Generation Interconnection

Feasibility Study Report

for

Queue Project AG1-524

SULLIVAN-ROCKPORT 765 KV

180 MW Capacity / 300 MW Energy

Solar Project

January 2021

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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 AEP.

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.

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 Sullivan County, Indiana. AG1-524 is an uprate to AG1-522 and AG1-523.

The proposed in-service date for this project is June 01, 2023. This study does not imply a TO commitment to this in-service date.

Queue Number	AG1-524
Project Name	SULLIVAN-ROCKPORT 765 KV
State	Indiana
County	Sullivan
Transmission Owner	AEP
MFO	900
MWE	300
MWC	180
Fuel	Solar
Basecase Study Year	2024

Any new service customers who can feasibly be commercially operable prior to June 1st of the basecase study year are required to request interim deliverability analysis.

4 Point of Interconnection

AG1-524 will interconnect with the AEP transmission system via a direct connection to the AG1-522 proposed 765 kV station, as an uprate to the PJM projects AG1-522/523.

Note: It is assumed that the existing 765 kV revenue metering system, generation lead and Protection & Control Equipment that will be installed for AG1-522/523 will be adequate for the increased generation of AG1-524. Depending on the timing of the completion of the AG1-522/523 interconnection construction relative to the AG1-524 completion, there may (or may not) be a need to review and revise the relay settings for the increased generation of AG1-524.

5 Cost Summary

The AG1-524 project will be responsible for the following costs:

Description	Total Cost
Total Physical Interconnection Costs	$45,000
Total System Network Upgrade Costs	$54,680,000
Total Costs	$54,725,000

This cost excludes a Federal Income Tax Gross Up charges. This tax may or may not be charged based on whether this project meets the eligibility requirements of IRS Notice 2016-36, 2016-25 I.R.B. (6/20/2016). If at a future date it is determined that the Federal Income Tax Gross charge is required, the Transmission Owner shall be reimbursed by the Interconnection Customer for such taxes.

Cost allocations for any System Upgrades will be provided in the System Impact Study Report.

The estimates provided in this report are preliminary in nature, as they were determined without the benefit of detailed engineering studies. Final estimates will require an on-site review and coordination to determine final construction requirements. In addition, Stability analysis will be completed during the Facilities Study stage. It is possible that a need for additional upgrades could be identified by these studies.

6 Transmission Owner Scope of Work

The total physical interconnection costs is given in the table below:

6.1 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
	$ 0
Total Attachment Facility Costs	**$** 0

6.2 Direct Connection Cost Estimate

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

Description	Total Cost
	$ 0
Total Direct Connection Facility Costs	**$** 0

6.3 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
Review line protection and control settings at the AG1-522 proposed 765 kV substation	$ 45,000
Total Non-Direct Connection Facility Costs	**$** 45,000

7 Schedule

It is anticipated that the time between receipt of executed Agreements and Commercial Operation may range from 12 to 18 months if no line work is required. If line work is required, construction time would generally be between 24 to 36 months after signing Agreement execution.

8 Interconnection Customer Requirements

It is understood that the Interconnection Customer (IC) is responsible for all costs associated with this interconnection. The costs above are reimbursable to the Transmission Owner. The cost of the IC's generating plant and the costs for the line connecting the generating plant to the Point of Interconnection are not included in this report; these are assumed to be the IC's responsibility.

The Generation Interconnection Agreement does not in or by itself establish a requirement for the Transmission Owner to provide power for consumption at the developer's facilities. A separate agreement may be reached with the local utility that provides service in the area to ensure that infrastructure is in place to meet this demand and proper metering equipment is installed. It is the responsibility of the developer to contact the local service provider to determine if a local service agreement is required.

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

2. The Interconnection Customer may be required to install and/or pay for metering as necessary to properly track real time output of the facility as well as installing metering which shall be used for billing purposes. See Section 8 of Appendix 2 to the Interconnection Service Agreement as well as Section 4 of PJM Manual 14D for additional information.

9 Revenue Metering and SCADA Requirements

9.1 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.

9.2 Meteorological Data Reporting Requirements

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

- Back Panel temperature (Fahrenheit) - (Required for plants with Maximum Facility Output of 3 MW or higher)
- Irradiance (Watts/meter2) - (Required for plants with Maximum Facility Output of 3 MW or higher)
- Ambient air temperature (Fahrenheit) - (Accepted, not required)
- Wind speed (meters/second) - (Accepted, not required)
- Wind direction (decimal degrees from true north) - (Accepted, not required)

9.3 Interconnected Transmission Owner Requirements

The IC will be required to comply with all Interconnected Transmission Owner's revenue metering requirements for generation interconnection customers located at the following link:

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

10 Summer Peak - Load Flow Analysis

The Queue Project AG1-524 was evaluated as a 300.0 MW (Capacity 180.0 MW) injection tapping the Sullivan to Rockport 765 kV line in the AEP area. Project AG1-524 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AG1-524 was studied with a commercial probability of 53.0 %. Potential network impacts were as follows:

10.1 Generation Deliverability

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

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
16827574 2	24321 0	05SULLIVA N	765. 0	AEP	24771 2	05SULLIVA N	345. 0	AEP	1	AEP_P1-2_#363_16 82	singl e	1737. 0	99.02	104.13	DC	88.74

10.2 Multiple Facility Contingency

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

None

10.3 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	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
1647655 13	2428 65	05JEFRSO	345. 0	AEP	2480 00	06CLIFT Y	345. 0	OVE C	Z1	AEP_P4_#1760_05JE FRSO 765_A	break er	1868. 0	199.42	204.99	DC	102.4 3
1647655 14	2428 65	05JEFRSO	345. 0	AEP	2480 00	06CLIFT Y	345. 0	OVE C	Z1	AEP_P4_#6189_05H ANG R 765_D1	break er	1868. 0	164.92	167.05	DC	70.7
1647658 31	2428 65	05JEFRSO	345. 0	AEP	2480 00	06CLIFT Y	345. 0	OVE C	Z1	AEP_P1-2_#709_546	single	1868. 0	143.96	144.71	DC	42.47
1674799 33	2428 65	05JEFRSO	345. 0	AEP	2480 00	06CLIFT Y	345. 0	OVE C	Z1	AEP_P4_#1760_05JE FRSO	break er	1868. 0	199.42	204.99	DC	102.4 3
1674799 34	2428 65	05JEFRSO	345. 0	AEP	2480 00	06CLIFT Y	345. 0	OVE C	Z1	AEP_P4_#6189_05H ANG	break er	1868. 0	164.92	167.05	DC	70.7
1674800 43	2432 08	05JEFRSO	765. 0	AEP	2428 65	05JEFRS O	345. 0	AEP	2	AEP_P4_#1760_05JE FRSO	break er	3039. 0	122.58	126.0	DC	102.4 3
1674800 44	2432 08	05JEFRSO	765. 0	AEP	2428 65	05JEFRS O	345. 0	AEP	2	AEP_P4_#6189_05H ANG	break er	3039. 0	101.37	102.68	DC	70.7
1619320 14	2432 09	05ROCKP T	765. 0	AEP	2432 08	05JEFRS O	765. 0	AEP	1	AEP_P7-1_#11042-B	tower	3854. 0	135.48	139.03	DC	139.2 8
1619320 15	2432 09	05ROCKP T	765. 0	AEP	2432 08	05JEFRS O	765. 0	AEP	1	AEP_P7-1_#11042-A	tower	3854. 0	134.95	138.5	DC	139.2 8
1682757 72	2432 09	05ROCKP T	765. 0	AEP	2432 08	05JEFRS O	765. 0	AEP	1	AEP_P1-2_#8905_1697	single	3854. 0	100.88	103.06	DC	83.87
1682756 67	2477 12	05SULLIV AN	345. 0	AEP	2545 29	16PETE	345. 0	IPL	1	AEP_P1-2_#363_1682	single	1409. 0	108.97	112.24	DC	46.06
1682756 78	2477 12	05SULLIV AN	345. 0	AEP	2432 21	05EUGE NE	345. 0	AEP	1	AEP_P1-2_#363_1682	single	1335. 0	119.86	122.81	DC	39.33
1647656 67	2480 00	06CLIFTY	345. 0	OVE C	2480 01	06DEAR B1	345. 0	OVE C	1	AEP_P4_#1760_05JE FRSO 765_A	break er	1099. 0	107.09	108.16	DC	25.59

