Generation Interconnection

Feasibility Study Report

for

Queue Project AF1-255

OSTERBURG-CLAYSBURG 23 KV

5.67 MW Capacity / 13.5 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 (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.

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 Crawford County, Pennsylvania. The installed facilities will have a total capability of 13.5 MW with 5.67 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is December 31, 2020. This study does not imply a TO commitment to this in-service date.

Queue Number	**AF1-255**
Project Name	OSTERBURG-CLAYSBURG 23 KV
State	Pennsylvania
County	Bedford
Transmission Owner	PENELEC
MFO	13.5
MWE	13.5
MWC	5.67
Fuel	Solar
Basecase Study Year	2023

3.1 Point of Interconnection

AF1-255 will interconnect with the PENELEC distribution system at the Claysburg circuit out of Osterburg East 23 kV substation at pole # RCB2-3773. The IC's proposed generating unit site is approximately 0.9 miles northwest of Osterburg PA., near Funny Farm Road.

Attachment 1 shows a one-line diagram of the proposed primary direct connection facilities for the AF1-255 generation project to connect to the Penelec distribution system. IC will be responsible for constructing all of the facilities on its side of the POI, including the attachment facilities which connect the generator to the Penelec distribution system's direct connection facilities.

3.2 Cost Summary

The AF1-255 project will be responsible for the following costs:

Description	Total Cost
Attachment Facilities	$74,900
Direct Connection Network Upgrade	$0
Non Direct Connection Network Upgrades	$144,300
Total Costs	$219,200

In addition, the AF1-255 project may be responsible for a contribution to the following costs

Description	Total Cost
System Upgrades	**$7,497,000**

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

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.

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.

The required Attachment Facilities and Direct and Non-Direct Connection work for the interconnection of the AF1-255 generation project to the Penelec Distribution System is detailed in the following sections. The associated one-line with the generation project Attachment Facilities and the Primary Direct Connection facilities are shown in Attachment 1.

4 Transmission Owner Scope of Work

AF1-255 will interconnect with the PENELEC distribution system at the Claysburg circuit out of Osterburg East 23 kV substation at pole # RCB2-3773. The IC's proposed generating unit site is approximately 0.9 miles northwest of Osterburg PA., near Funny Farm Road. The IC will be responsible for acquiring all easements, properties, and permits that may be required to construct the new interconnection station and the associated facilities.

Attachment 1 shows a one-line diagram of the proposed primary direct connection facilities for the AF1-255 generation project to connect to the Penelec distribution system. IC will be responsible for constructing all of the facilities on its side of the POI, including the attachment facilities which connect the generator to the Penelec distribution system's direct connection facilities.

4.1 Attachment Facilities

The total preliminary cost estimate for the Attachment work is given in the table below. These costs do not include CIAC Tax Gross-up.

Description	Total Cost
NPs & Review Cust Dwgs @ AF1-255	$ 74,900
Total Attachment Facilities Costs	**$ 74,900**

4.2 Direct Connection Cost Estimate

There is no Direct Connection scope of work required for this project.

4.3 Non-Direct Connection Cost Estimate

The total preliminary cost estimate for the Non-Direct Connection work is given in the table below. These costs do not include CIAC Tax Gross-up.

Description	Total Cost
Osterburg East 23kV SS. Adjust Remote Relay and Metering Settings.	$ 13,200

Description	Total Cost
Tap the existing Claysburg-Bedford North 23kV line at an existing pole or interspersed pole on Penelec's existing distribution circuit (00638-73) near pole RCB2-3773, new SCADA recloser tap to interconnect queue project AF1-255. Install 34.5 kV metering in customer's facilities. The customer is responsible to build their own line from their site to Penelec's existing facilities.	$ 131,100
Total Non-Direct Connection Facility Costs	**$144,300**

5 Schedule

Based on the scope of work for the Attachment Facilities and Non-Direct Connection facilities, it is expected to take a minimum of **6 months** after the signing of an Interconnection Construction Service Agreement to complete the installation. This includes the requirement for the IC to make a preliminary payment that compensates FE for the first three months of the engineering design work that is related to the Attachment Facilities. Full initial deposit will be required for the Non-Direct Connection work. This assumes that there will be no environmental issues with any of the new properties associated with this project, that there will be no delays in acquiring the necessary permits for implementing the defined direct connection and that any distribution system outages will be allowed when requested.

6 Transmission Owner Analysis

Penelec performed an analysis of its distribution system. The AF1-255 project did not contribute to any overloads on the distribution system.

7 Interconnection Customer Requirements

7.1 System Protection

An analysis was conducted to assess the impact of the Osterburg-Claysburg 23 kV (AF1-255) Project on the system protection requirements in the area. The results of this review show that the following relay additions will be required:

Proposed single line diagrams show the IC constructing a generation facility tapping Penelec's Osterburg East - 23kV Claysburg circuit at pole RCB2-3773.

