

***Generation Interconnection
Feasibility Study Report***

For

***PJM Generation Interconnection Request
Queue Position AD2-136***

Melmore 138 kV

December 2018

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. 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.

For Local and Network Upgrades which are required due to overloads associated with the System Impact Studies of an individual New Services Queue, and have a cost less than \$5,000,000, the cost of the Local and Network Upgrades will be shared by all proposed projects which have been assigned a Queue Position in the New Services Queue in which the need for the Local and Network Upgrades was identified. The Load Flow Cost Allocation methods discussed in this manual, including cutoffs, still apply to the individual projects.

For Local and Network Upgrades which are required due to the overloads associated with the System Impact Studies of an individual New Services Queue, and have a cost of \$5,000,000 or greater, the cost of the Local and Network Upgrades will be allocated according to the order of the New Service Requests in the New Services Queue and the MW contribution of each individual Interconnection Request for those projects which cause or contribute to the need for the Local or Network Upgrades. The Load Flow Cost Allocation methods discussed in this manual, including cutoffs, still apply to the individual projects.

Cost allocation rules 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.

PJM utilizes manufacturer models to ensure the performance of turbines is properly captured during the simulations performed for stability verification. Turbine manufacturers provide such models to their customers. The list of manufacturer models PJM has already validated is contained in Attachment G-2 of Manual 14A. 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 2.2.2. of Manual 14A 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 G-1 of Manual 14A) 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.

General

The Interconnection Customer (IC) proposes to install PJM Project #AD2-136, a 360 MW (46.8 MW Capacity) Wind generating facility in Seneca County, Ohio (see Figure 2). The primary point of interconnection is a direct connection to AEP's Melmore 138 kV Substation (see Figure 1). The Secondary Point of interconnection is a direct connection to AEP's Chatfield 138kV Substation (See figure 3).

The requested in service date is October 31, 2021.

The objective of this Feasibility Study is to determine budgetary cost estimates and approximate construction timelines for identified transmission facilities required to connect the proposed generating facilities to the AEP transmission system. These reinforcements include the Attachment Facilities, Local Upgrades, and Network Upgrades required for maintaining the reliability of the AEP transmission system. Stability analysis is not included as part of this study.

Attachment Facilities

Primary Point of Interconnection (Melmore 138kV substation)

To accommodate the interconnection at the Melmore 138 kV substation, the substation will have to be expanded requiring the installation of two new 138 kV circuit breakers, extending the two 138kV buses, and starting a new string (See Figure 1) Installation of associated protection and control equipment, SCADA, and 138 kV revenue metering.

Direct Connection to the Melmore 138 kV Substation Work and Cost:

- Expand the Melmore 138 kV substation, start a new string, extend the two 138 kV buses and install two (2) 138 kV circuit breakers (see Figure 1). Installation of associated protection and control equipment, SCADA, and 138 kV revenue metering will also be required.
- **Estimated Station Cost: \$3,000,000**

Non-Direct Connection Cost Estimate

The total preliminary cost estimate for Non-Direct Connection work is given in the following table below:

For AEP building Non-Direct Connection cost estimates:

Description	Estimated Cost
138 kV Revenue Metering	\$250,000
Total	\$250,000

Table 1

Secondary Point of Interconnection (Chatfield 138kV substation)

To accommodate the interconnection at the Chatfield 138 kV substation, installation of one (1) additional 138 kV circuit breaker will be required (see Figure 3). Installation of associated protection and control equipment, 138 kV line risers, SCADA, and 138 kV revenue metering will also be required.

Interconnection Customer Requirements

It is understood that The IC is responsible for all costs associated with this interconnection. The costs above are reimbursable to AEP (or FE, where noted.) The cost of The IC Wind's generating plant and the costs for the line connecting the generating plant to The IC Wind's switching station are not included in this report; these are assumed to be The IC Wind's responsibility.

The Generation Interconnection Agreement does not in or by itself establish a requirement for American Electric Power 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.

Requirement from the PJM Open Access Transmission Tariff:

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.

Revenue Metering and SCADA Requirements

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 Sections 24.1 and 24.2.

AEP Requirements

The Interconnection Customer will be required to comply with all AEP Revenue Metering Requirements for Generation Interconnection Customers. The Revenue Metering Requirements may be found within the "Requirements for Connection of New Facilities or Changes to Existing Facilities Connected to the AEP Transmission System" document located at the following link:

<http://www.pjm.com/~media/planning/plan-standards/private-aep/aep-interconnection-requirements.ashx>

Network Impacts – Option 1

The Queue Project AD2-136 was evaluated as a 360.0 MW (Capacity 46.8 MW) injection at the Melmore 138kV substation in the AEP area. Project AD2-136 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AD2-136 was studied with a commercial probability of 53%. Potential network impacts were as follows:

Base Case Used

Summer Peak Analysis – 2021 Case

Contingency Descriptions

The following contingencies resulted in overloads:

Contingency Name	Description
'AEP_P4_#7111_05MELMOR 138'	CONTINGENCY 'AEP_P4_#7111_05MELMOR 138' OPEN BRANCH FROM BUS 243006 TO BUS 243039 CKT 1 / 243006 05FOSTOR 138 243039 05MELMOR 138 1 OPEN BRANCH FROM BUS 243024 TO BUS 243039 CKT 1 / 243024 05HOWARD 138 243039 05MELMOR 138 1 END
'AEP_P7-1_#7114'	CONTINGENCY 'AEP_P7-1_#7114' OPEN BRANCH FROM BUS 242953 TO BUS 243110 CKT 1 / 242953 05AIRCO8 138 243110 05STIFFI 138 1 OPEN BRANCH FROM BUS 242953 TO BUS 243137 CKT 1 / 242953 05AIRCO8 138 243137 05W.END 138 1 OPEN BRANCH FROM BUS 243006 TO BUS 243039 CKT 1 / 243006 05FOSTOR 138 243039 05MELMOR 138 1 OPEN BRANCH FROM BUS 243039 TO BUS 243110 CKT 1 / 243039 05MELMOR 138 243110 05STIFFI 138 1 OPEN BRANCH FROM BUS 243110 TO BUS 245630 CKT 1 / 243110 05STIFFI 138 245630 05S TIFFIN 69.0 1 END
'AEP_P7-1_#7731'	CONTINGENCY 'AEP_P7-1_#7731' OPEN BRANCH FROM BUS 243006 TO BUS 243039 CKT 1 / 243006 05FOSTOR 138 243039 05MELMOR 138 1 OPEN BRANCH FROM BUS 243039 TO BUS 243110 CKT 1 / 243039 05MELMOR 138 243110 05STIFFI 138 1 END
'AEP_P7-1_#7732'	CONTINGENCY 'AEP_P7-1_#7732' OPEN BRANCH FROM BUS 242953 TO BUS 243110 CKT 1 / 242953 05AIRCO8 138 243110 05STIFFI 138 1 OPEN BRANCH FROM BUS 242953 TO BUS 243137 CKT 1 / 242953 05AIRCO8 138 243137 05W.END 138 1 OPEN BRANCH FROM BUS 243006 TO BUS 243039 CKT 1 / 243006 05FOSTOR 138 243039 05MELMOR 138 1 END
'AEP_P2-2_#7730_05FREMCT 138'	CONTINGENCY 'AEP_P2-2_#7730_05FREMCT 138' OPEN BRANCH FROM BUS 243008 TO BUS 243009 CKT 1 / 243008 05FREMCT 138 243009 05FRMNT 138 1 OPEN BRANCH FROM BUS 243008 TO BUS 243130 CKT 1 / 243008 05FREMCT 138 243130 05TIFFIN 138 1

	OPEN BRANCH FROM BUS 243008 TO BUS 243130 CKT 2 / 243008 05FREMCT 138 243130 05TIFFIN 138 2 OPEN BRANCH FROM BUS 243008 TO BUS 245614 CKT 1 / 243008 05FREMCT 138 245614 05FREMNT C 69.0 1 END
'AEP_P4_#7730_05FREMCT 138'	CONTINGENCY 'AEP_P4_#7730_05FREMCT 138' OPEN BRANCH FROM BUS 243008 TO BUS 243009 CKT 1 / 243008 05FREMCT 138 243009 05FRMNT 138 1 OPEN BRANCH FROM BUS 243008 TO BUS 243130 CKT 1 / 243008 05FREMCT 138 243130 05TIFFIN 138 1 OPEN BRANCH FROM BUS 243008 TO BUS 243130 CKT 2 / 243008 05FREMCT 138 243130 05TIFFIN 138 2 OPEN BRANCH FROM BUS 243008 TO BUS 245614 CKT 1 / 243008 05FREMCT 138 245614 05FREMNT C 69.0 1 END
'AEP_P4_#7727_05TIFFIN 138'	CONTINGENCY 'AEP_P4_#7727_05TIFFIN 138' OPEN BRANCH FROM BUS 243008 TO BUS 243130 CKT 1 / 243008 05FREMCT 138 243130 05TIFFIN 138 1 OPEN BRANCH FROM BUS 243008 TO BUS 243130 CKT 2 / 243008 05FREMCT 138 243130 05TIFFIN 138 2 END
'AEP_P7-1_#7734'	CONTINGENCY 'AEP_P7-1_#7734' OPEN BRANCH FROM BUS 242984 TO BUS 243039 CKT 1 / 242984 05CHATFL 138 243039 05MELMOR 138 1 OPEN BRANCH FROM BUS 243024 TO BUS 243039 CKT 1 / 243024 05HOWARD 138 243039 05MELMOR 138 1 END
'AEP_P1-2_#7104'	CONTINGENCY 'AEP_P1-2_#7104' OPEN BRANCH FROM BUS 243006 TO BUS 243039 CKT 1 / 243006 05FOSTOR 138 243039 05MELMOR 138 1 END
'AEP_P1-2_#7105'	CONTINGENCY 'AEP_P1-2_#7105' OPEN BRANCH FROM BUS 243024 TO BUS 243039 CKT 1 / 243024 05HOWARD 138 243039 05MELMOR 138 1 END
'712_B3_05TIFFIN 138-1_WOMOAB'	CONTINGENCY '712_B3_05TIFFIN 138-1_WOMOAB' OPEN BRANCH FROM BUS 243008 TO BUS 243009 CKT 1 / 243008 05FREMCT 138 243009 05FRMNT 138 1 OPEN BRANCH FROM BUS 243008 TO BUS 243130 CKT 1 / 243008 05FREMCT 138 243130 05TIFFIN 138 1 OPEN BRANCH FROM BUS 243015 TO BUS 243130 CKT 1 / 243015 05GREENL 138 243130 05TIFFIN 138 1 OPEN BRANCH FROM BUS 243008 TO BUS 245614 CKT 1 / 243008 05FREMCT 138 245614 05FREMNT C 69.0 1 OPEN BRANCH FROM BUS 243130 TO BUS 245637 CKT 1 / 243130 05TIFFIN 138 245637 05TIFFIN C 69.0 1 OPEN BRANCH FROM BUS 247481 TO BUS 245637 CKT 1 / 247481 05HOLME STSS69.0 245637 05TIFFIN C 69.0 1 OPEN BRANCH FROM BUS 245648 TO BUS 245637 CKT 1 / 245648 05MAULE RD 69.0 245637 05TIFFIN C 69.0 1 END

'1016_B3_05CHATFL 138-1_WOMOAB-A'.	CONTINGENCY '1016_B3_05CHATFL 138-1_WOMOAB-A'	
	OPEN BRANCH FROM BUS 242953 TO BUS 243110 CKT 1	/ 242953 05AIRCO8 138 243110 05STIFFI 138 1
	OPEN BRANCH FROM BUS 242953 TO BUS 243137 CKT 1	/ 242953 05AIRCO8 138 243137 05W.END 138 1
	OPEN BRANCH FROM BUS 242984 TO BUS 932050 CKT 1	/ 242984 05CHATFL 138 932050 AC2-015 TAP 138 1
	OPEN BRANCH FROM BUS 242984 TO BUS 243039 CKT 1	/ 932050 05CHATFL 138 243039 05MELMOR 138 1
	OPEN BRANCH FROM BUS 242984 TO BUS 245656 CKT 1	/ 242984 05CHATFL 138 245656 05CHATFIEL
	69.0 1	
	OPEN BRANCH FROM BUS 243110 TO BUS 245630 CKT 1	/ 243110 05STIFFI 138 245630 05S TIFFIN 69.0 1
	OPEN BRANCH FROM BUS 247193 TO BUS 245655 CKT 1	/ 247193 05BULLHDSS 69.0 245655
	05CARROTHR 69.0 1	
	OPEN BRANCH FROM BUS 247193 TO BUS 245669 CKT 1	/ 247193 05BULLHDSS 69.0 245669 05N WILLAR
	69.0 1	
	OPEN BRANCH FROM BUS 245655 TO BUS 245656 CKT 1	/ 245655 05CARROTHR 69.0 245656 05CHATFIEL
	69.0 1	
	OPEN BRANCH FROM BUS 245655 TO BUS 245674 CKT 1	/ 245655 05CARROTHR 69.0 245674
	05ST.STEPHSS69.0 1	
	OPEN BRANCH FROM BUS 245656 TO BUS 247380 CKT 1	/ 245656 05CHATFIEL 69.0 247380 05NEW
	WASHSS69.0 1	
	END	

Table 2

Generator Deliverability

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

None

Multiple Facility Contingency

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

AD2-136 Multiple Facility Contingency													
#	Type	Contingency Name	Affected Area	Facility Description	Bus From	Bus To	Ckt.	PF	Loading Initial	Loading Final	Rating Type	Rating MVA	MW Con.
1	LFFB	'AEP_P4_#7111_05MELMOR 138'	AEP - AEP	05CHATFL-AC2-015 TAP 138 kV line	242984	932050	1	DC	69.11	115.97	ER	167	78.25
2	DCTL	'AEP_P7-1_#7114'	AEP - AEP	05FREMCT-05FRMNT 138 kV line	243008	243009	1	DC	64.12	121.38	ER	251	143.71
3	DCTL	'AEP_P7-1_#7731'	AEP - AEP	05FREMCT-05FRMNT 138 kV line	243008	243009	1	DC	63.28	119.61	ER	251	141.39
4	DCTL	'AEP_P7-1_#7732'	AEP - AEP	05STIFFI 138/69 kV transformer	243110	245630	1	DC	65.86	118.96	ER	72	38.24
5	DCTL	'AEP_P7-1_#7732'	AEP - AEP	05RIVERVIE-05BASCOM 69 kV line	245628	245604	1	DC	69.44	100.89	ER	31	21.64
6	Bus Fault	'AEP_P2-2_#7730_05FREMCT 138'	AEP - AEP	05TIFFIN C-05MAULE RD 69 kV line	245637	245648	1	DC	95.71	117.49	ER	73	35.29
7	LFFB	'AEP_P4_#7730_05FREMCT 138'	AEP- AEP	05TIFFIN C-05MAULE RD 69 kV line	245637	245648	1	DC	95.71	117.49	ER	73	35.29

AD2-136 Multiple Facility Contingency													
#	Type	Contingency Name	Affected Area	Facility Description	Bus		Ckt.	PF	Loading		Rating		MW Con.
					From	To			Initial	Final	Type	MVA	
8	LFFB	'AEP_P4_#7727_05TIFFIN 138'	AEP-AEP	05TIFFIN C-05MAULE RD 69 kV line	245637	245648	1	DC	92.36	114.44	ER	73	35.77
9	DCTL	'AEP_P7-1_#7731'	AEP-AEP	05TIFFIN T-05RIVERVIE 69 kV line	245638	245628	1	DC	99.83	160.07	ER	73	43.97
10	DCTL	'AEP_P7-1_#7114'	AEP-AEP	05TIFFIN T-05RIVERVIE 69 kV line	245638	245628	1	DC	93.41	149.48	ER	73	40.94
11	Bus	'AEP_P2-2_#7730_05FREMCT 138'	AEP-AEP	05MAULE RD-05DAVIS STSS 69 kV line	245648	247480	1	DC	86.94	108.72	ER	73	35.29
12	LFFB	'AEP_P4_#7730_05FREMCT 138'	AEP-AEP	05MAULE RD-05DAVIS STSS 69 kV line	245648	247480	1	DC	86.94	108.72	ER	73	35.29
13	LFFB	'AEP_P4_#7727_05TIFFIN 138'	AEP-AEP	05MAULE RD-05DAVIS STSS 69 kV line	245648	247480	1	DC	83.73	105.81	ER	73	35.77
14	Bus Fault	'AEP_P2-2_#7730_05FREMCT 138'	AEP-AEP	05DAVIS STSS-05TIFFIN T 69 kV line	247480	245638	1	DC	86.94	108.72	ER	73	35.29
15	LFFB	'AEP_P4_#7730_05FREMCT 138'	AEP-AEP	05DAVIS STSS-05TIFFIN T 69 kV line	247480	245638	1	DC	86.94	108.72	ER	73	35.29
16	LFFB	'AEP_P4_#7727_05TIFFIN 138'	AEP-AEP	05DAVIS STSS-05TIFFIN T 69 kV line	247480	245638	1	DC	83.73	105.81	ER	73	35.77
17	LFFB	'AEP_P4_#7111_05MELMOR 138'	AEP-AEP	05AIRCO8-05W.END 138 kV line	242953	243137	1	DC	60.35	109.86	ER	167	82.68
18	LFFB	'AEP_P4_#7111_05MELMOR 138'	AEP-AEP	05STIFFI-05AIRCO8 138 kV line	243110	242953	1	DC	66.34	115.85	ER	167	82.68

Table 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)

AD2-136 Contribution to Previously Identified Overloads													
#	Type	Contingency Name	Affected Area	Facility Description	Bus		Ckt.	PF	Loading		Rating		MW Con.
					From	To			Initial	Final	Type	MVA	
1	DCTL	'AEP_P7-1_#7734'	AEP - AEP	05GREENLAW-05E.TIFF2 69 kV line	245621	245646	1	DC	151.86	173.57	ER	39	18.8
2	DCTL	'AEP_P7-1_#7731'	AEP - AEP	05TIFFIN C-05MAULE RD 69 kV line	245637	245648	1	DC	117.64	177.88	ER	73	43.97
3	DCTL	'AEP_P7-1_#7114'	AEP - AEP	05TIFFIN C-05MAULE RD 69 kV line	245637	245648	1	DC	111.22	167.29	ER	73	40.94
4	DCTL	'AEP_P7-1_#7734'	AEP - AEP	05E.TIFF2-05WROCKWSS 69 kV line	245646	245635	1	DC	191.05	218.37	ER	31	18.8
5	DCTL	'AEP_P7-1_#7731'	AEP - AEP	05MAULE RD-05DAVIS STSS 69 kV line	245628	247480	1	DC	108.88	169.11	ER	73	43.97
6	DCTL	'AEP_P7-1_#7114'	AEP - AEP	05MAULE RD-05DAVIS STSS 69 kV line	245648	247480	1	DC	102.59	158.66	ER	73	40.94

AD2-136 Contribution to Previously Identified Overloads													
#	Type	Contingency Name	Affected Area	Facility Description	Bus		Ckt.	PF	Loading		Rating		MW Con.
				kV line	From	To			Initial	Final	Type	MVA	
7	DCTL	'AEP_P7-1_#7734'	AEP - AEP	05ST.STEPHSS-05CARROTHR 69 kV line	245674	245655	1	DC	142.02	169.33	ER	31	18.8
8	DCTL	'AEP_P7-1_#7731'	AEP - AEP	05DAVIS STSS-05TIFFIN T 69 kV line	247480	245638	1	DC	108.88	169.11	ER	73	43.97
9	DCTL	'AEP_P7-1_#7114'	AEP - AEP	05DAVIS STSS-05TIFFIN T 69 kV line	247480	245638	1	DC	102.59	158.66	ER	73	40.94
10	LFFB	'AEP_P4_#7111_05MELMOR 138'	AEP - AEP	AC2-015 TAP-05HOWARD 138 kV line	932050	243024	1	DC	105.2	152.06	ER	167	78.25

Table 4

Steady-State Voltage Requirements

None

Short Circuit

(Summary of impacted circuit breakers)

New circuit breakers found to be over-duty:

None

Affected System Analysis & Mitigation

LGEE Impacts:

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

MISO Impacts:

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

Duke, Progress & TVA Impacts:

Duke Carolina, Progress, & TVA Impacts to be determined during later study phases (as applicable).