10.4 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	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
164765830	242865	05JEFRSO	345.0	AEP	248000	06CLIFTY	345.0	OVEC	Z1	AEP_P1-2_#709_546	operation	1868.0	162.85	164.91	DC	70.78
168275947	243208	05JEFRSO	765.0	AEP	242865	05JEFRSO	345.0	AEP	2	AEP_P1-2_#709_546	operation	3039.0	100.1	101.37	DC	70.78
168275769	243209	05ROCKPT	765.0	AEP	243208	05JEFRSO	765.0	AEP	1	AEP_P1-2_#8905_1697	operation	3854.0	120.92	124.49	DC	139.79
168275771	243209	05ROCKPT	765.0	AEP	243208	05JEFRSO	765.0	AEP	1	Base Case	operation	3854.0	112.63	116.08	DC	132.94
168275741	243210	05SULLIVAN	765.0	AEP	247712	05SULLIVAN	345.0	AEP	1	AEP_P1-2_#363_1682	operation	1737.0	115.23	123.74	DC	147.9
168275878	243217	05DEQUIN	345.0	AEP	243878	05MEADOW	345.0	AEP	1	AEP_P1-2_#6490_16000	operation	1959.0	103.51	105.09	DC	31.06
168275890	243217	05DEQUIN	345.0	AEP	243878	05MEADOW	345.0	AEP	2	AEP_P1-2_#6472_15258	operation	1959.0	102.77	104.34	DC	30.83
168275636	243878	05MEADOW	345.0	AEP	255205	17REYNOLDS	345.0	NIPS	2	AEP_P1-2_#8695-B	operation	1868.0	163.35	165.1	DC	32.62
168275650	243878	05MEADOW	345.0	AEP	958970	AF2-188 TAP	345.0	AEP	1	AEP_P1-2_#8807	operation	1868.0	158.92	160.66	DC	32.54
168275665	247712	05SULLIVAN	345.0	AEP	254529	16PETE	345.0	IPL	1	AEP_P1-2_#363_1682	operation	1409.0	149.25	154.71	DC	76.77
168275676	247712	05SULLIVAN	345.0	AEP	243221	05EUGENE	345.0	AEP	1	AEP_P1-2_#363_1682	operation	1335.0	147.58	152.49	DC	65.54
168275794	247712	05SULLIVAN	345.0	AEP	243217	05DEQUIN	345.0	AEP	1	AEP_P1-2_#363_1682	operation	1318.0	115.47	118.79	DC	43.84
168571647	255204	17REYNOLDS	765.0	NIPS	243207	05GRNTWN	765.0	AEP	1	AEP_P1-2_#363_1682	operation	2669.0	104.94	105.55	DC	31.25
164765938	324010	7TRIMBLREAC	345.0	LGEE	248000	06CLIFTY	345.0	OVEC	1	AEP_P1-2_#363_1682	operation	1451.0	123.66	124.24	DC	18.53
169801081	923880	AB2-028 TAP	345.0	AEP	243218	05DESOTO	345.0	AEP	1	AEP_P1-2_#363_1682	operation	1318.0	105.2	106.02	DC	24.03
170077423	958970	AF2-188 TAP	345.0	AEP	255205	17REYNOLDS	345.0	NIPS	1	AEP_P1-2_#8807	operation	1868.0	163.47	165.21	DC	32.54
170077653	963840	AG1-237 TAP	345.0	AEP	243217	05DEQUIN	345.0	AEP	1	AEP_P1-2_#363_1682	operation	1959.0	101.38	101.95	DC	25.01
170077591	966530	AG1-522 TAP	765.0	AEP	243210	05SULLIVAN	765.0	AEP	1	AEP_P1-2_#363_1682	operation	3859.0	103.74	111.4	DC	295.81

10.5 System Reinforcements - Summer Peak Load Flow - Primary POI

ID	Idx	Facility	Upgrade Description	Cost
168275742	1	**05SULLIVAN 765.0 kV - 05SULLIVAN 345.0 kV Ckt 1**	**AEP** **AEPI0052a (559) : An engineering study will need to be conducted to determine if the Sullivan Compliance Thermal limits 2997 Amps settings can be adjusted to mitigate the overload, Estimated Cost $25,000. New relay packages will be required if the settings cannot be adjusted. Estimated Cost: $600,000.** **Project Type : FAC** **Cost : $25,000** **Time Estimate : 12-18 Months**	$25,000
164765667	7	**06CLIFTY 345.0 kV - 06DEARB1 345.0 kV Ckt 1**	**OVEC** **b2943 (2170) : PJM Baseline Upgrade b2943. Perform a LIDAR study on the Clifty Creek - Dearborn 345 kV line to increase the Summer Emergency rating. The baseline project had a projected in-service date of 12/01/2020.** **Project Type : FAC** **Cost : $0** **Time Estimate : 0.0 Months**	$0
168275678	6	**05SULLIVAN 345.0 kV - 05EUGENE 345.0 kV Ckt 1**	**AEP** **AEPI0036a (352) : Rebuild 3.83 miles of 2303.5 ACAR , conductor section 1** **Project Type : FAC** **Cost : $5,745,000** **Time Estimate : 24- 36 Months** **AEPI0036b (353) : Rebuild 47.02 miles of 1414 ACSR/PE, conductor section 2** **Project Type : FAC** **Cost : $7,660,000** **Time Estimate : 24- 36 Months**	$13,405,000

ID	Idx	Facility	Upgrade Description	Cost
167479933,164765513,164765514,167479934,164765831	2	05JEFRSO 345.0 kV - 06CLIFTY 345.0 kV Ckt Z1	**AEP** **AEPI0045a (11) : Replace 4 Clifty Switches (3000A)** **Project Type : FAC** **Cost : $2,000,000** **Time Estimate : 12-18 Months** **AEPI0045b (12) : A Sag Study will be required on the 0.75 mile section of ACSR ~ 2156 ~ 64/19 ~ BLUEBIRD line to mitigate the overload . New Rating after the Sag Study : S/N: 2354 MVA S/E: 3212 MVA. Depending on the sag study results, cost for this upgrade is expected to be between $20,000 (No remediations required just sag study) and 1.96 million (complete line reconductor/rebuild required). Time Estimate: a) Sag Study: 6-12 months b) Rebuild: The standard time required for construction differs from state to state. An approximate construction time would be 24 to 36 months after signing an interconnection agreement.** **Project Type : FAC** **Cost : $20,000** **Time Estimate : 6-12 Months** **AEPI0045c (14) : Replace Clifty Bus 5"0 AL Tubular Sch 40** **Project Type : FAC** **Cost : $100,000** **Time Estimate : 12-18 Months** **AEPI0045d (13) : Rebuild 0.75 miles of ACSR ~ 2156 ~ 64/19 ~ BLUEBIRD conductor to mitigate the overload.** **Project Type : FAC** **Cost : $1,960,000** **Time Estimate : 24-36 Months** **AEPI0045e (15) : Replace Jefferson Breaker (5000A)** **Project Type : FAC** **Cost : $1,200,000** **Time Estimate : 12-18 Months** **AEPI0045f (245) : An engineering study will need to be conducted to determine if the Jefferson Relay Compliance Trip limits 5506 Amps settings can be adjusted to mitigate the overload, Estimated Cost $25,000. New relay packages will be required if the settings cannot be adjusted. Estimated Cost: $600,000.** **Project Type : FAC** **Cost : $25,000** **Time Estimate : 12-18 Months** **AEPI0045g (246) : An engineering study will need to be conducted to determine if the Clifty Relay Thermal limits 5993 Amps settings can be adjusted to mitigate the overload, Estimated Cost $25,000. New relay packages will be required if the settings cannot be adjusted. Estimated Cost: $600,000.** **Project Type : FAC** **Cost : $25,000** **Time Estimate : 12-18 Months**	$12,175,000