The 23kV interconnection proposal will require the IC to meet applicable "Technical Requirements" as outlined in First Energy's document titled "Technical Requirements for the Interconnection of Customer-Owned Generation to the FirstEnergy Distribution System". Anti-islanding system shall meet IEEE 1547 and UL 1741. Therefore, no Direct Transfer Trip (DTT) will be required.

7.2 General Concerns

It is to be understood, for abnormal operation of the Penelec system, which could cause the IC's generation facility to be electrically isolated from the Penelec system synchronous source via the tripping of a interconnecting primary voltage line or device, Developer will, via Penelec's direction, be required to disconnect the generation from Penelec's system and remain disconnected (**units are required to be OFF LINE**), until the Penelec system normal circuitry is restored. These abnormal conditions will be reviewed by Penelec system operators as to the need for the generation facility to be disconnected.

7.3 Requirements for Owner's/Developer's generation IPP Facility

The proposed IC's facilities must be designed in accordance with the document titled *FirstEnergy Distribution Engineering Practices Interconnection of Customer-Owned Generation to the FirstEnergy Distribution System* dated 11/17/14 located at the following link:

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

The document is referred to as engineering practice EP(# 02-280) with section 4 part C specifically referencing the "interconnection technical requirements". Certain protection requirement are shown.

Additionally, IC is responsible to provide adequate protection (for their equipment) under any distribution system operating condition' - which includes 'Separation from supply' (i.e. tripping of F.E. circuit breakers) and 'Re-synchronizing the generation after electric restoration of the supply' (i.e. reclosing of F.E. circuit breakers).

The IC's protection must be designed to coordinate with the reclosing practices of FirstEnergy line protective devices. The generator must cease to energize the FirstEnergy circuit to which it is connected prior to reclosing of any (FE) automatic reclosing devices.

The IC's electrical protection and control schematics shall be provided to FE for consideration. FE may request modifications, if required, to meet the technical requirements.

7.4 Compliance Issues

The IC will be responsible for meeting a power factor between 0.90 lagging (producing MVARs) to 0.95 leading (absorbing MVARs) and assure that voltage deviation will be less than 1.0 volt as measured at the POI under all Solar Gen operating conditions due to the inherent dynamic reactive power capability of this solar facility.

Generators with no inherent VAR (reactive power) control capability, or those that have a restricted VAR capability less than the defined requirements, must provide dynamic supplementary reactive support located at the generation facility with electrical characteristics equivalent to that provided by a similar sized synchronous generator. A Dynamic Reactive Compensation (either Static VAR Compensator (SVC) or STATCOM) or other method be applied in order to maintain the required specifications at the POI. The IC is responsible for the installation of equipment on its side of the POI in order to adhere to the criteria stated above by FirstEnergy.

8 Revenue Metering and SCADA Requirements

8.1 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.

8.1.1 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

8.2 PENELEC Requirements

The IC will be required to comply with all FE Revenue Metering Requirements for Generation Interconnection Customers. These FE requirements are the following:

The FE operating company (Penelec) shall provide, own, operate, test, and maintain the revenue metering equipment at the Interconnection Customer's (IC) expense. The revenue metering equipment includes, but is not limited to, current transformers, voltage transformers, secondary wires, meter socket, bidirectional revenue meter, and associated devices. The IC shall mount the instrument transformers unless otherwise agreed to by Penelec. The instrument transformers and meter socket shall be installed in a location that is readily accessible to authorized Penelec representatives. Penelec will provide the IC access to bidirectional kWh and kVARh pulses from the Penelec meter at the IC's expense if requested. The IC shall, at its expense, install, own, operate, test, and maintain any metering and telemetry equipment that may be required to provide real-time meter data to FE or PJM.

9 Network Impacts

The Queue Project AF1-255 was evaluated as a 13.5 MW (Capacity 5.7 MW) injection at the Osterburg 23 kV substation in the PENELEC area. Project AF1-255 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AF1-255 was studied with a commercial probability of 53%. Potential network impacts were as follows:

Summer Peak Load Flow

10 Generation Deliverability

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

None

11 Multiple Facility Contingency

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

None

12 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	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
4104988	200746	26ROCKWOOD	115.0	PENELEC	202650	26HIGHPOINT	115.0	PENELEC	1	PN-P7-1-PN-230-001	tower	179.0	117.09	118.23	DC	2.05
4166387 0	200747	26PENN-MAR	115.0	PENELEC	946190	AF1-284 TAP	115.0	PENELEC	1	PN-P2-3-PN-115-35E	breaker	167.0	162.75	163.75	DC	1.67

13 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	CKT ID	CONTNAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
4135056 7	20074 3	26HOOVERS V	115. 0	PENELE C	20074 2	26TOWER 51	115. 0	PENELE C	1	AP-P1-3-PN-115-010	operatio n	172.0	113.05	114.6	DC	2.66
4135033 7	20074 5	26ALLEGHE N	115. 0	PENELE C	20264 7	26KIMRUN TAP	115. 0	PENELE C	1	Base Case	operatio n	133.0	108.56	110.13	DC	2.08
4135034 4	20263 7	26PRIDE	115. 0	PENELE C	20074 4	26SOMERS T	115. 0	PENELE C	1	Base Case	operatio n	133.0	106.16	107.72	DC	2.08
4135033 0	20264 7	26KIMRUN TAP	115. 0	PENELE C	20263 7	26PRIDE	115. 0	PENELE C	1	Base Case	operatio n	133.0	108.56	110.13	DC	2.08

14 System Reinforcements

ID	Index	Facility	Upgrade Description	Cost
41663870	2	**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 Line for ~4 miles.** **Project Type : FAC** **Cost : $7,497,000** **Time Estimate : 6.0 Months**	$7,497,000
41049888	1	**26ROCKWOOD 115.0 kV - 26HIGHPOINT 115.0 kV Ckt 1**	**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** **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** **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**	$0
			TOTAL COST	**$7,497,000**

15 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.

