O1	5.37
924152	AB2-059 E O1	2.76
924161	AB2-060 C O1	4.07
924162	AB2-060 E O1	1.92
924301	AB2-077 C O1	0.91

924302	AB2-077 E O1	0.6
924311	AB2-078 C O1	0.91
924312	AB2-078 E O1	0.6
924321	AB2-079 C O1	0.91
924322	AB2-079 E O1	0.6
924381	AB2-087 C	0.25
924382	AB2-087 E	0.12
924391	AB2-088 C	0.21
924392	AB2-088 E	0.1
924401	AB2-089 C	1.08
924402	AB2-089 E	0.55
924411	AB2-090 C	1.8
924412	AB2-090 E	0.92
924491	AB2-098 C	0.25
924492	AB2-098 E	0.11
924501	AB2-099 C	0.26
924502	AB2-099 E	0.11
924511	AB2-100 C	10.65
924512	AB2-100 E	5.25
925121	AB2-169 C	2.45
925122	AB2-169 E	2.2
925171	AB2-174 C O1	5.21
925172	AB2-174 E O1	4.72
925221	AB2-176 C	0.74
925222	AB2-176 E	0.32
925591	AC1-034 C	3.33
925592	AC1-034 E	2.52
925611	AC1-036 C	0.37
925612	AC1-036 E	0.61
925781	AC1-054 C	3.71
925782	AC1-054 E	1.71
926071	AC1-086 C	14.1
926072	AC1-086 E	6.42
926201	AC1-098 C	3.13
926202	AC1-098 E	1.86
926211	AC1-099 C	1.05
926212	AC1-099 E	0.62
926271	AC1-105 C	2.38
926272	AC1-105 E	1.19
926771	AC1-163 C	0.84
926772	AC1-163 E	0.39
927021	AC1-189 C	3.98
927022	AC1-189 E	1.98
927111	AC1-206 C	9.5
927112	AC1-206 E	4.49

927141	AC1-208 C	4.92
927142	AC1-208 E	2.19
927251	AC1-221 C	0.94
927252	AC1-221 E	0.94
927261	AC1-222 C	1.48
927262	AC1-222 E	1.41

Appendix 15

(DVP - CPLE) The 3BTLEBRO-3ROCKYMT115T 115 kV line (from bus 314554 to bus 304223 ckt 1) loads from 438.46% to 441.93% (**DC power flow**) of its emergency rating (93 MVA) for the tower line contingency outage of 'DVP_P7-1: LN 2058-2181'. This project contributes approximately 7.15 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
315131	1EDGECEMA	13.41
315132	1EDGECEMB	13.41
315139	1GASTONA	2.49
315141	1GASTONB	2.49
315126	1ROARAP2	1.04
315128	1ROARAP4	1.
315136	1ROSEMG1	2.02
315138	1ROSEMG2	0.95
315137	1ROSEMS1	1.25
314557	3BETHEL C	0.88
314554	3BTLEBRO	1.95
314572	3EMPORIA	0.2
314578	3HORNRTN	2.51
314582	3KELFORD	0.68
314603	3SCOT NK	3.67
314617	3TUNIS	0.44
314574	6EVERETS	1.04
932631	AC2-084 C	11.33
932632	AC2-084 E	5.58
933451	AC2-158 C	2.27
933452	AC2-158 E	2.27
933461	AC2-159 C	3.97
933462	AC2-159 E	3.97

934041	AD1-029 C	14.01
934042	AD1-029 E	9.24
934201	AD1-047 C	4.29
934202	AD1-047 E	2.86
934331	AD1-057 C O1	11.1
934332	AD1-057 E O1	5.92
LTF	AMIL	0.26
LTF	BAYOU	1.35
LTF	BIG_CAJUN1	2.13
LTF	BIG_CAJUN2	4.29
LTF	BLUEG	1.35
LTF	CALDERWOOD	0.8
LTF	CANNELTON	0.26
LTF	CARR	< 0.01
LTF	CATAWBA	0.78
LTF	CELEVELAND	2.22
LTF	CHEOAH	0.74
LTF	CHILHOWEE	0.26
LTF	CHOCTAW	1.45
LTF	CLIFTY	4.95
LTF	COTTONWOOD	5.29
LTF	DEARBORN	0.49
LTF	EDWARDS	0.42
LTF	ELMERSMITH	0.75
LTF	FARMERCITY	0.33
LTF	G-007A	0.49
LTF	GIBSON	0.47
LTF	HAMLET	3.13
LTF	MORGAN	2.34
LTF	NEWTON	1.14
LTF	O-066A	0.23
LTF	PRAIRIE	2.46
LTF	RENSSELAER	< 0.01
LTF	ROSETON	0.01
LTF	ROWAN	1.63
LTF	SANTEETLA	0.22
LTF	SMITHLAND	0.22
LTF	TATANKA	0.55
LTF	TILTON	0.49
LTF	TRIMBLE	0.26
LTF	TVA	0.99
LTF	UNIONPOWER	1.42
900672	V4-068 E	0.15
LTF	VFT	1.32
LTF	X1-078	0.38

917331	Z2-043 C	0.38
917332	Z2-043 E	0.82
917341	Z2-044 C	0.57
917342	Z2-044 E	1.25
917511	Z2-088 C OP1	0.92
917512	Z2-088 E OP1	3.69
917592	Z2-099 E	0.2
918411	AA1-050	0.77
LTF	AA1-055	9.69
918492	AA1-063AE OP	2.28
918512	AA1-065 E OP	1.93
918532	AA1-067 E	0.31
918561	AA1-072 C	0.06
918562	AA1-072 E	0.14
919691	AA2-053 C	1.06
919692	AA2-053 E	2.32
919701	AA2-057 C	2.6
919702	AA2-057 E	6.64
919821	AA2-068 C	0.64
919822	AA2-068 E	1.51
920022	AA2-086 E	0.11
920042	AA2-088 E	4.77
920591	AA2-165 C	0.36
920592	AA2-165 E	0.87
920671	AA2-174 C	0.05
920672	AA2-174 E	0.27
930401	AB1-081 C	20.03
930402	AB1-081 E	8.59
930861	AB1-132 C	9.71
930862	AB1-132 E	4.16
931231	AB1-173 C	1.21
931232	AB1-173 E	0.56
931241	AB1-173AC	1.21
931242	AB1-173AE	0.56
923911	AB2-031 C O1	1.2
923912	AB2-031 E O1	0.59
923941	AB2-035 C	0.37
923942	AB2-035 E	0.16
923991	AB2-040 C O1	3.93
923992	AB2-040 E O1	3.22
924151	AB2-059 C O1	23.61
924152	AB2-059 E O1	12.16
924381	AB2-087 C	0.31
924382	AB2-087 E	0.15
924391	AB2-088 C	0.47