ID	Idx	Facility	Upgrade Description	Cost
167479933,164765513,164765514,167479934,164765831	2	05JEFRSO 345.0 kV - 06CLIFTY 345.0 kV Ckt Z1	**continued:** **AEPI0045h (247) : An engineering study will need to be conducted to determine if the Jefferson Relay Compliance Trip limits 5993 Amps settings can be adjusted to mitigate the overload, Estimated Cost $25,000. New relay packages will be required if the settings cannot be adjusted. Estimated Cost: $600,000.** **Project Type : FAC** **Cost : $25,000** **Time Estimate : 12-18 Months** **AEPI0045i (248) : Replace 2 Clifty Breakers (3000A)** **Project Type : FAC** **Cost : $2,400,000** **Time Estimate : 12-18 Months** **AEPI0045j (249) : Replace 3 Clifty risers (Sub cond 2-3500 kcm AAC 127 Str)** **Project Type : FAC** **Cost : $300,000** **Time Estimate : 12-18 Months** **AEPI0045k (406) : Replace 3 Jefferson 5000 A switches** **Project Type : FAC** **Cost : $150,000** **Time Estimate : 24-36 Months** **AEPI0045L (407) : Replace 1 Jefferson (Sub cond 3-2500 kcm AAC 91 Str)** **Project Type : FAC** **Cost : $10,000** **Time Estimate : 12-18 Months** **n4106 (408) : Perform a sag study on the 345 kV line between Jefferson and Clifty Creek. The 345 kV line between Jefferson and Clifty Creek can be sag studied to increase the emergency rating from 2354 to 3212. The cost of a sag study to identify any mitigation requirements should cost around $3,680. If remediation can only be reached through a rebuild, wed expect that to cost around $1,960,000. Note that the transformer will still be limited to 2919 MVA emergency.** **Project Type : FAC** **Cost : $1,960,000** **Time Estimate : N/A Months** **n4106.1 (409) : Replace 4 Clifty switches.** **Project Type : FAC** **Cost : $2,000,000** **Time Estimate : 12-18 Months**	

ID	Idx	Facility	Upgrade Description	Cost
168275667	5	05SULLIVAN 345.0 kV - 16PETE 345.0 kV Ckt 1	**AEP** **AEPI0039a (383) : A Sag Study will be required on the ~0.5 miles section of 954 2x Rail Conductor section 2 to mitigate the overload. New Ratings after the sag study S/N : 1410 MVA S/E: 1888 MVA. Depending on the sag study results, cost for this upgrade is expected to be between $25,000 (no remediations required just sag study) and $0.75 million (complete line reconductor/rebuild required)** **Project Type : FAC** **Cost : $25,000** **Time Estimate : 6-12 Months** **IPL** **NonPJMArea (540) : The external (i.e. Non-PJM) Transmission Owner, IPL, will not evaluate this violation until the impact study phase.** **Project Type : FAC** **Cost : $0** **Time Estimate : N/A Months**	$25,000
167480043,167480044	3	05JEFRSO 765.0 kV - 05JEFRSO 345.0 kV Ckt 2	**AEP** **AEPI0025a (331) : Replace 765/345 Transformer** **Project Type : FAC** **Cost : $6,000,000** **Time Estimate : 12-18 Months** **AEPI0025b (332) : Replace Jefferson 345kV Circuit Breaker (5000A)** **Project Type : FAC** **Cost : $1,200,000** **Time Estimate : 12-18 Months** **AEPI0025c (333) : An engineering study will need to be conducted to determine if the Jefferson CT thermal Trip limits 2703 Amps settings can be adjusted to mitigate the overload, Estimated Cost $25,000. New relay packages will be required if the settings cannot be adjusted. Estimated Cost: $600,000.** **Project Type : FAC** **Cost : $25,000** **Time Estimate : 12-18 Months** **AEPI0025d (334) : Replace 9 Jefferson 5000 A switches** **Project Type : FAC** **Cost : $4,500,000** **Time Estimate : 12-18 Months** **AEPI0025e (335) : Replace 2 Jefferson (Sub cond 3-2500 kcm AAC 91 Str)** **Project Type : FAC** **Cost : $200,000** **Time Estimate : 12-18 Months**	$11,925,000

ID	Idx	Facility	Upgrade Description	Cost
161932014,161932015,168275772	4	05ROCKPT 765.0 kV - 05JEFRSO 765.0 kV Ckt 1	**AEP** **AEPI0002a (271) : An engineering study will need to be conducted to determine if the Rockport Relay Thermal limits 2996 Amps settings can be adjusted to mitigate the overload, Estimated Cost $25,000. New relay packages will be required if the settings cannot be adjusted, Estimated Cost: $600,000** **Project Type : FAC** **Cost : $25,000** **Time Estimate : 12-18 Months** **AEPI0002c (273) : Replace 6 Rockport Current Transformers 3000Amps** **Project Type : FAC** **Cost : $4,800,000** **Time Estimate : 12-18 Months** **AEPI0002d (274) : Replace 2 Rockport 3000A non-oil Breakers at Rockport** **Project Type : FAC** **Cost : $6,000,000** **Time Estimate : 12-18 Months** **AEPI0002e (275) : Replace 3 3000A Wavetraps at Rockport** **Project Type : FAC** **Cost : $150,000** **Time Estimate : 12-18 Months** **AEPI0002f (276) : Replace 3 3000A wavetraps at Jefferson** **Project Type : FAC** **Cost : $150,000** **Time Estimate : 12-18 Months** **AEPI0002g (277) : Replace 12 3000A switches at Rockport** **Project Type : FAC** **Cost : $6,000,000** **Time Estimate : 12-18 Months**	$17,125,000
			TOTAL COST	**$54,680,000**

10.6 Flow Gate Details

The following indices contain additional information about each facility presented in the body of the report. For each index, a description of the flowgate and its contingency was included for convenience. The intent of the indices is to provide more details 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 indices. Please note that there may be contributors that are subsequently queued after the queue under study that are not listed in the indices. 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 are Full MW Impact contributions which are also noted in the indices column named "Full MW Impact", whereas the loading percentages reported in the body of the report, take into consideration the PJM Generator Deliverability Test rules such as commercial probability of each project as well as the ramping impact of "Adder" contributions. The MW Impact found and used in the analysis is shown in the indices column named "Gendeliv MW Impact".

10.6.1 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
168275742	243210	05SULLIVAN	AEP	247712	05SULLIVAN	AEP	1	AEP_P1-2_#363_1682	single	1737.0	99.02	104.13	DC	88.74

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
243442	05RKG1	105.4722	80/20	105.4722
243443	05RKG2	101.1164	80/20	101.1164
941341	AE2-130 C	236.6448	80/20	236.6448
966531	AG1-522 C	88.7418	80/20	88.7418
966541	AG1-523 C	88.7418	80/20	88.7418
966551	AG1-524 C	88.7418	80/20	88.7418
966561	AG1-525 C	88.7418	80/20	88.7418
CALDERWOOD	CALDERWOOD	0.3474	Confirmed LTF	0.3474
NY	NY	0.3865	Confirmed LTF	0.3865
PRAIRIE	PRAIRIE	1.8055	Confirmed LTF	1.8055
CHEOAH	CHEOAH	0.3498	Confirmed LTF	0.3498
COTTONWOOD	COTTONWOOD	1.4679	Confirmed LTF	1.4679
HAMLET	HAMLET	0.4037	Confirmed LTF	0.4037
GIBSON	GIBSON	0.3817	Confirmed LTF	0.3817
BLUEG	BLUEG	1.2135	Confirmed LTF	1.2135
TRIMBLE	TRIMBLE	0.3890	Confirmed LTF	0.3890
CATAWBA	CATAWBA	0.2447	Confirmed LTF	0.2447

10.6.2 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
167479933	242865	05JEFRSO	AEP	248000	06CLIFTY	OVEC	Z1	AEP_P4_#1760_05JEFRSO	breaker	1868.0	199.42	204.99	DC	102.43

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
243442	05RKG1	102.2311	50/50	102.2311
243443	05RKG2	98.0091	50/50	98.0091
247900	05FR-11G E	5.3350	Adder	6.28
247901	05FR-12G E	5.2465	Adder	6.17
247902	05FR-21G E	5.6076	Adder	6.6
247903	05FR-22G E	5.3691	Adder	6.32
247904	05FR-3G E	10.8745	Adder	12.79
247905	05FR-4G E	8.5170	Adder	10.02
247906	05MDL-1G E	9.3352	Adder	10.98
247907	05MDL-2G E	4.6764	Adder	5.5
247912	05MDL-3G E	4.6764	Adder	5.5
247913	05MDL-4G E	4.6764	Adder	5.5
247943	T-127 E	4.6764	Adder	5.5
276615	W2-048 GEN	3.3609	Adder	3.95
276621	X2-022 GEN	12.6067	Adder	14.83
290261	S-027 E	9.5285	Adder	11.21
290265	S-028 E	9.5285	Adder	11.21
293798	W4-005 E	20.4537	Adder	24.06
917502	Z2-087 E	10.1208	Adder	11.91
924042	AB2-047 E O1	12.6510	Adder	14.88
924261	AB2-070 C O1	1.7371	Adder	2.04
924262	AB2-070 E O1	10.5206	Adder	12.38
925771	AC1-053 C	1.7481	Adder	2.06
925772	AC1-053 E	11.6989	Adder	13.76
930042	AB1-006 E	10.1711	Adder	11.97
930461	AB1-087 CT1	72.3747	50/50	72.3747
930462	AB1-087 ST1	57.5408	50/50	57.5408
930471	AB1-088 CT1	72.3747	50/50	72.3747
930472	AB1-088 ST1	57.5408	50/50	57.5408
933446	AC2-157 1C	8.9760	50/50	8.9760
933447	AC2-157 2C	8.9760	50/50	8.9760
933448	AC2-157 1E	14.6450	50/50	14.6450
933449	AC2-157 2E	14.6450	50/50	14.6450
935141	AD1-148	3.3391	Adder	3.93
936771	AD2-100 C	9.1196	Adder	10.73
936772	AD2-100 E	6.0797	Adder	7.15
936971	AD2-131 C	0.6007	Adder	0.71
936972	AD2-131 E	3.0181	Adder	3.55
937211	AD2-159 C	2.2103	Adder	2.6
937212	AD2-159 E	10.3484	Adder	12.17
939741	AE1-205 C O1	4.8859	Adder	5.75
939742	AE1-205 E O1	6.7472	Adder	7.94

