

***Generation Interconnection
System Impact Study Report***

For

***PJM Generation Interconnection Request
Queue Position AC2-084***

***Dawson Crossroads – South Justice 115kV
40.2 MW Capacity / 60.0 MW Energy***

Revision 2 / November 2021

Revision 1 / October 2021

August 2018

Introduction

This System Impact Study has been prepared in accordance with the PJM Open Access Transmission Tariff, Section 205, as well as the System Impact Study Agreement between American Beech Solar 2, LLC, 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 System Impact Study is to determine a plan, with approximate cost and construction time estimates, to connect the subject generation interconnection project to the PJM network at a location specified by the IC. As a requirement for interconnection, the IC may be responsible for the cost of constructing Network Upgrades, which are facility additions, or upgrades to existing facilities, that are needed to maintain the reliability of the PJM system. All facilities required for interconnection of a generation interconnection project must be designed to meet the technical specifications (on PJM web site) for the appropriate transmission owner.

In some instances an IC may not be responsible for 100% of the identified network upgrade cost because other transmission network uses, e.g. another generation interconnection or merchant transmission upgrade, 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 System Impact Study is performed.

The System Impact 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 Transmission Owners, the costs may be included in the study.

Revision 2 Summary- November 2021

This revision is being issued to correct results due to a update in the contingencies used in the analysis.

Revision 1 Summary- October 2021

This revision is being issued due to a re-tool that was performed that updated the results of the system reinforcements and cost allocations. The report was also updated to reflect that AC2-083 was withdrawn from the queue. This project will be considered an uprate to AC1-098/099.

General

The IC has proposed a solar generating facility located in Halifax County, North Carolina. Queue project AC2-084 will have a total installed capability of 60 MW (40.2 MW capacity). The AC1-098/099 and AC2-084 projects will share the same point of interconnection. The installed AC1-098/099 and AC2-084 facility will have a total capability of 140 MW, with 90.4 MW of this output being recognized by PJM as capacity. The proposed in-service date for the combined project is June 2019. This study does not imply an ITO commitment to this in-service date.

Point of Interconnection

AC1-098/099 and AC2-084 will interconnect with the ITO transmission system via a new three breaker ring bus that connects the future Scotland Neck – South Justice Branch 115kV line. The Scotland Neck – South Justice 115kV line will be constructed under PJM baseline project b2654. The ITO projected in-service date for b2654 is September 2018.

Cost Summary

The AC2-084 project will be responsible for the following costs:

Description	Total Cost
Attachment Facilities	\$ 0
Direct Connection Network Upgrades	\$ 0
Non Direct Connection Network Upgrades	\$ 0
Allocation for New System Upgrades	\$ 0
Contribution for Previously Identified Upgrades	\$ 0
Total Costs	\$ 0

Attachment Facilities

AC2-084 will share the attachment facilities built as part of AC1-098/099.

Direct Connection Cost Estimate

AC2-084 will share the Direct Connect upgrades built as part of AC1-098/099.

Non-Direct Connection Cost Estimate

AC2-084 will share the Non-Direct Connect upgrades built as part of AC1-098/099.

System Reinforcements

PJM OATT 217.3 outlines cost responsibility for Network Upgrades and as the minimum amount of Network Upgrades required to resolve a single reliability criteria violation will not meet or exceed \$5,000,000 such costs shall be allocated to those Interconnection Requests in the New Services Queue that contribute to the need for such upgrades. Such allocations shall be made in proportion to each Interconnection Request's megawatt contribution to the need for these upgrades subject to the rules for minimum cost allocation thresholds in the PJM Manuals. For the purpose of applying the \$5,000,000 threshold, each reliability criteria violation shall be considered separately.

		AC2-084
Violation #	Upgrade Description	Cost Allocation
1, 2 & 3	Rebuild 21.32 miles of the Chesterfield-Lakeside 230kV transmission line. Line upgrade went into service on 05/26/2020	\$0
4	Replace Battleboro substation terminal equipment. Upgrading the breaker leads at Battleboro will bring the rating to 398 MVA. Note : Duke/Progress Energy portion of this line will need to be studied under Duke's FERC tariff process	\$0
Total Network Upgrades		\$0

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>

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.

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

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.

Interconnected Transmission Owner Requirements

Metering and SCADA/Communication equipment must meet the requirements outlined in section 3.1.6 Metering and Telecommunications of ITO's Facility Connection Requirement NERC Standard FAC-001 which is publically available at www.dom.com .

