



Generation Interconnection

Feasibility Study Report

for

Queue Project AF1-143

LICK RUN 115 KV

60 MW Capacity / 100 MW Energy

January 2020

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1 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 Mid-Atlantic Interstate Transmission, LLC (MAIT), PENELEC Zone.

2 Preface

The intent of the feasibility study is to determine a plan, with ballpark cost and construction time estimates, to connect the subject generation to the PJM network at a location specified by the Interconnection Customer. The Interconnection Customer may request the interconnection of generation as a capacity resource or as an energy-only resource. As a requirement for interconnection, the Interconnection Customer 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. Cost allocation rules for network upgrades can be found in PJM Manual 14A, Attachment B. 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 Interconnection Customer seeking to interconnect a wind or solar generation facility shall maintain meteorological data facilities as well as provide that meteorological data which is required per Schedule H to the Interconnection Service Agreement and Section 8 of Manual 14D.

An Interconnection Customer 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.

PJM utilizes manufacturer models to ensure the performance of turbines is properly captured during the simulations performed for stability verification and, where applicable, for compliance with low voltage ride through requirements. Turbine manufacturers provide such models to their customers. The list of manufacturer models PJM has already validated is contained in Attachment B of Manual 14G. Manufacturer models may be updated from time to time, for various reasons such as to reflect changes to the control systems or to more accurately represent the capabilities turbines and controls which are currently available in the field. Additionally, as new turbine models are developed, turbine manufacturers provide such new models which must be used in the conduct of these studies. PJM needs adequate time to evaluate the new models in

order to reduce delays to the System Impact Study process timeline for the Interconnection Customer as well as other Interconnection Customers in the study group. Therefore, PJM will require that any Interconnection Customer with a new manufacturer model must supply that model to PJM, along with a \$10,000 fully refundable deposit, no later than three (3) months prior to the starting date of the System Impact Study (See Section 4.3 for starting dates) for the Interconnection Request which shall specify the use of the new model. The Interconnection Customer will be required to submit a completed dynamic model study request form (Attachment B-1 of Manual 14G) in order to document the request for the study.

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 project developer 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.

3 General

The Interconnection Customer (IC), has proposed a Solar generating facility located in Somerset County, Pennsylvania. The installed facilities will have a total capability of 100 MW with 60 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is June 1, 2023. This study does not imply a TO commitment to this in-service date.

Queue Number	AF1-143
Project Name	LICK RUN 115 KV
State	Pennsylvania
County	Somerset
Transmission Owner	MAIT (PENELEC Zone)
MFO	100
MWE	100
MWC	60
Fuel	Solar
Basecase Study Year	2023

3.1 Point of Interconnection

AF1-143 will interconnect behind the existing meter point for the L13 project at Lick Run 115 kV substation.

Attachment 1 shows a one-line diagram of the proposed primary direct connection facilities for the AF1-143 and L13 generation projects to connect to the FirstEnergy (“FE”) transmission system. IC will be responsible for constructing the facilities on its side of the POI, including the attachment facilities which connect the generator to the FE transmission system’s direct connection facilities.

3.2 Cost Summary

The AF1-143 project will be responsible for the following costs:

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

There are no direct or non-direct connection facility upgrades to accommodate this queue request.

In addition, the AF1-143 project may be responsible for a contribution to the following costs

Description	Total Cost
System Upgrades	\$ 63,206,850

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

The costs provided above exclude the Contribution in Aid of Construction (“CIAC”) Federal Income Tax Gross Up charge. If, at a future date, it is determined that the CIAC Federal Income Tax Gross charge is required, the Transmission Owner shall be reimbursed by the Interconnection Customer for such taxes.

4 Transmission Owner Scope of Work

AF1-143 will interconnect behind the existing meter point for the L13 project at Lick Run 115 kV substation. No modification of the FE connection facilities are required to accommodate this capacity increase.

5 Attachment Facilities

There is no Attachment Facility scope of work required.

6 Direct Connection Cost Estimate

There is no Direct Connection scope of work required.

7 Non-Direct Connection Cost Estimate

There is no Non-Direct Connection scope of work required.

8 Schedule

The schedule for the required Network Impact Reinforcements will be more clearly identified in future study phases. The estimate elapsed time to complete each of the required reinforcements is identified in the “System Reinforcements” section of the report.

9 Transmission Owner Analysis

9.1 Power Flow Analysis

FE performed an analysis of its underlying transmission <100 kV system. The AF1-143 project did not contribute to any overloads on the FE transmission <100 kV system.

10 Interconnection Customer Requirements

System Protection

The IC must design its Customer Facilities in accordance with all applicable standards, including the standards in FE's "Requirements for Transmission Connected Facilities" document located at:

<http://www.pjm.com/planning/design-engineering/to-tech-standards/private-firstenergy.aspx>.

Preliminary Protection requirements will be provided as part of the Facilities Study. Detailed Protection Requirements will be provided once the project enters the construction phase.

The original one-line diagram provided by the IC depicts a non-standard GSU transformer winding configuration. This transformer is in violation of section 14.2.6 of FE's "Requirements for Transmission Connected Facilities" document and will not be accepted. The GSU transformer must have a grounded wye connection on the high (utility) side and a delta connection on the low (generator) side.

Compliance Issues and Interconnection Customer Requirements

The proposed Customer Facilities must be designed in accordance with FE's "Requirements for Transmission Connected Facilities" document located at: <http://www.pjm.com/planning/design-engineering/to-tech-standards/private-firstenergy.aspx>. In particular, the IC is responsible for the following:

1. The purchase and installation of a fully rated 115 kV circuit breaker to protect the AF1-143 generator lead line. A single circuit breaker must be used to protect this line; if the project has several GSU transformers, the individual GSU transformer breakers cannot be used to protect this line.
2. The purchase and installation of the minimum required FE generation interconnection relaying and control facilities. This includes over/under voltage protection, over/under frequency protection, and zero sequence voltage protection relays.
3. The purchase and installation of supervisory control and data acquisition ("SCADA") equipment to provide information in a compatible format to the FE Transmission System Control Center.
4. Compliance with the FE and PJM generator power factor and voltage control requirements.
5. The execution of a back-up service agreement to serve the customer load supplied from the AF1-043 generation project metering point when the units are out-of-service. This assumes the intent of the IC is to net the generation with the load.

The IC will also be required to meet all PJM, ReliabilityFirst, and NERC reliability criteria and operating procedures for standards compliance. For example, the IC will need to properly locate and report the over and under voltage and over and under frequency system protection elements for its units as well as the submission of the generator model and protection data required to satisfy the PJM and ReliabilityFirst audits.

Failure to comply with these requirements may result in a disconnection of service if the violation is found to compromise the reliability of the FE system.

Power Factor Requirements

The IC shall design its solar Customer Facility with the ability to maintain a power factor of at least 0.95 leading (absorbing VARs) to 0.95 lagging (supplying VARs) measured at the high-side of the facility substation transformer(s) connected to the FE transmission system.

11 Revenue Metering and SCADA Requirements

11.1 PJM Requirements

The Interconnection Customer 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 Section 8 of Attachment O.

11.2 PENELEC Requirements

The IC will be required to comply with all FE revenue metering requirements for generation interconnection customers which can be found in FE's "Requirements for Transmission Connected Facilities" document located at: <http://www.pjm.com/planning/design-engineering/to-tech-standards/private-firstenergy.aspx>

12 Network Impacts

The Queue Project AF1-143 was evaluated as a 100.0 MW (Capacity 60.0 MW) injection behind the existing meter point for the L13 project at Lick Run 115 kV substation. Project AF1-143 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AF1-143 was studied with a commercial probability of 0.53. Potential network impacts were as follows:

Summer Peak Load Flow

12.1 Generation Deliverability

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

None

12.2 Multiple Facility Contingency

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

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CK T ID	CONT NAME	Type	Rating MVA	PRE PROJE T LOADIN G %	POST PROJE T LOADIN G %	AC D C	MW IMPAC T
41560944	200747	26PENN-MAR	115.0	PENELEC	946190	AF1-284 TAP	115.0	PENELEC	1	PN-P2-3-PN-115-35E	breaker	167.0	95.11	127.99	DC	54.9
41560969	202650	26HIGHPOINT	115.0	PENELEC	200747	26PENN-MAR	115.0	PENELEC	1	PN-P2-3-PN-115-35E	breaker	174.0	88.08	119.64	DC	54.9

12.3 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)

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CK T ID	CONT NAME	Type	Rating MVA	PRE PROJE T LOADIN G %	POST PROJE T LOADIN G %	AC D C	MW IMPAC T
41561452	200740	26BLRSVLE	115.0	PENEL EC	200763	26BLAIRSVL	138.0	PENEL EC	1	PN_P4-500-001J	breaker	364.0	103.44	104.27	DC	6.67
42172802	200767	26HOMERCT	230.0	PENEL EC	200795	26SHELOC TA	230.0	PENEL EC	1	PN_P4-500-002A	breaker	917.0	148.1	150.8	DC	24.33
42172803	200767	26HOMERCT	230.0	PENEL EC	200795	26SHELOC TA	230.0	PENEL EC	1	PN_P4-500-002F	breaker	917.0	148.12	150.81	DC	24.33
42464100	200767	26HOMERCT	230.0	PENEL EC	200795	26SHELOC TA	230.0	PENEL EC	1	Base Case	single	731.0	111.66	113.1	DC	10.34
42172812	200795	26SHELOC TA	230.0	PENEL EC	200810	26KEYSTO NE	230.0	PENEL EC	1	PN_P4-500-002F	breaker	917.0	127.84	130.77	DC	26.48
42172813	200795	26SHELOC TA	230.0	PENEL EC	200810	26KEYSTO NE	230.0	PENEL EC	1	PN_P4-500-002A	breaker	917.0	127.84	130.77	DC	26.48
42172918	200810	26KEYSTO NE	230.0	PENEL EC	999401	STAR592	1.0	PJM	4	PJM500_PN_P4-500-001A	breaker	635.0	107.1	109.35	DC	14.07
42172919	200810	26KEYSTO NE	230.0	PENEL EC	999401	STAR592	1.0	PJM	4	PJM500_PN_P4-500-001D	breaker	635.0	107.08	109.33	DC	14.07
41561125	999401	STAR592	1.0	PJM	200011	KEYSTONE	500.0	PJM	4	PJM500_PN_P4-500-001D	breaker	634.0	106.53	108.78	DC	14.07
41561126	999401	STAR592	1.0	PJM	200011	KEYSTONE	500.0	PJM	4	PJM500_PN_P4-500-001A	breaker	634.0	106.53	108.78	DC	14.07

12.4 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 developer 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.