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
941341	AE2-130 C	229.3728	50/50	229.3728
941342	AE2-130 E	152.9152	50/50	152.9152
941571	AE2-154 C	1.8998	Adder	2.24
941572	AE2-154 E	12.7139	Adder	14.96
941731	AE2-173 O1	2.9083	Adder	3.42
942111	AE2-223 C	1.1342	Adder	1.33
942112	AE2-223 E	7.5906	Adder	8.93
942481	AE2-261 C	12.7863	Adder	15.04
942482	AE2-261 E	8.5242	Adder	10.03
942601	AE2-276	11.8105	50/50	11.8105
944201	AF1-088 FTIR	236.2100	50/50	236.2100
944221	AF1-090 C O1	2.6614	Adder	3.13
944222	AF1-090 E O1	12.4601	Adder	14.66
945391	AF1-204 C O1	6.5592	50/50	6.5592
945392	AF1-204 E O1	19.6777	50/50	19.6777
945871	AF1-252 O1	4.7179	Adder	5.55
945881	AF1-253	3.2662	Adder	3.84
946581	AF1-322 C	4.9102	Adder	5.78
946582	AF1-322 E	6.7807	Adder	7.98
954681	J949 C	11.4172	PJM External (MISO)	11.4172
957141	AF2-008 FTIR	118.1050	50/50	118.1050
957142	AF2-008 NFTI	236.2100	50/50	236.2100
957381	AF2-032 C	0.9639	Adder	1.13
957382	AF2-032 E	0.4536	Adder	0.53
959341	AF2-225 C	3.6644	Adder	4.31
959342	AF2-225 E	5.0604	Adder	5.95
959611	AF2-252 C	1.2031	Adder	1.42
959612	AF2-252 E	1.8046	Adder	2.12
960141	AF2-305	0.6147	Adder	0.72
960261	AF2-317	1.0685	Adder	1.26
960611	AF2-352 C	1.2031	Adder	1.42
960612	AF2-352 E	1.8046	Adder	2.12
963741	AG1-226 C O1	13.3122	Adder	29.55
963742	AG1-226 E O1	4.7587	Adder	10.56
963831	AG1-236 C	0.9265	Adder	2.06
963832	AG1-236 E	6.2004	Adder	13.76
963841	AG1-237 C O1	0.9708	Adder	2.15
963842	AG1-237 E O1	6.4967	Adder	14.42
965091	AG1-374 C	5.7387	Adder	12.74
965092	AG1-374 E	3.8258	Adder	8.49
965331	AG1-398	0.2596	Adder	0.58
965341	AG1-399 C	1.7854	Adder	3.96
965342	AG1-399 E	8.3590	Adder	18.55
965351	AG1-400	5.0722	Adder	11.26
965361	AG1-401 C	1.7854	Adder	3.96
965362	AG1-401 E	8.3590	Adder	18.55
965371	AG1-402	5.0722	Adder	11.26
965381	AG1-403 C	1.1903	Adder	2.64
965382	AG1-403 E	5.5726	Adder	12.37
965391	AG1-404	3.3815	Adder	7.51
965911	AG1-460 C	0.4533	Adder	1.01
965912	AG1-460 E	0.6799	Adder	1.51

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
966531	AG1-522 C	61.4592	50/50	61.4592
966532	AG1-522 E	40.9728	50/50	40.9728
966541	AG1-523 C	61.4592	50/50	61.4592
966542	AG1-523 E	40.9728	50/50	40.9728
966551	AG1-524 C	61.4592	50/50	61.4592
966552	AG1-524 E	40.9728	50/50	40.9728
966561	AG1-525 C	61.4592	50/50	61.4592
966562	AG1-525 E	40.9728	50/50	40.9728
966841	AG1-555 C	3.1923	Adder	7.09
966842	AG1-555 E	1.1411	Adder	2.53
WEC	WEC	1.6484	Confirmed LTF	1.6484
CALDERWOOD	CALDERWOOD	0.0199	Confirmed LTF	0.0199
LGE-0012019	LGE-0012019	3.6443	LTF	3.6443
CBM-W2	CBM-W2	38.5101	Confirmed LTF	38.5101
NY	NY	0.7902	Confirmed LTF	0.7902
TVA	TVA	2.2484	Confirmed LTF	2.2484
O-066	O-066	9.6979	Confirmed LTF	9.6979
SIGE	SIGE	0.4278	Confirmed LTF	0.4278
CHEOAH	CHEOAH	0.0280	Confirmed LTF	0.0280
CBM-S1	CBM-S1	0.0277	Confirmed LTF	0.0277
G-007	G-007	1.5131	Confirmed LTF	1.5131
HAMLET	HAMLET	0.4424	Confirmed LTF	0.4424
MEC	MEC	8.7459	Confirmed LTF	8.7459
BLUEG	BLUEG	14.8289	Confirmed LTF	14.8289
TRIMBLE	TRIMBLE	5.2906	Confirmed LTF	5.2906
LAGN	LAGN	4.7705	Confirmed LTF	4.7705
CATAWBA	CATAWBA	0.2335	Confirmed LTF	0.2335
CBM-W1	CBM-W1	52.0002	Confirmed LTF	52.0002

10.6.3 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
167480043	243208	05JEFRSO	AEP	242865	05JEFRSO	AEP	2	AEP_P4_#1760_05JEFRSO	breaker	3039.0	122.58	126.0	DC	102.43

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
243442	05RKG1	102.2311	50/50	102.2311
243443	05RKG2	98.0091	50/50	98.0091
247900	05FR-11G E	5.3350	Adder	6.28
247901	05FR-12G E	5.2465	Adder	6.17
247902	05FR-21G E	5.6076	Adder	6.6
247903	05FR-22G E	5.3691	Adder	6.32
247904	05FR-3G E	10.8745	Adder	12.79
247905	05FR-4G E	8.5170	Adder	10.02
247906	05MDL-1G E	9.3352	Adder	10.98
247907	05MDL-2G E	4.6764	Adder	5.5
247912	05MDL-3G E	4.6764	Adder	5.5
247913	05MDL-4G E	4.6764	Adder	5.5
247943	T-127 E	4.6764	Adder	5.5
276615	W2-048 GEN	3.3609	Adder	3.95
276621	X2-022 GEN	12.6067	Adder	14.83
290261	S-027 E	9.5285	Adder	11.21
290265	S-028 E	9.5285	Adder	11.21
293798	W4-005 E	20.4537	Adder	24.06
917502	Z2-087 E	10.1208	Adder	11.91
924042	AB2-047 E O1	12.6510	Adder	14.88
924261	AB2-070 C O1	1.7371	Adder	2.04
924262	AB2-070 E O1	10.5206	Adder	12.38
925771	AC1-053 C	1.7481	Adder	2.06
925772	AC1-053 E	11.6989	Adder	13.76
930042	AB1-006 E	10.1711	Adder	11.97
930461	AB1-087 CT1	72.3747	50/50	72.3747
930462	AB1-087 ST1	57.5408	50/50	57.5408
930471	AB1-088 CT1	72.3747	50/50	72.3747
930472	AB1-088 ST1	57.5408	50/50	57.5408
933446	AC2-157 1C	8.9760	50/50	8.9760
933447	AC2-157 2C	8.9760	50/50	8.9760
933448	AC2-157 1E	14.6450	50/50	14.6450
933449	AC2-157 2E	14.6450	50/50	14.6450
935141	AD1-148	3.3391	Adder	3.93
936771	AD2-100 C	9.1196	Adder	10.73
936772	AD2-100 E	6.0797	Adder	7.15
936971	AD2-131 C	0.6007	Adder	0.71
936972	AD2-131 E	3.0181	Adder	3.55
937211	AD2-159 C	2.2103	Adder	2.6
937212	AD2-159 E	10.3484	Adder	12.17
939741	AE1-205 C O1	4.8859	Adder	5.75
939742	AE1-205 E O1	6.7472	Adder	7.94