Network Impacts

The Queue Project AC2-084 was evaluated as a 60.0 MW (Capacity 40.2 MW) injection into Dawson Crossroads – South Justice 115kV tap in the VAP area. Project AC2-084 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AC2-084 was studied with a commercial probability of 100%. Potential network impacts were as follows:

ITO also 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.dominionenergy.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
562T563	CONTINGENCY '562T563' /*CARSON OPEN BRANCH FROM BUS 314902 TO BUS 314923 CKT 1 /*CARSON TO MIDLOTHIAN OPEN BRANCH FROM BUS 314914 TO BUS 314902 CKT 1 /*CARSON 500.00 - 8SEPTA 500.00 END
T672B	CONTINGENCY 'T672B' /*_ BASIN OPEN BRANCH FROM BUS 314276 TO BUS 314260 CKT 1 /*L284 BASIN VARINA OPEN BRANCH FROM BUS 314275 TO BUS 314276 CKT 1 /*L2055 BASIN BELLMEADE REMOVE MACHINE 1 FROM BUS 315053 /*BELMEADE GEN CT-1 REMOVE MACHINE 2 FROM BUS 315054 /*BELMEADE GEN CT-2 REMOVE MACHINE 3 FROM BUS 315055 /*BELMEADE GEN ST OPEN BRANCH FROM BUS 314274 TO BUS 314276 CKT 1 /*BASIN TX5 OPEN BRANCH FROM BUS 314274 TO BUS 314276 CKT 2 /*BASIN TX6 OPEN BRANCH FROM BUS 314276 TO BUS 314287 CKT 1 /*L259 BASIN CHESTERFIELD OPEN BRANCH FROM BUS 314276 TO BUS 314339 CKT 1 /*L2065 BASIN SPRUANCE NUG END
T672B	CONTINGENCY 'T672B' /*_ BASIN OPEN BRANCH FROM BUS 314276 TO BUS 314260 CKT 1 /*L284 BASIN VARINA OPEN BRANCH FROM BUS 314275 TO BUS 314276 CKT 1 /*L2055 BASIN BELLMEADE REMOVE MACHINE 1 FROM BUS 315053 /*BELMEADE GEN CT-1 REMOVE MACHINE 2 FROM BUS 315054 /*BELMEADE GEN CT-2 REMOVE MACHINE 3 FROM BUS 315055 /*BELMEADE GEN ST OPEN BRANCH FROM BUS 314274 TO BUS 314276 CKT 1 /*BASIN TX5 OPEN BRANCH FROM BUS 314274 TO BUS 314276 CKT 2 /*BASIN TX6 OPEN BRANCH FROM BUS 314276 TO BUS 314287 CKT 1 /*L259 BASIN CHESTERFIELD OPEN BRANCH FROM BUS 314276 TO BUS 314339 CKT 1 /*L2065 BASIN SPRUANCE NUG END
LN 2058-2181	CONTINGENCY 'LN 2058-2181' 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 OPEN BRANCH FROM BUS 304222 TO BUS 313845 CKT 1 /* 6ROCKYMT230T230.00 - 6HATHAWAY 230.00 END
'LN 563'	CONTINGENCY 'LN 563' OPEN BRANCH FROM BUS 314902 TO BUS 314914 CKT 1 /* 8CARSON 500.00 - 8MDLTHAN 500.00 END
'LN 254_A'	CONTINGENCY 'LN 254_A' OPEN BRANCH FROM BUS 314563 TO BUS 924510 CKT 1 /* 6CLUBHSE 230.00 - AB2-100 TAP 230.00 END
'LN 1015_AC1-098 B'	CONTINGENCY 'LN 1015_AC1-098 B' OPEN BRANCH FROM BUS 926970 TO BUS 314603 CKT 1 /* 3SO JUSTICE 115.00 - 3SCOT NK 115.00 END
'LN 81_A'	CONTINGENCY 'LN 81_A' OPEN BRANCH FROM BUS 314628 TO BUS 928190 CKT 1 /* 3SO AC1- 208 TAP 115.00 - 3HALF DP 115.00 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 - 3HALF DP 115.00 OPEN BUS 314578 /* ISLAND OPEN BUS 314598 /* ISLAND OPEN BUS 314628 /* ISLAND END
'LN 2012'	CONTINGENCY '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