OVEC Impacts:

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

Delivery of Energy Portion of Interconnection Request

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.

AD2-136 Delivery of Energy Portion of Interconnection Request													
#	Type	Contingency Name	Affected Area	Facility Description	Bus		Ckt.	PF	Loading		Rating		MW Con.
					From	To			Initial	Final	Type	MVA	
1	N-1	'AEP_P1-2_#7105'	AEP - AEP	05CHATFL-AC2-015 TAP 138 kV line	242984	932050	1	DC	68.95	105.53	ER	167	61.08
2	Non	Non	AEP - FE	05HOWARD-02BRKSID 138 kV line	243024	238586	1	DC	105.89	131.7	NR	167	43.1
3	N-1	'712_B3_05TIFFIN 138-1_WOMOAB'	AEP - AEP	05HOWARD-02BRKSID 138 kV line	243024	238586	1	DC	89.5	114.97	ER	245	62.4
4	N-1	'712_B3_05TIFFIN 138-1_WOMOAB'	AEP - AEP	05MELMOR-05FOSTOR 138 kV line	243039	243006	1	DC	82.33	137.23	ER	245	134.5
5	Non	Non	AEP - AEP	05MELMOR-05FOSTOR 138 kV line	243039	243006	1	DC	79.23	132.9	NR	167	89.63
6	N-1	'1016_B3_05CHATFL 138-1_WOMOAB-A'	AEP - AEP	05MELMOR-05HOWARD 138 kV line	243039	243024	1	DC	86.58	130.95	ER	173	76.75
7	N-1	'AEP_P1-2_#7105'	AEP - AEP	AC2-015 TAP-05HOWARD 138 kV line	932050	243024	1	DC	103.03	139.61	ER	167	61.08
8	Non	Non	AEP - AEP	AC2-015 TAP-05HOWARD 138 kV line	932050	243024	1	DC	91.53	122.28	NR	138	42.44
9	LFFB	'AEP_P1-2_#7104'	AEP-AEP	05AIRCO8-05W.END 138 kV line	242953	243137	1	DC	59.87	104.54	ER	167	74.6
10	LFFB	'AEP_P1-2_#7104'	AEP-AEP	05STIFFI-05AIRCO8 138 kV line	243110	242953	1	DC	65.8	110.47	ER	167	74.6

Table 5

New System Reinforcements

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

#	Overloaded Facility	Upgrade Description	Schedule	Estimated Cost
#1	05CHATFL-AC2-015 TAP 138 kV line	1)4.5 miles section of ACSR~397.5~30/7~LARK conductor section 1 will have to reconducted/rebuilt to mitigate the overload. 2) Howard Line risers needs to be replaced.	An approximate construction time will be 24 to 36 months after signing of an interconnection agreement.	\$6,850,000
#2	05FREMCT-05FRMNT 138 kV line	1)A Sag Study will be required on the 6.9-mile section of ACSR ~ 795 ~ 45/7 ~ TERN - Conductor section 1 line to mitigate the overload. 2) Fremont CT needs to be replaced. 3) Fremont Switch needs to be replaced.	Sag Study: 6 to 12 months. (2) 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.	\$1,102,600
#3	05STIFFIN – 05W.END 138kV	1)A Sag Study will be required on the 11.6-mile section of ACSR~397.5~30/7~LARK Conductor section 1 line to mitigate the overload. 2) An Engineering study need to be conducted to determine if the W.End relay thermal limits settings can be adjusted to mitigate the overload, Estimated Cost: \$25,000. 3)An Engineering study need to be conducted to determine if the W.End relay compliance limits settings can be adjusted to mitigate the overload, Estimated Cost: \$25,000.	Sag Study: 6 to 12 months. (2) 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.	\$96,400
Total New Network Upgrades				\$8,049,000

Table 6

The System Reinforcements listed below are not part of the Bulk Electric System (BES), but were identified by AEP and will be required for the interconnection of AD2-136.

#	Overloaded Facility	Upgrade Description	Schedule	Estimated Cost
#1	05STIFFI 138/69 kV transformer	1)Replace South Tiffin 138/69kVTransformer. 2)Replace S Tiffin Switch.	An approximate construction time would be 24 to 36 months after signing an interconnection agreement.	\$1,700,000
#2	05RIVERVIE-05BASCOM 69 kV	Supplemental Project S1486: Rebuild 11.3 miles of line between East End Fostoria – Riverview 69kV will mitigate this overload facility.	ISD: 11/1/2018	N/A

#	Overloaded Facility	Upgrade Description	Schedule	Estimated Cost
#3	05TIFFIN T-05RIVERVIE 69 kV line	1) 0.98 miles section of ACSR ~ 336.4 ~ 18/1 ~ MERLIN - Conductor section 1 will have to reconducted/rebuilt to mitigate the overload 2) Replace Riverview risers. 3) Replace Tiffin Tap off MOAB switch. 4) Replace Riverview Switch.	An approximate construction time would be 24 to 36 months after signing an interconnection agreement.	\$1,700,000
Total New Network Upgrades				\$3,400,000

Table 7

Contribution to Previously Identified System Reinforcements

(Overloads initially caused by prior Queue positions with additional contribution to overloading by this project. This project may have a % allocation cost responsibility which will be calculated and reported for the Impact Study)

(Summary form of Cost allocation for transmission lines and transformers will be inserted here if any)

The System Reinforcements listed below are not part of the Bulk Electric System (BES), but were identified by AEP and will be required for the interconnection of AD2-136.

#	Overloaded Facility	Upgrade Description	Schedule	Estimated Cost
#1	05GREENLAW-05E.TIFF2 69 kV line	1) 1.72 miles section of ACSR ~ 133.1 ~ 6/1 ~ QUAIL (2/0) conductor section 2 will have to reconducted/rebuilt to mitigate the overload. 2) An engineering study will need to be conducted to determine if the Greenlawn relay trip limits settings can be adjusted to mitigate the overload. New relay packages will be required if the settings cannot be adjusted. 3) An engineering study will need to be conducted to determine if the Greenlawn CT thermal limits settings can be adjusted to mitigate the overload. New relay packages will be required if the settings cannot be adjusted.	An approximate construction time would be 24 to 36 months after signing an interconnection agreement.	\$2,114,000
#2	05TIFFIN C-05MAULE RD 69 kV line	1) Tiffin center risers will need to be replaced. 2) 3.09 miles of ACSR ~ 556.5 ~ 18/1 ~ OSPREY - Conductor section 2 will need to be rebuilt/Reconductor.	An approximate construction time would be 24 to 36 months after signing an interconnection agreement.	\$3,800,000
#3	05MAULE RD-05DAVIS STSS 69 kV line	1) 1.71 miles of ACSR ~ 336.4 ~ 18/1 ~ MERLIN - Conductor section 1 will have to reconducted/rebuilt to mitigate the overload. 2) Davis St Switch needs to be replaced.	An approximate construction time would be 24 to 36 months after signing an interconnection agreement.	\$2,200,000
#4	05DAVIS STSS-05TIFFIN T 69 kV line	1) 0.27 miles of ACSR ~ 336.4 ~ 18/1 ~ MERLIN - Conductor section 1 will need to replace/rebuilt, 2) Davit STSS switch needs to be replaced. 3) Tiffin T switch needs to be replaced.	An approximate construction time would be 24 to 36 months after signing an interconnection agreement.	\$524,000

#	Overloaded Facility	Upgrade Description	Schedule	Estimated Cost
#5	05ST.STEPHSS-05CARROTHR 69 kV line	Baseline Project B2791.2: Rebuild Tiffin – Howard 69kV line from St. Stephen’s Switch to Hinesville will mitigate this overload facility. Note: The upgrade costs are presently the responsibilities of the Transmission Owner under PJM project B2791 which is scheduled to be put in service by 06/01/2021. Any cost to advance the in service date would be determined in the facility study.	In Service Date: 6/1/2021	N/A
#6	AC2-015 TAP-05HOWARD 138 kV line	1) 15.6 miles section of ACSR ~ 397.5 ~ 30/7 ~ LARK - Conductor section 1 will have to reconductored/ rebuilt to mitigate the overload. 2) Howard Line risers need to be replaced. 3) Chatfield Switch MOAB needs to be replaced. 4) Howard CTs needs to be replaced. 5) Replace Howard Bus and Risers. 6) Replace Chatfield Bus and Risers.	An approximate construction time would be 24 to 36 months after signing an interconnection agreement.	\$3,515,000
Total Network Upgrades				\$12,153,000

Table 8

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 be between 24 to 36 months after signing an interconnection agreement.

Note: The time provided between anticipated normal completion of System Impact, Facilities Studies, subsequent execution of ISA and ICSA documents, and the proposed Backfeed Date is shorter than usual and may be difficult to achieve.

Conclusion

Based upon the results of this Feasibility Study, the construction of the IC’s 360.0MW (46.8MW Capacity) Wind generating facility (PJM Project AD2-136) will require additional interconnection charges. The plan of service will interconnect the proposed wind generating facility in a manner that will provide operational reliability and flexibility to both AEP system and the IC’s generating facility.

Cost Breakdown for Primary Point of Interconnection (Melmore 138 kV Substation)		
Attachment Cost	Expand the Melmore 138kV substation	\$3,000,000
Non-Direct Connection Cost Estimate	138 kV Revenue Metering	\$250,000
	New System Reinforcements <i>(Upgrades required to mitigate reliability criteria violations, i.e. Network Impacts, initially caused by the addition of this project generation)</i>	\$8,049,000
	New System Reinforcements-Not part of the BES	\$3,400,000

	Contribution to Previously Identified System Reinforcements-Not part of the BES	\$12,153,000
	Total Estimated Cost for Project AD2-136	\$26,852,000

Table 9

The estimates 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.

Network Impacts – Option 2

The Queue Project AD2-136 was evaluated as a 360.0 MW (Capacity 46.8 MW) injection at the Chatfield 138kV substation in the AEP area. Project AD2-136 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AD2-136 was studied with a commercial probability of 53%. Potential network impacts were as follows:

Base Case Used

Summer Peak Analysis – 2021 Case

Contingency Descriptions

The following contingencies resulted in overloads:

Contingency Name	Description
'AEP_P2-2_#7118_05HOWARD 138'	CONTINGENCY 'AEP_P2-2_#7118_05HOWARD 138' OPEN BRANCH FROM BUS 238586 TO BUS 243024 CKT 1 / 238586 02BRKSID 138 243024 05HOWARD 138 1 OPEN BRANCH FROM BUS 932050 TO BUS 243024 CKT 1 / 932050 AC2-015 TAP 138 243024 05HOWARD 138 1 OPEN BRANCH FROM BUS 243024 TO BUS 243050 CKT 1 / 243024 05HOWARD 138 243050 05NBELVL 138 1 OPEN BRANCH FROM BUS 243024 TO BUS 243100 CKT 1 / 243024 05HOWARD 138 243100 05SHELGH 138 1 OPEN BRANCH FROM BUS 243024 TO BUS 247542 CKT Z1 / 243024 05HOWARD 138 247542 U4-001 C 138 Z1 OPEN BRANCH FROM BUS 247542 TO BUS 247934 CKT 1 / 247542 U4-001 C 138 247934 U4-001 E 138 1 REMOVE UNIT 1C FROM BUS 247542 / 247542 U4-001 C 138 REMOVE UNIT 1E FROM BUS 247934 / 247934 U4-001 E 138 END
'AEP_P7-1_#7734'	CONTINGENCY 'AEP_P7-1_#7734' OPEN BRANCH FROM BUS 242984 TO BUS 243039 CKT 1 / 242984 05CHATFL 138 243039 05MELMOR 138 1 OPEN BRANCH FROM BUS 243024 TO BUS 243039 CKT 1 / 243024 05HOWARD 138 243039 05MELMOR 138 1 END
'AEP_P4_#7111_05MELMOR 138'	CONTINGENCY 'AEP_P4_#7111_05MELMOR 138' OPEN BRANCH FROM BUS 243006 TO BUS 243039 CKT 1 / 243006 05FOSTOR 138 243039 05MELMOR 138 1 OPEN BRANCH FROM BUS 243024 TO BUS 243039 CKT 1 / 243024 05HOWARD 138 243039 05MELMOR 138 1 END

'AEP_P7-1_#7114'	CONTINGENCY 'AEP_P7-1_#7114' OPEN BRANCH FROM BUS 242953 TO BUS 243110 CKT 1 OPEN BRANCH FROM BUS 242953 TO BUS 243137 CKT 1 OPEN BRANCH FROM BUS 243006 TO BUS 243039 CKT 1 1 OPEN BRANCH FROM BUS 243039 TO BUS 243110 CKT 1 OPEN BRANCH FROM BUS 243110 TO BUS 245630 CKT 1 END	/ 242953 05AIRCO8 138 243110 05STIFFI 138 1 / 242953 05AIRCO8 138 243137 05W.END 138 1 / 243006 05FOSTOR 138 243039 05MELMOR 138 / 243039 05MELMOR 138 243110 05STIFFI 138 1 / 243110 05STIFFI 138 245630 05S TIFFIN 69.0 1
'AEP_P7-1_#7731'	CONTINGENCY 'AEP_P7-1_#7731' OPEN BRANCH FROM BUS 243006 TO BUS 243039 CKT 1 1 OPEN BRANCH FROM BUS 243039 TO BUS 243110 CKT 1 END	/ 243006 05FOSTOR 138 243039 05MELMOR 138 / 243039 05MELMOR 138 243110 05STIFFI 138 1
'AEP_P2-2_#7730_05FREMCT 138'	CONTINGENCY 'AEP_P2-2_#7730_05FREMCT 138' OPEN BRANCH FROM BUS 243008 TO BUS 243009 CKT 1 OPEN BRANCH FROM BUS 243008 TO BUS 243130 CKT 1 OPEN BRANCH FROM BUS 243008 TO BUS 243130 CKT 2 OPEN BRANCH FROM BUS 243008 TO BUS 245614 CKT 1 69.0 1 END	/ 243008 05FREMCT 138 243009 05FRMNT 138 1 / 243008 05FREMCT 138 243130 05TIFFIN 138 1 / 243008 05FREMCT 138 243130 05TIFFIN 138 2 / 243008 05FREMCT 138 245614 05FREMNT C
'AEP_P4_#7730_05FREMCT 138'	CONTINGENCY 'AEP_P4_#7730_05FREMCT 138' OPEN BRANCH FROM BUS 243008 TO BUS 243009 CKT 1 OPEN BRANCH FROM BUS 243008 TO BUS 243130 CKT 1 OPEN BRANCH FROM BUS 243008 TO BUS 243130 CKT 2 OPEN BRANCH FROM BUS 243008 TO BUS 245614 CKT 1 69.0 1 END	/ 243008 05FREMCT 138 243009 05FRMNT 138 1 / 243008 05FREMCT 138 243130 05TIFFIN 138 1 / 243008 05FREMCT 138 243130 05TIFFIN 138 2 / 243008 05FREMCT 138 245614 05FREMNT C
'AEP_P4_#7727_05TIFFIN 138'	CONTINGENCY 'AEP_P4_#7727_05TIFFIN 138' OPEN BRANCH FROM BUS 243008 TO BUS 243130 CKT 1 OPEN BRANCH FROM BUS 243008 TO BUS 243130 CKT 2 END	/ 243008 05FREMCT 138 243130 05TIFFIN 138 1 / 243008 05FREMCT 138 243130 05TIFFIN 138 2
'AEP_P4_#7714_05MELMOR 138'	CONTINGENCY 'AEP_P4_#7714_05MELMOR 138' OPEN BRANCH FROM BUS 242984 TO BUS 243039 CKT 1 1 OPEN BRANCH FROM BUS 243039 TO BUS 243110 CKT 1 END	/ 242984 05CHATFL 138 243039 05MELMOR 138 / 243039 05MELMOR 138 243110 05STIFFI 138 1
'AEP_P1-2_#7709-B'	CONTINGENCY 'AEP_P1-2_#7709-B' OPEN BRANCH FROM BUS 932050 TO BUS 243024 CKT 1 138 1 END	/ 932050 AC2-015 TAP 138 243024 05HOWARD
'AEP_P1-2_#7713'	CONTINGENCY 'AEP_P1-2_#7713' OPEN BRANCH FROM BUS 242984 TO BUS 243039 CKT 1 1 END	/ 242984 05CHATFL 138 243039 05MELMOR 138

'AEP_P1-2_#7105'	CONTINGENCY 'AEP_P1-2_#7105' OPEN BRANCH FROM BUS 243024 TO BUS 243039 CKT 1 1 END	/ 243024 05HOWARD 138 243039 05MELMOR 138
'712_B3_05TIFFIN 138-1_WOMOAB'	CONTINGENCY '712_B3_05TIFFIN 138-1_WOMOAB' OPEN BRANCH FROM BUS 243008 TO BUS 243009 CKT 1 OPEN BRANCH FROM BUS 243008 TO BUS 243130 CKT 1 OPEN BRANCH FROM BUS 243015 TO BUS 243130 CKT 1 OPEN BRANCH FROM BUS 243008 TO BUS 245614 CKT 1 69.0 1 OPEN BRANCH FROM BUS 243130 TO BUS 245637 CKT 1 OPEN BRANCH FROM BUS 247481 TO BUS 245637 CKT 1 69.0 1 OPEN BRANCH FROM BUS 245648 TO BUS 245637 CKT 1 69.0 1 END	/ 243008 05FREMCT 138 243009 05FRMNT 138 1 / 243008 05FREMCT 138 243130 05TIFFIN 138 1 / 243015 05GREENL 138 243130 05TIFFIN 138 1 / 243008 05FREMCT 138 245614 05FREMNT C / 243130 05TIFFIN 138 245637 05TIFFIN C 69.0 1 / 247481 05HOLME STSS69.0 245637 05TIFFIN C / 245648 05MAULE RD 69.0 245637 05TIFFIN C

Table 1

Generator Deliverability

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

None

Multiple Facility Contingency

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

Option -2 AD2-136 Multiple Facility Contingency													
#	Type	Contingency Name	Affected Area	Facility Description	Bus From	Bus To	Ckt.	PF	Loading Initial	Loading Final	Rating Type	Rating MVA	MW Con.
1	Bus Fault	'AEP_P2-2_#7118_05HOWARD 138'	AEP-AEP	05CHATFL-05MELMOR 138 kV line	242984	243039	1	DC	34.48	157.7	ER	245	301.88
2	DCTL	'AEP_P7-1_#7733_A'	AEP-AEP	05CHATFL-05MELMOR 138 kV line	242984	243039	1	DC	38.65	157.62	ER	245	291.47
3	DCTL	'AEP_P7-1_#7733_A'	AEP-AEP	05CHATFL 138/69 kV	242984	245656	1	DC	64.96	129.01	ER	107	68.53
4	DCTL	'AEP_P7-1_#7734'	AEP-AEP	05CHATFL 138/69 kV	242984	245656	1	DC	50.22	130.29	ER	107	85.68
5	LFFB	'AEP_P4_#7111_05MELMOR 138'	AEP-AEP	05CHATFL-AC2-015 TAP 138 kV line	242984	932050	1	DC	69.11	156.69	ER	167	146.25
6	DCTL	'AEP_P7-1_#7114'	AEP-AEP	05FREMCT-05FRMNT 138 kV line	243008	243009	1	DC	64.12	109.41	ER	251	113.67