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CK T ID	CONT NAME	Type	Rating MVA	PRE PROJE CT LOADING %	POST PROJE CT LOADING %	AC DC	MW IMPACT
41231005	200740	26BLRSVLE	115.0	PENEL EC	200763	26BLAIRSVL	138.0	PENEL EC	1	PJM_P1_APS_B_G692	operation	364.0	102.91	103.67	DC	6.21
41230373	200746	26ROCKWOOD	115.0	PENEL EC	200744	26SOMERT	115.0	PENEL EC	1	AP-P1-3-PN-115-010	operation	179.0	115.25	171.09	DC	99.97
41230378	200746	26ROCKWOOD	115.0	PENEL EC	200744	26SOMERT	115.0	PENEL EC	1	Base Case	operation	148.0	67.04	113.98	DC	69.47
41230694	200746	26ROCKWOOD	115.0	PENEL EC	202650	26HIGHPOINT	115.0	PENEL EC	1	PN-P1-2-PN-115-068	operation	179.0	78.73	134.58	DC	99.98
41230696	200746	26ROCKWOOD	115.0	PENEL EC	202650	26HIGHPOINT	115.0	PENEL EC	1	Base Case	operation	148.0	88.8	109.42	DC	30.52
41230406	200747	26PENNMAR	115.0	PENEL EC	946190	AF1-284TAP	115.0	PENEL EC	1	PN-P1-2-PN-115-068	operation	167.0	113.87	173.73	DC	99.98
41230408	200747	26PENNMAR	115.0	PENEL EC	946190	AF1-284TAP	115.0	PENEL EC	1	Base Case	operation	137.0	111.59	133.86	DC	30.51
41230289	200762	26GARRET T	115.0	PENEL EC	235470	01GARRET	115.0	AP	1	PN-P1-2-PN-115-068	operation	160.0	130.56	193.04	DC	99.97
41230291	200762	26GARRET T	115.0	PENEL EC	235470	01GARRET	115.0	AP	1	Base Case	operation	133.0	123.8	146.73	DC	30.5
42464094	200767	26HOMERCT	230.0	PENEL EC	200795	26SHELOCTA	230.0	PENEL EC	1	PN-P1-3-PN-230-001T	operation	917.0	143.4	146.1	DC	24.36
42464095	200767	26HOMERCT	230.0	PENEL EC	200795	26SHELOCTA	230.0	PENEL EC	1	PN-P1-2-PN-230-025	operation	917.0	143.4	146.1	DC	24.36
42464096	200767	26HOMERCT	230.0	PENEL EC	200795	26SHELOCTA	230.0	PENEL EC	1	Base Case	operation	731.0	146.91	149.3	DC	17.23
42464110	200795	26SHELOCTA	230.0	PENEL EC	200810	26KEYSTONE	230.0	PENEL EC	1	PN-P1-2-PN-230-025	operation	917.0	122.49	125.42	DC	26.51
42464111	200795	26SHELOCTA	230.0	PENEL EC	200810	26KEYSTONE	230.0	PENEL EC	1	PN-P1-3-PN-230-001T	operation	917.0	122.49	125.42	DC	26.51
42464112	200795	26SHELOCTA	230.0	PENEL EC	200810	26KEYSTONE	230.0	PENEL EC	1	Base Case	operation	731.0	124.86	127.5	DC	18.99
42464310	200810	26KEYSTONE	230.0	PENEL EC	999401	STAR592	1.0	PJM	4	PN-P1-3-PN-500-001AT	operation	635.0	100.7	102.95	DC	14.1
41230401	200856	26LICKRUN	115.0	PENEL EC	200746	26ROCKWOOD	115.0	PENEL EC	1	Base Case	operation	137.0	103.08	176.06	DC	99.98
41230457	202650	26HIGHPOINT	115.0	PENEL EC	200747	26PENNMAR	115.0	PENEL EC	1	PN-P1-2-PN-115-068	operation	174.0	105.93	163.39	DC	99.98
41230459	202650	26HIGHPOINT	115.0	PENEL EC	200747	26PENNMAR	115.0	PENEL EC	1	Base Case	operation	137.0	107.56	129.83	DC	30.51
41230357	946190	AF1-284TAP	115.0	PENEL EC	200762	26GARRET T	115.0	PENEL EC	1	PN-P1-2-PN-115-068	operation	167.0	113.75	173.61	DC	99.98
41230359	946190	AF1-284TAP	115.0	PENEL EC	200762	26GARRET T	115.0	PENEL EC	1	Base Case	operation	137.0	111.65	133.92	DC	30.51
41230728	999401	STAR592	1.0	PJM	200011	KEYSTONE	500.0	PJM	4	PN-P1-3-PN-500-001AT	operation	634.0	100.13	102.39	DC	14.1

13 System Reinforcements

ID	Index	Facility	Upgrade Description	Cost
42172918,42172919	6	26KEYSTONE 230.0 kV - STAR592 1.0 kV Ckt 4	PENELEC PN-AF1-F-0046a: Replace transformer. Replace substation conductor at Keystone (3A) Project Type : FAC Cost : \$26,180,000 Time Estimate : 24.0 Months	\$26,180,000
41561125,41561126	7	STAR592 1.0 kV - KEYSTONE 500.0 kV Ckt 4		
41560944	1	26PENN-MAR 115.0 kV - AF1-284 TAP 115.0 kV Ckt 1	PENELEC PN-AF1-F-0037: Reconductor Penn Mar - AF1-284 115 kV (~4 miles) Project Type : FAC Cost : \$7,497,000 Time Estimate : 6.0 Months	\$7,497,000
41561452	3	26BLRSVL E 115.0 kV - 26BLAIRSVL 138.0 kV Ckt 1	PENELEC PN-AF1-F-0088a: At Blairsville East substation, replace the 138/115 kV transformer. Project Type : FAC Cost : \$4,165,000 Time Estimate : 24.0 Months PN-AF1-F-0088b: At Blairsville East, replace the transformer circuit breaker. Project Type : FAC Cost : \$595,000 Time Estimate : 12.0 Months PN-AF1-F-0088c: At Blairsville, replace disconnect switches. Project Type : FAC Cost : \$714,000 Time Estimate : 12.0 Months Note: AF1-143 currently has a cost responsibility for the above upgrade. The following baseline project is "on-hold"; if the following baseline project is approved for construction, then AF1-143 will not have a cost responsibility and can take advantage of the following baseline project. If additional mitigations beyond the following baseline project are needed, AF1-143 will have a cost responsibility for those additional mitigations. b3073 : PJM Baseline Upgrade b3073: Replace the Blairsville East 138/115 kV transformer and associated equipment such as breaker disconnects and bus conductor. The baseline project has a projected in-service date of 06/01/2022.	\$5,474,000

ID	Index	Facility	Upgrade Description	Cost
42464100,42172802, 42172803	4	26HOMER CT 230.0 kV - 26SHELOCTA 230.0 kV Ckt 1	<p>PENELEC PN-AF1-F-0040a: Replace Wave Trap at Homer City Project Type : FAC Cost : \$119,000 Time Estimate : 9.0 Months</p> <p>PN-AF1-F-0040b: Reconductor Homer City - Sheloctoa 230 kV (~11 miles) Project Type : FAC Cost : \$19,188,750 Time Estimate : 6.0 Months</p> <p>PN-AF1-F-0040c: Replace line drops at Shelocta Project Type : FAC Cost : \$119,000 Time Estimate : 6.0 Months</p> <p>PN-AF1-F-0040d: Replace disconnect switch at Shelocta Project Type : FAC Cost : \$119,000 Time Estimate : 9.0 Months</p>	\$19,545,750
41560969	2	26HIGHPOINT 115.0 kV - 26PENN-MAR 115.0 kV Ckt 1	<p>PENELEC s1770.1: Supplemental upgrade s1770.1: Penn Mar – High Point – Rockwood 115 kV Line, Rebuild/reconductor approximately 14.8 miles of wood pole construction. The supplemental project has a projected in-service date of 06/01/2020. Project Type: CON Cost : \$0</p> <p>s1770.2: Supplemental upgrade s1770.2: Rockwood 115 kV Substation - Adjust CT ratios and replace substation conductor and breaker disconnect (on Penn Mar – High Point – Rockwood 115 kV Line). The supplemental project has a projected in-service date of 06/01/2020. Project Type: CON Cost : \$0</p> <p>s1770.3: Supplemental upgrade s1770.3: Penn Mar 115 kV Substation - Adjust relaying and replace CTs, substation conductor, line drops, circuit breaker and disconnect switches (on Penn Mar – High Point – Rockwood 115 kV Line). The supplemental project has a projected in-service date of 06/01/2020. Project Type: CON Cost : \$0</p>	\$0