924392	AB2-088 E	0.23
924491	AB2-098 C	0.24
924492	AB2-098 E	0.1
924501	AB2-099 C	0.31
924502	AB2-099 E	0.13
924511	AB2-100 C	5.31
924512	AB2-100 E	2.61
925171	AB2-174 C O1	3.6
925172	AB2-174 E O1	3.26
925591	AC1-034 C	7.49
925592	AC1-034 E	5.65
926071	AC1-086 C	14.29
926072	AC1-086 E	6.5
926201	AC1-098 C	7.95
926202	AC1-098 E	4.73
926211	AC1-099 C	2.66
926212	AC1-099 E	1.56
LTF	AC1-133	9.36
926771	AC1-163 C	1.04
926772	AC1-163 E	0.48
927021	AC1-189 C	6.74
927022	AC1-189 E	3.36
927111	AC1-206 C	4.31
927112	AC1-206 E	2.04
927141	AC1-208 C	11.27
927142	AC1-208 E	5.

Appendix 16

(DVP - DVP) The 6CLUBHSE 230/115 kV transformer (from bus 314562 to bus 314563 ckt 1) loads from 100.29% to 130.75% (**DC power flow**) of its load dump rating (209 MVA) for the line fault with failed breaker contingency outage of 'DVP_P4-5: T122C'. This project contributes approximately 63.52 MW to the thermal violation.

CONTINGENCY 'DVP_P4-5: T122C'

/* CAROLINA

OPEN BUS 314559

/* CAROLINA 115KV BUS

OPEN BUS 315126

/* ROANOKE RAPIDS GEN 1 AND 2

OPEN BUS 315128

/* ROANOKE RAPIDS GEN 3 AND 4

OPEN BRANCH FROM BUS 314559 TO BUS 314561 CKT 1

/* TX. #4

END

Bus Number	Bus Name	Full Contribution
315159	1KERR 2	1.27
315164	1KERR 7	1.25
314572	3EMPORIA	1.99
314704	3LAWRENC	1.44
934201	AD1-047 C	38.11
934202	AD1-047 E	25.41
934231	AD1-050 C	3.55
934232	AD1-050 E	1.94
LTF	CARR	0.01
LTF	CBM-S1	0.61
LTF	CBM-S2	0.82
LTF	CBM-W1	1.65
LTF	CBM-W2	3.36
LTF	CIN	0.38
LTF	CPLE	0.21
LTF	G-007	0.11
LTF	IPL	0.24
LTF	LGEE	0.08
LTF	MEC	0.77
LTF	MECS	0.42
LTF	O-066	0.36
LTF	RENSSELAER	0.01
LTF	ROSETON	0.08
LTF	WEC	0.1
920631	AA2-169 C	1.67
920632	AA2-169 E	0.77
931231	AB1-173 C	10.72

931232	AB1-173 E	5.
931241	AB1-173AC	10.72
931242	AB1-173AE	5.
923911	AB2-031 C O1	10.64
923912	AB2-031 E O1	5.24
923991	AB2-040 C O1	34.94
923992	AB2-040 E O1	28.59
924021	AB2-043 C O1	3.16
924022	AB2-043 E O1	5.18
924161	AB2-060 C O1	8.96
924162	AB2-060 E O1	4.22
924301	AB2-077 C O1	1.94
924302	AB2-077 E O1	1.29
924311	AB2-078 C O1	1.94
924312	AB2-078 E O1	1.29
924321	AB2-079 C O1	1.94
924322	AB2-079 E O1	1.29
924401	AB2-089 C	1.61
924402	AB2-089 E	0.83
924411	AB2-090 C	3.97
924412	AB2-090 E	2.04
925171	AB2-174 C O1	33.35
925172	AB2-174 E O1	30.17
925221	AB2-176 C	1.64
925222	AB2-176 E	0.7
925611	AC1-036 C	0.76
925612	AC1-036 E	1.25
925781	AC1-054 C	5.42
925782	AC1-054 E	2.5

Appendix 17

(DVP - DVP) The 6CLUBHSE-6SAPONY 230 kV line (from bus 314563 to bus 314435 ckt 1) loads from 120.03% to 124.64% (**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 29.27 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
315131	1EDGECEMA	10.81
315132	1EDGECEMB	10.81
315139	1GASTONA	7.59
315141	1GASTONB	7.59
315126	1ROARAP2	2.72
315128	1ROARAP4	2.61
315136	1ROSEMG1	5.12
315138	1ROSEMG2	2.4
315137	1ROSEMS1	3.18
314557	3BETHEL C	0.9
314554	3BTLEBRO	0.91
314566	3CRESWEL	1.69
314572	3EMPORIA	1.04
314578	3HORNRTN	5.4
314582	3KELFORD	1.09
314704	3LAWRENC	0.82
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
933451	AC2-158 C	6.47
933452	AC2-158 E	6.47
933461	AC2-159 C	9.91
933462	AC2-159 E	9.91
933991	AD1-023 C	12.49
933992	AD1-023 E	6.8
934041	AD1-029 C	14.61
934042	AD1-029 E	9.63
934201	AD1-047 C	17.56
934202	AD1-047 E	11.71
934231	AD1-050 C	5.08
934232	AD1-050 E	2.78
934331	AD1-057 C O1	15.84
934332	AD1-057 E O1	8.45
934521	AD1-076 C O1	47.2
934522	AD1-076 E O1	24.03
LTF	AD1-120	4.44
LTF	AD1-121	4.42
LTF	CARR	0.12
LTF	CBM-S1	5.44
LTF	CBM-S2	10.91
LTF	CBM-W1	12.05
LTF	CBM-W2	29.4
LTF	CIN	2.71
LTF	CPL	3.68
LTF	G-007	0.77
LTF	IPL	1.73
LTF	LGEE	0.58
LTF	MEC	6.08
LTF	MECS	2.73
LTF	O-066	2.57
LTF	RENSSELAER	0.1
LTF	ROSETON	0.69
900671	V4-068 C	0.12
900672	V4-068 E	0.33
LTF	WEC	0.74
917331	Z2-043 C	0.6
917332	Z2-043 E	1.31