Option -2 AD2-136 Multiple Facility Contingency													
#	Type	Contingency Name	Affected Area	Facility Description	Bus From	Bus To	Ckt.	PF	Initial	Final	Rating Type	MVA	MW Con.
7	DCTL	'AEP_P7-1_#7731'	AEP-AEP	05FREMCT-05FRMNT 138 kV line	243008	243009	1	DC	63.28	107.74	ER	251	111.61
8	Bus Fault	'AEP_P2-2_#7730_05FREMCT 138'	AEP-AEP	05TIFFIN C-05MAULE RD 69 kV line	245637	245648	1	DC	95.71	115.06	ER	73	31.36
19	LFFB	'AEP_P4_#7730_05FREMCT 138'	AEP-AEP	05TIFFIN C-05MAULE RD 69 kV line	245637	245648	1	DC	95.71	115.06	ER	73	31.36
10	LFFB	'AEP_P4_#7727_05TIFFIN 138'	AEP-AEP	05TIFFIN C-05MAULE RD 69 kV line	245637	245648	1	DC	92.36	111.97	ER	73	31.77
11	DCTL	'AEP_P7-1_#7731'	AEP-AEP	05TIFFIN T-05RIVERVIE 69 kV line	245638	245628	1	DC	99.83	151.25	ER	73	37.53
12	DCTL	'AEP_P7-1_#7114'	AEP-AEP	05TIFFIN T-05RIVERVIE 69 kV line	245638	245628	1	DC	93.41	114.91	ER	73	34.85
13	DCTL	'AEP_P7-1_#7734'	AEP-AEP	05E.TIFF2-05GREENLAW 69 kV line	245646	245621	1	DC	68.2	219.39	ER	39	58.96
14	Bus Fault	'AEP_P2-2_#7730_05FREMCT 138'	AEP-AEP	05MAULE RD-05DAVIS STSS 69 kV line	245648	247480	1	DC	86.94	106.3	ER	73	31.36
15	LFFB	'AEP_P4_#7730_05FREMCT 138'	AEP-AEP	05MAULE RD-05DAVIS STSS 69 kV line	245648	247480	1	DC	86.94	106.3	ER	73	31.36
16	LFFB	'AEP_P4_#7727_05TIFFIN 138'	AEP-AEP	05MAULE RD-05DAVIS STSS 69 kV line	245648	247480	1	DC	83.73	103.34	ER	73	31.77
17	DCTL	'AEP_P7-1_#7734'	AEP-AEP	05BLOOMVL-05N.BLOOMVSS 69 kV line	245650	247429	1	DC	40.44	105.96	ER	90	58.96
18	DCTL	'AEP_P7-1_#7734'	AEP-AEP	05CHATFIEL-05CARROTHR 69 kV line	245656	245655	1	DC	53.13	129.38	ER	90	68.63
19	DCTL	'AEP_P7-1_#7734'	AEP-AEP	05ST.STEPHSS-05BLOOMVL 69 kV line	245674	245650	1	DC	43.44	108.96	ER	90	58.96
20	DCTL	'AEP_P7-1_#7734'	AEP-AEP	05BROK SWR-05NEVADA SS 69 kV line	245687	247379	1	DC	99.37	142.24	ER	31	29.5
21	LFFB	'AEP_P4_#7714_05MELMOR 138'	AEP-AEP	05BROK SWR-05NEVADA SS 69 kV line	245687	247379	1	DC	82.97	117.01	ER	31	23.43
22	DCTL	'AEP_P7-1_#7734'	AEP-AEP	05NEVADA SS-05U SANDSK 69 kV line	247379	247515	1	DC	93.56	136.43	ER	31	29.5
23	LFFB	'AEP_P4_#7714_05MELMOR 138'	AEP-AEP	05NEVADA SS-05U SANDSK 69 kV line	247379	247515	1	DC	77.16	111.21	ER	31	23.43
24	DCTL	'AEP_P7-1_#7734'	AEP-AEP	05N.BLOOMVSS-05WROCKWSS 69 kV line	247429	245635	1	DC	35.66	101.18	ER	90	58.96
25	Bus Fault	'AEP_P2-2_#7730_05FREMCT 138'	AEP-AEP	05DAVIS STSS-05TIFFIN T 69 kV line	247480	245638	1	DC	86.94	106.3	ER	73	31.36
26	LFFB	'AEP_P4_#7730_05FREMCT 138'	AEP-AEP	05DAVIS STSS-05TIFFIN T 69 kV line	247480	245638	1	DC	86.94	106.3	ER	73	31.36
27	LFFB	'AEP_P4_#7727_05TIFFIN 138'	AEP-	05DAVIS STSS-05TIFFIN T 69 kV	247480	245638	1	DC	83.73	103.34	ER	73	31.77

Option -2 AD2-136 Multiple Facility Contingency													
#	Type	Contingency Name	Affected Area	Facility Description	Bus		Ckt.	PF	Loading		Rating	MW	
			AEP	line	From	To			Initial	Final	Type	MVA	Con.
28	LFFB	'AEP_P4_#7714_05MELMOR 138'	AEP-AEP	AC2-015 TAP-05HOWARD 138 kV line	932050	243024	1	DC	55.73	224.38	ER	167	281.64

Table 11

Note: PJM project B2791 will mitigate flowgate 8, 20, and 26 in the immediate above Table

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)

Option 2 -AD2-136 Contribution to Previously Identified Overloads													
#	Type	Contingency Name	Affected Area	Facility Description	Bus		Ckt.	PF	Loading		Rating	MW	
					From	To			Initial	Final	Type	MVA	Con.
1	DCTL	'AEP_P7-1_#7731'	AEP - AEP	05TIFFIN C-05MAULE RD 69 kV line	245637	245648	1	DC	117.64	169.06	ER	73	37.53
2	DCTL	'AEP_P7-1_#7114'	AEP - AEP	05TIFFIN C-05MAULE RD 69 kV line	245637	245648	1	DC	111.22	132.72	ER	73	34.85
3	DCTL	'AEP_P7-1_#7731'	AEP - AEP	05MAULE RD-05DAVIS STSS 69 kV line	245648	247480	1	DC	108.88	160.29	ER	73	37.53
4	DCTL	'AEP_P7-1_#7114'	AEP - AEP	05MAULE RD-05DAVIS STSS 69 kV line	245648	247480	1	DC	102.59	124.09	ER	73	34.85
5	DCTL	'AEP_P7-1_#7731'	AEP - AEP	05DAVIS STSS-05TIFFIN T 69 kV line	247480	245638	1	DC	108.88	160.29	ER	73	37.53
6	DCTL	'AEP_P7-1_#7114'	AEP - AEP	05DAVIS STSS-05TIFFIN T 69 kV line	247480	245638	1	DC	102.59	124.09	ER	73	34.85

Table 12

Note: PJM project B2791 will mitigate flowgate 5 in the above table

Steady-State Voltage Requirements

(Results of the steady-state voltage studies should be inserted here)

None

Short Circuit

New circuit breakers found to be over-duty:

Bus Name	BREAKER	Breaker Capacity (Amps)	Duty Percent With AD2-136	Duty Percent Without AD2-136
05HOWARD 138kV	C	16700	100.27	98.23
05HOWARD 138kV	H	16700	100.27	98.23
05HOWARD 138kV	L	16700	100.27	98.23

Table 13

Note: Howard Station Breaker ‘C’ is going to be replaced for PJM Project U4-001. Breakers H and L have already been replaced.

Affected System Analysis & Mitigation

LGEE Impacts:

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

MISO Impacts:

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

Duke, Progress & TVA Impacts:

Duke Carolina, Progress, & TVA Impacts to be determined during later study phases (as applicable).

OVEC Impacts:

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

Delivery of Energy Portion of Interconnection Request

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.

Only the most severely overloaded conditions are listed. 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 will study all overload conditions associated with the overloaded element(s) identified.

AD2-136 Delivery of Energy Portion of Interconnection Request													
#	Type	Contingency Name	Affected Area	Facility Description	Bus		Ckt.	PF	Loading		Rating		MW Con.
					From	To			Initial	Final	Type	MVA	
1	Non	Non	AEP-AEP	05CHATFL-05MELMOR 138 kV line	242984	243039	1	DC	44.59	159.12	NR	167	191.28
2	N-1	'AEP_P1-2_#7709-B'	AEP-AEP	05CHATFL-05MELMOR 138 kV line	242984	243039	1	DC	34.93	156.52	ER	245	297.89
3	N-1	'AEP_P1-2_#7713'	AEP-AEP	05CHATFL 138/69 kV transformer	242984	245656	1	DC	39.4	112.73	ER	107	78.47
4	N-1	'AEP_P1-2_#7105'	AEP-AEP	05CHATFL-AC2-015 TAP 138 kV line	242984	932050	1	DC	68.95	149.25	ER	167	134.11
5	Non	Non	AEP-AEP	05CHATFL-AC2-015 TAP 138 kV line	242984	932050	1	DC	48.32	146.02	NR	138	134.83
6	Non	Non	AEP-FE	05HOWARD-02BRKSID 138 kV line	243024	238586	1	DC	105.89	146.54	NR	167	67.88
7	N-1	'712_B3_05TIFFIN 138-1_WOMOAB'	AEP-FE	05HOWARD-02BRKSID 138 kV line	243024	238586	1	DC	89.5	123.72	ER	245	83.83
8	N-1	'712_B3_05TIFFIN 138-1_WOMOAB'	AEP-AEP	05MELMOR-05FOSTOR 138 kV line	243039	243006	1	DC	82.33	125.61	ER	245	106.03
9	Non	Non	AEP-AEP	05MELMOR-05FOSTOR 138 kV line	243039	243006	1	DC	79.23	120.73	NR	167	69.31
10	N-1	'AEP_P1-2_#7709-B'	AEP-AEP	05MELMOR-05HOWARD 138 kV line	243039	243024	1	DC	78.42	106.74	ER	173	48.99
11	N-1	'AEP_P1-2_#7713'	AEP-AEP	05E.TIFF2-05GREENLAW 69 kV line	245646	245621	1	DC	45.89	168.73	ER	39	47.91
12	N-1	'AEP_P1-2_#7713'	AEP-AEP	05CHATFIEL-05CARROTHR 69 kV line	245656	245655	1	DC	37.69	104.15	ER	90	59.82
13	N-1	'AEP_P1-2_#7713'	AEP-AEP	05NEVADA SS-05U SANDSK 69 kV line	247379	247515	1	DC	75.71	109.04	ER	31	22.93
14	N-1	'AEP_P1-2_#7713'	AEP-AEP	AC2-015 TAP-05HOWARD 138 kV line	932050	243024	1	DC	55.71	224.3	ER	167	281.53
15	Non	Non	AEP-AEP	AC2-015 TAP-05HOWARD 138 kV line	93250	243024	1	DC	91.53	189.23	NR	138	134.83

Table 14

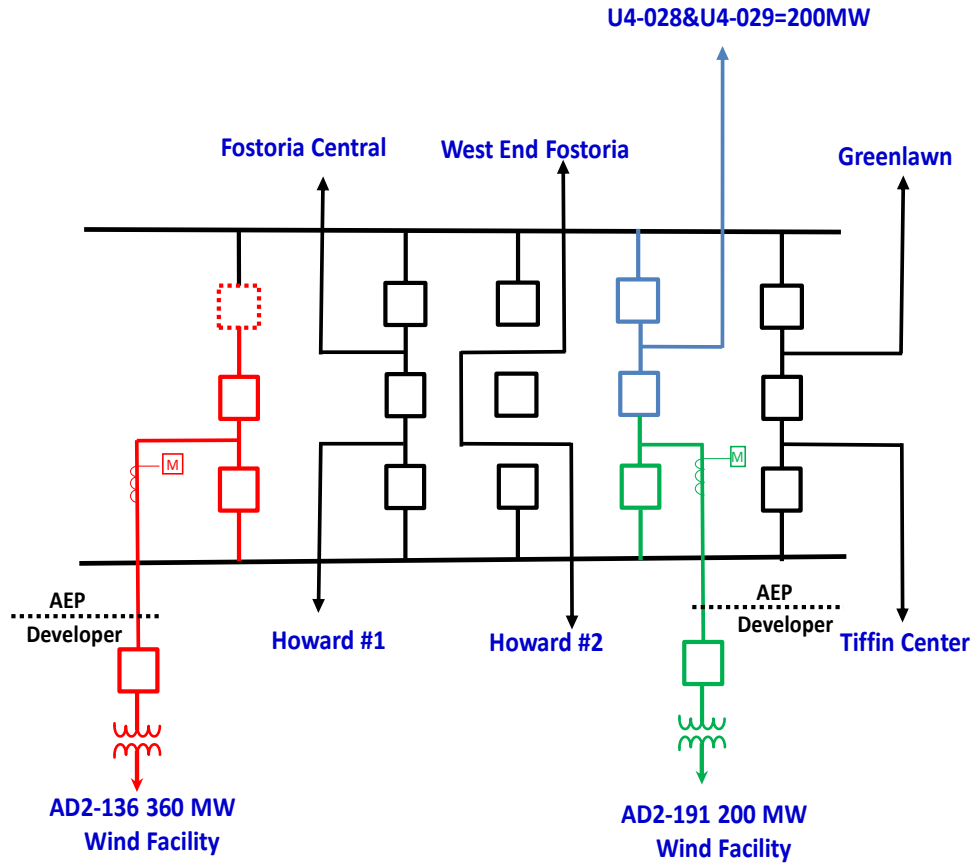
Note: PJM project B2791 will mitigate flowgates 11 and 13 in the above table.

Figure 1: Primary Point of Interconnection (Melmore 138 kV Substation)

Single-Line Diagram

**AD2-136 Primary Point of Interconnection
Melmore 138 kV Substation**

Remote stations not completely shown.

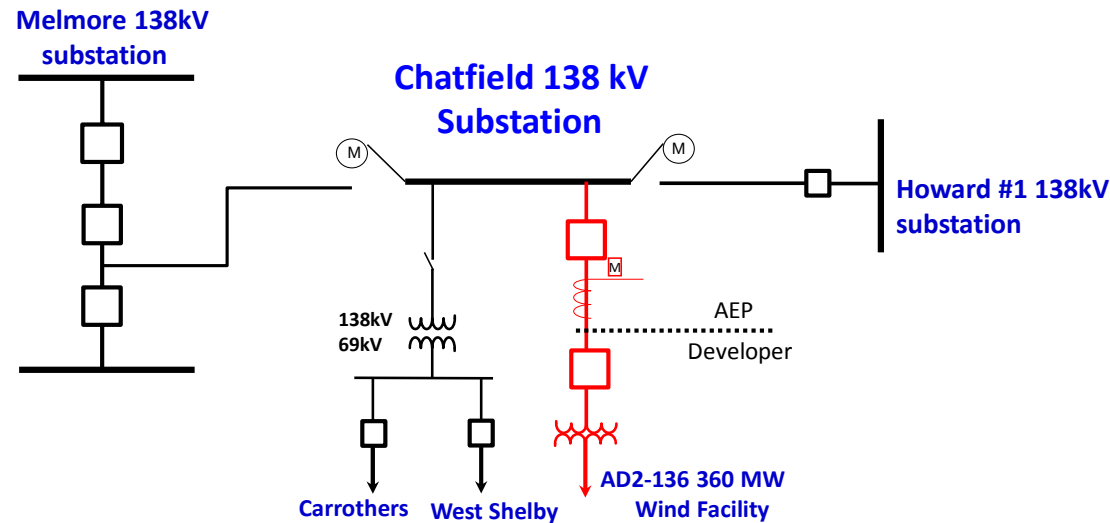


Legend

- Existing
- To be constructed for U4-28&U4-29
- To be constructed for AD2-136
- To be constructed for AD2-191
- Future facility

Figure 3: Secondary Point of Interconnection (Chatfield 138 kV Substation)
Single-Line Diagram

**AD2-136 Secondary Point of Interconnection
Chatfield 138 kV Substation**



Legend

- Existing
- To be constructed for AD2-136

Appendices – Primary POI

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

Appendix 1

(AEP - AEP) The 05AIRCO8-05W.END 138 kV line (from bus 242953 to bus 243137 ckt 1) loads from 60.35% to 109.86% (**DC power flow**) of its emergency rating (167 MVA) for the line fault with failed breaker contingency outage of 'AEP_P4_#7111_05MELMOR 138'. This project contributes approximately 82.68 MW to the thermal violation.

CONTINGENCY 'AEP_P4_#7111_05MELMOR 138'

OPEN BRANCH FROM BUS 243006 TO BUS 243039 CKT 1 / 243006

05FOSTOR 138 243039 05MELMOR 138 1

OPEN BRANCH FROM BUS 243024 TO BUS 243039 CKT 1 / 243024

05HOWARD 138 243039 05MELMOR 138 1

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932051	AC2-015 C	7.67
932052	AC2-015 E	8.95
937021	AD2-136 C O1	10.75
937022	AD2-136 E O1	71.93
937381	AD2-191 C	5.97
937382	AD2-191 E	39.96
LTF	AMIL	0.09
LTF	BAYOU	0.22
LTF	BIG_CAJUN1	0.34
LTF	BIG_CAJUN2	0.68
LTF	BLUEG	0.47
LTF	CALDERWOOD	0.08
LTF	CANNELTON	0.08
LTF	CATAWBA	0.03
LTF	CBM-N	0.04
LTF	CELEVELAND	0.1
LTF	CHEOAH	0.08
LTF	CHILHOWEE	0.03
LTF	CHOCTAW	0.21
LTF	CLIFTY	1.32
LTF	COTTONWOOD	0.91
LTF	DEARBORN	0.49
LTF	EDWARDS	0.18
LTF	ELMERSMITH	0.23
LTF	FARMERCITY	0.11
LTF	G-007A	0.27
LTF	GIBSON	0.18
LTF	HAMLET	0.09
LTF	MORGAN	0.34
LTF	NEWTON	0.41

<i>LTF</i>	<i>NYISO</i>	<i>0.61</i>
<i>LTF</i>	<i>PRAIRIE</i>	<i>0.74</i>
<i>LTF</i>	<i>ROWAN</i>	<i>0.06</i>
<i>LTF</i>	<i>SANTEETLA</i>	<i>0.02</i>
<i>LTF</i>	<i>SMITHLAND</i>	<i>0.05</i>
<i>LTF</i>	<i>TATANKA</i>	<i>0.2</i>
<i>LTF</i>	<i>TILTON</i>	<i>0.21</i>
<i>LTF</i>	<i>TRIMBLE</i>	<i>0.09</i>
<i>LTF</i>	<i>TVA</i>	<i>0.15</i>
<i>247542</i>	<i>U4-001 C</i>	<i>2.23</i>
<i>247934</i>	<i>U4-001 E</i>	<i>14.94</i>
<i>247551</i>	<i>U4-028 C</i>	<i>2.99</i>
<i>247940</i>	<i>U4-028 E</i>	<i>19.98</i>
<i>247552</i>	<i>U4-029 C</i>	<i>2.99</i>
<i>247941</i>	<i>U4-029 E</i>	<i>19.98</i>
<i>LTF</i>	<i>UNIONPOWER</i>	<i>0.11</i>
<i>247548</i>	<i>V4-010 C</i>	<i>4.85</i>
<i>247947</i>	<i>V4-010 E</i>	<i>32.46</i>
<i>LTF</i>	<i>VFT</i>	<i>0.74</i>
<i>925751</i>	<i>AC1-051 C</i>	<i>0.97</i>
<i>925752</i>	<i>AC1-051 E</i>	<i>6.5</i>

Appendix 2

(AEP - AEP) The 05CHATFL-AC2-015 TAP 138 kV line (from bus 242984 to bus 932050 ckt 1) loads from 69.11% to 115.97% (**DC power flow**) of its emergency rating (167 MVA) for the line fault with failed breaker contingency outage of 'AEP_P4_#7111_05MELMOR 138'. This project contributes approximately 78.25 MW to the thermal violation.