Summer Peak Analysis - 2020

Generator Deliverability

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

None

Multiple Facility Contingency

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

Overload Number	Contingency		Affected Area	Facility Description	Bus		Circuit	Power Flow	Loading %		Rating		MW Contribution	Flowgate Appendix
	Type	Name			From	To			Initial	Final	Type	MVA		
1	LFFB	562T563	DVP-DVP	6MESSER-6CHARCTY 230 kV line	314228	314225	1	AC	99.98	100.56	ER	459	3.13	1
2	LFFB	T672B	DVP-DVP	6MESSER-6CHARCTY 230 kV line	314228	314225	1	AC	99.69	100.28	ER	459	3.19	
3	LFFB	T672B	DVP-DVP	6CHSTF B-6MESSER 230 kV line	314287	314228	1	AC	99.72	100.31	ER	459	3.19	2

Short Circuit

(Summary of impacted circuit breakers)

New circuit breakers found to be over-duty:

None

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

None

Contribution to Previously Identified Overloads

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

Overload Number	Type	Contingency Name	Affected Area	Facility Description	Bus		Circuit	Power Flow	Loading %		Rating		MW Contribution	Flowgate Appendix
					From	To			Initial	Final	Type	MVA		
4	DCTL	LN 2058-2181	DVP - CPLE	3BTLEBRO-3ROCKYMT115T 115 kV line	314554	304223	1	AC	152.2	159.64	ER	164	12.77	3

Steady-State Voltage Requirements

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

None

Stability and Reactive Power Requirement for Low Voltage Ride Through

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

No mitigations were found to be required.

New System Reinforcements

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

#	Overloaded Facility	Upgrade Description	Network Upgrade Number	Upgrade Cost	AC2-084 Cost Allocation
1 & 2	6MESSER-6CHARCTY 230 kV line	Rebuild 21.32 miles of the Chesterfield-Lakeside 230kV transmission line.	b2745	\$41,500,000	\$0
3	6CHSTF B-6MESSER 230 kV line	Line upgrade went into service on 05/26/2020			
Total New Network Upgrades				\$41,500,000	\$0

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 %

#	Overloaded Facility	Upgrade Description	Network Upgrade Number	Upgrade Cost	AC2-084 Cost Allocation
4	3BTLEBRO-3ROCKYMT115T 115 kV line	Replace Battleboro substation terminal equipment. Upgrading the breaker leads at Battleboro will bring the rating to 398 MVA. Note : Duke/Progress Energy portion of this line will need to be studied under Duke’s FERC tariff process	n6118	\$100,000	\$0
Total Contribution to Previous Network Upgrades				\$100,000	\$0

Potential Congestion due to Local Energy Deliverability

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

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

Overload Number	Type	Contingency Name	Affected Area	Facility Description	Bus		Circuit	Power Flow	Loading %		Rating		MW Contribution
					From	To			Initial	Final	Type	MVA	
5	N-1	LN 563	DVP - DVP	6CHARCTY-6LAKESD 230 kV line	314225	314227	1	AC	99.45	100.14	ER	375	3.04
6	N-1	LN 254_A	DVP - DVP	6CLUBHSE 230/115 kV transformer	314562	314563	1	AC	100.87	103.17	ER	183	4.95
7	N-1	LN 1015_AC1-098 B	DVP - DVP	3COX DP-3WITAKRS 115 kV line	314577	314623	1	AC	93.75	118.03	ER	134	33.52
8	N-1	LN 81_A	DVP - DVP	3WITAKRS-3BTLEBRO 115 kV	314623	314554	1	AC	92.66	118.13	ER	134	34.35
9	N-1	LN 2012	DVP - DVP	AB2-100 TAP-6CLUBHSE 230 kV line	924510	314563	1	AC	109.3	111.37	ER	375	8.11

Light Load Analysis

Light Load Analysis is not required for solar projects.