917341	Z2-044 C	0.32
917342	Z2-044 E	0.7
917511	Z2-088 C OP1	1.07
917512	Z2-088 E OP1	4.29
917591	Z2-099 C	0.2
917592	Z2-099 E	0.44
918411	AA1-050	0.9
918491	AA1-063AC OP	2.35
918492	AA1-063AE OP	5.65
918511	AA1-065 C OP	2.24
918512	AA1-065 E OP	5.62
918531	AA1-067 C	0.35
918532	AA1-067 E	0.76
918561	AA1-072 C	0.09
918562	AA1-072 E	0.22
919691	AA2-053 C	2.72
919692	AA2-053 E	5.95
919701	AA2-057 C	1.77
919702	AA2-057 E	4.52
919821	AA2-068 C	0.6
919822	AA2-068 E	1.39
LTF	AA2-074	2.51
920021	AA2-086 C	0.1
920022	AA2-086 E	0.24
920041	AA2-088 C	1.24
920042	AA2-088 E	10.3
920591	AA2-165 C	0.24
920592	AA2-165 E	0.6
920631	AA2-169 C	2.8
920632	AA2-169 E	1.29
920671	AA2-174 C	0.12
920672	AA2-174 E	0.69
920691	AA2-178 C	6.77
920692	AA2-178 E	2.9
930051	AB1-013 C	2.04
930052	AB1-013 E	13.68
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
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
924381	AB2-087 C	0.74
924382	AB2-087 E	0.35
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	17.68
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	7.73
925592	AC1-034 E	5.83
925781	AC1-054 C	8.28
925782	AC1-054 E	3.81
926071	AC1-086 C	43.47
926072	AC1-086 E	19.78

926201	AC1-098 C	8.29
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
927111	AC1-206 C	32.26
927112	AC1-206 E	15.25
927141	AC1-208 C	13.11
927142	AC1-208 E	5.82

Appendix 18

(DVP - DVP) The 6EARLEYS 230/115 kV transformer (from bus 314568 to bus 314569 ckt 1) loads from 125.95% to 127.6% (**DC power flow**) of its load dump rating (208 MVA) for the line fault with failed breaker contingency outage of 'DVP_P4-2: 2012TH4'. This project contributes approximately 7.62 MW to the thermal violation.

```
CONTINGENCY 'DVP_P4-2: 2012TH4'                /* EARLEYS
OPEN BRANCH FROM BUS 314569 TO BUS 314266 CKT 1    /* 2012
OPEN BRANCH FROM BUS 314266 TO BUS 314599 CKT 1    /* 2012
OPEN BRANCH FROM BUS 314569 TO BUS 314568 CKT 2    /* TX. #4
END
```

Bus Number	Bus Name	Full Contribution
315126	1ROARAP2	1.31
315128	1ROARAP4	1.26
315115	1S HAMPT1	1.43
314578	3HORNRTN	2.79
314582	3KELFORD	2.21
314603	3SCOT NK	6.37
314617	3TUNIS	2.13
314539	3UNCAMP	1.47
314541	3WATKINS	0.53
932631	AC2-084 C	13.12
932632	AC2-084 E	6.46
933461	AC2-159 C	13.79
933462	AC2-159 E	13.79
934041	AD1-029 C	16.23
934042	AD1-029 E	10.7
934201	AD1-047 C	4.57
934202	AD1-047 E	3.05
LTF	CARR	0.02
LTF	CBM-S1	0.3
LTF	CBM-S2	0.51
LTF	CBM-W1	0.63
LTF	CBM-W2	1.59
LTF	CIN	0.15
LTF	CPL	0.12
LTF	G-007	0.09
LTF	IPL	0.09
LTF	LGEE	0.03
LTF	MEC	0.33

LTF	MECS	0.13
LTF	O-066	0.3
LTF	RENSSELAER	0.01
LTF	ROSETON	0.11
900671	V4-068 C	0.19
900672	V4-068 E	0.53
LTF	WEC	0.04
907092	X1-038 E	3.69
917331	Z2-043 C	1.21
917332	Z2-043 E	2.65
917342	Z2-044 E	0.31
917591	Z2-099 C	0.22
917592	Z2-099 E	0.48
918491	AA1-063AC OP	1.55
918492	AA1-063AE OP	3.71
918561	AA1-072 C	0.18
918562	AA1-072 E	0.44
919691	AA2-053 C	2.35
919692	AA2-053 E	5.15
919701	AA2-057 C	1.05
919702	AA2-057 E	2.66
919821	AA2-068 C	0.46
919822	AA2-068 E	1.08
920021	AA2-086 C	0.11
920022	AA2-086 E	0.26
920041	AA2-088 C	1.35
920042	AA2-088 E	11.24
920591	AA2-165 C	0.14
920592	AA2-165 E	0.35
920631	AA2-169 C	1.18
920632	AA2-169 E	0.54
920671	AA2-174 C	0.11
920672	AA2-174 E	0.6
931231	AB1-173 C	1.29
931232	AB1-173 E	0.6
931241	AB1-173AC	1.29
931242	AB1-173AE	0.6
923801	AB2-015 C O1	6.06
923802	AB2-015 E O1	4.97
923911	AB2-031 C O1	1.28
923912	AB2-031 E O1	0.63
923991	AB2-040 C O1	4.19
923992	AB2-040 E O1	3.43
924381	AB2-087 C	1.9
924382	AB2-087 E	0.9

924501	AB2-099 C	1.74
924502	AB2-099 E	0.75
925171	AB2-174 C O1	3.65
925172	AB2-174 E O1	3.3
926201	AC1-098 C	9.21
926202	AC1-098 E	5.48
926211	AC1-099 C	3.09
926212	AC1-099 E	1.81
926771	AC1-163 C	5.74
926772	AC1-163 E	2.69
927141	AC1-208 C	8.93
927142	AC1-208 E	3.96

Appendix 19

(DVP - DVP) The 6EARLEYS 230/115 kV transformer (from bus 314568 to bus 314569 ckt 2) loads from 114.72% to 116.23% (**DC power flow**) of its load dump rating (228 MVA) for the line fault with failed breaker contingency outage of 'DVP_P4-2: 201262'. This project contributes approximately 7.62 MW to the thermal violation.