ID	Index	Facility	Upgrade Description	Cost
42172813,42172812	5	26SHELOCTA 230.0 kV - 26KEYSTONE 230.0 kV Ckt 1	<p>PENELEC PN-AF1-F-0044a : Replace Wave Trap at Keystone Project Type : FAC Cost : \$119,000 Time Estimate : 9.0 Months</p> <p>PN-AF1-F-0044b : Reconductor Shelocta - Keystone 230 kV (~3 miles) Project Type : FAC Cost : \$4,034,100 Time Estimate : 6.0 Months</p> <p>PN-AF1-F-0044c : Replace substation conductor at Shelocta and Keystone Project Type : FAC Cost : \$178,500 Time Estimate : 6.0 Months</p> <p>PN-AF1-F-0044d: Replace disconnect switch at Shelocta Project Type : FAC Cost : \$178,500 Time Estimate : 6.0 Months</p>	\$4,510,100
			TOTAL COST	\$63,206,850

14 Flow Gate Details

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

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14.1 Index 1

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
41560944	200747	26PENN-MAR	PENELEC	946190	AF1-284 TAP	PENELEC	1	PN-P2-3-PN-115-35E	breaker	167.0	95.11	127.99	DC	54.9

Bus #	Bus	MW Impact
200813	26YOUGH	0.5784
200834	26SW_E13_K22	0.1183
200835	26DSGENWIN	0.7969
200864	K-013 E	1.7927
200889	26STNY CRK	0.4819
200890	26BF_G21_K23	0.3908
200891	26CSLMN_L13	0.6130
200892	26LOOKOUT	0.5824
202225	26SCI_S29B	0.1840
202652	26RGH_Y1-033	0.4493
292350	K-023	18.0618
292542	L-013 1	17.5677
293432	R-040 E	0.9882
293902	O-048 E	15.8109
294903	P-060 E	13.8083
913142	Y1-033 E OP1	21.9875
917672	Z2-108 E	9.8818
938351	AE1-053	5.4899
938881	AE1-116	2.1183
938991	AE1-128 C	10.8166
938992	AE1-128 E	7.2110
942361	AE2-249 C	1.2169
942362	AE2-249 E	0.8112
943711	AF1-039 C O1	5.8168
943712	AF1-039 E O1	3.8779
944781	AF1-143 C	32.9394
944782	AF1-143 E	21.9596
945671	AF1-232 C O1	37.7374
945672	AF1-232 E O1	20.3202
945901	AF1-255 C	0.6997
945902	AF1-255 E	0.9663
946081	AF1-273 C O1	21.7716
946082	AF1-273 E O1	14.5144
946241	AF1-289 C O1	0.9499
946242	AF1-289 E O1	0.6333
DUCKCREEK	DUCKCREEK	0.2407
NEWTON	NEWTON	0.2310
FARMERCITY	FARMERCITY	0.0121
G-007A	G-007A	0.6401
VFT	VFT	1.7609
PRAIRIE	PRAIRIE	0.5631

Bus #	Bus	MW Impact
COFFEEN	COFFEEN	0.1131
EDWARDS	EDWARDS	0.0728
CHEOAH	CHEOAH	0.1206
TILTON	TILTON	0.1323
GIBSON	GIBSON	0.1174
CALDERWOOD	CALDERWOOD	0.1198
BLUEG	BLUEG	0.3767
TRIMBLE	TRIMBLE	0.1208
CATAWBA	CATAWBA	0.0889

14.2 Index 2

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
41560969	202650	26HIGHPOINT	PENELEC	200747	26PENN-MAR	PENELEC	1	PN-P2-3-PN-115-35E	breaker	174.0	88.08	119.64	DC	54.9

Bus #	Bus	MW Impact
200834	26SW_E13_K22	0.1183
200835	26DSGENWIN	0.7970
200864	K-013 E	1.7933
200889	26STNY CRK	0.4819
200890	26BF_G21_K23	0.3908
200891	26CSLMN_L13	0.6131
200892	26LOOKOUT	0.5824
202225	26SCI_S29B	0.1840
202652	26RGH_Y1-033	0.4493
292350	K-023	18.0628
292542	L-013 1	17.5686
293432	R-040 E	0.9882
293902	O-048 E	15.8118
294903	P-060 E	13.8096
913142	Y1-033 E OP1	21.9885
917672	Z2-108 E	9.8824
938351	AE1-053	5.4902
938881	AE1-116	2.1185
938991	AE1-128 C	10.8187
938992	AE1-128 E	7.2125
942361	AE2-249 C	1.2171
942362	AE2-249 E	0.8114
943711	AF1-039 C O1	5.8171
943712	AF1-039 E O1	3.8780
944781	AF1-143 C	32.9412
944782	AF1-143 E	21.9608
945671	AF1-232 C O1	37.7416
945672	AF1-232 E O1	20.3224
945901	AF1-255 C	0.6999
945902	AF1-255 E	0.9665
946081	AF1-273 C O1	21.7740
946082	AF1-273 E O1	14.5160
946241	AF1-289 C O1	0.9503
946242	AF1-289 E O1	0.6335
DUCKCREEK	DUCKCREEK	0.2361
NEWTON	NEWTON	0.2267
FARMERCITY	FARMERCITY	0.0119
G-007A	G-007A	0.6497
VFT	VFT	1.7866
PRAIRIE	PRAIRIE	0.5528

Bus #	Bus	MW Impact
COFFEEN	COFFEEN	0.1110
EDWARDS	EDWARDS	0.0714
CHEOAH	CHEOAH	0.1186
TILTON	TILTON	0.1298
GIBSON	GIBSON	0.1152
CALDERWOOD	CALDERWOOD	0.1178
BLUEG	BLUEG	0.3698
TRIMBLE	TRIMBLE	0.1185
CATAWBA	CATAWBA	0.0875

14.3 Index 3

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
41561452	200740	26BLRSVLE	PENELEC	200763	26BLAIRSVL	PENELEC	1	PN_P4-500-001J	breaker	364.0	103.44	104.27	DC	6.67

Bus #	Bus	MW Impact
200636	26IUP CO-G	0.2723
200794	26CONEMAGH	0.1881
200805	26COLVER13 (Deactivation : 09/01/20)	11.8140
200864	K-013 E	1.7770
200883	Q-053 E	3.4276
202158	26CON.GEN1	0.0485
202160	26CON.GEN2	0.0989
290086	Q-036 E	2.2304
292350	K-023	1.8658
292542	L-013 1	1.8148
293301	N-039 E	3.6481
293393	V3-030E	2.3416
293432	R-040 E	0.1021
293603	O-018 E	4.0717
293902	O-048 E	1.6333
294515	O38_P22	3.1921
294903	P-060 E	2.9877
296332	R-032 E	4.6981
917672	Z2-108 E	1.0208
935191	AD1-154	1.0416
936991	AD2-133 C	1.0037
936992	AD2-133 E	4.5907
938351	AE1-053	0.5671
938362	AE1-054 BAT	1.0105
938881	AE1-116	0.3078
938991	AE1-128 C	5.3691
938992	AE1-128 E	3.5794
941331	AE2-129 C	0.5873
941332	AE2-129 E	0.3915
941351	AE2-131 C	0.5873
941352	AE2-131 E	0.3915
942121	AE2-224 C	3.7475
942122	AE2-224 E	2.4983
942361	AE2-249 C	0.6040
942362	AE2-249 E	0.4027
942511	AE2-264 C	2.2636
942512	AE2-264 E	1.5091
944181	AF1-086 C O1	0.8374
944182	AF1-086 E O1	3.6432
944691	AF1-134 C O1	0.3250
944692	AF1-134 E O1	0.3250