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
941341	AE2-130 C	229.3728	50/50	229.3728
941342	AE2-130 E	152.9152	50/50	152.9152
941571	AE2-154 C	1.8998	Adder	2.24
941572	AE2-154 E	12.7139	Adder	14.96
941731	AE2-173 O1	2.9083	Adder	3.42
942111	AE2-223 C	1.1342	Adder	1.33
942112	AE2-223 E	7.5906	Adder	8.93
942481	AE2-261 C	12.7863	Adder	15.04
942482	AE2-261 E	8.5242	Adder	10.03
942601	AE2-276	11.8105	50/50	11.8105
944201	AF1-088 FTIR	236.2100	50/50	236.2100
944221	AF1-090 C O1	2.6614	Adder	3.13
944222	AF1-090 E O1	12.4601	Adder	14.66
945391	AF1-204 C O1	6.5592	50/50	6.5592
945392	AF1-204 E O1	19.6777	50/50	19.6777
945871	AF1-252 O1	4.7179	Adder	5.55
945881	AF1-253	3.2662	Adder	3.84
946581	AF1-322 C	4.9102	Adder	5.78
946582	AF1-322 E	6.7807	Adder	7.98
954681	J949 C	11.4172	PJM External (MISO)	11.4172
957141	AF2-008 FTIR	118.1050	50/50	118.1050
957142	AF2-008 NFTI	236.2100	50/50	236.2100
957381	AF2-032 C	0.9639	Adder	1.13
957382	AF2-032 E	0.4536	Adder	0.53
959341	AF2-225 C	3.6644	Adder	4.31
959342	AF2-225 E	5.0604	Adder	5.95
959611	AF2-252 C	1.2031	Adder	1.42
959612	AF2-252 E	1.8046	Adder	2.12
960141	AF2-305	0.6147	Adder	0.72
960261	AF2-317	1.0685	Adder	1.26
960611	AF2-352 C	1.2031	Adder	1.42
960612	AF2-352 E	1.8046	Adder	2.12
963741	AG1-226 C O1	13.3122	Adder	29.55
963742	AG1-226 E O1	4.7587	Adder	10.56
963831	AG1-236 C	0.9265	Adder	2.06
963832	AG1-236 E	6.2004	Adder	13.76
963841	AG1-237 C O1	0.9708	Adder	2.15
963842	AG1-237 E O1	6.4967	Adder	14.42
965091	AG1-374 C	5.7387	Adder	12.74
965092	AG1-374 E	3.8258	Adder	8.49
965331	AG1-398	0.2596	Adder	0.58
965341	AG1-399 C	1.7854	Adder	3.96
965342	AG1-399 E	8.3590	Adder	18.55
965351	AG1-400	5.0722	Adder	11.26
965361	AG1-401 C	1.7854	Adder	3.96
965362	AG1-401 E	8.3590	Adder	18.55
965371	AG1-402	5.0722	Adder	11.26
965381	AG1-403 C	1.1903	Adder	2.64
965382	AG1-403 E	5.5726	Adder	12.37
965391	AG1-404	3.3815	Adder	7.51
965911	AG1-460 C	0.4533	Adder	1.01
965912	AG1-460 E	0.6799	Adder	1.51

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
966531	AG1-522 C	61.4592	50/50	61.4592
966532	AG1-522 E	40.9728	50/50	40.9728
966541	AG1-523 C	61.4592	50/50	61.4592
966542	AG1-523 E	40.9728	50/50	40.9728
966551	AG1-524 C	61.4592	50/50	61.4592
966552	AG1-524 E	40.9728	50/50	40.9728
966561	AG1-525 C	61.4592	50/50	61.4592
966562	AG1-525 E	40.9728	50/50	40.9728
966841	AG1-555 C	3.1923	Adder	7.09
966842	AG1-555 E	1.1411	Adder	2.53
WEC	WEC	1.6484	Confirmed LTF	1.6484
CALDERWOOD	CALDERWOOD	0.0199	Confirmed LTF	0.0199
LGE-0012019	LGE-0012019	3.6443	LTF	3.6443
CBM-W2	CBM-W2	38.5101	Confirmed LTF	38.5101
NY	NY	0.7902	Confirmed LTF	0.7902
TVA	TVA	2.2484	Confirmed LTF	2.2484
O-066	O-066	9.6979	Confirmed LTF	9.6979
SIGE	SIGE	0.4278	Confirmed LTF	0.4278
CHEOAH	CHEOAH	0.0280	Confirmed LTF	0.0280
CBM-S1	CBM-S1	0.0277	Confirmed LTF	0.0277
G-007	G-007	1.5131	Confirmed LTF	1.5131
HAMLET	HAMLET	0.4424	Confirmed LTF	0.4424
MEC	MEC	8.7459	Confirmed LTF	8.7459
BLUEG	BLUEG	14.8289	Confirmed LTF	14.8289
TRIMBLE	TRIMBLE	5.2906	Confirmed LTF	5.2906
LAGN	LAGN	4.7705	Confirmed LTF	4.7705
CATAWBA	CATAWBA	0.2335	Confirmed LTF	0.2335
CBM-W1	CBM-W1	52.0002	Confirmed LTF	52.0002

10.6.4 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
161932014	243209	05ROCKPT	AEP	243208	05JEFRSO	AEP	1	AEP_P7-1_#11042-B	tower	3854.0	135.48	139.03	DC	139.28

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
243442	05RKG1	135.4745	50/50	135.4745
243443	05RKG2	129.8796	50/50	129.8796
243859	05FR-11G C	0.7437	50/50	0.7437
243862	05FR-12G C	0.3617	50/50	0.3617
243864	05FR-21G C	0.3762	50/50	0.3762
243866	05FR-22G C	0.3762	50/50	0.3762
243870	05FR-3G C	0.3617	50/50	0.3617
243873	05FR-4G C	0.8421	50/50	0.8421
246909	05MDL-1G C	0.7495	50/50	0.7495
246910	05MDL-2G C	0.4398	50/50	0.4398
246976	05MDL-3G C	0.4427	50/50	0.4427
246979	05MDL-4G C	0.3415	50/50	0.3415
247556	05MDL-5G	0.5845	50/50	0.5845
247900	05FR-11G E	14.3618	50/50	14.3618
247901	05FR-12G E	14.1233	50/50	14.1233
247902	05FR-21G E	15.0955	50/50	15.0955
247903	05FR-22G E	14.4535	50/50	14.4535
247904	05FR-3G E	29.2738	50/50	29.2738
247905	05FR-4G E	22.9275	50/50	22.9275
247906	05MDL-1G E	29.2906	50/50	29.2906
247907	05MDL-2G E	14.6728	50/50	14.6728
247912	05MDL-3G E	14.6728	50/50	14.6728
247913	05MDL-4G E	14.6728	50/50	14.6728
247943	T-127 E	14.6728	50/50	14.6728
274650	KINCAID ;1U	9.6185	50/50	9.6185
276615	W2-048 GEN	4.3025	Adder	5.06
276621	X2-022 GEN	16.1386	Adder	18.99
925771	AC1-053 C	2.2155	Adder	2.61
925772	AC1-053 E	14.8270	Adder	17.44
930041	AB1-006 C	0.7523	50/50	0.7523
930042	AB1-006 E	31.9133	50/50	31.9133
930461	AB1-087 CT1	102.3161	50/50	102.3161
930462	AB1-087 ST1	81.3453	50/50	81.3453
930471	AB1-088 CT1	102.3161	50/50	102.3161
930472	AB1-088 ST1	81.3453	50/50	81.3453
933446	AC2-157 1C	12.6893	50/50	12.6893
933447	AC2-157 2C	12.6893	50/50	12.6893
933448	AC2-157 1E	20.7037	50/50	20.7037
933449	AC2-157 2E	20.7037	50/50	20.7037
935141	AD1-148	4.2745	Adder	5.03
936771	AD2-100 C	14.2645	50/50	14.2645