CONTINGENCY 'DVP_P4-2: 201262'

/* EARLEYS

OPEN BRANCH FROM BUS 314569 TO BUS 314266 CKT 1 /* 2012
 OPEN BRANCH FROM BUS 314266 TO BUS 314599 CKT 1 /* 2012
 OPEN BRANCH FROM BUS 314569 TO BUS 314568 CKT 1 /* TX. #3
 END

Bus Number	Bus Name	Full Contribution
315126	1ROARAP2	1.31
315128	1ROARAP4	1.26
315115	1S HAMPT1	1.43
314578	3HORNRTN	2.79
314582	3KELFORD	2.21
314603	3SCOT NK	6.37
314617	3TUNIS	2.13
314539	3UNCAMP	1.47
314541	3WATKINS	0.53
932631	AC2-084 C	13.12
932632	AC2-084 E	6.46
933461	AC2-159 C	13.79
933462	AC2-159 E	13.79
934041	AD1-029 C	16.23
934042	AD1-029 E	10.7
934201	AD1-047 C	4.57
934202	AD1-047 E	3.05
LTF	CARR	0.02
LTF	CBM-S1	0.3
LTF	CBM-S2	0.51
LTF	CBM-W1	0.63
LTF	CBM-W2	1.59
LTF	CIN	0.15
LTF	CPL	0.12
LTF	G-007	0.09
LTF	IPL	0.09
LTF	LGEE	0.03
LTF	MEC	0.33

LTF	MECS	0.13
LTF	O-066	0.3
LTF	RENSSELAER	0.01
LTF	ROSETON	0.11
900671	V4-068 C	0.19
900672	V4-068 E	0.53
LTF	WEC	0.04
907092	X1-038 E	3.69
917331	Z2-043 C	1.21
917332	Z2-043 E	2.65
917342	Z2-044 E	0.31
917591	Z2-099 C	0.22
917592	Z2-099 E	0.48
918491	AA1-063AC OP	1.55
918492	AA1-063AE OP	3.71
918561	AA1-072 C	0.18
918562	AA1-072 E	0.44
919691	AA2-053 C	2.35
919692	AA2-053 E	5.15
919701	AA2-057 C	1.05
919702	AA2-057 E	2.66
919821	AA2-068 C	0.46
919822	AA2-068 E	1.08
920021	AA2-086 C	0.11
920022	AA2-086 E	0.26
920041	AA2-088 C	1.35
920042	AA2-088 E	11.24
920591	AA2-165 C	0.14
920592	AA2-165 E	0.35
920631	AA2-169 C	1.18
920632	AA2-169 E	0.54
920671	AA2-174 C	0.11
920672	AA2-174 E	0.6
931231	AB1-173 C	1.29
931232	AB1-173 E	0.6
931241	AB1-173AC	1.29
931242	AB1-173AE	0.6
923801	AB2-015 C O1	6.06
923802	AB2-015 E O1	4.97
923911	AB2-031 C O1	1.28
923912	AB2-031 E O1	0.63
923991	AB2-040 C O1	4.19
923992	AB2-040 E O1	3.43
924381	AB2-087 C	1.9
924382	AB2-087 E	0.9

924501	AB2-099 C	1.74
924502	AB2-099 E	0.75
925171	AB2-174 C O1	3.65
925172	AB2-174 E O1	3.3
926201	AC1-098 C	9.21
926202	AC1-098 E	5.48
926211	AC1-099 C	3.09
926212	AC1-099 E	1.81
926771	AC1-163 C	5.74
926772	AC1-163 E	2.69
927141	AC1-208 C	8.93
927142	AC1-208 E	3.96

Appendix 20

(DVP - CPLE) The 6EVERETS-6GREENVILE T 230 kV line (from bus 314574 to bus 304451 ckt 1) loads from 118.24% to 118.91% (**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 7.14 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	3.12
315292	1DOMTR78	2.11
315293	1DOMTR9	1.72
315131	1EDGECSMA	9.28
315132	1EDGECSMB	9.28
315136	1ROSEMG1	1.98
315138	1ROSEMG2	0.93
315137	1ROSEMS1	1.23
314557	3BETHEL	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
933451	AC2-158 C	5.87
933452	AC2-158 E	5.87
933461	AC2-159 C	5.22
933462	AC2-159 E	5.22
933711	AC2-194 C	0.6
933712	AC2-194 E	0.97
933991	AD1-023 C	13.46
933992	AD1-023 E	7.33
934041	AD1-029 C	7.62
934042	AD1-029 E	5.02
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
LTF	AMIL	0.48
LTF	BAYOU	2.64
LTF	BIG_CAJUN1	4.17
LTF	BIG_CAJUN2	8.39
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	9.05
LTF	COTTONWOOD	10.33
LTF	DEARBORN	0.9
LTF	EDWARDS	0.78
LTF	ELMERSMITH	1.42
LTF	FARMERCITY	0.62
LTF	G-007A	1.03
LTF	GIBSON	0.88
LTF	HAMLET	6.47
LTF	MORGAN	4.57
LTF	NEWTON	2.15
LTF	NYISO	0.09
LTF	O-066A	0.47
LTF	PRAIRIE	4.69

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	2.75
901082	W1-029E	23.36
907092	X1-038 E	2.96
LTF	X1-078	0.8
913392	Y1-086 E	1.05
916042	Z1-036 E	29.11
917122	Z2-027 E	0.51
917331	Z2-043 C	0.39
917332	Z2-043 E	0.86
917342	Z2-044 E	0.33
917511	Z2-088 C OP1	1.52
917512	Z2-088 E OP1	6.13
917592	Z2-099 E	0.26
918411	AA1-050	1.28
918492	AA1-063AE OP	2.44
918511	AA1-065 C OP	1.93
918512	AA1-065 E OP	4.84
918531	AA1-067 C	0.74
918532	AA1-067 E	1.62
918561	AA1-072 C	0.06
918562	AA1-072 E	0.14
919692	AA2-053 E	2.58
919702	AA2-057 E	2.12
919732	AA2-059 E	0.38
919822	AA2-068 E	0.66
920022	AA2-086 E	0.14
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	1.2
931232	AB1-173 E	0.56
931241	AB1-173AC	1.2
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
924381	AB2-087 C	0.54
924382	AB2-087 E	0.26
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	9.79
925592	AC1-034 E	7.38
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	22.49
926771	AC1-163 C	1.74