Bus #	Bus	MW Impact
944701	AF1-135 C	0.3900
944702	AF1-135 E	0.2600
944751	AF1-140 C	0.3899
944752	AF1-140 E	0.2599
944781	AF1-143 C	1.8034
944782	AF1-143 E	1.2023
945481	AF1-213 C	2.4767
945482	AF1-213 E	1.6511
945671	AF1-232 C O1	3.8850
945672	AF1-232 E O1	2.0919
945751	AF1-240 C O1	0.3312
945752	AF1-240 E O1	0.2208
945901	AF1-255 C	0.2249
945902	AF1-255 E	0.3105
946071	AF1-272 C O1	12.2977
946072	AF1-272 E O1	8.1985
946081	AF1-273 C O1	2.2413
946082	AF1-273 E O1	1.4942
946241	AF1-289 C O1	0.9560
946242	AF1-289 E O1	0.6373
946431	AF1-307 C	4.7625
946432	AF1-307 E	3.1750
946571	AF1-321 C O1	0.4904
946572	AF1-321 E O1	0.3269
DUCKCREEK	DUCKCREEK	1.1250
NEWTON	NEWTON	1.0358
FARMERCITY	FARMERCITY	0.0530
G-007A	G-007A	2.9489
VFT	VFT	7.9980
PRAIRIE	PRAIRIE	2.4306
COFFEEN	COFFEEN	0.5089
EDWARDS	EDWARDS	0.3433
CHEOAH	CHEOAH	0.4114
TILTON	TILTON	0.6180
MADISON	MADISON	0.0907
GIBSON	GIBSON	0.5302
CALDERWOOD	CALDERWOOD	0.4110
BLUEG	BLUEG	1.6909
TRIMBLE	TRIMBLE	0.5426
CATAWBA	CATAWBA	0.2460

14.4 Index 4

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
42172803	200767	26HOMER CT	PENELEC	200795	26SHELOCTA	PENELEC	1	PN_P4-500-002F	breaker	917.0	148.12	150.81	DC	24.33

Bus #	Bus	MW Impact
200503	26C.SLOPE (Deativation : 06/07/19)	28.9164
200794	26CONEMAGH	0.4629
200805	26COLVER13 (Deativation : 09/01/20)	14.5103
200809	26SITHE	2.2348
200823	26MHP_X3-003	1.9016
200833	26SEWRDB34	27.2507
200834	26SW_E13_K22	0.0724
200835	26DSGENWIN	0.3532
200837	26HOMER C1	38.4884
200838	26HOMER C2	32.0070
200839	26HOMER C3	33.8836
200846	26FORWARD	0.2587
200864	K-013 E	7.4126
200883	Q-053 E	13.4971
200886	26ARWF_N39	0.6904
200888	26HIGHLAND	0.5687
200889	26STNY CRK	0.4333
200890	26BF_G21_K23	0.1732
200891	26CSLMN_L13	0.2717
200892	26LOOKOUT	0.2581
200894	26K02	7.0234
200898	26AA1-106	2.6973
200905	26Q36	0.3168
200915	26CHSTN_FL	0.2983
200925	26R32	0.6562
201144	W3-099 C OP1	1.4662
201477	26Y2-055	4.1676
202225	26SCI_S29B	0.1127
203034	26NA_O38_P22	0.6041
203909	26Z1-038	1.8767
203910	26Z1-091	2.4569
203999	P-047 E	12.9768
235003	AC1-025 E	0.1729
236828	01GRAYMONT	0.4680
290086	Q-036 E	9.0772
292350	K-023	8.0052
292542	L-013 1	7.7862
293301	N-039 E	19.7843
293393	V3-030E	5.3060
293432	R-040 E	0.4380
293603	O-018 E	16.2963

Bus #	Bus	MW Impact
293902	O-048 E	7.0076
294515	O38_P22	17.3113
294573	P-028 E	11.4097
294903	P-060 E	12.4160
296332	R-032 E	18.8034
903644	W3-099 E OP1	9.8124
913142	Y1-033 E OP1	5.4199
915951	Y3-092 FTIR	107.9900
916202	Z1-069 E	10.3402
917672	Z2-108 E	4.3798
918682	AA1-082 E	6.9637
919201	AA1-144 OP	19.7891
919491	AA2-000	59.5323
920341	AA2-132	2.7294
922932	AB1-082 OP	3.7512
923443	AB1-160 E	2.9544
930511	AB1-092	2.1859
935191	AD1-154	2.5503
936421	AD2-055	4.5003
936991	AD2-133 C	4.0847
936992	AD2-133 E	18.6831
938351	AE1-053	2.4332
938881	AE1-116	1.2972
938951	AE1-123	2.2336
938991	AE1-128 C	21.9514
938992	AE1-128 E	14.6342
939171	AE1-147 C	1.4073
939172	AE1-147 E	0.9382
939291	AE1-160 C	1.5320
939292	AE1-160 E	0.8806
939381	AE1-169 C O1	6.2038
939382	AE1-169 E O1	4.1359
940201	AE2-001 C	1.4055
940202	AE2-001 E	0.9370
940681	AE2-055 C	1.3775
940682	AE2-055 E	0.9183
940861	AE2-074 C	2.8483
940862	AE2-074 E	3.7494
941191	AE2-113 C	10.9112
941192	AE2-113 E	11.7479
941231	AE2-117 C	1.9816
941232	AE2-117 E	1.3210
941241	AE2-118 C	1.9816
941242	AE2-118 E	1.3210
941251	AE2-119 C (Withdrawn : 12/16/2019)	1.7524
941252	AE2-119 E (Withdrawn : 12/16/2019)	1.1682
941261	AE2-120 C	1.4044
941262	AE2-120 E	0.9363
941271	AE2-121 C	0.7499
941272	AE2-121 E	0.5007
941321	AE2-126 C	1.7879
941322	AE2-126 E	1.1919

Bus #	Bus	MW Impact
941331	AE2-129 C	2.0624
941332	AE2-129 E	1.3750
941351	AE2-131 C	2.0624
941352	AE2-131 E	1.3750
941421	AE2-139 C	7.4089
941422	AE2-139 E	4.9393
942121	AE2-224 C	21.1962
942122	AE2-224 E	14.1308
942351	AE2-248 C	1.1113
942352	AE2-248 E	0.7409
942361	AE2-249 C	2.4695
942362	AE2-249 E	1.6464
942491	AE2-262 C	6.2505
942492	AE2-262 E	4.2003
942501	AE2-263 C	5.8754
942502	AE2-263 E	3.9228
942511	AE2-264 C	11.2229
942512	AE2-264 E	7.4819
942811	AE2-299 C	3.6451
942812	AE2-299 E	14.5803
942961	AE2-316 C	5.6956
942962	AE2-316 E	8.1220
943151	AE2-344 C	7.6841
943152	AE2-344 E	5.1228
943351	AF1-006 C	0.7075
943352	AF1-006 E	0.3980
943711	AF1-039 C O1	0.7599
943712	AF1-039 E O1	0.5066
943751	AF1-043	7.1554
943871	AF1-055 C O1	2.9015
943872	AF1-055 E O1	1.9343
944001	AF1-068 C O1	0.7834
944002	AF1-068 E O1	0.4406
944181	AF1-086 C O1	1.5310
944182	AF1-086 E O1	6.6609
944261	AF1-094 C	0.7197
944262	AF1-094 E	0.4798
944281	AF1-096 C	0.7672
944282	AF1-096 E	0.5115
944301	AF1-098 C	2.9545
944302	AF1-098 E	1.9697
944311	AF1-099 C	5.0288
944312	AF1-099 E	3.3525
944321	AF1-100 C O1	10.5721
944322	AF1-100 E O1	7.0481
944381	AF1-103 O1	1.5226
944391	AF1-104 O1	1.0293
944411	AF1-106 O1	1.5776
944471	AF1-112 C	0.7379
944472	AF1-112 E	0.4919
944671	AF1-132 C O1	0.7333
944672	AF1-132 E O1	0.4889

Bus #	Bus	MW Impact
944691	AF1-134 C O1	0.7576
944692	AF1-134 E O1	0.7576
944701	AF1-135 C	0.9091
944702	AF1-135 E	0.6061
944731	AF1-138 C O1	1.0502
944732	AF1-138 E O1	0.7001
944741	AF1-139 C O1	0.8723
944742	AF1-139 E O1	0.5815
944751	AF1-140 C	2.9287
944752	AF1-140 E	1.9525
944771	AF1-142 C	8.0460
944772	AF1-142 E	5.3640
944781	AF1-143 C	14.5992
944782	AF1-143 E	9.7328
944841	AF1-149 C	1.4043
944842	AF1-149 E	0.9362
944881	AF1-153 C O1	0.8674
944882	AF1-153 E O1	0.5783
944901	AF1-155 C	0.8670
944902	AF1-155 E	0.5780
945021	AF1-167 C	0.5944
945022	AF1-167 E	0.3963
945051	AF1-170 C	2.5442
945052	AF1-170 E	1.6961
945071	AF1-172 C	10.3025
945072	AF1-172 E	6.8683
945121	AF1-177	0.3806
945161	AF1-181	0.0564
945171	AF1-182	0.2819
945181	AF1-183	0.0738
945331	AF1-198	0.2114
945451	AF1-210 C	0.5540
945452	AF1-210 E	0.3694
945481	AF1-213 C	6.9713
945482	AF1-213 E	4.6475
945491	AF1-214 C	0.7444
945492	AF1-214 E	0.4963
945551	AF1-220 C	7.2853
945552	AF1-220 E	4.8595
945671	AF1-232 C O1	30.5604
945672	AF1-232 E O1	16.4556
945751	AF1-240 C O1	0.8110
945752	AF1-240 E O1	0.5407
945771	AF1-242 C	0.8670
945772	AF1-242 E	0.5780
945901	AF1-255 C	1.7168
945902	AF1-255 E	2.3708
946081	AF1-273 C O1	17.6310
946082	AF1-273 E O1	11.7540
946091	AF1-274 C	4.0432
946092	AF1-274 E	2.6955
946131	AF1-278	42.0132