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
936772	AD2-100 E	9.5096	50/50	9.5096
936971	AD2-131 C	0.9396	50/50	0.9396
936972	AD2-131 E	4.7209	50/50	4.7209
941341	AE2-130 C	303.9600	50/50	303.9600
941342	AE2-130 E	202.6400	50/50	202.6400
941571	AE2-154 C	5.9608	50/50	5.9608
941572	AE2-154 E	39.8917	50/50	39.8917
942481	AE2-261 C	19.8434	50/50	19.8434
942482	AE2-261 E	13.2290	50/50	13.2290
942601	AE2-276	16.6965	50/50	16.6965
944201	AF1-088 FTIR	333.9300	50/50	333.9300
944221	AF1-090 C O1	4.2529	50/50	4.2529
944222	AF1-090 E O1	19.9111	50/50	19.9111
945391	AF1-204 C O1	10.7151	50/50	10.7151
945392	AF1-204 E O1	32.1453	50/50	32.1453
945871	AF1-252 O1	7.5392	50/50	7.5392
945881	AF1-253	5.2194	50/50	5.2194
946581	AF1-322 C	15.4064	50/50	15.4064
946582	AF1-322 E	21.2756	50/50	21.2756
954681	J949 C	19.3290	PJM External (MISO)	19.3290
957141	AF2-008 FTIR	166.9650	50/50	166.9650
957142	AF2-008 NFTI	333.9300	50/50	333.9300
957381	AF2-032 C	1.4912	50/50	1.4912
957382	AF2-032 E	0.7018	50/50	0.7018
958971	AF2-188 C O1	12.3252	50/50	12.3252
958972	AF2-188 E O1	8.2168	50/50	8.2168
960261	AF2-317	1.3679	Adder	1.61
963741	AG1-226 C O1	58.7948	50/50	58.7948
963742	AG1-226 E O1	21.0172	50/50	21.0172
963831	AG1-236 C	1.1742	Adder	2.61
963832	AG1-236 E	7.8583	Adder	17.44
963841	AG1-237 C O1	4.7211	50/50	4.7211
963842	AG1-237 E O1	31.5949	50/50	31.5949
965911	AG1-460 C	1.3273	50/50	1.3273
965912	AG1-460 E	1.9910	50/50	1.9910
966531	AG1-522 C	83.5686	50/50	83.5686
966532	AG1-522 E	55.7124	50/50	55.7124
966541	AG1-523 C	83.5686	50/50	83.5686
966542	AG1-523 E	55.7124	50/50	55.7124
966551	AG1-524 C	83.5686	50/50	83.5686
966552	AG1-524 E	55.7124	50/50	55.7124
966561	AG1-525 C	83.5686	50/50	83.5686
966562	AG1-525 E	55.7124	50/50	55.7124
966841	AG1-555 C	16.2143	50/50	16.2143
966842	AG1-555 E	5.7961	50/50	5.7961
WEC	WEC	1.4008	Confirmed LTF	1.4008
LGEE	LGEE	0.2626	Confirmed LTF	0.2626
CBM-W2	CBM-W2	66.5370	Confirmed LTF	66.5370
NY	NY	1.0142	Confirmed LTF	1.0142
TVA	TVA	5.6014	Confirmed LTF	5.6014
O-066	O-066	12.3024	Confirmed LTF	12.3024
SIGE	SIGE	1.0880	Confirmed LTF	1.0880

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
CBM-S2	CBM-S2	0.0313	Confirmed LTF	0.0313
CBM-S1	CBM-S1	1.2730	Confirmed LTF	1.2730
G-007	G-007	1.9194	Confirmed LTF	1.9194
HAMLET	HAMLET	0.1819	Confirmed LTF	0.1819
MEC	MEC	10.0822	Confirmed LTF	10.0822
BLUEG	BLUEG	0.4583	Confirmed LTF	0.4583
TRIMBLE	TRIMBLE	0.4997	Confirmed LTF	0.4997
LAGN	LAGN	8.5908	Confirmed LTF	8.5908
CATAWBA	CATAWBA	0.0294	Confirmed LTF	0.0294
CBM-W1	CBM-W1	46.3782	Confirmed LTF	46.3782

10.6.5 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
168275667	247712	05SULLIVAN	AEP	254529	16PETE	IPL	1	AEP_P1-2_#363_1682	single	1409.0	108.97	112.24	DC	46.06

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
243442	05RKG1	54.7353	80/20	54.7353
243443	05RKG2	52.4749	80/20	52.4749
243859	05FR-11G C	0.2108	80/20	0.2108
243862	05FR-12G C	0.1025	80/20	0.1025
243864	05FR-21G C	0.1066	80/20	0.1066
243866	05FR-22G C	0.1066	80/20	0.1066
243870	05FR-3G C	0.1025	80/20	0.1025
243873	05FR-4G C	0.2387	80/20	0.2387
274650	KINCAID ;1U	4.8193	80/20	4.8193
274651	KINCAID ;2U	4.8176	80/20	4.8176
274880	RADFORD R;1U	0.3609	80/20	0.3609
924261	AB2-070 C O1	1.3005	80/20	1.3005
925771	AC1-053 C	1.3140	80/20	1.3140
930461	AB1-087 CT1	78.4139	80/20	78.4139
930462	AB1-087 ST1	62.3421	80/20	62.3421
930471	AB1-088 CT1	78.4139	80/20	78.4139
930472	AB1-088 ST1	62.3421	80/20	62.3421
933446	AC2-157 1C	9.7250	80/20	9.7250
933447	AC2-157 2C	9.7250	80/20	9.7250
935141	AD1-148	2.5308	80/20	2.5308
936771	AD2-100 C	7.1455	80/20	7.1455
936971	AD2-131 C	0.4707	80/20	0.4707
937211	AD2-159 C	1.6556	80/20	1.6556
941341	AE2-130 C	122.8080	80/20	122.8080
942481	AE2-261 C	9.9423	80/20	9.9423
942601	AE2-276	12.7960	80/20	12.7960
944201	AF1-088 FTIR	255.9200	80/20	255.9200
944221	AF1-090 C O1	2.1289	80/20	2.1289
945391	AF1-204 C O1	4.0347	80/20	4.0347
945871	AF1-252 O1	3.7740	80/20	3.7740
945881	AF1-253	2.6127	80/20	2.6127
953401	J811	6.6102	PJM External (MISO)	6.6102
953651	J815	12.9700	PJM External (MISO)	12.9700
953881	J848 C	2.0849	PJM External (MISO)	2.0849
954411	J912	5.5690	PJM External (MISO)	5.5690
954681	J949 C	12.1873	PJM External (MISO)	12.1873
955031	J979 C	1.6680	PJM External (MISO)	1.6680
955131	J991	13.9760	PJM External (MISO)	13.9760
956451	J1139	8.7510	PJM External (MISO)	8.7510
957141	AF2-008 FTIR	127.9600	80/20	127.9600
957381	AF2-032 C	0.7472	80/20	0.7472
960141	AF2-305	0.4602	80/20	0.4602

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
960261	AF2-317	0.8099	80/20	0.8099
963741	AG1-226 C O1	18.7132	80/20	18.7132
963831	AG1-236 C	1.3140	80/20	1.3140
963841	AG1-237 C O1	1.3868	80/20	1.3868
965331	AG1-398	0.3666	80/20	0.3666
965911	AG1-460 C	0.6650	80/20	0.6650
966531	AG1-522 C	46.0602	80/20	46.0602
966541	AG1-523 C	46.0602	80/20	46.0602
966551	AG1-524 C	46.0602	80/20	46.0602
966561	AG1-525 C	46.0602	80/20	46.0602
966841	AG1-555 C	4.5959	80/20	4.5959
WEC	WEC	0.8480	Confirmed LTF	0.8480
CALDERWOOD	CALDERWOOD	0.3643	Confirmed LTF	0.3643
NY	NY	0.4496	Confirmed LTF	0.4496
CHEOAH	CHEOAH	0.3654	Confirmed LTF	0.3654
HAMLET	HAMLET	0.4222	Confirmed LTF	0.4222
MEC	MEC	4.6637	Confirmed LTF	4.6637
GIBSON	GIBSON	6.3713	Confirmed LTF	6.3713
BLUEG	BLUEG	7.2877	Confirmed LTF	7.2877
TRIMBLE	TRIMBLE	2.2037	Confirmed LTF	2.2037
LAGN	LAGN	1.4298	Confirmed LTF	1.4298
CATAWBA	CATAWBA	0.2520	Confirmed LTF	0.2520
CBM-W1	CBM-W1	26.5959	Confirmed LTF	26.5959