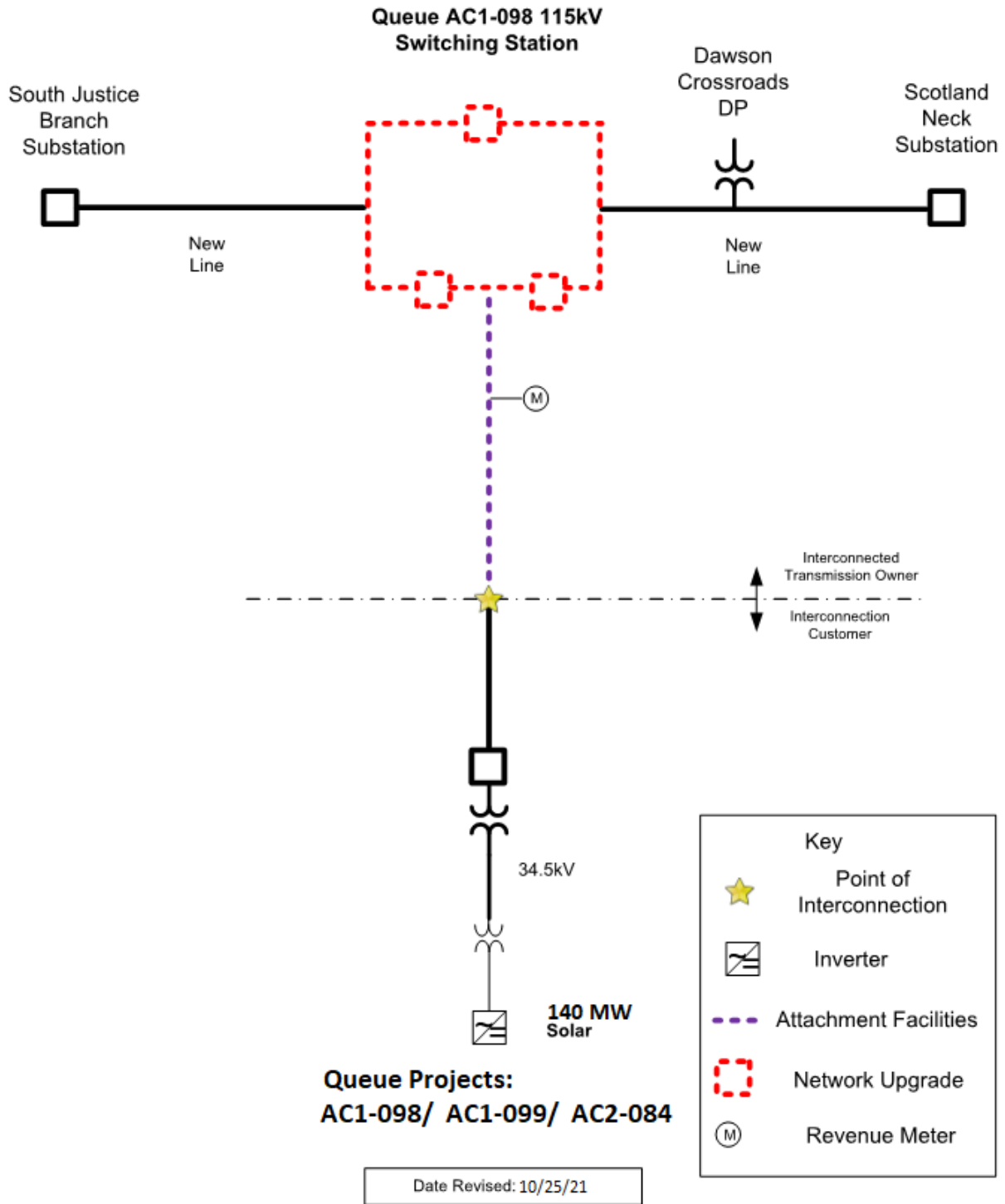
Affected System Analysis & Mitigation

Duke Energy Impacts:

Enter into an Affected System Facilities Study agreement with Duke / Progress Energy (DEP) to determine how to mitigate Battleboro – Rocky Mt. 115kV overload. The upgrade will likely be a complete reconductor, probably replacing structures.

Attachment 1.

System Configuration



Appendices

The following appendices contain additional information about each flowgate presented in the body of the report. For each appendix, a description of the flowgate and its contingency was included for convenience. However, the intent of the appendix section is to provide more information on which projects/generators have contributions to the flowgate in question. All New Service Queue Requests, through the end of the Queue under study, that are contributors to a flowgate will be listed in the Appendices. Please note that there may be contributors that are subsequently queued after the queue under study that are not listed in the Appendices. Although this information is not used "as is" for cost allocation purposes, it can be used to gage the impact of other projects/generators.