Bus #	Bus	MW Impact
946191	AF1-284 C O1	0.7890
946192	AF1-284 E O1	0.4734
946211	AF1-286 C O1	0.6389
946212	AF1-286 E O1	0.4338
946221	AF1-287 C	0.7027
946222	AF1-287 E	0.4684
946241	AF1-289 C O1	7.2007
946242	AF1-289 E O1	4.8005
946381	AF1-302 C	1.3182
946382	AF1-302 E	1.7576
946401	AF1-304 C	3.8864
946402	AF1-304 E	2.5909
946421	AF1-306 C	4.2972
946422	AF1-306 E	17.1887
946431	AF1-307 C	12.0207
946432	AF1-307 E	8.0138
946571	AF1-321 C O1	3.8779
946572	AF1-321 E O1	2.5853
946771	AF1-217 C O1	0.7027
946772	AF1-217 E O1	0.4684
DUCKCREEK	DUCKCREEK	0.7128
NEWTON	NEWTON	0.7049
FARMERCITY	FARMERCITY	0.0370
PRAIRIE	PRAIRIE	1.7487
O-066	O-066	1.6733
COFFEEN	COFFEEN	0.3430
EDWARDS	EDWARDS	0.2142
CHEOAH	CHEOAH	0.4109
TILTON	TILTON	0.3956
G-007	G-007	0.3588
MADISON	MADISON	0.0202
GIBSON	GIBSON	0.3593
CALDERWOOD	CALDERWOOD	0.4065
BLUEG	BLUEG	1.1735
TRIMBLE	TRIMBLE	0.3756
CATAWBA	CATAWBA	0.3206

14.5 Index 5

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
42172813	200795	26SHELOCTA	PENELEC	200810	26KEYSTONE	PENELEC	1	PN_P4-500-002A	breaker	917.0	127.84	130.77	DC	26.48

Bus #	Bus	MW Impact
200503	26C.SLOPE (Deactivation : 06/07/19)	32.5076
200636	26IUP CO-G	0.6752
200794	26CONEMAGH	0.5468
200805	26COLVER13 (Deactivation : 09/01/20)	34.8876
200809	26SITHE	2.1598
200833	26SEWRDB34	28.3096
200834	26SW_E13_K22	0.0787
200835	26DSGENWIN	0.3844
200837	26HOMER C1	37.1972
200838	26HOMER C2	31.2734
200839	26HOMER C3	33.1070
200846	26FORWARD	0.2807
200864	K-013 E	8.0446
200883	Q-053 E	15.1296
200886	26ARWF_N39	0.7144
200888	26HIGHLAND	0.6259
200889	26STNY CRK	0.4725
200890	26BF_G21_K23	0.1885
200891	26CSLMN_L13	0.2957
200892	26LOOKOUT	0.2809
200894	26K02	7.3804
200898	26AA1-106	2.7668
200915	26CHSTN_FL	0.3344
200925	26R32	0.7222
200945	26CT_V3-030	0.2375
201144	W3-099 C OP1	1.5476
201477	26Y2-055	4.3870
202158	26CON.GEN1	0.1133
202160	26CON.GEN2	0.0848
202225	26SCI_S29B	0.1224
203034	26NA_O38_P22	0.6251
203910	26Z1-091	2.4645
203999	P-047 E	13.0226
235003	AC1-025 E	0.1912
236828	01GRAYMONT	0.5180
290086	Q-036 E	8.8754
292350	K-023	8.7126
292542	L-013 1	8.4742
293301	N-039 E	20.4723
293393	V3-030E	8.9704
293432	R-040 E	0.4052

Bus #	Bus	MW Impact
293603	O-018 E	17.9374
293902	O-048 E	7.6268
294515	O38_P22	17.9133
294903	P-060 E	13.5395
296332	R-032 E	20.6970
903644	W3-099 E OP1	10.3567
913142	Y1-033 E OP1	5.9219
916202	Z1-069 E	10.4453
917672	Z2-108 E	4.0517
918682	AA1-082 E	7.0566
919201	AA1-144 OP	20.0981
919491	AA2-000	64.8177
920341	AA2-132	2.7367
922932	AB1-082 OP	3.8155
923443	AB1-160 E	2.9844
930511	AB1-092	2.3799
935191	AD1-154	4.1854
936421	AD2-055	4.8998
936991	AD2-133 C	3.9939
936992	AD2-133 E	18.2677
938351	AE1-053	2.2510
938881	AE1-116	1.4089
938951	AE1-123	2.9191
938991	AE1-128 C	24.0523
938992	AE1-128 E	16.0349
939171	AE1-147 C	1.5578
939172	AE1-147 E	1.0386
939291	AE1-160 C	1.8016
939292	AE1-160 E	1.0356
939381	AE1-169 C O1	7.3470
939382	AE1-169 E O1	4.8980
940201	AE2-001 C	1.5556
940202	AE2-001 E	1.0371
940681	AE2-055 C	1.5221
940682	AE2-055 E	1.0148
940861	AE2-074 C	2.8971
940862	AE2-074 E	3.8136
941191	AE2-113 C	11.4763
941192	AE2-113 E	12.3563
941231	AE2-117 C	2.0808
941232	AE2-117 E	1.3872
941241	AE2-118 C	2.0808
941242	AE2-118 E	1.3872
941251	AE2-119 C (Withdrawn : 12/16/2019)	2.1153
941252	AE2-119 E (Withdrawn : 12/16/2019)	1.4102
941261	AE2-120 C	1.5544
941262	AE2-120 E	1.0363
941271	AE2-121 C	0.8303
941272	AE2-121 E	0.5544
941321	AE2-126 C	2.0539
941322	AE2-126 E	1.3692
941331	AE2-129 C	2.4166

Bus #	Bus	MW Impact
941332	AE2-129 E	1.6111
941351	AE2-131 C	2.4166
941352	AE2-131 E	1.6111
941421	AE2-139 C	7.6068
941422	AE2-139 E	5.0712
942121	AE2-224 C	21.8082
942122	AE2-224 E	14.5388
942351	AE2-248 C	1.2289
942352	AE2-248 E	0.8193
942361	AE2-249 C	2.7059
942362	AE2-249 E	1.8039
942491	AE2-262 C	6.9530
942492	AE2-262 E	4.6724
942501	AE2-263 C	6.5358
942502	AE2-263 E	4.3637
942511	AE2-264 C	9.9878
942512	AE2-264 E	6.6586
942811	AE2-299 C	3.8423
942812	AE2-299 E	15.3691
942961	AE2-316 C	6.2990
942962	AE2-316 E	8.9823
943151	AE2-344 C	8.2183
943152	AE2-344 E	5.4789
943351	AF1-006 C	0.7537
943352	AF1-006 E	0.4239
943711	AF1-039 C O1	0.8303
943712	AF1-039 E O1	0.5535
943751	AF1-043	7.7907
943871	AF1-055 C O1	3.1386
943872	AF1-055 E O1	2.0924
944001	AF1-068 C O1	0.8661
944002	AF1-068 E O1	0.4872
944181	AF1-086 C O1	5.9075
944182	AF1-086 E O1	25.7008
944261	AF1-094 C	0.7983
944262	AF1-094 E	0.5322
944281	AF1-096 C	0.9022
944282	AF1-096 E	0.6015
944301	AF1-098 C	3.1348
944302	AF1-098 E	2.0899
944311	AF1-099 C	5.5940
944312	AF1-099 E	3.7293
944321	AF1-100 C O1	11.9824
944322	AF1-100 E O1	7.9883
944381	AF1-103 O1	1.6028
944391	AF1-104 O1	1.0955
944411	AF1-106 O1	1.5856
944471	AF1-112 C	0.8161
944472	AF1-112 E	0.5441
944671	AF1-132 C O1	0.8107
944672	AF1-132 E O1	0.5405
944691	AF1-134 C O1	1.1405

Bus #	Bus	MW Impact
944692	AF1-134 E O1	1.1405
944701	AF1-135 C	1.3686
944702	AF1-135 E	0.9124
944731	AF1-138 C O1	1.1028
944732	AF1-138 E O1	0.7352
944741	AF1-139 C O1	0.8746
944742	AF1-139 E O1	0.5831
944751	AF1-140 C	3.2443
944752	AF1-140 E	2.1629
944771	AF1-142 C	8.9503
944772	AF1-142 E	5.9669
944781	AF1-143 C	15.8892
944782	AF1-143 E	10.5928
944841	AF1-149 C	1.5543
944842	AF1-149 E	1.0362
944881	AF1-153 C O1	0.9693
944882	AF1-153 E O1	0.6462
944901	AF1-155 C	0.9691
944902	AF1-155 E	0.6461
945021	AF1-167 C	0.7104
945022	AF1-167 E	0.4736
945051	AF1-170 C	2.7153
945052	AF1-170 E	1.8102
945071	AF1-172 C	11.3364
945072	AF1-172 E	7.5576
945121	AF1-177	0.4007
945161	AF1-181	0.0639
945171	AF1-182	0.3195
945181	AF1-183	0.0864
945331	AF1-198	0.2136
945451	AF1-210 C	0.6626
945452	AF1-210 E	0.4418
945481	AF1-213 C	9.4791
945482	AF1-213 E	6.3194
945491	AF1-214 C	0.8239
945492	AF1-214 E	0.5492
945551	AF1-220 C	8.0851
945552	AF1-220 E	5.3930
945671	AF1-232 C O1	33.2946
945672	AF1-232 E O1	17.9278
945751	AF1-240 C O1	1.3310
945752	AF1-240 E O1	0.8873
945771	AF1-242 C	0.9691
945772	AF1-242 E	0.6461
945901	AF1-255 C	1.8890
945902	AF1-255 E	2.6086
946071	AF1-272 C O1	29.2485
946072	AF1-272 E O1	19.4990
946081	AF1-273 C O1	19.2084
946082	AF1-273 E O1	12.8056
946091	AF1-274 C	4.5988
946092	AF1-274 E	3.0659