10.6.6 Index 6

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
168275678	247712	05SULLIVAN	AEP	243221	05EUGENE	AEP	1	AEP_P1-2_#363_1682	single	1335.0	119.86	122.81	DC	39.33

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
243442	05RKG1	46.7406	80/20	46.7406
243443	05RKG2	44.8103	80/20	44.8103
930461	AB1-087 CT1	66.9453	80/20	66.9453
930462	AB1-087 ST1	53.2242	80/20	53.2242
930471	AB1-088 CT1	66.9453	80/20	66.9453
930472	AB1-088 ST1	53.2242	80/20	53.2242
933446	AC2-157 1C	8.3026	80/20	8.3026
933447	AC2-157 2C	8.3026	80/20	8.3026
941341	AE2-130 C	104.8704	80/20	104.8704
942601	AE2-276	10.9245	80/20	10.9245
944201	AF1-088 FTIR	218.4900	80/20	218.4900
955131	J991	10.5040	PJM External (MISO)	10.5040
957141	AF2-008 FTIR	109.2450	80/20	109.2450
966531	AG1-522 C	39.3264	80/20	39.3264
966541	AG1-523 C	39.3264	80/20	39.3264
966551	AG1-524 C	39.3264	80/20	39.3264
966561	AG1-525 C	39.3264	80/20	39.3264
LGEE	LGEE	0.2746	Confirmed LTF	0.2746
CPLE	CPLE	0.1058	Confirmed LTF	0.1058
CBM-W2	CBM-W2	11.4150	Confirmed LTF	11.4150
NY	NY	0.1576	Confirmed LTF	0.1576
TVA	TVA	1.6436	Confirmed LTF	1.6436
SIGE	SIGE	0.2489	Confirmed LTF	0.2489
CBM-S2	CBM-S2	3.0380	Confirmed LTF	3.0380
CBM-S1	CBM-S1	0.3952	Confirmed LTF	0.3952
MEC	MEC	1.0328	Confirmed LTF	1.0328
LAGN	LAGN	2.1770	Confirmed LTF	2.1770

10.6.7 Index 7

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
164765667	248000	06CLIFTY	OVEC	248001	06DEARB1	OVEC	1	AEP_P4_#1760_05JEFRSO 765_A	breaker	1099.0	107.09	108.16	DC	25.59

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
248014	06CLIFTY 1HP	3.7580	50/50	3.7580
248015	06CLIFTY 1LP	2.2090	50/50	2.2090
248016	06CLIFTY 2HP	3.7580	50/50	3.7580
248017	06CLIFTY 2LP	2.2090	50/50	2.2090
248018	06CLIFTY 3HP	3.7580	50/50	3.7580
248019	06CLIFTY 3LP	2.2090	50/50	2.2090
248020	06CLIFTY 4HP	3.7580	50/50	3.7580
248021	06CLIFTY 4LP	2.2090	50/50	2.2090
248022	06CLIFTY 5HP	3.7580	50/50	3.7580
248023	06CLIFTY 5LP	2.2090	50/50	2.2090
248024	06CLIFTY 6HP	3.7580	50/50	3.7580
248025	06CLIFTY 6LP	2.2090	50/50	2.2090
930461	AB1-087 CT1	15.8009	Adder	18.59
930462	AB1-087 ST1	12.5623	Adder	14.78
930471	AB1-088 CT1	15.8009	Adder	18.59
930472	AB1-088 ST1	12.5623	Adder	14.78
933446	AC2-157 1C	1.9596	Adder	2.31
933447	AC2-157 2C	1.9596	Adder	2.31
933448	AC2-157 1E	3.1973	Adder	3.76
933449	AC2-157 2E	3.1973	Adder	3.76
941341	AE2-130 C	47.8298	Adder	56.27
941342	AE2-130 E	31.8866	Adder	37.51
942601	AE2-276	2.5785	Adder	3.03
944201	AF1-088 FTIR	60.6700	Merchant Transmission	60.6700
957141	AF2-008 FTIR	30.3350	Merchant Transmission	30.3350
957142	AF2-008 NFTI	60.6700	Merchant Transmission	60.6700
957961	AF2-090 C	3.7048	Adder	4.36
957962	AF2-090 E	1.8323	Adder	2.16
959691	AF2-260 C	2.7790	Adder	3.27
959692	AF2-260 E	1.3895	Adder	1.63
960171	AF2-308	1.3092	Adder	1.54
960181	AF2-309 C	1.9639	Adder	2.31
960182	AF2-309 E	1.3092	Adder	1.54
961001	AF2-391 C O1	3.5294	Adder	4.15
961002	AF2-391 E O1	2.3529	Adder	2.77
962471	AG1-096 C O1	0.9767	Adder	2.17
962472	AG1-096 E O1	0.4884	Adder	1.08
964571	AG1-320 C O1	1.3144	Adder	2.92
964572	AG1-320 E O1	0.6524	Adder	1.45
966221	AG1-491 C O1	1.0912	Adder	2.42
966222	AG1-491 E O1	0.7274	Adder	1.61
966531	AG1-522 C	6.9170	Adder	15.35

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
966532	AG1-522 E	4.6113	Adder	10.24
966541	AG1-523 C	6.9170	Adder	15.35
966542	AG1-523 E	4.6113	Adder	10.24
966551	AG1-524 C	6.9170	Adder	15.35
966552	AG1-524 E	4.6113	Adder	10.24
966561	AG1-525 C	6.9170	Adder	15.35
966562	AG1-525 E	4.6113	Adder	10.24
WEC	WEC	0.3348	Confirmed LTF	0.3348
LGEE	LGEE	5.1891	Confirmed LTF	5.1891
CPLE	CPLE	0.3938	Confirmed LTF	0.3938
CBM-W2	CBM-W2	20.8320	Confirmed LTF	20.8320
NY	NY	0.1438	Confirmed LTF	0.1438
TVA	TVA	3.0296	Confirmed LTF	3.0296
O-066	O-066	1.5546	Confirmed LTF	1.5546
SIGE	SIGE	0.4688	Confirmed LTF	0.4688
CBM-S2	CBM-S2	8.5921	Confirmed LTF	8.5921
CBM-S1	CBM-S1	1.2430	Confirmed LTF	1.2430
G-007	G-007	0.2404	Confirmed LTF	0.2404
MEC	MEC	2.6362	Confirmed LTF	2.6362
LAGN	LAGN	3.5980	Confirmed LTF	3.5980
CBM-W1	CBM-W1	14.6369	Confirmed LTF	14.6369

10.7 Queue Dependencies

The Queue Projects below are listed in one or more indices for the overloads identified in your report. These projects contribute to the loading of the overloaded facilities identified in your report. The percent overload of a facility and cost allocation you may have towards a particular reinforcement could vary depending on the action of these earlier projects. The status of each project at the time of the analysis is presented in the table. This list may change as earlier projects withdraw or modify their requests.

Queue Number	Project Name	Status
AB1-006	Meadow Lake 345kV	In Service
AB1-087	Sullivan 345kV #1	Active
AB1-088	Sullivan 345kV #2	Active
AB2-047	Brokaw-Pontiac Midpoint	In Service
AB2-070	Mt. Pulaski-Brokaw	Engineering and Procurement
AC1-053	Lanesville-Brokaw	Active
AC2-157	Sullivan 345 kV	Active
AD1-148	Brokaw-Lanesville	Active
AD2-100	Kincaid-Pana	Active
AD2-131	Latham Kincaid	Active
AD2-159	Chestnut 345kV	Active
AE1-205	McLean 345 kV	Active
AE2-130	Rockport 765 kV	Active
AE2-154	Meadow Lake 345 kV (MLV VIII)	Active
AE2-173	McLean 345 kV	Active
AE2-223	McLean 345 kV	Active
AE2-261	Kincaid-Pana	Active
AE2-276	Sullivan 345kV	Active
AF1-088	Sullivan 345 kV	Active
AF1-090	Kincaid-Pana	Active
AF1-204	Eugene 345 kV	Active
AF1-252	Kincaid-Pana	Active
AF1-253	Kincaid-Pana	Active
AF1-322	Meadow Lake 345 kV	Active
AF2-008	Sullivan 345 kV	Active
AF2-032	Kincaid	Active
AF2-090	Central Hardin 138 kV	Active
AF2-188	Reynolds-Meadow Lake #1 345 kV	Active
AF2-225	McLean 345 kV	Active
AF2-252	Blue Mound 345 kV	Active
AF2-260	Stephensburg 69 kV	Active
AF2-305	Brokaw-Lanesville 345 kV	Active
AF2-308	Central Hardin-Stephensburg 69 kV	Active
AF2-309	Central Hardin-Stephensburg 69 kV	Active
AF2-317	Hill Topper 345 kV	Active
AF2-352	Blue Mound 34.5 kV	Active
AF2-391	Central Hardin 69 kV	Active
AG1-096	Rineyville 69 kV	Active
AG1-226	Eugene-Dequine 345 kV	Active