CONTINGENCY 'AEP_P4_#7111_05MELMOR 138'

OPEN BRANCH FROM BUS 243006 TO BUS 243039 CKT 1 / 243006

05FOSTOR 138 243039 05MELMOR 138 1

OPEN BRANCH FROM BUS 243024 TO BUS 243039 CKT 1 / 243024

05HOWARD 138 243039 05MELMOR 138 1

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
934251	AD1-052 C1	0.33
934261	AD1-052 C2	0.33
937021	AD2-136 C O1	10.17
937022	AD2-136 E O1	68.07
937381	AD2-191 C	5.65
937382	AD2-191 E	37.82
LTF	CALDERWOOD	< 0.01
LTF	CARR	0.02
LTF	CATAWBA	0.02
LTF	CBM-S1	0.14
LTF	CBM-W1	6.95
LTF	CBM-W2	2.22
LTF	CELEVELAND	0.07
LTF	CHEOAH	< 0.01
LTF	CHILHOWEE	< 0.01
LTF	CIN	0.41
LTF	CLIFTY	0.39
LTF	G-007	0.14
LTF	HAMLET	0.09
LTF	IPL	0.27
938021	J793	14.63
LTF	LGEE	0.03
LTF	MEC	1.11
LTF	MECS	4.94
LTF	O-066	0.91
LTF	RENSSELAER	0.02
LTF	ROSETON	0.14
LTF	ROWAN	0.06
LTF	SANTEETLA	< 0.01
247551	U4-028 C	2.83

<i>247940</i>	<i>U4-028 E</i>	<i>18.91</i>
<i>247552</i>	<i>U4-029 C</i>	<i>2.83</i>
<i>247941</i>	<i>U4-029 E</i>	<i>18.91</i>
<i>LTF</i>	<i>UNIONPOWER</i>	<i>< 0.01</i>
<i>247548</i>	<i>V4-010 C</i>	<i>4.61</i>
<i>247947</i>	<i>V4-010 E</i>	<i>30.87</i>
<i>LTF</i>	<i>WEC</i>	<i>0.21</i>

Appendix 3

(AEP - AEP) The 05FREMCT-05FRMNT 138 kV line (from bus 243008 to bus 243009 ckt 1) loads from 64.12% to 121.38% (**DC power flow**) of its emergency rating (251 MVA) for the tower line contingency outage of 'AEP_P7-1_#7114'. This project contributes approximately 143.71 MW to the thermal violation.

CONTINGENCY 'AEP_P7-1_#7114'

OPEN BRANCH FROM BUS 242953 TO BUS 243110 CKT 1 / 242953 05AIRCO8
138 243110 05STIFFI 138 1

OPEN BRANCH FROM BUS 242953 TO BUS 243137 CKT 1 / 242953 05AIRCO8
138 243137 05W.END 138 1

OPEN BRANCH FROM BUS 243006 TO BUS 243039 CKT 1 / 243006
05FOSTOR 138 243039 05MELMOR 138 1

OPEN BRANCH FROM BUS 243039 TO BUS 243110 CKT 1 / 243039
05MELMOR 138 243110 05STIFFI 138 1

OPEN BRANCH FROM BUS 243110 TO BUS 245630 CKT 1 / 243110 05STIFFI
138 245630 05S TIFFIN 69.0 1

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932051	AC2-015 C	15.31
932052	AC2-015 E	17.86
937021	AD2-136 C O1	18.68
937022	AD2-136 E O1	125.03
937381	AD2-191 C	10.38
937382	AD2-191 E	69.46
LTF	CARR	0.03
LTF	CBM-S1	0.42
LTF	CBM-S2	0.49
LTF	CBM-W2	1.27
LTF	CIN	0.15
LTF	CPL	0.12
LTF	DEARBORN	1.63
LTF	EDWARDS	0.04
LTF	FARMERCITY	< 0.01
LTF	G-007A	0.18
LTF	IPL	0.1
LTF	LGEE	0.08
LTF	RENSSELAER	0.03
LTF	ROSETON	0.18
LTF	TATANKA	0.03
LTF	TILTON	< 0.01
247542	U4-001 C	5.42
247934	U4-001 E	36.24
247551	U4-028 C	5.19

<i>247940</i>	<i>U4-028 E</i>	<i>34.73</i>
<i>247552</i>	<i>U4-029 C</i>	<i>5.19</i>
<i>247941</i>	<i>U4-029 E</i>	<i>34.73</i>
<i>247548</i>	<i>V4-010 C</i>	<i>11.91</i>
<i>247947</i>	<i>V4-010 E</i>	<i>79.71</i>
<i>LTF</i>	<i>VFT</i>	<i>0.48</i>
<i>925751</i>	<i>AC1-051 C</i>	<i>2.03</i>
<i>925752</i>	<i>AC1-051 E</i>	<i>13.57</i>

Appendix 4

(AEP - AEP) The 05STIFFI-05AIRCO8 138 kV line (from bus 243110 to bus 242953 ckt 1) loads from 66.34% to 115.85% (**DC power flow**) of its emergency rating (167 MVA) for the line fault with failed breaker contingency outage of 'AEP_P4_#7111_05MELMOR 138'. This project contributes approximately 82.68 MW to the thermal violation.

CONTINGENCY 'AEP_P4_#7111_05MELMOR 138'

OPEN BRANCH FROM BUS 243006 TO BUS 243039 CKT 1 / 243006

05FOSTOR 138 243039 05MELMOR 138 1

OPEN BRANCH FROM BUS 243024 TO BUS 243039 CKT 1 / 243024

05HOWARD 138 243039 05MELMOR 138 1

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932051	AC2-015 C	7.67
932052	AC2-015 E	8.95
937021	AD2-136 C O1	10.75
937022	AD2-136 E O1	71.93
937381	AD2-191 C	5.97
937382	AD2-191 E	39.96
LTF	AMIL	0.09
LTF	BAYOU	0.22
LTF	BIG_CAJUN1	0.34
LTF	BIG_CAJUN2	0.68
LTF	BLUEG	0.47
LTF	CALDERWOOD	0.08
LTF	CANNELTON	0.08
LTF	CATAWBA	0.03
LTF	CBM-N	0.04
LTF	CELEVELAND	0.1
LTF	CHEOAH	0.08
LTF	CHILHOWEE	0.03
LTF	CHOCTAW	0.21
LTF	CLIFTY	1.32
LTF	COTTONWOOD	0.91
LTF	DEARBORN	0.49
LTF	EDWARDS	0.18
LTF	ELMERSMITH	0.23
LTF	FARMERCITY	0.11
LTF	G-007A	0.27
LTF	GIBSON	0.18
LTF	HAMLET	0.09
LTF	MORGAN	0.34
LTF	NEWTON	0.41

<i>LTF</i>	<i>NYISO</i>	<i>0.61</i>
<i>LTF</i>	<i>PRAIRIE</i>	<i>0.74</i>
<i>LTF</i>	<i>ROWAN</i>	<i>0.06</i>
<i>LTF</i>	<i>SANTEETLA</i>	<i>0.02</i>
<i>LTF</i>	<i>SMITHLAND</i>	<i>0.05</i>
<i>LTF</i>	<i>TATANKA</i>	<i>0.2</i>
<i>LTF</i>	<i>TILTON</i>	<i>0.21</i>
<i>LTF</i>	<i>TRIMBLE</i>	<i>0.09</i>
<i>LTF</i>	<i>TVA</i>	<i>0.15</i>
<i>247542</i>	<i>U4-001 C</i>	<i>2.23</i>
<i>247934</i>	<i>U4-001 E</i>	<i>14.94</i>
<i>247551</i>	<i>U4-028 C</i>	<i>2.99</i>
<i>247940</i>	<i>U4-028 E</i>	<i>19.98</i>
<i>247552</i>	<i>U4-029 C</i>	<i>2.99</i>
<i>247941</i>	<i>U4-029 E</i>	<i>19.98</i>
<i>LTF</i>	<i>UNIONPOWER</i>	<i>0.11</i>
<i>247548</i>	<i>V4-010 C</i>	<i>4.85</i>
<i>247947</i>	<i>V4-010 E</i>	<i>32.46</i>
<i>LTF</i>	<i>VFT</i>	<i>0.74</i>
<i>925751</i>	<i>AC1-051 C</i>	<i>0.97</i>
<i>925752</i>	<i>AC1-051 E</i>	<i>6.5</i>

Appendix 5

(AEP - AEP) The 05STIFFI 138/69 kV transformer (from bus 243110 to bus 245630 ckt 1) loads from 65.86% to 118.96% (**DC power flow**) of its emergency rating (72 MVA) for the tower line contingency outage of 'AEP_P7-1_#7732'. This project contributes approximately 38.24 MW to the thermal violation.

CONTINGENCY 'AEP_P7-1_#7732'

OPEN BRANCH FROM BUS 242953 TO BUS 243110 CKT 1 / 242953 05AIRCO8
138 243110 05STIFFI 138 1

OPEN BRANCH FROM BUS 242953 TO BUS 243137 CKT 1 / 242953 05AIRCO8
138 243137 05W.END 138 1

OPEN BRANCH FROM BUS 243006 TO BUS 243039 CKT 1 / 243006
05FOSTOR 138 243039 05MELMOR 138 1

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932051	AC2-015 C	3.73
932052	AC2-015 E	4.36
937021	AD2-136 C O1	4.97
937022	AD2-136 E O1	33.27
937381	AD2-191 C	2.76
937382	AD2-191 E	18.48
LTF	AMIL	0.03
LTF	BAYOU	0.08
LTF	BIG_CAJUN1	0.12
LTF	BIG_CAJUN2	0.24
LTF	BLUEG	0.16
LTF	CALDERWOOD	0.03
LTF	CANNELTON	0.03
LTF	CATAWBA	0.01
LTF	CBM-N	0.02
LTF	CELEVELAND	0.03
LTF	CHEOAH	0.03
LTF	CHILHOWEE	< 0.01
LTF	CHOCTAW	0.07
LTF	CLIFTY	0.48
LTF	COTTONWOOD	0.32
LTF	DEARBORN	0.19
LTF	EDWARDS	0.06
LTF	ELMERSMITH	0.08
LTF	FARMERCITY	0.04
LTF	G-007A	0.1
LTF	GIBSON	0.06
LTF	HAMLET	0.03

<i>LTF</i>	<i>MORGAN</i>	<i>0.12</i>
<i>LTF</i>	<i>NEWTON</i>	<i>0.14</i>
<i>LTF</i>	<i>NYISO</i>	<i>0.22</i>
<i>LTF</i>	<i>PRAIRIE</i>	<i>0.26</i>
<i>LTF</i>	<i>ROWAN</i>	<i>0.02</i>
<i>LTF</i>	<i>SANTEETLA</i>	<i>< 0.01</i>
<i>LTF</i>	<i>SMITHLAND</i>	<i>0.02</i>
<i>LTF</i>	<i>TATANKA</i>	<i>0.07</i>
<i>LTF</i>	<i>TILTON</i>	<i>0.07</i>
<i>LTF</i>	<i>TRIMBLE</i>	<i>0.03</i>
<i>LTF</i>	<i>TVA</i>	<i>0.05</i>
<i>247551</i>	<i>U4-028 C</i>	<i>1.38</i>
<i>247940</i>	<i>U4-028 E</i>	<i>9.24</i>
<i>247552</i>	<i>U4-029 C</i>	<i>1.38</i>
<i>247941</i>	<i>U4-029 E</i>	<i>9.24</i>
<i>LTF</i>	<i>UNIONPOWER</i>	<i>0.04</i>
<i>247548</i>	<i>V4-010 C</i>	<i>1.88</i>
<i>247947</i>	<i>V4-010 E</i>	<i>12.58</i>
<i>LTF</i>	<i>VFT</i>	<i>0.27</i>
<i>925751</i>	<i>AC1-051 C</i>	<i>0.39</i>
<i>925752</i>	<i>AC1-051 E</i>	<i>2.62</i>

Appendix 6

(AEP - AEP) The 05RIVERVIE-05BASCOM 69 kV line (from bus 245628 to bus 245604 ckt 1) loads from 69.44% to 100.89% (**DC power flow**) of its emergency rating (31 MVA) for the tower line contingency outage of 'AEP_P7-1_#7732'. This project contributes approximately 21.64 MW to the thermal violation.

CONTINGENCY 'AEP_P7-1_#7732'

OPEN BRANCH FROM BUS 242953 TO BUS 243110 CKT 1 / 242953 05AIRCO8
138 243110 05STIFFI 138 1

OPEN BRANCH FROM BUS 242953 TO BUS 243137 CKT 1 / 242953 05AIRCO8
138 243137 05W.END 138 1

OPEN BRANCH FROM BUS 243006 TO BUS 243039 CKT 1 / 243006
05FOSTOR 138 243039 05MELMOR 138 1

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
937021	AD2-136 C O1	2.81
937022	AD2-136 E O1	18.83
937381	AD2-191 C	1.56
937382	AD2-191 E	10.46
LTF	AMIL	0.04
LTF	BAYOU	0.09
LTF	BIG_CAJUN1	0.14
LTF	BIG_CAJUN2	0.27
LTF	BLUEG	0.19
LTF	CALDERWOOD	0.03
LTF	CANNELTON	0.03
LTF	CATAWBA	0.01
LTF	CBM-N	0.02
LTF	CELEVELAND	0.04
LTF	CHEOAH	0.03
LTF	CHILHOWEE	0.01
LTF	CHOCTAW	0.09
LTF	CLIFTY	0.53
LTF	COTTONWOOD	0.37
LTF	DEARBORN	0.2
LTF	EDWARDS	0.08
LTF	ELMERSMITH	0.09
LTF	FARMERCITY	0.04
LTF	G-007A	0.11
LTF	GIBSON	0.07
LTF	HAMLET	0.03
LTF	MORGAN	0.14
LTF	NEWTON	0.16

<i>LTF</i>	<i>NYISO</i>	<i>0.25</i>
<i>LTF</i>	<i>PRAIRIE</i>	<i>0.3</i>
<i>LTF</i>	<i>ROWAN</i>	<i>0.02</i>
<i>LTF</i>	<i>SANTEETLA</i>	<i>< 0.01</i>
<i>LTF</i>	<i>SMITHLAND</i>	<i>0.02</i>
<i>LTF</i>	<i>TATANKA</i>	<i>0.08</i>
<i>LTF</i>	<i>TILTON</i>	<i>0.09</i>
<i>LTF</i>	<i>TRIMBLE</i>	<i>0.04</i>
<i>LTF</i>	<i>TVA</i>	<i>0.06</i>
<i>247551</i>	<i>U4-028 C</i>	<i>0.78</i>
<i>247940</i>	<i>U4-028 E</i>	<i>5.23</i>
<i>247552</i>	<i>U4-029 C</i>	<i>0.78</i>
<i>247941</i>	<i>U4-029 E</i>	<i>5.23</i>
<i>LTF</i>	<i>UNIONPOWER</i>	<i>0.05</i>
<i>247548</i>	<i>V4-010 C</i>	<i>1.56</i>
<i>247947</i>	<i>V4-010 E</i>	<i>10.43</i>
<i>LTF</i>	<i>VFT</i>	<i>0.3</i>

Appendix 7

(AEP - AEP) The 05TIFFIN T-05RIVERVIE 69 kV line (from bus 245638 to bus 245628 ckt 1) loads from 99.83% to 160.07% (**DC power flow**) of its emergency rating (73 MVA) for the tower line contingency outage of 'AEP_P7-1_#7731'. This project contributes approximately 43.97 MW to the thermal violation.

CONTINGENCY 'AEP_P7-1_#7731'

OPEN BRANCH FROM BUS 243006 TO BUS 243039 CKT 1 / 243006
05FOSTOR 138 243039 05MELMOR 138 1

OPEN BRANCH FROM BUS 243039 TO BUS 243110 CKT 1 / 243039
05MELMOR 138 243110 05STIFFI 138 1

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932051	AC2-015 C	5.01
932052	AC2-015 E	5.85
937021	AD2-136 C O1	5.72
937022	AD2-136 E O1	38.25
937381	AD2-191 C	3.18
937382	AD2-191 E	21.25
LTF	AMIL	0.05
LTF	BAYOU	0.13
LTF	BIG_CAJUN1	0.19
LTF	BIG_CAJUN2	0.38
LTF	BLUEG	0.26
LTF	CALDERWOOD	0.05
LTF	CANNELTON	0.05
LTF	CATAWBA	0.02
LTF	CBM-N	0.02
LTF	CELEVELAND	0.05
LTF	CHEOAH	0.04
LTF	CHILHOWEE	0.02
LTF	CHOCTAW	0.12
LTF	CLIFTY	0.76
LTF	COTTONWOOD	0.51
LTF	DEARBORN	0.29
LTF	EDWARDS	0.1
LTF	ELMERSMITH	0.13
LTF	FARMERCITY	0.06
LTF	G-007A	0.16
LTF	GIBSON	0.1
LTF	HAMLET	0.05
LTF	MORGAN	0.19
LTF	NEWTON	0.22

<i>LTF</i>	<i>NYISO</i>	<i>0.36</i>
<i>LTF</i>	<i>PRAIRIE</i>	<i>0.41</i>
<i>LTF</i>	<i>ROWAN</i>	<i>0.03</i>
<i>LTF</i>	<i>SANTEETLA</i>	<i>0.01</i>
<i>LTF</i>	<i>SMITHLAND</i>	<i>0.03</i>
<i>LTF</i>	<i>TATANKA</i>	<i>0.11</i>
<i>LTF</i>	<i>TILTON</i>	<i>0.12</i>
<i>LTF</i>	<i>TRIMBLE</i>	<i>0.05</i>
<i>LTF</i>	<i>TVA</i>	<i>0.09</i>
<i>247542</i>	<i>U4-001 C</i>	<i>1.72</i>
<i>247934</i>	<i>U4-001 E</i>	<i>11.5</i>
<i>247551</i>	<i>U4-028 C</i>	<i>1.59</i>
<i>247940</i>	<i>U4-028 E</i>	<i>10.63</i>
<i>247552</i>	<i>U4-029 C</i>	<i>1.59</i>
<i>247941</i>	<i>U4-029 E</i>	<i>10.63</i>
<i>LTF</i>	<i>UNIONPOWER</i>	<i>0.06</i>
<i>247548</i>	<i>V4-010 C</i>	<i>3.36</i>
<i>247947</i>	<i>V4-010 E</i>	<i>22.52</i>
<i>LTF</i>	<i>VFT</i>	<i>0.43</i>
<i>925751</i>	<i>AC1-051 C</i>	<i>0.83</i>
<i>925752</i>	<i>AC1-051 E</i>	<i>5.52</i>

Appendix 8

(FE - FE) The 02BEAVER-02CARLIL 345 kV line (from bus 238569 to bus 238607 ckt 1) loads from 114.0% to 115.53% (**DC power flow**) of its emergency rating (1243 MVA) for the tower line contingency outage of 'ATSI-P7-1-OEC-345-001'. This project contributes approximately 41.51 MW to the thermal violation.