Bus #	Bus	MW Impact
946131	AF1-278	19.3364
946191	AF1-284 C O1	0.8671
946192	AF1-284 E O1	0.5203
946211	AF1-286 C O1	0.6422
946212	AF1-286 E O1	0.4360
946221	AF1-287 C	0.7518
946222	AF1-287 E	0.5012
946241	AF1-289 C O1	7.9675
946242	AF1-289 E O1	5.3117
946381	AF1-302 C	1.4578
946382	AF1-302 E	1.9438
946401	AF1-304 C	4.6208
946402	AF1-304 E	3.0805
946421	AF1-306 C	4.7503
946422	AF1-306 E	19.0010
946431	AF1-307 C	14.1382
946432	AF1-307 E	9.4254
946571	AF1-321 C O1	4.1989
946572	AF1-321 E O1	2.7993
946771	AF1-217 C O1	0.7518
946772	AF1-217 E O1	0.5012
DUCKCREEK	DUCKCREEK	0.5412
NEWTON	NEWTON	0.5491
FARMERCITY	FARMERCITY	0.0290
PRAIRIE	PRAIRIE	1.3845
O-066	O-066	3.3130
COFFEEN	COFFEEN	0.2664
EDWARDS	EDWARDS	0.1617
CHEOAH	CHEOAH	0.3544
TILTON	TILTON	0.3018
G-007	G-007	0.6157
MADISON	MADISON	0.0081
GIBSON	GIBSON	0.2796
CALDERWOOD	CALDERWOOD	0.3499
BLUEG	BLUEG	0.9218
TRIMBLE	TRIMBLE	0.2949
CATAWBA	CATAWBA	0.2902

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ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
42172919	200810	26KEYSTONE	PENELEC	999401	STAR592	PJM	4	PJM500_PN_P4-500-001D	breaker	635.0	107.08	109.33	DC	14.07

Bus #	Bus	MW Impact
200503	26C.SLOPE (Deactivation : 06/07/19)	16.7325
200636	26IUP CO-G	0.4069
200794	26CONEMAGH	0.2755
200805	26COLVER13 (Deactivation : 09/01/20)	19.5371
200809	26SITHE	1.2781
200833	26SEWRDB34	13.2926
200834	26SW_E13_K22	0.0419
200835	26DSGENWIN	0.2043
200837	26HOMER C1	22.0118
200838	26HOMER C2	18.4521
200839	26HOMER C3	19.5339
200846	26FORWARD	0.1497
200864	K-013 E	4.2904
200883	Q-053 E	7.8926
200886	26ARWF_N39	0.3654
200888	26HIGHLAND	0.3256
200889	26STNY CRK	0.2507
200890	26BF_G21_K23	0.1002
200891	26CSLMN_L13	0.1571
200892	26LOOKOUT	0.1493
200894	26K02	4.2783
200898	26AA1-106	1.6183
200906	26KEYSTN#3	0.6753
200915	26CHSTN_FL	0.1744
200925	26R32	0.3757
200945	26CT_V3-030	0.1279
201144	W3-099 C OP1	0.8862
201477	26Y2-055	2.5227
202158	26CON.GEN1	0.0706
202160	26CON.GEN2	0.0494
202225	26SCI_S29B	0.0652
203034	26NA_O38_P22	0.3198
203910	26Z1-091	1.4594
203999	P-047 E	7.6636
235003	AC1-025 E	0.1066
236828	01GRAYMONT	0.2892
290086	Q-036 E	4.7474
292350	K-023	4.6300
292542	L-013 1	4.5034
293301	N-039 E	10.4723
293393	V3-030E	4.8293
293432	R-040 E	0.2153

Bus #	Bus	MW Impact
293603	O-018 E	9.3319
293902	O-048 E	4.0530
294515	O38_P22	9.1633
294903	P-060 E	7.1841
296332	R-032 E	10.7676
903644	W3-099 E OP1	5.9308
913142	Y1-033 E OP1	3.1317
916202	Z1-069 E	6.1155
917672	Z2-108 E	2.1532
918682	AA1-082 E	4.1617
919201	AA1-144 OP	11.8405
919491	AA2-000	36.9701
920341	AA2-132	1.6166
922932	AB1-082 OP	2.2258
923443	AB1-160 E	1.7473
930511	AB1-092	1.3574
935191	AD1-154	2.3565
936421	AD2-055	2.7947
936991	AD2-133 C	2.1363
936992	AD2-133 E	9.7714
938351	AE1-053	1.1962
938881	AE1-116	0.7506
938951	AE1-123	1.6552
938991	AE1-128 C	12.7001
938992	AE1-128 E	8.4667
939171	AE1-147 C	0.8700
939172	AE1-147 E	0.5800
939291	AE1-160 C	1.0268
939292	AE1-160 E	0.5902
939381	AE1-169 C O1	4.1867
939382	AE1-169 E O1	2.7912
940201	AE2-001 C	0.8686
940202	AE2-001 E	0.5791
940681	AE2-055 C	0.8483
940682	AE2-055 E	0.5656
940861	AE2-074 C	1.6901
940862	AE2-074 E	2.2247
941191	AE2-113 C	6.6183
941192	AE2-113 E	7.1257
941231	AE2-117 C	1.0872
941232	AE2-117 E	0.7248
941241	AE2-118 C	1.0872
941242	AE2-118 E	0.7248
941251	AE2-119 C (Withdrawn : 12/16/2019)	1.1764
941252	AE2-119 E (Withdrawn : 12/16/2019)	0.7842
941261	AE2-120 C	0.8679
941262	AE2-120 E	0.5786
941271	AE2-121 C	0.4638
941272	AE2-121 E	0.3097
941321	AE2-126 C	1.1560
941322	AE2-126 E	0.7706
941331	AE2-129 C	1.3127

Bus #	Bus	MW Impact
941332	AE2-129 E	0.8752
941351	AE2-131 C	1.3127
941352	AE2-131 E	0.8752
941421	AE2-139 C	4.4582
941422	AE2-139 E	2.9721
942121	AE2-224 C	11.0976
942122	AE2-224 E	7.3984
942351	AE2-248 C	0.6854
942352	AE2-248 E	0.4570
942361	AE2-249 C	1.4288
942362	AE2-249 E	0.9525
942491	AE2-262 C	3.9062
942492	AE2-262 E	2.6249
942501	AE2-263 C	3.6718
942502	AE2-263 E	2.4515
942511	AE2-264 C	5.1734
942512	AE2-264 E	3.4490
942811	AE2-299 C	2.2018
942812	AE2-299 E	8.8074
942961	AE2-316 C	3.5892
942962	AE2-316 E	5.1182
943151	AE2-344 C	4.6968
943152	AE2-344 E	3.1312
943351	AF1-006 C	0.4299
943352	AF1-006 E	0.2418
943711	AF1-039 C O1	0.4391
943712	AF1-039 E O1	0.2927
943751	AF1-043	4.4436
943871	AF1-055 C O1	1.8031
943872	AF1-055 E O1	1.2020
944001	AF1-068 C O1	0.4829
944002	AF1-068 E O1	0.2717
944181	AF1-086 C O1	3.2911
944182	AF1-086 E O1	14.3182
944261	AF1-094 C	0.4556
944262	AF1-094 E	0.3037
944281	AF1-096 C	0.5142
944282	AF1-096 E	0.3428
944301	AF1-098 C	1.7941
944302	AF1-098 E	1.1961
944311	AF1-099 C	3.1427
944312	AF1-099 E	2.0951
944321	AF1-100 C O1	6.7325
944322	AF1-100 E O1	4.4883
944381	AF1-103 O1	0.9216
944391	AF1-104 O1	0.6234
944411	AF1-106 O1	0.9338
944471	AF1-112 C	0.4553
944472	AF1-112 E	0.3035
944671	AF1-132 C O1	0.4520
944672	AF1-132 E O1	0.3013
944691	AF1-134 C O1	1.4096