926772	AC1-163 E	0.81
927021	AC1-189 C	15.45
927022	AC1-189 E	7.7
927111	AC1-206 C	4.78
927112	AC1-206 E	2.26
927141	AC1-208 C	5.74
927142	AC1-208 E	2.55

Appendix 21

(DVP - DVP) The 3COX DP-3CHESTNUT 115 kV line (from bus 314577 to bus 313719 ckt 1) loads from 123.24% to 126.12% (**DC power flow**) of its emergency rating (134 MVA) for the single line contingency outage of 'DVP_P1-2: LN 2056-A'. This project contributes approximately 3.88 MW to the thermal violation.

CONTINGENCY 'DVP_P1-2: LN 2056-A'

OPEN BRANCH FROM BUS 313845 TO BUS 934330 CKT 1 /* 6HATHAWAY
230.00 - AD1-057 TAP 230.00

END

Bus Number	Bus Name	Full Contribution
315139	1GASTONA	1.25
315141	1GASTONB	1.25
315126	1ROARAP2	1.08
315128	1ROARAP4	1.04
315136	1ROSEMG1	0.9
315138	1ROSEMG2	0.42
315137	1ROSEMS1	0.56
315115	1S HAMPT1	0.62
932631	AC2-084 C	20.12
933461	AC2-159 C	3.86
934041	AD1-029 C	24.89
934201	AD1-047 C	3.88
934331	AD1-057 C O1	3.56
LTF	AMIL	0.14
LTF	BAYOU	0.76
LTF	BIG_CAJUN1	1.2
LTF	BIG_CAJUN2	2.42
LTF	BLUEG	0.74
LTF	CALDERWOOD	0.45
LTF	CANNELTON	0.14
LTF	CATAWBA	0.44
LTF	CBM-N	< 0.01
LTF	CELEVELAND	1.26
LTF	CHEOAH	0.42
LTF	CHILHOWEE	0.15
LTF	CHOCTAW	0.82
LTF	CLIFTY	2.67
LTF	COTTONWOOD	2.98
LTF	DEARBORN	0.26

LTF	EDWARDS	0.23
LTF	ELMERSMITH	0.41
LTF	FARMERCITY	0.18
LTF	G-007A	0.3
LTF	GIBSON	0.26
LTF	HAMLET	1.82
LTF	MORGAN	1.32
LTF	NEWTON	0.63
LTF	NYISO	0.02
LTF	O-066A	0.14
LTF	PRAIRIE	1.36
LTF	ROWAN	0.91
LTF	SANTEETLA	0.12
LTF	SMITHLAND	0.12
LTF	TATANKA	0.31
LTF	TILTON	0.27
LTF	TRIMBLE	0.14
LTF	TVA	0.55
LTF	UNIONPOWER	0.8
900671	V4-068 C	0.05
LTF	VFT	0.81
LTF	X1-078	0.24
917331	Z2-043 C	0.53
917591	Z2-099 C	0.09
918491	AA1-063AC OP	0.96
918561	AA1-072 C	0.08
919691	AA2-053 C	1.07
919821	AA2-068 C	1.19
920021	AA2-086 C	0.04
920041	AA2-088 C	0.54
920631	AA2-169 C	0.91
920671	AA2-174 C	0.05
930861	AB1-132 C	4.88
931231	AB1-173 C	1.09
931241	AB1-173AC	1.09
923801	AB2-015 C O1	2.73
923911	AB2-031 C O1	1.08
923991	AB2-040 C O1	3.55
924381	AB2-087 C	0.28
924501	AB2-099 C	0.28
925171	AB2-174 C O1	3.12
925781	AC1-054 C	2.48
926071	AC1-086 C	7.18
926201	AC1-098 C	14.12
926211	AC1-099 C	4.73

926771	AC1-163 C	0.93
927141	AC1-208 C	19.61

Appendix 22

(DVP - DVP) The 3TREGO-3TREGOTP 115 kV line (from bus 314612 to bus 314615 ckt 1) loads from 172.87% to 279.26% (**DC power flow**) of its normal rating (45 MVA) for non-contingency condition. This project contributes approximately 48.0 MW to the thermal violation.

Bus Number	Bus Name	Full Contribution
934201	AD1-047 C	48.
931231	AB1-173 C	13.5
931241	AB1-173AC	13.5
923911	AB2-031 C O1	13.4
923991	AB2-040 C O1	44.

Appendix 23

(DVP - DVP) The 3WITAKRS-3BTLEBRO 115 kV line (from bus 314623 to bus 314554 ckt 1) loads from 158.18% to 161.06% (**DC power flow**) of its emergency rating (134 MVA) for the single line contingency outage of 'DVP_P1-2: LN 2056-A'. This project contributes approximately 3.86 MW to the thermal violation.

CONTINGENCY 'DVP_P1-2: LN 2056-A'

OPEN BRANCH FROM BUS 313845 TO BUS 934330 CKT 1 /* 6HATHAWAY
230.00 - AD1-057 TAP 230.00

END

Bus Number	Bus Name	Full Contribution
315139	1GASTONA	1.25
315141	1GASTONB	1.25
315126	1ROARAP2	1.08
315128	1ROARAP4	1.03
315136	1ROSEMG1	0.9
315138	1ROSEMG2	0.42
315137	1ROSEMS1	0.56
315115	1S HAMPT1	0.61
932631	AC2-084 C	20.1
933461	AC2-159 C	3.84
934041	AD1-029 C	24.87
934201	AD1-047 C	3.86
934331	AD1-057 C O1	3.54
LTF	AMIL	0.15
LTF	BAYOU	0.79
LTF	BIG_CAJUN1	1.25
LTF	BIG_CAJUN2	2.51
LTF	BLUEG	0.79
LTF	CALDERWOOD	0.46
LTF	CANNELTON	0.15
LTF	CARR	< 0.01
LTF	CATAWBA	0.45
LTF	CELEVELAND	1.29
LTF	CHEOAH	0.43
LTF	CHILHOWEE	0.15
LTF	CHOCTAW	0.85
LTF	CLIFTY	2.89
LTF	COTTONWOOD	3.1
LTF	DEARBORN	0.29