CONTINGENCY 'ATSI-P7-1-OEC-345-001'

/* BEAVER-LAKAVE 345

CK 1 & 2

DISCONNECT BRANCH FROM BUS 238569 TO BUS 239725 CKT 1 /* 02BEAVER
345 02LAKEAVE 345

DISCONNECT BRANCH FROM BUS 238569 TO BUS 239725 CKT 2 /* 02BEAVER
345 02LAKEAVE 345

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
238564	02BAYSG1	22.53
240968	02BG2 GEN	1.12
240969	02BG4 G1	0.28
240970	02BG4 G2&3	0.56
240971	02BG4 G4&5	0.56
240950	02BG5	3.44
240973	02BG6 AMPO	5.01
238670	02DVBSG1	36.51
238979	02NAPMUN	5.36
240975	02PGE GEN	7.76
239171	02WLORG-2	5.81
239172	02WLORG-3	5.97
239173	02WLORG-4	5.96
239174	02WLORG-5	5.98
932051	AC2-015 C	4.99
932052	AC2-015 E	5.82
932791	AC2-103 C	11.44
932792	AC2-103 E	76.56
934251	AD1-052 C1	0.84
934261	AD1-052 C2	0.84
934461	AD1-070 C O1	4.33
934462	AD1-070 E O1	20.34
LTF	AD1-092	4.7
LTF	AD1-093	8.07
LTF	AD1-094	1.54
934761	AD1-103 C O1	19.23
934762	AD1-103 E O1	128.7
934891	AD1-118	11.51
937021	AD2-136 C O1	5.4

937022	AD2-136 E O1	36.11
937081	AD2-143 C O1	2.75
937082	AD2-143 E O1	12.87
937381	AD2-191 C	3.
937382	AD2-191 E	20.06
LTF	CARR	1.39
LTF	CBM-S1	7.59
LTF	CBM-S2	2.39
LTF	CBM-W1	74.17
LTF	CBM-W2	56.02
LTF	CIN	9.21
LTF	CPLE	0.33
LTF	G-007	2.59
LTF	IPL	5.93
940241	J419	8.35
981121	J444	19.71
938021	J793	97.09
938351	J799	15.79
938881	J833	8.35
LTF	LGEE	1.61
LTF	MEC	18.63
LTF	MECS	41.52
LTF	O-066	16.72
LTF	RENSSELAER	1.09
LTF	ROSETON	7.9
247551	U4-028 C	1.5
247940	U4-028 E	10.03
247552	U4-029 C	1.5
247941	U4-029 E	10.03
247567	V2-006 C	1.78
247961	V2-006 E	11.93
247548	V4-010 C	3.24
247947	V4-010 E	21.66
LTF	WEC	3.06
907061	X1-027A C1	0.89
907064	X1-027A C2	0.89
907066	X1-027A C3	0.89
907068	X1-027A C4	0.89
907062	X1-027A E1	32.16
907065	X1-027A E2	32.16
907067	X1-027A E3	32.16
907069	X1-027A E4	32.16
LTF	Y3-032	35.13
LTF	Z1-043	11.77

<i>931951</i>	<i>AB1-107 1</i>	<i>44.12</i>
<i>931961</i>	<i>AB1-107 2</i>	<i>101.83</i>
<i>LTF</i>	<i>AB2-013</i>	<i>6.73</i>
<i>925751</i>	<i>AC1-051 C</i>	<i>0.71</i>
<i>925752</i>	<i>AC1-051 E</i>	<i>4.75</i>
<i>926941</i>	<i>AC1-181</i>	<i>0.58</i>

Appendix 9

(FE - FE) The 02BEAVER-02LAKEAVE 345 kV line (from bus 238569 to bus 239725 ckt 2) loads from 114.94% to 116.4% (**DC power flow**) of its emergency rating (1646 MVA) for the line fault with failed breaker contingency outage of 'ATSI-P2-3-OEC-345-023'. This project contributes approximately 52.34 MW to the thermal violation.

CONTINGENCY 'ATSI-P2-3-OEC-345-023'
121

/* BEAVER 345KV BRK B-

DISCONNECT BRANCH FROM BUS 238569 TO BUS 239725 CKT 1 /* 02BEAVER
345 02LAKEAVE 345

DISCONNECT BRANCH FROM BUS 238569 TO BUS 238607 CKT 1 /* 02BEAVER
345 02CARLIL 345

END

Bus Number	Bus Name	Full Contribution
241902	02_Y1-069 GE	32.38
238564	02BAYSG1	28.44
240968	02BG2 GEN	1.42
240969	02BG4 G1	0.36
240970	02BG4 G2&3	0.71
240971	02BG4 G4&5	0.71
240950	02BG5	4.35
240973	02BG6 AMPO	6.34
239276	02COLLW 11	-4.25
239297	02CPPW41	-5.22
238670	02DVBSG1	46.27
238979	02NAPMUN	6.81
240975	02PGE GEN	9.81
239171	02WLORG-2	7.38
239172	02WLORG-3	7.58
239173	02WLORG-4	7.57
239174	02WLORG-5	7.59
932051	AC2-015 C	6.32
932052	AC2-015 E	7.38
932791	AC2-103 C	14.51
932792	AC2-103 E	97.13
934251	AD1-052 C1	1.04
934261	AD1-052 C2	1.04
934461	AD1-070 C O1	5.51
934462	AD1-070 E O1	25.88
LTF	AD1-092	6.35
LTF	AD1-093	10.9
LTF	AD1-094	2.08
934761	AD1-103 C O1	24.4

934762	AD1-103 E O1	163.29
934891	AD1-118	14.61
937021	AD2-136 C O1	6.8
937022	AD2-136 E O1	45.54
937081	AD2-143 C O1	3.53
937082	AD2-143 E O1	16.53
937381	AD2-191 C	3.78
937382	AD2-191 E	25.3
LTF	CARR	2.24
LTF	CBM-S1	10.8
LTF	CBM-S2	3.98
LTF	CBM-W1	97.45
LTF	CBM-W2	77.86
LTF	CIN	12.63
LTF	CPL	0.65
LTF	G-007	3.37
LTF	IPL	8.13
938021	J793	120.29
LTF	LGEE	2.25
LTF	MEC	25.34
LTF	MECS	53.18
LTF	O-066	21.82
LTF	RENSSELAER	1.75
LTF	ROSETON	12.65
247551	U4-028 C	1.89
247940	U4-028 E	12.65
247552	U4-029 C	1.89
247941	U4-029 E	12.65
247567	V2-006 C	2.3
247961	V2-006 E	15.41
247548	V4-010 C	4.06
247947	V4-010 E	27.19
LTF	WEC	4.12
907061	X1-027A C1	1.13
907064	X1-027A C2	1.13
907066	X1-027A C3	1.13
907068	X1-027A C4	1.13
907062	X1-027A E1	40.81
907065	X1-027A E2	40.81
907067	X1-027A E3	40.81
907069	X1-027A E4	40.81
LTF	Y3-032	44.75
LTF	Z1-043	15.87
918401	AA1-056	1.86

<i>931951</i>	<i>AB1-107 1</i>	<i>55.72</i>
<i>931961</i>	<i>AB1-107 2</i>	<i>129.15</i>
<i>LTF</i>	<i>AB2-013</i>	<i>9.08</i>
<i>925751</i>	<i>AC1-051 C</i>	<i>0.9</i>
<i>925752</i>	<i>AC1-051 E</i>	<i>6.02</i>
<i>926941</i>	<i>AC1-181</i>	<i>0.75</i>

Appendix 10

(FE - FE) The 02LAKVEW-02GRNFLD 138 kV line (from bus 238874 to bus 238768 ckt 1) loads from 114.36% to 117.25% (**DC power flow**) of its emergency rating (316 MVA) for the tower line contingency outage of 'ADD202'. This project contributes approximately 20.16 MW to the thermal violation.

CONTINGENCY 'ADD202'

DISCONNECT BRANCH FROM BUS 238654 TO BUS 239289 CKT 1 /* 02DAVIS
BESSE 345 02HAYES 345

DISCONNECT BRANCH FROM BUS 238654 TO BUS 907060 CKT 1 /* 02DAVIS
BESSE 345 X1-027A TAP 345

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
238564	02BAYSG1	12.53
240968	02BG2 GEN	0.53
240969	02BG4 G1	0.14
240970	02BG4 G2&3	0.27
240971	02BG4 G4&5	0.27
240950	02BG5	1.63
240973	02BG6 AMPO	2.39
238601	02FRMENG 1	3.41
238602	02FRMENG 2	3.41
238603	02FRMENG 3	6.15
238979	02NAPMUN	2.36
240975	02PGE GEN	3.69
934251	AD1-052 C1	0.54
934261	AD1-052 C2	0.54
934461	AD1-070 C O1	1.86
934462	AD1-070 E O1	8.74
934891	AD1-118	4.36
937021	AD2-136 C O1	2.62
937022	AD2-136 E O1	17.54
937381	AD2-191 C	1.46
937382	AD2-191 E	9.74
LTF	CARR	0.6
LTF	CBM-S1	3.3
LTF	CBM-S2	1.22
LTF	CBM-W1	30.41
LTF	CBM-W2	23.95
LTF	CIN	3.88
LTF	CPL	0.2
LTF	G-007	0.96
LTF	IPL	2.5

938021	J793	38.13
LTF	LGEE	0.69
LTF	MEC	7.83
LTF	MECS	16.72
LTF	O-066	6.21
LTF	RENSSELAER	0.47
LTF	ROSETON	3.43
247551	U4-028 C	0.73
247940	U4-028 E	4.87
247552	U4-029 C	0.73
247941	U4-029 E	4.87
247548	V4-010 C	1.7
247947	V4-010 E	11.36
LTF	WEC	1.28
LTF	Y3-032	14.09
931951	AB1-107 1	24.27
931961	AB1-107 2	39.82
926941	AC1-181	0.25

Appendix 11

(FE - FE) The 02OTTAWA-02LAKVEW 138 kV line (from bus 239030 to bus 238874 ckt 1) loads from 114.61% to 117.04% (**DC power flow**) of its emergency rating (375 MVA) for the tower line contingency outage of 'ADD202'. This project contributes approximately 20.16 MW to the thermal violation.

CONTINGENCY 'ADD202'

DISCONNECT BRANCH FROM BUS 238654 TO BUS 239289 CKT 1 /* 02DAVIS
BESSE 345 02HAYES 345

DISCONNECT BRANCH FROM BUS 238654 TO BUS 907060 CKT 1 /* 02DAVIS
BESSE 345 X1-027A TAP 345

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
238564	02BAYSG1	12.53
240968	02BG2 GEN	0.53
240969	02BG4 G1	0.14
240970	02BG4 G2&3	0.27
240971	02BG4 G4&5	0.27
240950	02BG5	1.63
240973	02BG6 AMPO	2.39
238601	02FRMENG 1	3.41
238602	02FRMENG 2	3.41
238603	02FRMENG 3	6.15
238979	02NAPMUN	2.36
240975	02PGE GEN	3.69
934251	AD1-052 C1	0.54
934261	AD1-052 C2	0.54
934461	AD1-070 C O1	1.86
934462	AD1-070 E O1	8.74
934891	AD1-118	4.36
937021	AD2-136 C O1	2.62
937022	AD2-136 E O1	17.54
937381	AD2-191 C	1.46
937382	AD2-191 E	9.74
LTF	CARR	0.6
LTF	CBM-S1	3.3
LTF	CBM-S2	1.22
LTF	CBM-W1	30.41
LTF	CBM-W2	23.95
LTF	CIN	3.88
LTF	CPL	0.2
LTF	G-007	0.96
LTF	IPL	2.5

938021	J793	38.13
LTF	LGEE	0.69
LTF	MEC	7.83
LTF	MECS	16.72
LTF	O-066	6.21
LTF	RENSSELAER	0.47
LTF	ROSETON	3.43
247551	U4-028 C	0.73
247940	U4-028 E	4.87
247552	U4-029 C	0.73
247941	U4-029 E	4.87
247548	V4-010 C	1.7
247947	V4-010 E	11.36
LTF	WEC	1.28
LTF	Y3-032	14.09
931951	AB1-107 1	24.27
931961	AB1-107 2	39.82
926941	AC1-181	0.25

Appendix 12

(AEP - AEP) The 05GREENLAW-05E.TIFF2 69 kV line (from bus 245621 to bus 245646 ckt 1) loads from 151.86% to 173.57% (**DC power flow**) of its emergency rating (39 MVA) for the tower line contingency outage of 'AEP_P7-1_#7734'. This project contributes approximately 18.8 MW to the thermal violation.

CONTINGENCY 'AEP_P7-1_#7734'

OPEN BRANCH FROM BUS 242984 TO BUS 243039 CKT 1 / 242984

05CHATFL 138 243039 05MELMOR 138 1

OPEN BRANCH FROM BUS 243024 TO BUS 243039 CKT 1 / 243024

05HOWARD 138 243039 05MELMOR 138 1

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
937021	AD2-136 C O1	2.44
937022	AD2-136 E O1	16.35
937381	AD2-191 C	1.36
937382	AD2-191 E	9.08
LTF	CARR	0.01
LTF	CATAWBA	< 0.01
LTF	CBM-S1	0.08
LTF	CBM-W1	2.93
LTF	CBM-W2	1.09
LTF	CELEVELAND	0.02
LTF	CIN	0.2
LTF	CLIFTY	0.09
LTF	G-007	0.06
LTF	HAMLET	0.03
LTF	IPL	0.13
938021	J793	5.84
938441	J841	2.41
LTF	LGEE	0.02
LTF	MEC	0.5
LTF	MECS	2.02
LTF	O-066	0.39
LTF	RENSSELAER	0.01
LTF	ROSETON	0.07
LTF	ROWAN	0.02
247551	U4-028 C	0.68
247940	U4-028 E	4.54
247552	U4-029 C	0.68
247941	U4-029 E	4.54
247548	V4-010 C	1.49
247947	V4-010 E	9.98

<i>LTF</i>	<i>WEC</i>	<i>0.09</i>
<i>LTF</i>	<i>Y3-032</i>	<i>1.77</i>

Appendix 13

(AEP - AEP) The 05TIFFIN C-05MAULE RD 69 kV line (from bus 245637 to bus 245648 ckt 1) loads from 117.64% to 177.88% (**DC power flow**) of its emergency rating (73 MVA) for the tower line contingency outage of 'AEP_P7-1_#7731'. This project contributes approximately 43.97 MW to the thermal violation.

CONTINGENCY 'AEP_P7-1_#7731'

OPEN BRANCH FROM BUS 243006 TO BUS 243039 CKT 1 / 243006

05FOSTOR 138 243039 05MELMOR 138 1

OPEN BRANCH FROM BUS 243039 TO BUS 243110 CKT 1 / 243039

05MELMOR 138 243110 05STIFFI 138 1

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932051	AC2-015 C	5.01
932052	AC2-015 E	5.85
937021	AD2-136 C O1	5.72
937022	AD2-136 E O1	38.25
937381	AD2-191 C	3.18
937382	AD2-191 E	21.25
LTF	AMIL	0.05
LTF	BAYOU	0.13
LTF	BIG_CAJUN1	0.19
LTF	BIG_CAJUN2	0.38
LTF	BLUEG	0.26
LTF	CALDERWOOD	0.05
LTF	CANNELTON	0.05
LTF	CATAWBA	0.02
LTF	CBM-N	0.02
LTF	CELEVELAND	0.05
LTF	CHEOAH	0.04
LTF	CHILHOWEE	0.02
LTF	CHOCTAW	0.12
LTF	CLIFTY	0.76
LTF	COTTONWOOD	0.51
LTF	DEARBORN	0.29
LTF	EDWARDS	0.1
LTF	ELMERSMITH	0.13
LTF	FARMERCITY	0.06
LTF	G-007A	0.16
LTF	GIBSON	0.1
LTF	HAMLET	0.05
LTF	MORGAN	0.19
LTF	NEWTON	0.22

<i>LTF</i>	<i>NYISO</i>	<i>0.36</i>
<i>LTF</i>	<i>PRAIRIE</i>	<i>0.41</i>
<i>LTF</i>	<i>ROWAN</i>	<i>0.03</i>
<i>LTF</i>	<i>SANTEETLA</i>	<i>0.01</i>
<i>LTF</i>	<i>SMITHLAND</i>	<i>0.03</i>
<i>LTF</i>	<i>TATANKA</i>	<i>0.11</i>
<i>LTF</i>	<i>TILTON</i>	<i>0.12</i>
<i>LTF</i>	<i>TRIMBLE</i>	<i>0.05</i>
<i>LTF</i>	<i>TVA</i>	<i>0.09</i>
<i>247542</i>	<i>U4-001 C</i>	<i>1.72</i>
<i>247934</i>	<i>U4-001 E</i>	<i>11.5</i>
<i>247551</i>	<i>U4-028 C</i>	<i>1.59</i>
<i>247940</i>	<i>U4-028 E</i>	<i>10.63</i>
<i>247552</i>	<i>U4-029 C</i>	<i>1.59</i>
<i>247941</i>	<i>U4-029 E</i>	<i>10.63</i>
<i>LTF</i>	<i>UNIONPOWER</i>	<i>0.06</i>
<i>247548</i>	<i>V4-010 C</i>	<i>3.36</i>
<i>247947</i>	<i>V4-010 E</i>	<i>22.52</i>
<i>LTF</i>	<i>VFT</i>	<i>0.43</i>
<i>925751</i>	<i>AC1-051 C</i>	<i>0.83</i>
<i>925752</i>	<i>AC1-051 E</i>	<i>5.52</i>

Appendix 14

(AEP - AEP) The 05MAULE RD-05DAVIS STSS 69 kV line (from bus 245648 to bus 247480 ckt 1) loads from 108.88% to 169.11% (**DC power flow**) of its emergency rating (73 MVA) for the tower line contingency outage of 'AEP_P7-1_#7731'. This project contributes approximately 43.97 MW to the thermal violation.

CONTINGENCY 'AEP_P7-1_#7731'

OPEN BRANCH FROM BUS 243006 TO BUS 243039 CKT 1 / 243006

05FOSTOR 138 243039 05MELMOR 138 1

OPEN BRANCH FROM BUS 243039 TO BUS 243110 CKT 1 / 243039

05MELMOR 138 243110 05STIFFI 138 1

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932051	AC2-015 C	5.01
932052	AC2-015 E	5.85
937021	AD2-136 C O1	5.72
937022	AD2-136 E O1	38.25
937381	AD2-191 C	3.18
937382	AD2-191 E	21.25
LTF	AMIL	0.05
LTF	BAYOU	0.13
LTF	BIG_CAJUN1	0.19
LTF	BIG_CAJUN2	0.38
LTF	BLUEG	0.26
LTF	CALDERWOOD	0.05
LTF	CANNELTON	0.05
LTF	CATAWBA	0.02
LTF	CBM-N	0.02
LTF	CELEVELAND	0.05
LTF	CHEOAH	0.04
LTF	CHILHOWEE	0.02
LTF	CHOCTAW	0.12
LTF	CLIFTY	0.76
LTF	COTTONWOOD	0.51
LTF	DEARBORN	0.29
LTF	EDWARDS	0.1
LTF	ELMERSMITH	0.13
LTF	FARMERCITY	0.06
LTF	G-007A	0.16
LTF	GIBSON	0.1
LTF	HAMLET	0.05
LTF	MORGAN	0.19
LTF	NEWTON	0.22

<i>LTF</i>	<i>NYISO</i>	<i>0.36</i>
<i>LTF</i>	<i>PRAIRIE</i>	<i>0.41</i>
<i>LTF</i>	<i>ROWAN</i>	<i>0.03</i>
<i>LTF</i>	<i>SANTEETLA</i>	<i>0.01</i>
<i>LTF</i>	<i>SMITHLAND</i>	<i>0.03</i>
<i>LTF</i>	<i>TATANKA</i>	<i>0.11</i>
<i>LTF</i>	<i>TILTON</i>	<i>0.12</i>
<i>LTF</i>	<i>TRIMBLE</i>	<i>0.05</i>
<i>LTF</i>	<i>TVA</i>	<i>0.09</i>
<i>247542</i>	<i>U4-001 C</i>	<i>1.72</i>
<i>247934</i>	<i>U4-001 E</i>	<i>11.5</i>
<i>247551</i>	<i>U4-028 C</i>	<i>1.59</i>
<i>247940</i>	<i>U4-028 E</i>	<i>10.63</i>
<i>247552</i>	<i>U4-029 C</i>	<i>1.59</i>
<i>247941</i>	<i>U4-029 E</i>	<i>10.63</i>
<i>LTF</i>	<i>UNIONPOWER</i>	<i>0.06</i>
<i>247548</i>	<i>V4-010 C</i>	<i>3.36</i>
<i>247947</i>	<i>V4-010 E</i>	<i>22.52</i>
<i>LTF</i>	<i>VFT</i>	<i>0.43</i>
<i>925751</i>	<i>AC1-051 C</i>	<i>0.83</i>
<i>925752</i>	<i>AC1-051 E</i>	<i>5.52</i>

Appendix 15

(AEP - AEP) The 05ST.STEPHSS-05CARROTHR 69 kV line (from bus 245674 to bus 245655 ckt 1) loads from 142.02% to 169.33% (**DC power flow**) of its emergency rating (31 MVA) for the tower line contingency outage of 'AEP_P7-1_#7734'. This project contributes approximately 18.8 MW to the thermal violation.