Bus #	Bus	MW Impact
944692	AF1-134 E O1	1.4096
944701	AF1-135 C	1.6915
944702	AF1-135 E	1.1277
944731	AF1-138 C O1	0.5762
944732	AF1-138 E O1	0.3842
944741	AF1-139 C O1	0.5167
944742	AF1-139 E O1	0.3444
944751	AF1-140 C	1.6938
944752	AF1-140 E	1.1292
944771	AF1-142 C	5.0283
944772	AF1-142 E	3.3522
944781	AF1-143 C	8.4438
944782	AF1-143 E	5.6292
944841	AF1-149 C	0.8678
944842	AF1-149 E	0.5785
944881	AF1-153 C O1	0.5496
944882	AF1-153 E O1	0.3664
944901	AF1-155 C	0.5495
944902	AF1-155 E	0.3663
945021	AF1-167 C	0.4031
945022	AF1-167 E	0.2687
945051	AF1-170 C	1.5485
945052	AF1-170 E	1.0323
945071	AF1-172 C	6.4352
945072	AF1-172 E	4.2901
945121	AF1-177	0.2304
945161	AF1-181	0.0359
945171	AF1-182	0.1795
945181	AF1-183	0.0483
945331	AF1-198	0.1254
945451	AF1-210 C	0.3750
945452	AF1-210 E	0.2500
945481	AF1-213 C	5.2754
945482	AF1-213 E	3.5170
945491	AF1-214 C	0.4601
945492	AF1-214 E	0.3067
945551	AF1-220 C	4.5899
945552	AF1-220 E	3.0616
945671	AF1-232 C O1	17.6831
945672	AF1-232 E O1	9.5217
945751	AF1-240 C O1	0.7494
945752	AF1-240 E O1	0.4996
945771	AF1-242 C	0.5495
945772	AF1-242 E	0.3663
945901	AF1-255 C	0.9932
945902	AF1-255 E	1.3715
946071	AF1-272 C O1	17.9595
946072	AF1-272 E O1	11.9730
946081	AF1-273 C O1	10.2018
946082	AF1-273 E O1	6.8012
946091	AF1-274 C	2.5949
946092	AF1-274 E	1.7299

Bus #	Bus	MW Impact
946131	AF1-278	11.2469
946191	AF1-284 C O1	0.4553
946192	AF1-284 E O1	0.2732
946211	AF1-286 C O1	0.3782
946212	AF1-286 E O1	0.2568
946221	AF1-287 C	0.4297
946222	AF1-287 E	0.2864
946241	AF1-289 C O1	4.1647
946242	AF1-289 E O1	2.7765
946381	AF1-302 C	0.8307
946382	AF1-302 E	1.1076
946401	AF1-304 C	2.6330
946402	AF1-304 E	1.7553
946421	AF1-306 C	2.6955
946422	AF1-306 E	10.7819
946431	AF1-307 C	7.1429
946432	AF1-307 E	4.7619
946571	AF1-321 C O1	2.2446
946572	AF1-321 E O1	1.4964
946771	AF1-217 C O1	0.4297
946772	AF1-217 E O1	0.2864
DUCKCREEK	DUCKCREEK	0.5619
NEWTON	NEWTON	0.5458
FARMERCITY	FARMERCITY	0.0284
PRAIRIE	PRAIRIE	1.3354
COFFEEN	COFFEEN	0.2664
EDWARDS	EDWARDS	0.1698
CHEOAH	CHEOAH	0.2933
TILTON	TILTON	0.3112
G-007	G-007	0.0426
MADISON	MADISON	0.0262
GIBSON	GIBSON	0.2790
CALDERWOOD	CALDERWOOD	0.2907
BLUEG	BLUEG	0.9062
TRIMBLE	TRIMBLE	0.2905
CATAWBA	CATAWBA	0.2188

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ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
41561126	999401	STAR592	PJM	200011	KEYSTONE	PJM	4	PJM500_PN_P4-500-001A	breaker	634.0	106.53	108.78	DC	14.07

Bus #	Bus	MW Impact
200503	26C.SLOPE (Deactivation : 06/07/19)	16.7325
200636	26IUP CO-G	0.4069
200794	26CONEMAGH	0.2755
200805	26COLVER13 (Deactivation : 09/01/20)	19.5371
200809	26SITHE	1.2781
200833	26SEWRDB34	13.2926
200834	26SW_E13_K22	0.0419
200835	26DSGENWIN	0.2043
200837	26HOMER C1	22.0118
200838	26HOMER C2	18.4521
200839	26HOMER C3	19.5339
200846	26FORWARD	0.1497
200864	K-013 E	4.2904
200883	Q-053 E	7.8926
200886	26ARWF_N39	0.3654
200888	26HIGHLAND	0.3256
200889	26STNY CRK	0.2507
200890	26BF_G21_K23	0.1002
200891	26CSLMN_L13	0.1571
200892	26LOOKOUT	0.1493
200894	26K02	4.2783
200898	26AA1-106	1.6183
200906	26KEYSTN#3	0.6753
200915	26CHSTN_FL	0.1744
200925	26R32	0.3757
200945	26CT_V3-030	0.1279
201144	W3-099 C OP1	0.8862
201477	26Y2-055	2.5227
202158	26CON.GEN1	0.0706
202160	26CON.GEN2	0.0494
202225	26SCI_S29B	0.0652
203034	26NA_O38_P22	0.3198
203910	26Z1-091	1.4594
203999	P-047 E	7.6636
235003	AC1-025 E	0.1066
236828	01GRAYMONT	0.2892
290086	Q-036 E	4.7474
292350	K-023	4.6300
292542	L-013 1	4.5034
293301	N-039 E	10.4723
293393	V3-030E	4.8293
293432	R-040 E	0.2153

Bus #	Bus	MW Impact
293603	O-018 E	9.3319
293902	O-048 E	4.0530
294515	O38_P22	9.1633
294903	P-060 E	7.1841
296332	R-032 E	10.7676
903644	W3-099 E OP1	5.9308
913142	Y1-033 E OP1	3.1317
916202	Z1-069 E	6.1155
917672	Z2-108 E	2.1532
918682	AA1-082 E	4.1617
919201	AA1-144 OP	11.8405
919491	AA2-000	36.9701
920341	AA2-132	1.6166
922932	AB1-082 OP	2.2258
923443	AB1-160 E	1.7473
930511	AB1-092	1.3574
935191	AD1-154	2.3565
936421	AD2-055	2.7947
936991	AD2-133 C	2.1363
936992	AD2-133 E	9.7714
938351	AE1-053	1.1962
938881	AE1-116	0.7506
938951	AE1-123	1.6552
938991	AE1-128 C	12.7001
938992	AE1-128 E	8.4667
939171	AE1-147 C	0.8700
939172	AE1-147 E	0.5800
939291	AE1-160 C	1.0268
939292	AE1-160 E	0.5902
939381	AE1-169 C O1	4.1867
939382	AE1-169 E O1	2.7912
940201	AE2-001 C	0.8686
940202	AE2-001 E	0.5791
940681	AE2-055 C	0.8483
940682	AE2-055 E	0.5656
940861	AE2-074 C	1.6901
940862	AE2-074 E	2.2247
941191	AE2-113 C	6.6183
941192	AE2-113 E	7.1257
941231	AE2-117 C	1.0872
941232	AE2-117 E	0.7248
941241	AE2-118 C	1.0872
941242	AE2-118 E	0.7248
941251	AE2-119 C (Withdrawn : 12/16/2019)	1.1764
941252	AE2-119 E (Withdrawn : 12/16/2019)	0.7842
941261	AE2-120 C	0.8679
941262	AE2-120 E	0.5786
941271	AE2-121 C	0.4638
941272	AE2-121 E	0.3097
941321	AE2-126 C	1.1560
941322	AE2-126 E	0.7706
941331	AE2-129 C	1.3127

Bus #	Bus	MW Impact
941332	AE2-129 E	0.8752
941351	AE2-131 C	1.3127
941352	AE2-131 E	0.8752
941421	AE2-139 C	4.4582
941422	AE2-139 E	2.9721
942121	AE2-224 C	11.0976
942122	AE2-224 E	7.3984
942351	AE2-248 C	0.6854
942352	AE2-248 E	0.4570
942361	AE2-249 C	1.4288
942362	AE2-249 E	0.9525
942491	AE2-262 C	3.9062
942492	AE2-262 E	2.6249
942501	AE2-263 C	3.6718
942502	AE2-263 E	2.4515
942511	AE2-264 C	5.1734
942512	AE2-264 E	3.4490
942811	AE2-299 C	2.2018
942812	AE2-299 E	8.8074
942961	AE2-316 C	3.5892
942962	AE2-316 E	5.1182
943151	AE2-344 C	4.6968
943152	AE2-344 E	3.1312
943351	AF1-006 C	0.4299
943352	AF1-006 E	0.2418
943711	AF1-039 C O1	0.4391
943712	AF1-039 E O1	0.2927
943751	AF1-043	4.4436
943871	AF1-055 C O1	1.8031
943872	AF1-055 E O1	1.2020
944001	AF1-068 C O1	0.4829
944002	AF1-068 E O1	0.2717
944181	AF1-086 C O1	3.2911
944182	AF1-086 E O1	14.3182
944261	AF1-094 C	0.4556
944262	AF1-094 E	0.3037
944281	AF1-096 C	0.5142
944282	AF1-096 E	0.3428
944301	AF1-098 C	1.7941
944302	AF1-098 E	1.1961
944311	AF1-099 C	3.1427
944312	AF1-099 E	2.0951
944321	AF1-100 C O1	6.7325
944322	AF1-100 E O1	4.4883
944381	AF1-103 O1	0.9216
944391	AF1-104 O1	0.6234
944411	AF1-106 O1	0.9338
944471	AF1-112 C	0.4553
944472	AF1-112 E	0.3035
944671	AF1-132 C O1	0.4520
944672	AF1-132 E O1	0.3013
944691	AF1-134 C O1	1.4096