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

Appendix 1

(DVP - DVP) The 6MESSER-6CHARCTY 230 kV line (from bus 314228 to bus 314225 ckt 1) loads from 99.98% to 100.56% (AC power flow) of its load dump rating (459 MVA) for the line fault with failed breaker contingency outage of '562T563'. This project contributes approximately 3.13 MW to the thermal violation.

CONTINGENCY '562T563'

/*CARSON

OPEN BRANCH FROM BUS 314902 TO BUS 314923 CKT 1

/*CARSON TO

MIDLOTHIAN

OPEN BRANCH FROM BUS 314914 TO BUS 314902 CKT 1

/*CARSON 500.00

- 8SEPTA 500.00

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315065	1CHESTF6	24.86
315074	1HOPCGN1	4.62
315075	1HOPCGN2	4.56
315073	1STONECA	3.83
314314	3LOCKS	0.79
314539	3UNCAMP	0.75
314541	3WATKINS	0.22
932591	AC2-079 C O1	2.14
932592	AC2-079 E O1	3.5
932631	AC2-084 C	2.1
932632	AC2-084 E	1.03
900672	V4-068 E	0.1
907092	X1-038 E	1.88
916302	Z1-086 E	2.95
917332	Z2-043 E	0.31
921162	AA1-063AC	2.89
921163	AA1-063AE	1.36

918512	AA1-065 E OP	1.35
918562	AA1-072 E	0.05
921752	AA2-053 C	2.97
921753	AA2-053 E	1.27
921762	AA2-057 C	2.24
921763	AA2-057 E	1.12
921982	AA2-088 C	2.08
921983	AA2-088 E	3.39
922442	AA2-165 C	0.31
922443	AA2-165 E	0.15
922512	AA2-174 C	0.14
922513	AA2-174 E	0.15
923262	AB1-132 C OP	5.32
923263	AB1-132 E OP	2.28
923572	AB1-173 C OP	0.88
923573	AB1-173 E OP	0.41
923582	AB1-173AC OP	0.88
923583	AB1-173AE OP	0.41
923801	AB2-015 C OP	2.69
923802	AB2-015 E OP	2.21
923851	AB2-025 C	1.35
923852	AB2-025 E	0.61
923911	AB2-031 C OP	0.87
923912	AB2-031 E OP	0.43
923991	AB2-040 C OP	2.86
923992	AB2-040 E OP	2.34

924061	AB2-050	-1.09
924501	AB2-099 C	0.18
924502	AB2-099 E	0.08
924511	AB2-100 C	5.32
924512	AB2-100 E	2.62
924811	AB2-134 C OP	5.73
924812	AB2-134 E OP	5.63
925051	AB2-160 C OP	3.22
925052	AB2-160 E OP	5.25
925061	AB2-161 C OP	1.55
925062	AB2-161 E OP	2.53
925171	AB2-174 C OI	2.79
925172	AB2-174 E OI	2.53
925331	AB2-190 C	8.59
925332	AB2-190 E	3.68
926601	ACI-061	0.02
926851	ACI-086 C	7.84
926852	ACI-086 E	3.57
926981	ACI-099 C	2.62
926982	ACI-099 E	1.56
927411	ACI-134	-2.72
928191	ACI-208 C OI	2.93
928192	ACI-208 E OI	1.3
928271	ACI-216 C OP	4.37
928272	ACI-216 E OP	3.44

Appendix 2

(DVP - DVP) The 6CHSTF B-6MESSER 230 kV line (from bus 314287 to bus 314228 ckt 1) loads from 99.72% to 100.31% (AC power flow) of its load dump rating (459 MVA) for the line fault with failed breaker contingency outage of 'T672B'. This project contributes approximately 3.19 MW to the thermal violation.

```

CONTINGENCY 'T672B'                                /* _ BASIN
  OPEN BRANCH FROM BUS 314276 TO BUS 314260 CKT 1    /*L284 BASIN
VARINA
  OPEN BRANCH FROM BUS 314275 TO BUS 314276 CKT 1    /*L2055 BASIN
BELLMEADE
  REMOVE MACHINE 1 FROM BUS 315053                   /*BELMEADE GEN CT-1
  REMOVE MACHINE 2 FROM BUS 315054                   /*BELMEADE GEN CT-2
  REMOVE MACHINE 3 FROM BUS 315055                   /*BELMEADE GEN ST
  OPEN BRANCH FROM BUS 314274 TO BUS 314276 CKT 1    /*BASIN TX5
  OPEN BRANCH FROM BUS 314274 TO BUS 314276 CKT 2    /*BASIN TX6
  OPEN BRANCH FROM BUS 314276 TO BUS 314287 CKT 1    /*L259 BASIN
CHESTERFIELD
  OPEN BRANCH FROM BUS 314276 TO BUS 314339 CKT 1    /*L2065 BASIN
SPRUANCE NUG
END