CONTINGENCY 'AEP_P7-1_#7734'

OPEN BRANCH FROM BUS 242984 TO BUS 243039 CKT 1 / 242984

05CHATFL 138 243039 05MELMOR 138 1

OPEN BRANCH FROM BUS 243024 TO BUS 243039 CKT 1 / 243024

05HOWARD 138 243039 05MELMOR 138 1

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
937021	AD2-136 C O1	2.44
937022	AD2-136 E O1	16.35
937381	AD2-191 C	1.36
937382	AD2-191 E	9.08
LTF	CARR	0.01
LTF	CATAWBA	< 0.01
LTF	CBM-S1	0.08
LTF	CBM-W1	2.93
LTF	CBM-W2	1.09
LTF	CELEVELAND	0.02
LTF	CIN	0.2
LTF	CLIFTY	0.09
LTF	G-007	0.06
LTF	HAMLET	0.03
LTF	IPL	0.13
938021	J793	5.84
938441	J841	2.41
LTF	LGEE	0.02
LTF	MEC	0.5
LTF	MECS	2.02
LTF	O-066	0.39
LTF	RENSSELAER	0.01
LTF	ROSETON	0.07
LTF	ROWAN	0.02
247551	U4-028 C	0.68
247940	U4-028 E	4.54
247552	U4-029 C	0.68
247941	U4-029 E	4.54
247548	V4-010 C	1.49
247947	V4-010 E	9.98

<i>LTF</i>	<i>WEC</i>	<i>0.09</i>
<i>LTF</i>	<i>Y3-032</i>	<i>1.77</i>

Appendix 16

(AEP - AEP) The 05DAVIS STSS-05TIFFIN T 69 kV line (from bus 247480 to bus 245638 ckt 1) loads from 108.88% to 169.11% (**DC power flow**) of its emergency rating (73 MVA) for the tower line contingency outage of 'AEP_P7-1_#7731'. This project contributes approximately 43.97 MW to the thermal violation.

CONTINGENCY 'AEP_P7-1_#7731'

OPEN BRANCH FROM BUS 243006 TO BUS 243039 CKT 1 / 243006

05FOSTOR 138 243039 05MELMOR 138 1

OPEN BRANCH FROM BUS 243039 TO BUS 243110 CKT 1 / 243039

05MELMOR 138 243110 05STIFFI 138 1

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932051	AC2-015 C	5.01
932052	AC2-015 E	5.85
937021	AD2-136 C O1	5.72
937022	AD2-136 E O1	38.25
937381	AD2-191 C	3.18
937382	AD2-191 E	21.25
LTF	AMIL	0.05
LTF	BAYOU	0.13
LTF	BIG_CAJUN1	0.19
LTF	BIG_CAJUN2	0.38
LTF	BLUEG	0.26
LTF	CALDERWOOD	0.05
LTF	CANNELTON	0.05
LTF	CATAWBA	0.02
LTF	CBM-N	0.02
LTF	CELEVELAND	0.05
LTF	CHEOAH	0.04
LTF	CHILHOWEE	0.02
LTF	CHOCTAW	0.12
LTF	CLIFTY	0.76
LTF	COTTONWOOD	0.51
LTF	DEARBORN	0.29
LTF	EDWARDS	0.1
LTF	ELMERSMITH	0.13
LTF	FARMERCITY	0.06
LTF	G-007A	0.16
LTF	GIBSON	0.1
LTF	HAMLET	0.05
LTF	MORGAN	0.19
LTF	NEWTON	0.22

<i>LTF</i>	<i>NYISO</i>	<i>0.36</i>
<i>LTF</i>	<i>PRAIRIE</i>	<i>0.41</i>
<i>LTF</i>	<i>ROWAN</i>	<i>0.03</i>
<i>LTF</i>	<i>SANTEETLA</i>	<i>0.01</i>
<i>LTF</i>	<i>SMITHLAND</i>	<i>0.03</i>
<i>LTF</i>	<i>TATANKA</i>	<i>0.11</i>
<i>LTF</i>	<i>TILTON</i>	<i>0.12</i>
<i>LTF</i>	<i>TRIMBLE</i>	<i>0.05</i>
<i>LTF</i>	<i>TVA</i>	<i>0.09</i>
<i>247542</i>	<i>U4-001 C</i>	<i>1.72</i>
<i>247934</i>	<i>U4-001 E</i>	<i>11.5</i>
<i>247551</i>	<i>U4-028 C</i>	<i>1.59</i>
<i>247940</i>	<i>U4-028 E</i>	<i>10.63</i>
<i>247552</i>	<i>U4-029 C</i>	<i>1.59</i>
<i>247941</i>	<i>U4-029 E</i>	<i>10.63</i>
<i>LTF</i>	<i>UNIONPOWER</i>	<i>0.06</i>
<i>247548</i>	<i>V4-010 C</i>	<i>3.36</i>
<i>247947</i>	<i>V4-010 E</i>	<i>22.52</i>
<i>LTF</i>	<i>VFT</i>	<i>0.43</i>
<i>925751</i>	<i>AC1-051 C</i>	<i>0.83</i>
<i>925752</i>	<i>AC1-051 E</i>	<i>5.52</i>

Appendix 17

(AEP - AEP) The AC2-015 TAP-05HOWARD 138 kV line (from bus 932050 to bus 243024 ckt 1) loads from 105.2% to 152.06% (**DC power flow**) of its emergency rating (167 MVA) for the line fault with failed breaker contingency outage of 'AEP_P4_#7111_05MELMOR 138'. This project contributes approximately 78.25 MW to the thermal violation.

CONTINGENCY 'AEP_P4_#7111_05MELMOR 138'

OPEN BRANCH FROM BUS 243006 TO BUS 243039 CKT 1 / 243006
05FOSTOR 138 243039 05MELMOR 138 1

OPEN BRANCH FROM BUS 243024 TO BUS 243039 CKT 1 / 243024
05HOWARD 138 243039 05MELMOR 138 1

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932051	AC2-015 C	27.82
932052	AC2-015 E	32.45
934251	AD1-052 C1	0.33
934261	AD1-052 C2	0.33
937021	AD2-136 C O1	10.17
937022	AD2-136 E O1	68.07
937381	AD2-191 C	5.65
937382	AD2-191 E	37.82
LTF	CALDERWOOD	< 0.01
LTF	CARR	0.02
LTF	CATAWBA	0.02
LTF	CBM-S1	0.14
LTF	CBM-W1	6.95
LTF	CBM-W2	2.22
LTF	CELEVELAND	0.07
LTF	CHEOAH	< 0.01
LTF	CHILHOWEE	< 0.01
LTF	CIN	0.41
LTF	CLIFTY	0.39
LTF	G-007	0.14
LTF	HAMLET	0.09
LTF	IPL	0.27
938021	J793	14.63
LTF	LGEE	0.03
LTF	MEC	1.11
LTF	MECS	4.94
LTF	O-066	0.91
LTF	RENSSELAER	0.02
LTF	ROSETON	0.14
LTF	ROWAN	0.06

<i>LTF</i>	<i>SANTEETLA</i>	<i>< 0.01</i>
<i>247551</i>	<i>U4-028 C</i>	<i>2.83</i>
<i>247940</i>	<i>U4-028 E</i>	<i>18.91</i>
<i>247552</i>	<i>U4-029 C</i>	<i>2.83</i>
<i>247941</i>	<i>U4-029 E</i>	<i>18.91</i>
<i>LTF</i>	<i>UNIONPOWER</i>	<i>< 0.01</i>
<i>247548</i>	<i>V4-010 C</i>	<i>4.61</i>
<i>247947</i>	<i>V4-010 E</i>	<i>30.87</i>
<i>LTF</i>	<i>WEC</i>	<i>0.21</i>

Appendices – Alternate POI

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

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

Appendix 1

(AEP - AEP) The 05CHATFL-05MELMOR 138 kV line (from bus 242984 to bus 243039 ckt 1) loads from 34.48% to 157.7% (**DC power flow**) of its emergency rating (245 MVA) for the bus fault outage of 'AEP_P2-2_#7118_05HOWARD 138'. This project contributes approximately 301.88 MW to the thermal violation.

CONTINGENCY 'AEP_P2-2_#7118_05HOWARD 138'

OPEN BRANCH FROM BUS 238586 TO BUS 243024 CKT 1 / 238586
02BRKSID 138 243024 05HOWARD 138 1
OPEN BRANCH FROM BUS 932050 TO BUS 243024 CKT 1 / 932050 AC2-015
TAP 138 243024 05HOWARD 138 1
OPEN BRANCH FROM BUS 243024 TO BUS 243050 CKT 1 / 243024
05HOWARD 138 243050 05NBELVL 138 1
OPEN BRANCH FROM BUS 243024 TO BUS 243100 CKT 1 / 243024
05HOWARD 138 243100 05SHELGH 138 1
OPEN BRANCH FROM BUS 243024 TO BUS 247542 CKT Z1 / 243024
05HOWARD 138 247542 U4-001 C 138 Z1
OPEN BRANCH FROM BUS 247542 TO BUS 247934 CKT 1 / 247542 U4-001 C
138 247934 U4-001 E 138 1
REMOVE UNIT 1C FROM BUS 247542 / 247542 U4-001 C 138
REMOVE UNIT 1E FROM BUS 247934 / 247934 U4-001 E 138
END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932051	AC2-015 C	45.28
932052	AC2-015 E	52.83
937021	AD2-136 C O2	39.24
937022	AD2-136 E O2	262.63
LTF	AMIL	< 0.01
LTF	CARR	< 0.01
LTF	CBM-S1	0.03
LTF	CBM-S2	0.04
LTF	CBM-W2	0.02
LTF	CPL	< 0.01
LTF	DEARBORN	0.16
LTF	EDWARDS	< 0.01
LTF	FARMERCITY	< 0.01
LTF	G-007A	0.01
LTF	LGEE	< 0.01
LTF	NEWTON	< 0.01
LTF	PRAIRIE	< 0.01
LTF	RENSSELAER	< 0.01
LTF	ROSETON	0.02
LTF	TATANKA	< 0.01
LTF	TILTON	< 0.01

<i>LTF</i>	<i>VFT</i>	<i>0.03</i>
<i>925751</i>	<i>AC1-051 C</i>	<i>2.32</i>
<i>925752</i>	<i>AC1-051 E</i>	<i>15.5</i>

Appendix 2

(AEP - AEP) The 05CHATFL 138/69 kV transformer (from bus 242984 to bus 245656 ckt 1) loads from 64.96% to 129.01% (**DC power flow**) of its emergency rating (107 MVA) for the tower line contingency outage of 'AEP_P7-1_#7733_A'. This project contributes approximately 68.53 MW to the thermal violation.

CONTINGENCY 'AEP_P7-1_#7733_A'

OPEN BRANCH FROM BUS 932050 TO BUS 243024 CKT 1 / 932050 AC2-015

TAP 138 243024 05HOWARD 138 1

OPEN BRANCH FROM BUS 243024 TO BUS 243039 CKT 1 / 243024

05HOWARD 138 243039 05MELMOR 138 1

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932051	AC2-015 C	10.28
932052	AC2-015 E	11.99
937021	AD2-136 C O2	8.91
937022	AD2-136 E O2	59.62
937381	AD2-191 C	1.64
937382	AD2-191 E	10.94
LTF	CARR	0.01
LTF	CATAWBA	< 0.01
LTF	CBM-S1	0.07
LTF	CBM-W1	2.18
LTF	CBM-W2	0.86
LTF	CELEVELAND	0.02
LTF	CIN	0.15
LTF	CLIFTY	0.04
LTF	G-007	0.05
LTF	HAMLET	0.02
LTF	IPL	0.1
LTF	LGEE	0.02
LTF	MEC	0.39
LTF	MECS	1.49
LTF	O-066	0.3
LTF	RENSSELAER	< 0.01
LTF	ROSETON	0.06
LTF	ROWAN	0.01
247551	U4-028 C	0.82
247940	U4-028 E	5.47
247552	U4-029 C	0.82
247941	U4-029 E	5.47
LTF	WEC	0.07

Appendix 3

(AEP - AEP) The 05CHATFL-AC2-015 TAP 138 kV line (from bus 242984 to bus 932050 ckt 1) loads from 69.11% to 156.69% (**DC power flow**) of its emergency rating (167 MVA) for the line fault with failed breaker contingency outage of 'AEP_P4_#7111_05MELMOR 138'. This project contributes approximately 146.25 MW to the thermal violation.

CONTINGENCY 'AEP_P4_#7111_05MELMOR 138'

OPEN BRANCH FROM BUS 243006 TO BUS 243039 CKT 1 / 243006

05FOSTOR 138 243039 05MELMOR 138 1

OPEN BRANCH FROM BUS 243024 TO BUS 243039 CKT 1 / 243024

05HOWARD 138 243039 05MELMOR 138 1

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
934251	AD1-052 C1	0.33
934261	AD1-052 C2	0.33
937021	AD2-136 C O2	19.01
937022	AD2-136 E O2	127.24
937381	AD2-191 C	5.65
937382	AD2-191 E	37.82
LTF	CALDERWOOD	< 0.01
LTF	CARR	0.02
LTF	CATAWBA	0.02
LTF	CBM-S1	0.14
LTF	CBM-W1	6.95
LTF	CBM-W2	2.22
LTF	CELEVELAND	0.07
LTF	CHEOAH	< 0.01
LTF	CHILHOWEE	< 0.01
LTF	CIN	0.41
LTF	CLIFTY	0.39
LTF	G-007	0.14
LTF	HAMLET	0.09
LTF	IPL	0.27
938021	J793	14.63
LTF	LGEE	0.03
LTF	MEC	1.11
LTF	MECS	4.94
LTF	O-066	0.91
LTF	RENSSELAER	0.02
LTF	ROSETON	0.14
LTF	ROWAN	0.06
LTF	SANTEETLA	< 0.01
247551	U4-028 C	2.83

<i>247940</i>	<i>U4-028 E</i>	<i>18.91</i>
<i>247552</i>	<i>U4-029 C</i>	<i>2.83</i>
<i>247941</i>	<i>U4-029 E</i>	<i>18.91</i>
<i>LTF</i>	<i>UNIONPOWER</i>	<i>< 0.01</i>
<i>247548</i>	<i>V4-010 C</i>	<i>4.61</i>
<i>247947</i>	<i>V4-010 E</i>	<i>30.87</i>
<i>LTF</i>	<i>WEC</i>	<i>0.21</i>

Appendix 4

(AEP - AEP) The 05FREMCT-05FRMNT 138 kV line (from bus 243008 to bus 243009 ckt 1) loads from 64.12% to 109.41% (**DC power flow**) of its emergency rating (251 MVA) for the tower line contingency outage of 'AEP_P7-1_#7114'. This project contributes approximately 113.67 MW to the thermal violation.

CONTINGENCY 'AEP_P7-1_#7114'

OPEN BRANCH FROM BUS 242953 TO BUS 243110 CKT 1 / 242953 05AIRCO8
138 243110 05STIFFI 138 1

OPEN BRANCH FROM BUS 242953 TO BUS 243137 CKT 1 / 242953 05AIRCO8
138 243137 05W.END 138 1

OPEN BRANCH FROM BUS 243006 TO BUS 243039 CKT 1 / 243006
05FOSTOR 138 243039 05MELMOR 138 1

OPEN BRANCH FROM BUS 243039 TO BUS 243110 CKT 1 / 243039
05MELMOR 138 243110 05STIFFI 138 1

OPEN BRANCH FROM BUS 243110 TO BUS 245630 CKT 1 / 243110 05STIFFI
138 245630 05S TIFFIN 69.0 1

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932051	AC2-015 C	15.31
932052	AC2-015 E	17.86
937021	AD2-136 C O2	14.78
937022	AD2-136 E O2	98.89
937381	AD2-191 C	10.38
937382	AD2-191 E	69.46
LTF	CARR	0.03
LTF	CBM-S1	0.42
LTF	CBM-S2	0.49
LTF	CBM-W2	1.27
LTF	CIN	0.15
LTF	CPLE	0.12
LTF	DEARBORN	1.63
LTF	EDWARDS	0.04
LTF	FARMERCITY	< 0.01
LTF	G-007A	0.18
LTF	IPL	0.1
LTF	LGEE	0.08
LTF	RENSSELAER	0.03
LTF	ROSETON	0.18
LTF	TATANKA	0.03
LTF	TILTON	< 0.01
247542	U4-001 C	5.42
247934	U4-001 E	36.24
247551	U4-028 C	5.19

<i>247940</i>	<i>U4-028 E</i>	<i>34.73</i>
<i>247552</i>	<i>U4-029 C</i>	<i>5.19</i>
<i>247941</i>	<i>U4-029 E</i>	<i>34.73</i>
<i>247548</i>	<i>V4-010 C</i>	<i>11.91</i>
<i>247947</i>	<i>V4-010 E</i>	<i>79.71</i>
<i>LTF</i>	<i>VFT</i>	<i>0.48</i>
<i>925751</i>	<i>AC1-051 C</i>	<i>2.03</i>
<i>925752</i>	<i>AC1-051 E</i>	<i>13.57</i>

Appendix 5

(AEP - AEP) The 05STIFFI-05AIRCO8 138 kV line (from bus 243110 to bus 242953 ckt 1) loads from 66.34% to 102.16% (**DC power flow**) of its emergency rating (167 MVA) for the line fault with failed breaker contingency outage of 'AEP_P4_#7111_05MELMOR 138'. This project contributes approximately 59.82 MW to the thermal violation.