Bus #	Bus	MW Impact
944692	AF1-134 E O1	1.4096
944701	AF1-135 C	1.6915
944702	AF1-135 E	1.1277
944731	AF1-138 C O1	0.5762
944732	AF1-138 E O1	0.3842
944741	AF1-139 C O1	0.5167
944742	AF1-139 E O1	0.3444
944751	AF1-140 C	1.6938
944752	AF1-140 E	1.1292
944771	AF1-142 C	5.0283
944772	AF1-142 E	3.3522
944781	AF1-143 C	8.4438
944782	AF1-143 E	5.6292
944841	AF1-149 C	0.8678
944842	AF1-149 E	0.5785
944881	AF1-153 C O1	0.5496
944882	AF1-153 E O1	0.3664
944901	AF1-155 C	0.5495
944902	AF1-155 E	0.3663
945021	AF1-167 C	0.4031
945022	AF1-167 E	0.2687
945051	AF1-170 C	1.5485
945052	AF1-170 E	1.0323
945071	AF1-172 C	6.4352
945072	AF1-172 E	4.2901
945121	AF1-177	0.2304
945161	AF1-181	0.0359
945171	AF1-182	0.1795
945181	AF1-183	0.0483
945331	AF1-198	0.1254
945451	AF1-210 C	0.3750
945452	AF1-210 E	0.2500
945481	AF1-213 C	5.2754
945482	AF1-213 E	3.5170
945491	AF1-214 C	0.4600
945492	AF1-214 E	0.3067
945551	AF1-220 C	4.5899
945552	AF1-220 E	3.0616
945671	AF1-232 C O1	17.6831
945672	AF1-232 E O1	9.5217
945751	AF1-240 C O1	0.7494
945752	AF1-240 E O1	0.4996
945771	AF1-242 C	0.5495
945772	AF1-242 E	0.3663
945901	AF1-255 C	0.9932
945902	AF1-255 E	1.3715
946071	AF1-272 C O1	17.9595
946072	AF1-272 E O1	11.9730
946081	AF1-273 C O1	10.2018
946082	AF1-273 E O1	6.8012
946091	AF1-274 C	2.5949
946092	AF1-274 E	1.7299

Bus #	Bus	MW Impact
946131	AF1-278	11.2469
946191	AF1-284 C O1	0.4553
946192	AF1-284 E O1	0.2732
946211	AF1-286 C O1	0.3782
946212	AF1-286 E O1	0.2568
946221	AF1-287 C	0.4297
946222	AF1-287 E	0.2864
946241	AF1-289 C O1	4.1647
946242	AF1-289 E O1	2.7765
946381	AF1-302 C	0.8307
946382	AF1-302 E	1.1076
946401	AF1-304 C	2.6330
946402	AF1-304 E	1.7553
946421	AF1-306 C	2.6955
946422	AF1-306 E	10.7819
946431	AF1-307 C	7.1429
946432	AF1-307 E	4.7619
946571	AF1-321 C O1	2.2446
946572	AF1-321 E O1	1.4964
946771	AF1-217 C O1	0.4297
946772	AF1-217 E O1	0.2864
DUCKCREEK	DUCKCREEK	0.5619
NEWTON	NEWTON	0.5458
FARMERCITY	FARMERCITY	0.0284
PRAIRIE	PRAIRIE	1.3354
COFFEEN	COFFEEN	0.2664
EDWARDS	EDWARDS	0.1698
CHEOAH	CHEOAH	0.2933
TILTON	TILTON	0.3112
G-007	G-007	0.0426
MADISON	MADISON	0.0262
GIBSON	GIBSON	0.2790
CALDERWOOD	CALDERWOOD	0.2907
BLUEG	BLUEG	0.9062
TRIMBLE	TRIMBLE	0.2905
CATAWBA	CATAWBA	0.2188

15 Contingency Details

Contingency Name	Contingency Definition
PJM500_PN_P4-500-001A	CONTINGENCY 'PJM500_PN_P4-500-001A' /* KEYSTONE 500KV BKR 1 DISCONNECT BRANCH FROM BUS 200011 TO BUS 200810 CKT 3 /* KEYSTONE 500 26KEYSTONE 230 REMOVE MACHINE H FROM BUS 200033 /* KEYS G2 20 REMOVE MACHINE L FROM BUS 200033 /* KEYS G2 20 DISCONNECT BUS 200033 /* KEYS G2 20 END
PJM500_PN_P4-500-001D	CONTINGENCY 'PJM500_PN_P4-500-001D' /* KEYSTONE 500KV BKR 4 DISCONNECT BRANCH FROM BUS 200011 TO BUS 200810 CKT 3 /* KEYSTONE 500 26KEYSTONE 230 REMOVE MACHINE H FROM BUS 200032 /* KEYS G1 20 REMOVE MACHINE L FROM BUS 200032 /* KEYS G1 20 DISCONNECT BUS 200032 /* KEYS G1 20 END
AP-P1-3-PN-115-010	CONTINGENCY 'AP-P1-3-PN-115-010' /* GARRETT 138/115KV XFMR FAULT OPEN BRANCH FROM BUS 235469 TO BUS 235470 CKT 1 /* 01GARRET 138.00 01GARRET 115.00 END
PN-P2-3-PN-115-35E	CONTINGENCY 'PN-P2-3-PN-115-35E' /* #14 STUCK TIE BREAKER BETWEEN BUSES 1 AND 2 DISCONNECT BRANCH FROM BUS 200734 TO BUS 200743 CKT 1 /* 26SCALP L. 115 26HOOVERSV 115 DISCONNECT BRANCH FROM BUS 200743 TO BUS 200802 CKT 1 /* 26HOOVERSV 115 26RALPHTON 115 DISCONNECT BRANCH FROM BUS 200743 TO BUS 200776 CKT 1 /* 26HOOVERSV 115 26HOOVER#1 23 DISCONNECT BRANCH FROM BUS 200743 TO BUS 200744 CKT 1 /* 26HOOVERSV 115 26SOMERST 115 DISCONNECT BRANCH FROM BUS 200742 TO BUS 200743 CKT 1 /* 26TOWER 51 115 26HOOVERSV 115 DISCONNECT BRANCH FROM BUS 200743 TO BUS 200789 CKT 2 /* 26HOOVERSV 115 26HOOVER#2 23 END
PJM_P1_APS_B_G692	CONTINGENCY 'PJM_P1_APS_B_G692' / 200011 KEYSTONE 500 235104 01CABOT 500 1 OPEN BRANCH FROM BUS 200011 TO BUS 235104 CKT 1 END
PN-P1-2-PN-115-068	CONTINGENCY 'PN-P1-2-PN-115-068' /* ROCKWOOD - SOMERSET 115KV DISCONNECT BRANCH FROM BUS 200744 TO BUS 200746 CKT 1 /* 26SOMERST 115 26ROCKWOOD 115 DISCONNECT BRANCH FROM BUS 200746 TO BUS 200773 CKT 1 /* 26ROCKWOOD 115 26ROCKWOOD 23 END
PN-P1-3-PN-230-001T	CONTINGENCY 'PN-P1-3-PN-230-001T' /* CONEMAUGH #1 500/230KV XFMR DISCONNECT BRANCH FROM BUS 200005 TO BUS 200912 CKT 3 /* CONEM-GH 500 26CONEMAGH 230 END

Contingency Name	Contingency Definition
PN-P1-3-PN-500-001AT	CONTINGENCY 'PN-P1-3-PN-500-001AT' /* KEYSTONE #3 500/230 KV XFMR OPEN BRANCH FROM BUS 200011 TO BUS 200810 CKT 3 /* KEYSTONE 500.00 26KEYSTONE 230.00 END
PN_P4-500-001J	CONTINGENCY 'PN_P4-500-001J' /* KEYSTONE 500KV BKR 16 DISCONNECT BRANCH FROM BUS 200011 TO BUS 235104 CKT 1 /* KEYSTONE 500 01CABOT 500 DISCONNECT BRANCH FROM BUS 200011 TO BUS 200810 TO BUS 200907 CKT 4/* KEYSTONE 500 26KEYSTONE 230 26KEYSTN#4 20.00 REDUCE BUS 200011 SHUNT BY 100 PERCENT /* KEYSTONE 500 END
Base Case	
PN_P4-500-002A	CONTINGENCY 'PN_P4-500-002A' /* CONEMAUGH 500KV BKR 1 DISCONNECT BRANCH FROM BUS 200005 TO BUS 200912 CKT 3 /* CONEM-GH 500 26CONEMAGH 230 DISCONNECT BUS 200031 /* CONE G2 22 END
PN-P1-2-PN-230-025	CONTINGENCY 'PN-P1-2-PN-230-025' /* CONEMAUGH - SEWARD 230KV DISCONNECT BRANCH FROM BUS 200912 TO BUS 200793 CKT 1 /* 26CONEMAGH 230 26SEWARD 2 230 END
PN_P4-500-002F	CONTINGENCY 'PN_P4-500-002F' /* CONEMAUGH 500KV BKR 6 DISCONNECT BRANCH FROM BUS 200005 TO BUS 200912 CKT 3 /* CONEM-GH 500 26CONEMAGH 230 DISCONNECT BUS 200030 /* CONE G1 22 END

Affected Systems

16 Affected Systems

None.

Short Circuit

17 Short Circuit

The following Breakers are overdutied:

None

18 Attachment 1 – One Line