```

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315065	1CHESTF6	34.57
315074	1HOPCGN1	6.18
315075	1HOPCGN2	6.1
315077	1HOPHCF1	1.78
315078	1HOPHCF2	1.78
315079	1HOPHCF3	1.78
315080	1HOPHCF4	2.7
315076	1HOPPOLC	1.52
315073	1STONECA	5.12
314314	3LOCKS	1.
314539	3UNCAMP	0.8
314541	3WATKINS	0.23

932591	AC2-079 C OI	2.49
932592	AC2-079 E OI	4.07
932631	AC2-084 C	2.14
932632	AC2-084 E	1.05
900672	V4-068 E	0.1
907092	X1-038 E	2.01
917332	Z2-043 E	0.32
921162	AA1-063AC	3.04
921163	AA1-063AE	1.43
918512	AA1-065 E OP	1.39
918562	AA1-072 E	0.05
921752	AA2-053 C	3.11
921753	AA2-053 E	1.33
921762	AA2-057 C	2.24
921763	AA2-057 E	1.12
921982	AA2-088 C	2.2
921983	AA2-088 E	3.59
922442	AA2-165 C	0.31
922443	AA2-165 E	0.15
922512	AA2-174 C	0.14
922513	AA2-174 E	0.15
923262	AB1-132 C OP	5.72
923263	AB1-132 E OP	2.45
923572	AB1-173 C OP	0.95
923573	AB1-173 E OP	0.44
923582	AB1-173AC OP	0.95

923583	<i>AB1-173AE OP</i>	0.44
923801	<i>AB2-015 C OP</i>	2.87
923802	<i>AB2-015 E OP</i>	2.36
923851	<i>AB2-025 C</i>	1.57
923852	<i>AB2-025 E</i>	0.71
923911	<i>AB2-031 C OP</i>	0.94
923912	<i>AB2-031 E OP</i>	0.46
923991	<i>AB2-040 C OP</i>	3.09
923992	<i>AB2-040 E OP</i>	2.53
924061	<i>AB2-050</i>	-1.22
924501	<i>AB2-099 C</i>	0.19
924502	<i>AB2-099 E</i>	0.08
924511	<i>AB2-100 C</i>	6.
924512	<i>AB2-100 E</i>	2.96
924811	<i>AB2-134 C OP</i>	7.39
924812	<i>AB2-134 E OP</i>	7.26
925051	<i>AB2-160 C OP</i>	4.06
925052	<i>AB2-160 E OP</i>	6.63
925061	<i>AB2-161 C OP</i>	1.88
925062	<i>AB2-161 E OP</i>	3.08
925171	<i>AB2-174 C OI</i>	3.03
925172	<i>AB2-174 E OI</i>	2.74
925331	<i>AB2-190 C</i>	11.
925332	<i>AB2-190 E</i>	4.72
926601	<i>AC1-061</i>	0.03
926851	<i>AC1-086 C</i>	8.43

<i>926852</i>	<i>ACI-086 E</i>	<i>3.84</i>
<i>926981</i>	<i>ACI-099 C</i>	<i>2.67</i>
<i>926982</i>	<i>ACI-099 E</i>	<i>1.58</i>
<i>927411</i>	<i>ACI-134</i>	<i>-3.05</i>
<i>928191</i>	<i>ACI-208 C OI</i>	<i>2.98</i>
<i>928192</i>	<i>ACI-208 E OI</i>	<i>1.32</i>
<i>928271</i>	<i>ACI-216 C OP</i>	<i>5.64</i>
<i>928272</i>	<i>ACI-216 E OP</i>	<i>4.43</i>

Appendix 3

(DVP - CPLE) The 3BTLEBRO-3ROCKYMT115T 115 kV line (from bus 314554 to bus 304223 ckt 1) loads from 152.2% to 159.64% (AC power flow) of its emergency rating (164 MVA) for the tower line contingency outage of 'LN 2058-2181'. This project contributes approximately 12.77 MW to the thermal violation.