LTF	EDWARDS	0.24
LTF	ELMERSMITH	0.44
LTF	FARMERCITY	0.19
LTF	G-007A	0.23
LTF	GIBSON	0.28
LTF	HAMLET	1.86
LTF	MORGAN	1.37
LTF	NEWTON	0.67
LTF	O-066A	0.11
LTF	PRAIRIE	1.44
LTF	RENSSELAER	< 0.01
LTF	ROSETON	0.04
LTF	ROWAN	0.93
LTF	SANTEETLA	0.13
LTF	SMITHLAND	0.13
LTF	TATANKA	0.32
LTF	TILTON	0.29
LTF	TRIMBLE	0.15
LTF	TVA	0.58
LTF	UNIONPOWER	0.83
900671	V4-068 C	0.05
LTF	VFT	0.61
LTF	X1-078	0.18
917331	Z2-043 C	0.53
917341	Z2-044 C	1.17
917591	Z2-099 C	0.09
918491	AA1-063AC OP	0.96
918561	AA1-072 C	0.08
919691	AA2-053 C	1.07
919701	AA2-057 C	5.17
919821	AA2-068 C	1.19
920021	AA2-086 C	0.04
920041	AA2-088 C	0.54
920591	AA2-165 C	0.71
920631	AA2-169 C	0.91
920671	AA2-174 C	0.05
930861	AB1-132 C	4.85
931231	AB1-173 C	1.09
931241	AB1-173AC	1.09
923801	AB2-015 C O1	2.72
923911	AB2-031 C O1	1.08
923991	AB2-040 C O1	3.54
924381	AB2-087 C	0.28
924501	AB2-099 C	0.28
925171	AB2-174 C O1	3.11

925781	AC1-054 C	2.47
926071	AC1-086 C	7.14
926201	AC1-098 C	14.1
926211	AC1-099 C	4.73
926771	AC1-163 C	0.93
927141	AC1-208 C	19.59

Appendix 24

(DVP - DVP) The 3AULANDR-3EARLEYS 115 kV line (from bus 314625 to bus 314568 ckt 1) loads from 121.29% to 123.68% (**DC power flow**) of its load dump rating (136 MVA) for the tower line contingency outage of 'DVP_P7-1: LN 56-2060'. This project contributes approximately 7.19 MW to the thermal violation.

CONTINGENCY 'DVP_P7-1: LN 56-2060'

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

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

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

OPEN BUS 314587 /* ISLAND: 3MARGTSV 115.00

OPEN BUS 314604 /* ISLAND: 3SEABORD 115.00

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

END

Bus Number	Bus Name	Full Contribution
315126	1ROARAP2	1.24
315128	1ROARAP4	1.19
314572	3EMPORIA	0.17
314578	3HORNRTN	2.25
314541	3WATKINS	-0.22
933461	AC2-159 C	19.61
933462	AC2-159 E	19.61
934201	AD1-047 C	4.31
934202	AD1-047 E	2.87
934231	AD1-050 C	1.84
934232	AD1-050 E	1.01
LTF	CARR	0.01
LTF	CBM-S1	0.27
LTF	CBM-S2	0.46
LTF	CBM-W1	0.61
LTF	CBM-W2	1.45
LTF	CIN	0.14
LTF	CPL	0.12
LTF	G-007	0.07
LTF	IPL	0.09
LTF	LGEE	0.03

LTF	MEC	0.3
LTF	MECS	0.14
LTF	O-066	0.22
LTF	RENSSELAER	< 0.01
LTF	ROSETON	0.07
LTF	WEC	0.04
918491	AA1-063AC OP	1.27
918492	AA1-063AE OP	3.06
919691	AA2-053 C	2.99
919692	AA2-053 E	6.54
920631	AA2-169 C	1.12
920632	AA2-169 E	0.51
920671	AA2-174 C	0.14
920672	AA2-174 E	0.76
930861	AB1-132 C	4.59
930862	AB1-132 E	1.97
931231	AB1-173 C	1.21
931232	AB1-173 E	0.57
931241	AB1-173AC	1.21
931242	AB1-173AE	0.57
923911	AB2-031 C O1	1.2
923912	AB2-031 E O1	0.59
923991	AB2-040 C O1	3.95
923992	AB2-040 E O1	3.23
924401	AB2-089 C	0.83
924402	AB2-089 E	0.43
925171	AB2-174 C O1	3.43
925172	AB2-174 E O1	3.11
925781	AC1-054 C	3.13
925782	AC1-054 E	1.44
926071	AC1-086 C	6.76
926072	AC1-086 E	3.08
927141	AC1-208 C	2.9
927142	AC1-208 E	1.29

Appendix 25

(DVP - DVP) The 3WOODLND-3AULANDR 115 kV line (from bus 314626 to bus 314625 ckt 1) loads from 126.44% to 128.82% (**DC power flow**) of its load dump rating (136 MVA) for the tower line contingency outage of 'DVP_P7-1: LN 56-2060'. This project contributes approximately 7.19 MW to the thermal violation.

CONTINGENCY 'DVP_P7-1: LN 56-2060'

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

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

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

OPEN BUS 314587 /* ISLAND: 3MARGTSV 115.00

OPEN BUS 314604 /* ISLAND: 3SEABORD 115.00

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

END

Bus Number	Bus Name	Full Contribution
315126	1ROARAP2	1.24
315128	1ROARAP4	1.19
314572	3EMPORIA	0.17
314578	3HORNRTN	2.25
314541	3WATKINS	-0.22
933461	AC2-159 C	19.61
933462	AC2-159 E	19.61
934201	AD1-047 C	4.31
934202	AD1-047 E	2.87
934231	AD1-050 C	1.84
934232	AD1-050 E	1.01
LTF	CARR	0.01
LTF	CBM-S1	0.27
LTF	CBM-S2	0.46
LTF	CBM-W1	0.61
LTF	CBM-W2	1.45
LTF	CIN	0.14
LTF	CPL	0.12
LTF	G-007	0.07
LTF	IPL	0.09
LTF	LGEE	0.03