CONTINGENCY 'AEP_P4_#7111_05MELMOR 138'

OPEN BRANCH FROM BUS 243006 TO BUS 243039 CKT 1 / 243006

05FOSTOR 138 243039 05MELMOR 138 1

OPEN BRANCH FROM BUS 243024 TO BUS 243039 CKT 1 / 243024

05HOWARD 138 243039 05MELMOR 138 1

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932051	AC2-015 C	7.67
932052	AC2-015 E	8.95
937021	AD2-136 C O2	7.78
937022	AD2-136 E O2	52.04
937381	AD2-191 C	5.97
937382	AD2-191 E	39.96
LTF	AMIL	0.09
LTF	BAYOU	0.22
LTF	BIG_CAJUN1	0.34
LTF	BIG_CAJUN2	0.68
LTF	BLUEG	0.47
LTF	CALDERWOOD	0.08
LTF	CANNELTON	0.08
LTF	CATAWBA	0.03
LTF	CBM-N	0.04
LTF	CELEVELAND	0.1
LTF	CHEOAH	0.08
LTF	CHILHOWEE	0.03
LTF	CHOCTAW	0.21
LTF	CLIFTY	1.32
LTF	COTTONWOOD	0.91
LTF	DEARBORN	0.49
LTF	EDWARDS	0.18
LTF	ELMERSMITH	0.23
LTF	FARMERCITY	0.11
LTF	G-007A	0.27
LTF	GIBSON	0.18
LTF	HAMLET	0.09
LTF	MORGAN	0.34
LTF	NEWTON	0.41

<i>LTF</i>	<i>NYISO</i>	<i>0.61</i>
<i>LTF</i>	<i>PRAIRIE</i>	<i>0.74</i>
<i>LTF</i>	<i>ROWAN</i>	<i>0.06</i>
<i>LTF</i>	<i>SANTEETLA</i>	<i>0.02</i>
<i>LTF</i>	<i>SMITHLAND</i>	<i>0.05</i>
<i>LTF</i>	<i>TATANKA</i>	<i>0.2</i>
<i>LTF</i>	<i>TILTON</i>	<i>0.21</i>
<i>LTF</i>	<i>TRIMBLE</i>	<i>0.09</i>
<i>LTF</i>	<i>TVA</i>	<i>0.15</i>
<i>247542</i>	<i>U4-001 C</i>	<i>2.23</i>
<i>247934</i>	<i>U4-001 E</i>	<i>14.94</i>
<i>247551</i>	<i>U4-028 C</i>	<i>2.99</i>
<i>247940</i>	<i>U4-028 E</i>	<i>19.98</i>
<i>247552</i>	<i>U4-029 C</i>	<i>2.99</i>
<i>247941</i>	<i>U4-029 E</i>	<i>19.98</i>
<i>LTF</i>	<i>UNIONPOWER</i>	<i>0.11</i>
<i>247548</i>	<i>V4-010 C</i>	<i>4.85</i>
<i>247947</i>	<i>V4-010 E</i>	<i>32.46</i>
<i>LTF</i>	<i>VFT</i>	<i>0.74</i>
<i>925751</i>	<i>AC1-051 C</i>	<i>0.97</i>
<i>925752</i>	<i>AC1-051 E</i>	<i>6.5</i>

Appendix 6

(AEP - AEP) The 05WROCKWSS-05E.TIFF2 69 kV line (from bus 245635 to bus 245646 ckt 1) loads from 85.8% to 276.01% (**DC power flow**) of its emergency rating (31 MVA) for the tower line contingency outage of 'AEP_P7-1_#7734'. This project contributes approximately 58.96 MW to the thermal violation.

CONTINGENCY 'AEP_P7-1_#7734'

OPEN BRANCH FROM BUS 242984 TO BUS 243039 CKT 1 / 242984

05CHATFL 138 243039 05MELMOR 138 1

OPEN BRANCH FROM BUS 243024 TO BUS 243039 CKT 1 / 243024

05HOWARD 138 243039 05MELMOR 138 1

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932051	AC2-015 C	7.72
932052	AC2-015 E	9.01
937021	AD2-136 C O2	7.67
937022	AD2-136 E O2	51.3
LTF	AMIL	0.03
LTF	BAYOU	0.04
LTF	BIG_CAJUN1	0.06
LTF	BIG_CAJUN2	0.11
LTF	BLUEG	0.07
LTF	CALDERWOOD	< 0.01
LTF	CANNELTON	0.02
LTF	CBM-N	< 0.01
LTF	CBM-S2	0.06
LTF	CHEOAH	< 0.01
LTF	CHILHOWEE	< 0.01
LTF	CHOCTAW	0.03
LTF	COTTONWOOD	0.17
LTF	CPL	0.02
LTF	DEARBORN	0.62
LTF	EDWARDS	0.07
LTF	ELMERSMITH	0.05
LTF	FARMERCITY	0.03
LTF	G-007A	0.14
LTF	GIBSON	0.04
LTF	MORGAN	0.04
LTF	NEWTON	0.12
LTF	NYISO	0.11
LTF	PRAIRIE	0.21
LTF	SMITHLAND	0.01
LTF	TATANKA	0.07

<i>LTF</i>	<i>TILTON</i>	<i>0.07</i>
<i>LTF</i>	<i>TRIMBLE</i>	<i>0.01</i>
<i>LTF</i>	<i>TVA</i>	<i>0.02</i>
<i>247542</i>	<i>U4-001 C</i>	<i>2.46</i>
<i>247934</i>	<i>U4-001 E</i>	<i>16.45</i>
<i>LTF</i>	<i>UNIONPOWER</i>	<i>< 0.01</i>
<i>LTF</i>	<i>VFT</i>	<i>0.37</i>
<i>925751</i>	<i>AC1-051 C</i>	<i>1.82</i>
<i>925752</i>	<i>AC1-051 E</i>	<i>12.16</i>

Appendix 7

(AEP - AEP) The 05TIFFIN T-05RIVERVIE 69 kV line (from bus 245638 to bus 245628 ckt 1) loads from 99.83% to 151.25% (**DC power flow**) of its emergency rating (73 MVA) for the tower line contingency outage of 'AEP_P7-1_#7731'. This project contributes approximately 37.53 MW to the thermal violation.

CONTINGENCY 'AEP_P7-1_#7731'

OPEN BRANCH FROM BUS 243006 TO BUS 243039 CKT 1 / 243006
05FOSTOR 138 243039 05MELMOR 138 1

OPEN BRANCH FROM BUS 243039 TO BUS 243110 CKT 1 / 243039
05MELMOR 138 243110 05STIFFI 138 1

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932051	AC2-015 C	5.01
932052	AC2-015 E	5.85
937021	AD2-136 C O2	4.88
937022	AD2-136 E O2	32.65
937381	AD2-191 C	3.18
937382	AD2-191 E	21.25
LTF	AMIL	0.05
LTF	BAYOU	0.13
LTF	BIG_CAJUN1	0.19
LTF	BIG_CAJUN2	0.38
LTF	BLUEG	0.26
LTF	CALDERWOOD	0.05
LTF	CANNELTON	0.05
LTF	CATAWBA	0.02
LTF	CBM-N	0.02
LTF	CELEVELAND	0.05
LTF	CHEOAH	0.04
LTF	CHILHOWEE	0.02
LTF	CHOCTAW	0.12
LTF	CLIFTY	0.76
LTF	COTTONWOOD	0.51
LTF	DEARBORN	0.29
LTF	EDWARDS	0.1
LTF	ELMERSMITH	0.13
LTF	FARMERCITY	0.06
LTF	G-007A	0.16
LTF	GIBSON	0.1
LTF	HAMLET	0.05
LTF	MORGAN	0.19
LTF	NEWTON	0.22

<i>LTF</i>	<i>NYISO</i>	<i>0.36</i>
<i>LTF</i>	<i>PRAIRIE</i>	<i>0.41</i>
<i>LTF</i>	<i>ROWAN</i>	<i>0.03</i>
<i>LTF</i>	<i>SANTEETLA</i>	<i>0.01</i>
<i>LTF</i>	<i>SMITHLAND</i>	<i>0.03</i>
<i>LTF</i>	<i>TATANKA</i>	<i>0.11</i>
<i>LTF</i>	<i>TILTON</i>	<i>0.12</i>
<i>LTF</i>	<i>TRIMBLE</i>	<i>0.05</i>
<i>LTF</i>	<i>TVA</i>	<i>0.09</i>
<i>247542</i>	<i>U4-001 C</i>	<i>1.72</i>
<i>247934</i>	<i>U4-001 E</i>	<i>11.5</i>
<i>247551</i>	<i>U4-028 C</i>	<i>1.59</i>
<i>247940</i>	<i>U4-028 E</i>	<i>10.63</i>
<i>247552</i>	<i>U4-029 C</i>	<i>1.59</i>
<i>247941</i>	<i>U4-029 E</i>	<i>10.63</i>
<i>LTF</i>	<i>UNIONPOWER</i>	<i>0.06</i>
<i>247548</i>	<i>V4-010 C</i>	<i>3.36</i>
<i>247947</i>	<i>V4-010 E</i>	<i>22.52</i>
<i>LTF</i>	<i>VFT</i>	<i>0.43</i>
<i>925751</i>	<i>AC1-051 C</i>	<i>0.83</i>
<i>925752</i>	<i>AC1-051 E</i>	<i>5.52</i>

Appendix 8

(AEP - AEP) The 05E.TIFF2-05GREENLAW 69 kV line (from bus 245646 to bus 245621 ckt 1) loads from 68.2% to 219.39% (**DC power flow**) of its emergency rating (39 MVA) for the tower line contingency outage of 'AEP_P7-1_#7734'. This project contributes approximately 58.96 MW to the thermal violation.

CONTINGENCY 'AEP_P7-1_#7734'

OPEN BRANCH FROM BUS 242984 TO BUS 243039 CKT 1 / 242984

05CHATFL 138 243039 05MELMOR 138 1

OPEN BRANCH FROM BUS 243024 TO BUS 243039 CKT 1 / 243024

05HOWARD 138 243039 05MELMOR 138 1

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932051	AC2-015 C	7.72
932052	AC2-015 E	9.01
937021	AD2-136 C O2	7.67
937022	AD2-136 E O2	51.3
LTF	AMIL	0.03
LTF	BAYOU	0.04
LTF	BIG_CAJUN1	0.06
LTF	BIG_CAJUN2	0.11
LTF	BLUEG	0.07
LTF	CALDERWOOD	< 0.01
LTF	CANNELTON	0.02
LTF	CBM-N	< 0.01
LTF	CBM-S2	0.06
LTF	CHEOAH	< 0.01
LTF	CHILHOWEE	< 0.01
LTF	CHOCTAW	0.03
LTF	COTTONWOOD	0.17
LTF	CPL	0.02
LTF	DEARBORN	0.62
LTF	EDWARDS	0.07
LTF	ELMERSMITH	0.05
LTF	FARMERCITY	0.03
LTF	G-007A	0.14
LTF	GIBSON	0.04
LTF	MORGAN	0.04
LTF	NEWTON	0.12
LTF	NYISO	0.11
LTF	PRAIRIE	0.21
LTF	SMITHLAND	0.01
LTF	TATANKA	0.07

<i>LTF</i>	<i>TILTON</i>	<i>0.07</i>
<i>LTF</i>	<i>TRIMBLE</i>	<i>0.01</i>
<i>LTF</i>	<i>TVA</i>	<i>0.02</i>
<i>247542</i>	<i>U4-001 C</i>	<i>2.46</i>
<i>247934</i>	<i>U4-001 E</i>	<i>16.45</i>
<i>LTF</i>	<i>UNIONPOWER</i>	<i>< 0.01</i>
<i>LTF</i>	<i>VFT</i>	<i>0.37</i>
<i>925751</i>	<i>AC1-051 C</i>	<i>1.82</i>
<i>925752</i>	<i>AC1-051 E</i>	<i>12.16</i>

Appendix 9

(AEP - AEP) The 05BLOOMVL-05N.BLOOMVSS 69 kV line (from bus 245650 to bus 247429 ckt 1) loads from 40.44% to 105.96% (**DC power flow**) of its emergency rating (90 MVA) for the tower line contingency outage of 'AEP_P7-1_#7734'. This project contributes approximately 58.96 MW to the thermal violation.

CONTINGENCY 'AEP_P7-1_#7734'

OPEN BRANCH FROM BUS 242984 TO BUS 243039 CKT 1 / 242984

05CHATFL 138 243039 05MELMOR 138 1

OPEN BRANCH FROM BUS 243024 TO BUS 243039 CKT 1 / 243024

05HOWARD 138 243039 05MELMOR 138 1

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932051	AC2-015 C	7.72
932052	AC2-015 E	9.01
937021	AD2-136 C O2	7.67
937022	AD2-136 E O2	51.3
LTF	AMIL	0.03
LTF	BAYOU	0.04
LTF	BIG_CAJUN1	0.06
LTF	BIG_CAJUN2	0.11
LTF	BLUEG	0.07
LTF	CALDERWOOD	< 0.01
LTF	CANNELTON	0.02
LTF	CBM-N	< 0.01
LTF	CBM-S2	0.06
LTF	CHEOAH	< 0.01
LTF	CHILHOWEE	< 0.01
LTF	CHOCTAW	0.03
LTF	COTTONWOOD	0.17
LTF	CPL	0.02
LTF	DEARBORN	0.62
LTF	EDWARDS	0.07
LTF	ELMERSMITH	0.05
LTF	FARMERCITY	0.03
LTF	G-007A	0.14
LTF	GIBSON	0.04
LTF	MORGAN	0.04
LTF	NEWTON	0.12
LTF	NYISO	0.11
LTF	PRAIRIE	0.21
LTF	SMITHLAND	0.01
LTF	TATANKA	0.07

<i>LTF</i>	<i>TILTON</i>	<i>0.07</i>
<i>LTF</i>	<i>TRIMBLE</i>	<i>0.01</i>
<i>LTF</i>	<i>TVA</i>	<i>0.02</i>
<i>247542</i>	<i>U4-001 C</i>	<i>2.46</i>
<i>247934</i>	<i>U4-001 E</i>	<i>16.45</i>
<i>LTF</i>	<i>UNIONPOWER</i>	<i>< 0.01</i>
<i>LTF</i>	<i>VFT</i>	<i>0.37</i>
<i>925751</i>	<i>AC1-051 C</i>	<i>1.82</i>
<i>925752</i>	<i>AC1-051 E</i>	<i>12.16</i>

Appendix 10

(AEP - AEP) The 05CHATFIEL-05CARROTHR 69 kV line (from bus 245656 to bus 245655 ckt 1) loads from 53.13% to 129.38% (**DC power flow**) of its emergency rating (90 MVA) for the tower line contingency outage of 'AEP_P7-1_#7734'. This project contributes approximately 68.63 MW to the thermal violation.

CONTINGENCY 'AEP_P7-1_#7734'

OPEN BRANCH FROM BUS 242984 TO BUS 243039 CKT 1 / 242984

05CHATFL 138 243039 05MELMOR 138 1

OPEN BRANCH FROM BUS 243024 TO BUS 243039 CKT 1 / 243024

05HOWARD 138 243039 05MELMOR 138 1

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932051	AC2-015 C	8.44
932052	AC2-015 E	9.85
937021	AD2-136 C O2	8.92
937022	AD2-136 E O2	59.71
LTF	AMIL	0.02
LTF	BAYOU	0.03
LTF	BIG_CAJUN1	0.05
LTF	BIG_CAJUN2	0.1
LTF	BLUEG	0.06
LTF	CALDERWOOD	< 0.01
LTF	CANNELTON	0.01
LTF	CBM-N	< 0.01
LTF	CBM-S2	0.05
LTF	CHEOAH	< 0.01
LTF	CHILHOWEE	< 0.01
LTF	CHOCTAW	0.03
LTF	COTTONWOOD	0.15
LTF	CPL	0.02
LTF	DEARBORN	0.49
LTF	EDWARDS	0.06
LTF	ELMERSMITH	0.04
LTF	FARMERCITY	0.03
LTF	G-007A	0.11
LTF	GIBSON	0.04
LTF	MORGAN	0.04
LTF	NEWTON	0.1
LTF	NYISO	0.1
LTF	PRAIRIE	0.17
LTF	SANTEETLA	< 0.01
LTF	SMITHLAND	< 0.01

<i>LTF</i>	<i>TATANKA</i>	<i>0.06</i>
<i>LTF</i>	<i>TILTON</i>	<i>0.06</i>
<i>LTF</i>	<i>TRIMBLE</i>	<i>0.01</i>
<i>LTF</i>	<i>TVA</i>	<i>0.02</i>
<i>247542</i>	<i>U4-001 C</i>	<i>1.98</i>
<i>247934</i>	<i>U4-001 E</i>	<i>13.28</i>
<i>LTF</i>	<i>UNIONPOWER</i>	<i>< 0.01</i>
<i>LTF</i>	<i>VFT</i>	<i>0.3</i>

Appendix 11

(AEP - AEP) The 05CHATFIEL-05NEW WASHSS 69 kV line (from bus 245656 to bus 247380 ckt 1) loads from 75.79% to 114.91% (**DC power flow**) of its emergency rating (31 MVA) for the tower line contingency outage of 'AEP_P7-1_#7733_A'. This project contributes approximately 26.92 MW to the thermal violation.

CONTINGENCY 'AEP_P7-1_#7733_A'

OPEN BRANCH FROM BUS 932050 TO BUS 243024 CKT 1 / 932050 AC2-015

TAP 138 243024 05HOWARD 138 1

OPEN BRANCH FROM BUS 243024 TO BUS 243039 CKT 1 / 243024

05HOWARD 138 243039 05MELMOR 138 1

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932051	AC2-015 C	4.04
932052	AC2-015 E	4.71
937021	AD2-136 C O2	3.5
937022	AD2-136 E O2	23.42
LTF	CARR	< 0.01
LTF	CATAWBA	< 0.01
LTF	CBM-S1	0.05
LTF	CBM-W1	1.7
LTF	CBM-W2	0.63
LTF	CELEVELAND	0.01
LTF	CIN	0.11
LTF	CLIFTY	0.06
LTF	G-007	0.04
LTF	HAMLET	0.02
LTF	IPL	0.07
938021	J793	3.41
LTF	LGEE	0.01
LTF	MEC	0.29
LTF	MECS	1.18
LTF	O-066	0.23
LTF	RENSSELAER	< 0.01
LTF	ROSETON	0.04
LTF	ROWAN	0.01
LTF	WEC	0.05
LTF	Y3-032	1.03

Appendix 12

(AEP - AEP) The 05ST.STEPHSS-05BLOOMVL 69 kV line (from bus 245674 to bus 245650 ckt 1) loads from 43.44% to 108.96% (**DC power flow**) of its emergency rating (90 MVA) for the tower line contingency outage of 'AEP_P7-1_#7734'. This project contributes approximately 58.96 MW to the thermal violation.

CONTINGENCY 'AEP_P7-1_#7734'

OPEN BRANCH FROM BUS 242984 TO BUS 243039 CKT 1 / 242984
05CHATFL 138 243039 05MELMOR 138 1

OPEN BRANCH FROM BUS 243024 TO BUS 243039 CKT 1 / 243024
05HOWARD 138 243039 05MELMOR 138 1

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932051	AC2-015 C	7.72
932052	AC2-015 E	9.01
937021	AD2-136 C O2	7.67
937022	AD2-136 E O2	51.3
LTF	AMIL	0.03
LTF	BAYOU	0.04
LTF	BIG_CAJUN1	0.06
LTF	BIG_CAJUN2	0.11
LTF	BLUEG	0.07
LTF	CALDERWOOD	< 0.01
LTF	CANNELTON	0.02
LTF	CBM-N	< 0.01
LTF	CBM-S2	0.06
LTF	CHEOAH	< 0.01
LTF	CHILHOWEE	< 0.01
LTF	CHOCTAW	0.03
LTF	COTTONWOOD	0.17
LTF	CPL	0.02
LTF	DEARBORN	0.62
LTF	EDWARDS	0.07
LTF	ELMERSMITH	0.05
LTF	FARMERCITY	0.03
LTF	G-007A	0.14
LTF	GIBSON	0.04
LTF	MORGAN	0.04
LTF	NEWTON	0.12
LTF	NYISO	0.11
LTF	PRAIRIE	0.21
LTF	SMITHLAND	0.01
LTF	TATANKA	0.07

<i>LTF</i>	<i>TILTON</i>	<i>0.07</i>
<i>LTF</i>	<i>TRIMBLE</i>	<i>0.01</i>
<i>LTF</i>	<i>TVA</i>	<i>0.02</i>
<i>247542</i>	<i>U4-001 C</i>	<i>2.46</i>
<i>247934</i>	<i>U4-001 E</i>	<i>16.45</i>
<i>LTF</i>	<i>UNIONPOWER</i>	<i>< 0.01</i>
<i>LTF</i>	<i>VFT</i>	<i>0.37</i>
<i>925751</i>	<i>AC1-051 C</i>	<i>1.82</i>
<i>925752</i>	<i>AC1-051 E</i>	<i>12.16</i>

Appendix 13

(AEP - AEP) The 05BROK SWR-05NEVADA SS 69 kV line (from bus 245687 to bus 247379 ckt 1) loads from 99.37% to 142.24% (**DC power flow**) of its emergency rating (31 MVA) for the tower line contingency outage of 'AEP_P7-1_#7734'. This project contributes approximately 29.5 MW to the thermal violation.