CONTINGENCY 'LN 2058-2181'

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

OPEN BRANCH FROM BUS 304222 TO BUS 313845 CKT 1 /* 6ROCKYMT230T230.00 - 6HATHAWAY 230.00

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
315131	1EDGECEMA	11.6
315132	1EDGECEMB	11.6
315139	1GASTONA	2.29
315141	1GASTONB	2.29
315126	1ROARAP2	0.95
315128	1ROARAP4	0.91
315136	1ROSEMG1	1.85
315138	1ROSEMG2	0.87
315137	1ROSEMS1	1.15
932631	AC2-084 C	8.56
932632	AC2-084 E	4.22
900672	V4-068 E	0.15
917331	Z2-043 C	0.35
917332	Z2-043 E	0.83

<i>917341</i>	<i>Z2-044 C</i>	<i>0.52</i>
<i>917342</i>	<i>Z2-044 E</i>	<i>1.25</i>
<i>917511</i>	<i>Z2-088 C OP1</i>	<i>0.67</i>
<i>917512</i>	<i>Z2-088 E OP1</i>	<i>2.96</i>
<i>918411</i>	<i>AA1-050</i>	<i>0.56</i>
<i>921162</i>	<i>AA1-063AC</i>	<i>4.89</i>
<i>921163</i>	<i>AA1-063AE</i>	<i>2.31</i>
<i>918512</i>	<i>AA1-065 E OP</i>	<i>1.96</i>
<i>921183</i>	<i>AA1-067 E</i>	<i>0.32</i>
<i>918561</i>	<i>AA1-072 C</i>	<i>0.05</i>
<i>918562</i>	<i>AA1-072 E</i>	<i>0.14</i>
<i>921752</i>	<i>AA2-053 C</i>	<i>5.44</i>
<i>921753</i>	<i>AA2-053 E</i>	<i>2.33</i>
<i>921762</i>	<i>AA2-057 C</i>	<i>12.9</i>
<i>921763</i>	<i>AA2-057 E</i>	<i>6.45</i>
<i>921982</i>	<i>AA2-088 C</i>	<i>2.95</i>
<i>921983</i>	<i>AA2-088 E</i>	<i>4.81</i>
<i>922442</i>	<i>AA2-165 C</i>	<i>1.76</i>
<i>922443</i>	<i>AA2-165 E</i>	<i>0.85</i>
<i>922512</i>	<i>AA2-174 C</i>	<i>0.25</i>
<i>922513</i>	<i>AA2-174 E</i>	<i>0.27</i>
<i>922922</i>	<i>AB1-081 C OP</i>	<i>20.09</i>
<i>922923</i>	<i>AB1-081 E OP</i>	<i>8.61</i>
<i>923262</i>	<i>AB1-132 C OP</i>	<i>9.78</i>
<i>923263</i>	<i>AB1-132 E OP</i>	<i>4.19</i>
<i>923572</i>	<i>AB1-173 C OP</i>	<i>1.22</i>

923573	<i>AB1-173 E OP</i>	0.57
923582	<i>AB1-173AC OP</i>	1.22
923583	<i>AB1-173AE OP</i>	0.57
923911	<i>AB2-031 C OP</i>	1.21
923912	<i>AB2-031 E OP</i>	0.6
923991	<i>AB2-040 C OP</i>	3.97
923992	<i>AB2-040 E OP</i>	3.25
924151	<i>AB2-059 C</i>	23.68
924152	<i>AB2-059 E</i>	12.2
924501	<i>AB2-099 C</i>	0.32
924502	<i>AB2-099 E</i>	0.14
924511	<i>AB2-100 C</i>	5.36
924512	<i>AB2-100 E</i>	2.64
925171	<i>AB2-174 C OI</i>	3.63
925172	<i>AB2-174 E OI</i>	3.28
926331	<i>AC1-034 C</i>	15.34
926332	<i>AC1-034 E</i>	11.57
926851	<i>AC1-086 C</i>	14.4
926852	<i>AC1-086 E</i>	6.55
926981	<i>AC1-099 C</i>	10.69
926982	<i>AC1-099 E</i>	6.34
<i>LTF</i>	<i>AC1-133</i>	9.09
927991	<i>AC1-189 C</i>	5.16
927992	<i>AC1-189 E</i>	2.57
928191	<i>AC1-208 C OI</i>	12.54
928192	<i>AC1-208 E OI</i>	5.57