LTF	MEC	0.3
LTF	MECS	0.14
LTF	O-066	0.22
LTF	RENSSELAER	< 0.01
LTF	ROSETON	0.07
LTF	WEC	0.04
918491	AA1-063AC OP	1.27
918492	AA1-063AE OP	3.06
919691	AA2-053 C	2.99
919692	AA2-053 E	6.54
920631	AA2-169 C	1.12
920632	AA2-169 E	0.51
920671	AA2-174 C	0.14
920672	AA2-174 E	0.76
930861	AB1-132 C	4.59
930862	AB1-132 E	1.97
931231	AB1-173 C	1.21
931232	AB1-173 E	0.57
931241	AB1-173AC	1.21
931242	AB1-173AE	0.57
923911	AB2-031 C O1	1.2
923912	AB2-031 E O1	0.59
923991	AB2-040 C O1	3.95
923992	AB2-040 E O1	3.23
924401	AB2-089 C	0.83
924402	AB2-089 E	0.43
925171	AB2-174 C O1	3.43
925172	AB2-174 E O1	3.11
925781	AC1-054 C	3.13
925782	AC1-054 E	1.44
926071	AC1-086 C	6.76
926072	AC1-086 E	3.08
927141	AC1-208 C	2.9
927142	AC1-208 E	1.29

Appendix 26

(DVP - DVP) The AB2-100 TAP-6CLUBHSE 230 kV line (from bus 924510 to bus 314563 ckt 1) loads from 100.34% to 103.02% (**DC power flow**) of its emergency rating (375 MVA) for the single line contingency outage of 'DVP_P1-2: LN 130-A'. This project contributes approximately 10.07 MW to the thermal violation.