15.1 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
41049888	200746	26ROCKWOOD	PENELEC	202650	26HIGHPOINT	PENELEC	1	PN-P7-1-PN-230-001	tower	179.0	117.09	118.23	DC	2.05

Bus #	Bus	MW Impact
200834	26SW_E13_K22	0.0701
200835	26DSGENWIN	0.5597
200846	26FORWARD	0.1641
200864	K-013 E	4.7029
200883	Q-053 E	3.2881
200888	26HIGHLAND	0.2074
200889	26STNY CRK	0.3411
200890	26BF_G21_K23	0.2745
200891	26CSLMN_L13	0.4306
200892	26LOOKOUT	0.4090
200925	26R32	0.2393
202225	26SCI_S29B	0.1090
292350	K-023	12.6859
292542	L-013 1	12.3389
293432	R-040 E	0.6941
293603	O-018 E	5.9441
293902	O-048 E	11.1050
294903	P-060 E	9.7738
296332	R-032 E	6.8586
917672	Z2-108 E	6.9406
938351	AE1-053	3.8559
938881	AE1-116	1.2553
938991	AE1-128 C	12.5662
938992	AE1-128 E	8.3774
942361	AE2-249 C	1.4137
942362	AE2-249 E	0.9425
944751	AF1-140 C	1.1212
944752	AF1-140 E	0.7475
944781	AF1-143 C	23.1354
944782	AF1-143 E	15.4236
945671	AF1-232 C O1	25.3562
945672	AF1-232 E O1	13.6534
945901	AF1-255 C	0.8591
945902	AF1-255 E	1.1863
946081	AF1-273 C O1	14.6286
946082	AF1-273 E O1	9.7524
946241	AF1-289 C O1	2.9038
946242	AF1-289 E O1	1.9358
946571	AF1-321 C O1	2.5168
946572	AF1-321 E O1	1.6778

Bus #	Bus	MW Impact
DUCKCREEK	DUCKCREEK	0.3155
NEWTON	NEWTON	0.3019
FARMERCITY	FARMERCITY	0.0158
G-007A	G-007A	0.9350
VFT	VFT	2.5671
PRAIRIE	PRAIRIE	0.7362
COFFEEN	COFFEEN	0.1480
EDWARDS	EDWARDS	0.0952
CHEOAH	CHEOAH	0.1577
TILTON	TILTON	0.1732
GIBSON	GIBSON	0.1534
CALDERWOOD	CALDERWOOD	0.1566
BLUEG	BLUEG	0.4930
TRIMBLE	TRIMBLE	0.1580
CATAWBA	CATAWBA	0.1162

15.2 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
41663870	200747	26PENN-MAR	PENELEC	946190	AF1-284 TAP	PENELEC	1	PN-P2-3-PN-115-35E	breaker	167.0	162.75	163.75	DC	1.67

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

Affected Systems

16 Affected Systems

16.1 LG&E

LG&E Impacts to be determined during later study phases (as applicable).

16.2 MISO

MISO Impacts to be determined during later study phases (as applicable).

16.3 TVA

TVA Impacts to be determined during later study phases (as applicable).

16.4 Duke Energy Progress

Duke Energy Progress Impacts to be determined during later study phases (as applicable).

16.5 NYISO

NYISO Impacts to be determined during later study phases (as applicable).

17 Contingency Descriptions

Contingency Name	Contingency Definition
Base Case	
PN-P7-1-PN-230-001	CONTINGENCY 'PN-P7-1-PN-230-001' /* HOMER CITY - HOOVERSVILLE 230KV & SEWARD - TOWER 51 115KV DISCONNECT BRANCH FROM BUS 200767 TO BUS 200768 CKT 1 /* 26HOMER CT 230 26QUEMAHON 230 DISCONNECT BRANCH FROM BUS 200768 TO BUS 200796 CKT 1 /* 26QUEMAHON 230 26HOOVRSVL 230 DISCONNECT BRANCH FROM BUS 200796 TO BUS 200743 CKT 3 /* 26HOOVRSVL 230 26HOOVERSV 115 DISCONNECT BRANCH FROM BUS 200741 TO BUS 200742 CKT 1 /* 26SEWARD 115 26TOWER 51 115 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
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

Short Circuit

18 Short Circuit

The following Breakers are overduty:

None

19 Attachment One: One Line Diagram