Queue Number	Project Name	Status
AG1-236	Lanesville-Brokaw 345 kV	Active
AG1-237	Dequine-Eugene 345 kV	Active
AG1-320	Glendale-Stephensburg 69 kV	Active
AG1-374	Blue Mound 345 kV	Active
AG1-398	Brokaw-Lanesville 345 kV	Active
AG1-399	Blue Mound-Chestnut 345 kV	Active
AG1-400	Blue Mound-Chestnut 345 kV	Active
AG1-401	Blue Mound-Chestnut 345 kV	Active
AG1-402	Blue Mound-Chestnut 345 kV	Active
AG1-403	Clinton-Brokaw 345 kV	Active
AG1-404	Clinton-Brokaw 345 kV	Active
AG1-460	Kincaid-Pana 345 kV	Active
AG1-491	Central Hardin 69 kV	Active
AG1-522	Sullivan-Rockport 765 kV	Active
AG1-523	Sullivan-Rockport 765 kV	Active
AG1-524	Sullivan-Rockport 765 kV	Active
AG1-525	Sullivan-Rockport 765 kV	Active
AG1-555	Dequine 345 kV	Active
W2-048	Brokaw-Lanesville	In Service
W4-005	Blue Mound-Latham	In Service
X2-022	Brokaw-Lanesville	In Service
Z2-087	Pontiac MidPoint-Brokaw 345kV	In Service
J1139	MISO	MISO
J811	MISO	MISO
J815	MISO	MISO
J848	MISO	MISO
J912	MISO	MISO
J949	MISO	MISO
J979	MISO	MISO
J991	MISO	MISO

10.8 Contingency Descriptions

Contingency Name	Contingency Definition
Base Case	
AEP_P7-1_#11042-A	CONTINGENCY 'AEP_P7-1_#11042-A' OPEN BRANCH FROM BUS 243878 TO BUS 958970 CKT 1 / 243878 05MEADOW 345 255205 AF2-188 TAP 345 1 OPEN BRANCH FROM BUS 243878 TO BUS 255205 CKT 2 / 243878 05MEADOW 345 255205 17REYNOLDS 345 2 END
AEP_P7-1_#11042-B	CONTINGENCY 'AEP_P7-1_#11042-B' OPEN BRANCH FROM BUS 958970 TO BUS 255205 CKT 1 / 958970 AF2-188 TAP 345 255205 17REYNOLDS 345 1 OPEN BRANCH FROM BUS 243878 TO BUS 255205 CKT 2 / 243878 05MEADOW 345 255205 17REYNOLDS 345 2 END
AEP_P1-2_#8905_1697	CONTINGENCY 'AEP_P1-2_#8905_1697' OPEN BRANCH FROM BUS 243217 TO BUS 247712 CKT 1 / 243217 05DEQUIN 345 247712 05SULLIVAN 345 1 END
AEP_P1-2_#363_1682	CONTINGENCY 'AEP_P1-2_#363_1682' OPEN BRANCH FROM BUS 243208 TO BUS 243209 CKT 1 / 243208 05JEFRSO 765 243209 05ROCKPT 765 1 END
AEP_P1-2_#6490_16000	CONTINGENCY 'AEP_P1-2_#6490_16000' OPEN BRANCH FROM BUS 243217 TO BUS 243878 CKT 2 / 243217 05DEQUIN 345 243878 05MEADOW 345 2 END
AEP_P1-2_#8807	CONTINGENCY 'AEP_P1-2_#8807' OPEN BRANCH FROM BUS 243878 TO BUS 255205 CKT 2 / 243878 05MEADOW 345 255205 17REYNOLDS 345 2 END

Contingency Name	Contingency Definition
AEP_P4_#6189_05HANG	CONTINGENCY '"AEP_P4_#6189_05HANG' R 765_D1" / 1717 OPEN BRANCH FROM BUS 242921 TO BUS 242924 CKT 1 / 242921 05CORNU 765 242924 05HANG R 765 1 OPEN BRANCH FROM BUS 242924 TO BUS 243208 CKT 1 / 242924 05HANG R 765 243208 05JEFRSO 765 1 OPEN BRANCH FROM BUS 242921 TO BUS 242934 CKT 1 / 242921 05CORNU 765 242934 05CORNU 345 1 REMOVE MACHINE 1A FROM BUS 247245 /* 247245 05HRKG1A 18.0 DEFAULT DISPATCH REMOVE MACHINE 1B FROM BUS 247246 /* 247246 05HRKG1B 18.0 DEFAULT DISPATCH REMOVE MACHINE 1S FROM BUS 247247 /* 247247 05HRKG1S 18.0 DEFAULT DISPATCH REMOVE MACHINE 2A FROM BUS 247248 /* 247248 05HRKG2A 18.0 DEFAULT DISPATCH REMOVE MACHINE 2B FROM BUS 247249 /* 247249 05HRKG2B 18.0 DEFAULT DISPATCH REMOVE MACHINE 2S FROM BUS 247250 /* 247250 05HRKG2S 18.0 DEFAULT DISPATCH END
AEP_P1-2_#6472_15258	CONTINGENCY 'AEP_P1-2_#6472_15258' OPEN BRANCH FROM BUS 243217 TO BUS 243878 CKT 1 / 243217 05DEQUIN 345 243878 05MEADOW 345 1 END
AEP_P4_#6189_05HANG R 765_D1	CONTINGENCY 'AEP_P4_#6189_05HANG R 765_D1' OPEN BRANCH FROM BUS 242921 TO BUS 242924 CKT 1 / 242921 05CORNU 765 242924 05HANG R 765 1 OPEN BRANCH FROM BUS 242924 TO BUS 243208 CKT 1 / 242924 05HANG R 765 243208 05JEFRSO 765 1 OPEN BRANCH FROM BUS 242921 TO BUS 242934 CKT 1 / 242921 05CORNU 765 242934 05CORNU 345 1 REMOVE UNIT 1A FROM BUS 247245 / 247245 05HRKG1A 18.0 1A REMOVE UNIT 1B FROM BUS 247246 / 247246 05HRKG1B 18.0 1B REMOVE UNIT 1S FROM BUS 247247 / 247247 05HRKG1S 18.0 1S REMOVE UNIT 2A FROM BUS 247248 / 247248 05HRKG2A 18.0 2A REMOVE UNIT 2B FROM BUS 247249 / 247249 05HRKG2B 18.0 2B REMOVE UNIT 2S FROM BUS 247250 / 247250 05HRKG2S 18.0 2S END
AEP_P4_#1760_05JEFRSO	CONTINGENCY '"AEP_P4_#1760_05JEFRSO' 765_A" / 1455 OPEN BRANCH FROM BUS 243207 TO BUS 243208 CKT 1 / 243207 05GRNTWN 765 243208 05JEFRSO 765 1 OPEN BRANCH FROM BUS 242924 TO BUS 243208 CKT 1 / 242924 05HANG R 765 243208 05JEFRSO 765 1 END

Contingency Name	Contingency Definition
AEP_P1-2_#709_546	CONTINGENCY 'AEP_P1-2_#709_546' OPEN BRANCH FROM BUS 242924 TO BUS 243208 CKT 1 / 242924 05HANG R 765 243208 05JEFRSO 765 1 END
AEP_P1-2_#8695-B	CONTINGENCY 'AEP_P1-2_#8695-B' OPEN BRANCH FROM BUS 958970 TO BUS 255205 CKT 1 / 958970 AF2-188 TAP 345 255205 17REYNOLDS 345 1 END
AEP_P4_#1760_05JEFRSO 765_A	CONTINGENCY 'AEP_P4_#1760_05JEFRSO 765_A' OPEN BRANCH FROM BUS 243207 TO BUS 243208 CKT 1 / 243207 05GRNTWN 765 243208 05JEFRSO 765 1 OPEN BRANCH FROM BUS 242924 TO BUS 243208 CKT 1 / 242924 05HANG R 765 243208 05JEFRSO 765 1 END

11 Short Circuit Analysis

The following Breakers are overdutied:

None.

12 Affected Systems

12.1 TVA

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

12.2 Duke Energy Progress

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

12.3 MISO

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

12.4 LG&E

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