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

```

Bus Number	Bus Name	Full Contribution
315294	1DOMTR10	1.51
315292	1DOMTR78	1.02
315293	1DOMTR9	0.83
315131	1EDGECEMA	9.35
315132	1EDGECEMB	9.35
315139	1GASTONA	7.38
315141	1GASTONB	7.38
315159	1KERR 2	0.55
315163	1KERR 6	0.54
315164	1KERR 7	0.54
315126	1ROARAP2	2.05
315128	1ROARAP4	1.97
315136	1ROSEMG1	4.94
315138	1ROSEMG2	2.32
315137	1ROSEMS1	3.07
315115	1S HAMPT1	1.08
932631	AC2-084 C	9.

933451	AC2-158 C	4.32
933461	AC2-159 C	7.23
933991	AD1-023 C	8.3
934041	AD1-029 C	11.14
934201	AD1-047 C	10.07
934231	AD1-050 C	2.27
934331	AD1-057 C O1	14.72
934521	AD1-076 C O1	31.3
LTF	CARR	0.09
LTF	CBM-S1	3.78
LTF	CBM-S2	7.85
LTF	CBM-W1	8.13
LTF	CBM-W2	20.35
LTF	CIN	1.83
LTF	CPL	2.69
LTF	IPL	1.16
LTF	LGEE	0.39
LTF	MEC	4.16
LTF	MECS	1.81
LTF	RENSSELAER	0.07
LTF	ROSETON	0.5
900671	V4-068 C	0.09
LTF	WEC	0.5
917331	Z2-043 C	0.43
917341	Z2-044 C	0.26
917511	Z2-088 C OP1	0.86
917591	Z2-099 C	0.15
918411	AA1-050	0.72
918491	AA1-063AC OP	1.79
918511	AA1-065 C OP	1.49
918531	AA1-067 C	0.26
918561	AA1-072 C	0.06
919691	AA2-053 C	2.02
919701	AA2-057 C	1.42
919731	AA2-059 C	0.08
919821	AA2-068 C	0.46
LTF	AA2-074	1.83
920021	AA2-086 C	0.08
920041	AA2-088 C	0.97
920591	AA2-165 C	0.19
920631	AA2-169 C	1.59
920671	AA2-174 C	0.09
920691	AA2-178 C	4.4
930051	AB1-013 C	1.33
930401	AB1-081 C	8.66

930861	AB1-132 C	28.71
931231	AB1-173 C	2.83
931241	AB1-173AC	2.83
923801	AB2-015 C O1	4.69
923911	AB2-031 C O1	2.81
923941	AB2-035 C	0.31
923991	AB2-040 C O1	9.23
924151	AB2-059 C O1	10.2
924381	AB2-087 C	0.51
924391	AB2-088 C	0.4
924401	AB2-089 C	1.03
924491	AB2-098 C	0.44
924501	AB2-099 C	0.52
924511	AB2-100 C	39.57
925121	AB2-169 C	4.3
925171	AB2-174 C O1	8.81
925291	AB2-188 C O1	1.08
925591	AC1-034 C	6.36
925781	AC1-054 C	4.11
926071	AC1-086 C	42.28
926201	AC1-098 C	6.31
926211	AC1-099 C	2.12
926771	AC1-163 C	1.71
927021	AC1-189 C	7.36
927141	AC1-208 C	10.09

Appendix 27

(AEP - AEP) The 05EDAN 1-05DANVL2 138 kV line (from bus 242631 to bus 242620 ckt 1) loads from 108.49% to 108.98% (**DC power flow**) of its emergency rating (415 MVA) for the line fault with failed breaker contingency outage of 'AEP_P4_#7589_05J.FERR 765'. This project contributes approximately 4.58 MW to the thermal violation.

CONTINGENCY 'AEP_P4_#7589_05J.FERR 765'

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

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

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

END

Bus Number	Bus Name	Full Contribution
244012	05PINNACLE	-2.08
315131	1EDGECSMA	4.25
315132	1EDGECSMB	4.25
314557	3BETHEL C	0.35
314554	3BTLEBRO	0.37
314572	3EMPORIA	0.14
314578	3HORNRTN	1.21
314582	3KELFORD	0.3
314603	3SCOT NK	1.24
314617	3TUNIS	0.28
314620	6CASHIE	0.27
314574	6EVERETS	0.98
314594	6PLYMOTH	0.26
932631	AC2-084 C	3.42
932632	AC2-084 E	1.68
932701	AC2-093 C	24.4
932702	AC2-093 E	13.96
932761	AC2-100 C	3.66
932762	AC2-100 E	1.79
932821	AC2-107 C	3.48
932822	AC2-107 E	1.63
933451	AC2-158 C	1.78
933452	AC2-158 E	1.78
933461	AC2-159 C	2.33
933462	AC2-159 E	2.33

933941	AD1-017 C	0.84
933942	AD1-017 E	1.36
933991	AD1-023 C	4.1
933992	AD1-023 E	2.23
934041	AD1-029 C	4.23
934042	AD1-029 E	2.79
934201	AD1-047 C	2.75
934202	AD1-047 E	1.83
934231	AD1-050 C	2.01
934232	AD1-050 E	1.1
934311	AD1-055 C	1.07
934312	AD1-055 E	0.28
934331	AD1-057 C O1	4.1
934332	AD1-057 E O1	2.19
934341	AD1-058 C	3.99
934342	AD1-058 E	1.01
934521	AD1-076 C O1	16.71
934522	AD1-076 E O1	8.51
934611	AD1-087 C O1	3.62
934612	AD1-087 E O1	1.69
934621	AD1-088 C O1	4.63
934622	AD1-088 E O1	2.17
LTF	AD1-120	7.55
LTF	AD1-121	7.6
934911	AD1-123 C	0.47
934912	AD1-123 E	0.24
934991	AD1-131 C	1.31
934992	AD1-131 E	0.87
935171	AD1-152 C O1	3.36
935172	AD1-152 E O1	2.24
935221	AD1-157 C	0.46
935222	AD1-157 E	0.31
935231	AD1-160 C	0.34
935232	AD1-160 E	0.47
LTF	AMIL	0.17
LTF	BLUEG	2.07
LTF	CANNELTON	0.27
LTF	CARR	0.06
LTF	CBM-S1	1.13
LTF	CBM-S2	16.92
LTF	CBM-W2	2.91
LTF	CLIFTY	10.78
LTF	CPL	5.57
LTF	DEARBORN	0.98
LTF	EDWARDS	0.45

LTF	ELMERSMITH	0.71
LTF	FARMERCITY	0.12
LTF	G-007A	0.79
LTF	GIBSON	0.59
LTF	NEWTON	0.97
LTF	O-066A	0.36
LTF	PRAIRIE	0.86
LTF	RENSSELAER	0.05
LTF	ROSETON	0.35
LTF	SMITHLAND	< 0.01
LTF	TATANKA	0.34
LTF	TILTON	0.61
LTF	TRIMBLE	0.41
900672	V4-068 E	0.1
LTF	VFT	2.09
LTF	X1-078	0.61
917332	Z2-043 E	0.36
917342	Z2-044 E	0.25
917512	Z2-088 E OP1	1.66
917592	Z2-099 E	0.14
918492	AA1-063AE OP	1.37
918512	AA1-065 E OP	1.46
918532	AA1-067 E	0.29
918562	AA1-072 E	0.06
919692	AA2-053 E	1.33
919702	AA2-057 E	1.51
919822	AA2-068 E	0.41
LTF	AA2-074	3.79
920022	AA2-086 E	0.07
920042	AA2-088 E	3.27
920592	AA2-165 E	0.2
920631	AA2-169 C	0.91
920632	AA2-169 E	0.42
920672	AA2-174 E	0.15
930401	AB1-081 C	4.09
930402	AB1-081 E	1.75
930861	AB1-132 C	4.93
930862	AB1-132 E	2.11
931231	AB1-173 C	0.77
931232	AB1-173 E	0.36
931241	AB1-173AC	0.77
931242	AB1-173AE	0.36
923911	AB2-031 C O1	0.77
923912	AB2-031 E O1	0.38
923941	AB2-035 C	0.15

923942	AB2-035 E	0.06
923991	AB2-040 C O1	2.52
923992	AB2-040 E O1	2.06
924021	AB2-043 C O1	1.21
924022	AB2-043 E O1	1.99
924151	AB2-059 C O1	4.82
924152	AB2-059 E O1	2.48
924161	AB2-060 C O1	3.48
924162	AB2-060 E O1	1.64
924301	AB2-077 C O1	0.78
924302	AB2-077 E O1	0.52
924311	AB2-078 C O1	0.78
924312	AB2-078 E O1	0.52
924321	AB2-079 C O1	0.78
924322	AB2-079 E O1	0.52
924381	AB2-087 C	0.19
924382	AB2-087 E	0.09
924391	AB2-088 C	0.19
924392	AB2-088 E	0.09
924401	AB2-089 C	0.91
924402	AB2-089 E	0.47
924411	AB2-090 C	1.53
924412	AB2-090 E	0.78
924491	AB2-098 C	0.23
924492	AB2-098 E	0.1
924501	AB2-099 C	0.2
924502	AB2-099 E	0.08
924511	AB2-100 C	3.5
924512	AB2-100 E	1.72
925121	AB2-169 C	2.26
925122	AB2-169 E	2.03
925171	AB2-174 C O1	2.38
925172	AB2-174 E O1	2.15
925221	AB2-176 C	0.63
925222	AB2-176 E	0.27
925591	AC1-034 C	3.01
925592	AC1-034 E	2.27
925611	AC1-036 C	0.33
925612	AC1-036 E	0.54
925781	AC1-054 C	3.03
925782	AC1-054 E	1.4
925991	AC1-075 C	1.96
925992	AC1-075 E	1.11
926021	AC1-080 C	0.65
926022	AC1-080 E	0.37

926051	AC1-083 C	4.18
926052	AC1-083 E	6.82
926071	AC1-086 C	7.26
926072	AC1-086 E	3.31
926201	AC1-098 C	2.4
926202	AC1-098 E	1.43
926211	AC1-099 C	0.8
926212	AC1-099 E	0.47
926271	AC1-105 C	2.39
926272	AC1-105 E	1.19
926771	AC1-163 C	0.65
926772	AC1-163 E	0.3
927021	AC1-189 C	3.63
927022	AC1-189 E	1.81
927111	AC1-206 C	2.97
927112	AC1-206 E	1.4
927141	AC1-208 C	3.54
927142	AC1-208 E	1.57
927251	AC1-221 C	1.59
927252	AC1-221 E	1.59
927261	AC1-222 C	1.54
927262	AC1-222 E	1.46