CONTINGENCY 'AEP_P7-1_#7734'

OPEN BRANCH FROM BUS 242984 TO BUS 243039 CKT 1 / 242984

05CHATFL 138 243039 05MELMOR 138 1

OPEN BRANCH FROM BUS 243024 TO BUS 243039 CKT 1 / 243024

05HOWARD 138 243039 05MELMOR 138 1

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932051	AC2-015 C	4.44
932052	AC2-015 E	5.18
937021	AD2-136 C O2	3.83
937022	AD2-136 E O2	25.66
LTF	AMIL	0.04
LTF	BAYOU	0.08
LTF	BIG_CAJUN1	0.12
LTF	BIG_CAJUN2	0.24
LTF	BLUEG	0.17
LTF	CALDERWOOD	0.03
LTF	CANNELTON	0.03
LTF	CATAWBA	< 0.01
LTF	CBM-N	0.02
LTF	CELEVELAND	0.02
LTF	CHEOAH	0.02
LTF	CHILHOWEE	< 0.01
LTF	CHOCTAW	0.07
LTF	CLIFTY	0.39
LTF	COTTONWOOD	0.33
LTF	DEARBORN	0.3
LTF	EDWARDS	0.08
LTF	ELMERSMITH	0.09
LTF	FARMERCITY	0.04
LTF	G-007A	0.14
LTF	GIBSON	0.07
LTF	HAMLET	0.01
LTF	MORGAN	0.12
LTF	NEWTON	0.16
LTF	NYISO	0.24
LTF	PRAIRIE	0.29

<i>LTF</i>	<i>ROWAN</i>	<i>0.01</i>
<i>LTF</i>	<i>SANTEETLA</i>	<i>< 0.01</i>
<i>LTF</i>	<i>SMITHLAND</i>	<i>0.02</i>
<i>LTF</i>	<i>TATANKA</i>	<i>0.08</i>
<i>LTF</i>	<i>TILTON</i>	<i>0.09</i>
<i>LTF</i>	<i>TRIMBLE</i>	<i>0.03</i>
<i>LTF</i>	<i>TVA</i>	<i>0.05</i>
<i>247542</i>	<i>U4-001 C</i>	<i>2.15</i>
<i>247934</i>	<i>U4-001 E</i>	<i>14.4</i>
<i>LTF</i>	<i>UNIONPOWER</i>	<i>0.03</i>
<i>LTF</i>	<i>VFT</i>	<i>0.39</i>
<i>925751</i>	<i>AC1-051 C</i>	<i>0.82</i>
<i>925752</i>	<i>AC1-051 E</i>	<i>5.5</i>

Appendix 14

(AEP - AEP) The 05NEVADA SS-05U SANDSK 69 kV line (from bus 247379 to bus 245715 ckt 1) loads from 93.56% to 136.43% (**DC power flow**) of its emergency rating (31 MVA) for the tower line contingency outage of 'AEP_P7-1_#7734'. This project contributes approximately 29.5 MW to the thermal violation.

CONTINGENCY 'AEP_P7-1_#7734'

OPEN BRANCH FROM BUS 242984 TO BUS 243039 CKT 1 / 242984

05CHATFL 138 243039 05MELMOR 138 1

OPEN BRANCH FROM BUS 243024 TO BUS 243039 CKT 1 / 243024

05HOWARD 138 243039 05MELMOR 138 1

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932051	AC2-015 C	4.44
932052	AC2-015 E	5.18
937021	AD2-136 C O2	3.83
937022	AD2-136 E O2	25.66
LTF	AMIL	0.04
LTF	BAYOU	0.08
LTF	BIG_CAJUN1	0.12
LTF	BIG_CAJUN2	0.24
LTF	BLUEG	0.17
LTF	CALDERWOOD	0.03
LTF	CANNELTON	0.03
LTF	CATAWBA	< 0.01
LTF	CBM-N	0.02
LTF	CELEVELAND	0.02
LTF	CHEOAH	0.02
LTF	CHILHOWEE	< 0.01
LTF	CHOCTAW	0.07
LTF	CLIFTY	0.39
LTF	COTTONWOOD	0.33
LTF	DEARBORN	0.3
LTF	EDWARDS	0.08
LTF	ELMERSMITH	0.09
LTF	FARMERCITY	0.04
LTF	G-007A	0.14
LTF	GIBSON	0.07
LTF	HAMLET	0.01
LTF	MORGAN	0.12
LTF	NEWTON	0.16
LTF	NYISO	0.24
LTF	PRAIRIE	0.29

<i>LTF</i>	<i>ROWAN</i>	<i>0.01</i>
<i>LTF</i>	<i>SANTEETLA</i>	<i>< 0.01</i>
<i>LTF</i>	<i>SMITHLAND</i>	<i>0.02</i>
<i>LTF</i>	<i>TATANKA</i>	<i>0.08</i>
<i>LTF</i>	<i>TILTON</i>	<i>0.09</i>
<i>LTF</i>	<i>TRIMBLE</i>	<i>0.03</i>
<i>LTF</i>	<i>TVA</i>	<i>0.05</i>
<i>247542</i>	<i>U4-001 C</i>	<i>2.15</i>
<i>247934</i>	<i>U4-001 E</i>	<i>14.4</i>
<i>LTF</i>	<i>UNIONPOWER</i>	<i>0.03</i>
<i>LTF</i>	<i>VFT</i>	<i>0.39</i>
<i>925751</i>	<i>AC1-051 C</i>	<i>0.82</i>
<i>925752</i>	<i>AC1-051 E</i>	<i>5.5</i>

Appendix 15

(AEP - AEP) The 05NEW WASHSS-05HINESVIL 69 kV line (from bus 247380 to bus 245680 ckt 1) loads from 64.82% to 103.94% (**DC power flow**) of its emergency rating (31 MVA) for the tower line contingency outage of 'AEP_P7-1_#7733_A'. This project contributes approximately 26.92 MW to the thermal violation.

CONTINGENCY 'AEP_P7-1_#7733_A'

OPEN BRANCH FROM BUS 932050 TO BUS 243024 CKT 1 / 932050 AC2-015

TAP 138 243024 05HOWARD 138 1

OPEN BRANCH FROM BUS 243024 TO BUS 243039 CKT 1 / 243024

05HOWARD 138 243039 05MELMOR 138 1

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932051	AC2-015 C	4.04
932052	AC2-015 E	4.71
937021	AD2-136 C O2	3.5
937022	AD2-136 E O2	23.42
LTF	CARR	< 0.01
LTF	CATAWBA	< 0.01
LTF	CBM-S1	0.05
LTF	CBM-W1	1.7
LTF	CBM-W2	0.63
LTF	CELEVELAND	0.01
LTF	CIN	0.11
LTF	CLIFTY	0.06
LTF	G-007	0.04
LTF	HAMLET	0.02
LTF	IPL	0.07
938021	J793	3.41
LTF	LGEE	0.01
LTF	MEC	0.29
LTF	MECS	1.18
LTF	O-066	0.23
LTF	RENSSELAER	< 0.01
LTF	ROSETON	0.04
LTF	ROWAN	0.01
LTF	WEC	0.05
LTF	Y3-032	1.03

Appendix 16

(AEP - AEP) The 05N.BLOOMVSS-05WROCKWSS 69 kV line (from bus 247429 to bus 245635 ckt 1) loads from 35.66% to 101.18% (**DC power flow**) of its emergency rating (90 MVA) for the tower line contingency outage of 'AEP_P7-1_#7734'. This project contributes approximately 58.96 MW to the thermal violation.

CONTINGENCY 'AEP_P7-1_#7734'

OPEN BRANCH FROM BUS 242984 TO BUS 243039 CKT 1 / 242984
05CHATFL 138 243039 05MELMOR 138 1

OPEN BRANCH FROM BUS 243024 TO BUS 243039 CKT 1 / 243024
05HOWARD 138 243039 05MELMOR 138 1

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932051	AC2-015 C	7.72
932052	AC2-015 E	9.01
937021	AD2-136 C O2	7.67
937022	AD2-136 E O2	51.3
LTF	AMIL	0.03
LTF	BAYOU	0.04
LTF	BIG_CAJUN1	0.06
LTF	BIG_CAJUN2	0.11
LTF	BLUEG	0.07
LTF	CALDERWOOD	< 0.01
LTF	CANNELTON	0.02
LTF	CBM-N	< 0.01
LTF	CBM-S2	0.06
LTF	CHEOAH	< 0.01
LTF	CHILHOWEE	< 0.01
LTF	CHOCTAW	0.03
LTF	COTTONWOOD	0.17
LTF	CPL	0.02
LTF	DEARBORN	0.62
LTF	EDWARDS	0.07
LTF	ELMERSMITH	0.05
LTF	FARMERCITY	0.03
LTF	G-007A	0.14
LTF	GIBSON	0.04
LTF	MORGAN	0.04
LTF	NEWTON	0.12
LTF	NYISO	0.11
LTF	PRAIRIE	0.21
LTF	SMITHLAND	0.01
LTF	TATANKA	0.07

<i>LTF</i>	<i>TILTON</i>	<i>0.07</i>
<i>LTF</i>	<i>TRIMBLE</i>	<i>0.01</i>
<i>LTF</i>	<i>TVA</i>	<i>0.02</i>
<i>247542</i>	<i>U4-001 C</i>	<i>2.46</i>
<i>247934</i>	<i>U4-001 E</i>	<i>16.45</i>
<i>LTF</i>	<i>UNIONPOWER</i>	<i>< 0.01</i>
<i>LTF</i>	<i>VFT</i>	<i>0.37</i>
<i>925751</i>	<i>AC1-051 C</i>	<i>1.82</i>
<i>925752</i>	<i>AC1-051 E</i>	<i>12.16</i>

Appendix 17

(AEP - AEP) The AC2-015 TAP-05HOWARD 138 kV line (from bus 932050 to bus 243024 ckt 1) loads from 55.73% to 224.38% (**DC power flow**) of its emergency rating (167 MVA) for the line fault with failed breaker contingency outage of 'AEP_P4_#7714_05MELMOR 138'. This project contributes approximately 281.64 MW to the thermal violation.

CONTINGENCY 'AEP_P4_#7714_05MELMOR 138'

OPEN BRANCH FROM BUS 242984 TO BUS 243039 CKT 1 / 242984
05CHATFL 138 243039 05MELMOR 138 1

OPEN BRANCH FROM BUS 243039 TO BUS 243110 CKT 1 / 243039
05MELMOR 138 243110 05STIFFI 138 1

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932051	AC2-015 C	45.12
932052	AC2-015 E	52.64
937021	AD2-136 C O2	36.61
937022	AD2-136 E O2	245.03
LTF	CARR	< 0.01
LTF	CATAWBA	< 0.01
LTF	CBM-S1	0.04
LTF	CBM-W1	1.22
LTF	CBM-W2	0.5
LTF	CELEVELAND	< 0.01
LTF	CIN	0.09
LTF	CLIFTY	0.01
LTF	G-007	0.03
LTF	HAMLET	0.01
LTF	IPL	0.06
LTF	LGEE	< 0.01
LTF	MEC	0.22
LTF	MECS	0.81
LTF	O-066	0.17
LTF	RENSSELAER	< 0.01
LTF	ROSETON	0.04
LTF	ROWAN	< 0.01
LTF	WEC	0.04
925751	AC1-051 C	1.79
925752	AC1-051 E	11.96

Appendix 18

(FE - FE) The 02BEAVER-02CARLIL 345 kV line (from bus 238569 to bus 238607 ckt 1) loads from 114.01% to 115.33% (**DC power flow**) of its emergency rating (1243 MVA) for the tower line contingency outage of 'ATSI-P7-1-OEC-345-001'. This project contributes approximately 35.68 MW to the thermal violation.

CONTINGENCY 'ATSI-P7-1-OEC-345-001'

/* BEAVER-LAKAVE 345

CK 1 & 2

DISCONNECT BRANCH FROM BUS 238569 TO BUS 239725 CKT 1 /* 02BEAVER
345 02LAKEAVE 345

DISCONNECT BRANCH FROM BUS 238569 TO BUS 239725 CKT 2 /* 02BEAVER
345 02LAKEAVE 345

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
238564	02BAYSG1	22.53
240968	02BG2 GEN	1.12
240969	02BG4 G1	0.28
240970	02BG4 G2&3	0.56
240971	02BG4 G4&5	0.56
240950	02BG5	3.44
240973	02BG6 AMPO	5.01
238670	02DVBSG1	36.51
238979	02NAPMUN	5.36
240975	02PGE GEN	7.76
239171	02WLORG-2	5.81
239172	02WLORG-3	5.97
239173	02WLORG-4	5.96
239174	02WLORG-5	5.98
932051	AC2-015 C	4.99
932052	AC2-015 E	5.82
932791	AC2-103 C	11.44
932792	AC2-103 E	76.56
934251	AD1-052 C1	0.84
934261	AD1-052 C2	0.84
934461	AD1-070 C O1	4.33
934462	AD1-070 E O1	20.34
LTF	AD1-092	4.7
LTF	AD1-093	8.07
LTF	AD1-094	1.54
934761	AD1-103 C O1	19.23
934762	AD1-103 E O1	128.7
934891	AD1-118	11.51
937021	AD2-136 C O2	4.64

937022	AD2-136 E O2	31.04
937081	AD2-143 C O2	2.78
937082	AD2-143 E O2	12.99
937381	AD2-191 C	3.
937382	AD2-191 E	20.06
LTF	CARR	1.39
LTF	CBM-S1	7.59
LTF	CBM-S2	2.39
LTF	CBM-W1	74.17
LTF	CBM-W2	56.02
LTF	CIN	9.21
LTF	CPLE	0.33
LTF	G-007	2.59
LTF	IPL	5.93
940241	J419	8.35
981121	J444	19.71
938021	J793	97.09
938351	J799	15.79
938881	J833	8.35
LTF	LGEE	1.61
LTF	MEC	18.63
LTF	MECS	41.52
LTF	O-066	16.72
LTF	RENSSELAER	1.09
LTF	ROSETON	7.9
247551	U4-028 C	1.5
247940	U4-028 E	10.03
247552	U4-029 C	1.5
247941	U4-029 E	10.03
247567	V2-006 C	1.78
247961	V2-006 E	11.93
247548	V4-010 C	3.24
247947	V4-010 E	21.66
LTF	WEC	3.06
907061	X1-027A C1	0.89
907064	X1-027A C2	0.89
907066	X1-027A C3	0.89
907068	X1-027A C4	0.89
907062	X1-027A E1	32.16
907065	X1-027A E2	32.16
907067	X1-027A E3	32.16
907069	X1-027A E4	32.16
LTF	Y3-032	35.13
LTF	Z1-043	11.77

<i>931951</i>	<i>AB1-107 1</i>	<i>44.12</i>
<i>931961</i>	<i>AB1-107 2</i>	<i>101.83</i>
<i>LTF</i>	<i>AB2-013</i>	<i>6.73</i>
<i>925751</i>	<i>AC1-051 C</i>	<i>0.71</i>
<i>925752</i>	<i>AC1-051 E</i>	<i>4.75</i>
<i>926941</i>	<i>AC1-181</i>	<i>0.58</i>

Appendix 19

(FE - FE) The 02BEAVER-02LAKEAVE 345 kV line (from bus 238569 to bus 239725 ckt 2) loads from 114.94% to 116.2% (**DC power flow**) of its emergency rating (1646 MVA) for the line fault with failed breaker contingency outage of 'ATSI-P2-3-OEC-345-023'. This project contributes approximately 45.12 MW to the thermal violation.

CONTINGENCY 'ATSI-P2-3-OEC-345-023'
121

/* BEAVER 345KV BRK B-

DISCONNECT BRANCH FROM BUS 238569 TO BUS 239725 CKT 1 /* 02BEAVER
345 02LAKEAVE 345

DISCONNECT BRANCH FROM BUS 238569 TO BUS 238607 CKT 1 /* 02BEAVER
345 02CARLIL 345

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
241902	02_Y1-069 GE	32.38
238564	02BAYSG1	28.44
240968	02BG2 GEN	1.42
240969	02BG4 G1	0.36
240970	02BG4 G2&3	0.71
240971	02BG4 G4&5	0.71
240950	02BG5	4.35
240973	02BG6 AMPO	6.34
239276	02COLLW 11	-4.25
239297	02CPPW41	-5.22
238670	02DVBSG1	46.27
238979	02NAPMUN	6.81
240975	02PGE GEN	9.81
239171	02WLORG-2	7.38
239172	02WLORG-3	7.58
239173	02WLORG-4	7.57
239174	02WLORG-5	7.59
932051	AC2-015 C	6.32
932052	AC2-015 E	7.38
932791	AC2-103 C	14.51
932792	AC2-103 E	97.13
934251	AD1-052 C1	1.04
934261	AD1-052 C2	1.04
934461	AD1-070 C O1	5.51
934462	AD1-070 E O1	25.88
LTF	AD1-092	6.35
LTF	AD1-093	10.9
LTF	AD1-094	2.08
934761	AD1-103 C O1	24.4

934762	AD1-103 E O1	163.29
934891	AD1-118	14.61
937021	AD2-136 C O2	5.87
937022	AD2-136 E O2	39.26
937081	AD2-143 C O2	3.57
937082	AD2-143 E O2	16.69
937381	AD2-191 C	3.78
937382	AD2-191 E	25.3
LTF	CARR	2.24
LTF	CBM-S1	10.8
LTF	CBM-S2	3.98
LTF	CBM-W1	97.45
LTF	CBM-W2	77.86
LTF	CIN	12.63
LTF	CPL	0.65
LTF	G-007	3.37
LTF	IPL	8.13
938021	J793	120.29
LTF	LGEE	2.25
LTF	MEC	25.34
LTF	MECS	53.18
LTF	O-066	21.82
LTF	RENSSELAER	1.75
LTF	ROSETON	12.65
247551	U4-028 C	1.89
247940	U4-028 E	12.65
247552	U4-029 C	1.89
247941	U4-029 E	12.65
247567	V2-006 C	2.3
247961	V2-006 E	15.41
247548	V4-010 C	4.06
247947	V4-010 E	27.19
LTF	WEC	4.12
907061	X1-027A C1	1.13
907064	X1-027A C2	1.13
907066	X1-027A C3	1.13
907068	X1-027A C4	1.13
907062	X1-027A E1	40.81
907065	X1-027A E2	40.81
907067	X1-027A E3	40.81
907069	X1-027A E4	40.81
LTF	Y3-032	44.75
LTF	Z1-043	15.87
918401	AA1-056	1.86

<i>931951</i>	<i>AB1-107 1</i>	<i>55.72</i>
<i>931961</i>	<i>AB1-107 2</i>	<i>129.15</i>
<i>LTF</i>	<i>AB2-013</i>	<i>9.08</i>
<i>925751</i>	<i>AC1-051 C</i>	<i>0.9</i>
<i>925752</i>	<i>AC1-051 E</i>	<i>6.02</i>
<i>926941</i>	<i>AC1-181</i>	<i>0.75</i>

Appendix 20

(AEP - AEP) The 05TIFFIN C-05MAULE RD 69 kV line (from bus 245637 to bus 245648 ckt 1) loads from 117.64% to 169.06% (**DC power flow**) of its emergency rating (73 MVA) for the tower line contingency outage of 'AEP_P7-1_#7731'. This project contributes approximately 37.53 MW to the thermal violation.

CONTINGENCY 'AEP_P7-1_#7731'

OPEN BRANCH FROM BUS 243006 TO BUS 243039 CKT 1 / 243006

05FOSTOR 138 243039 05MELMOR 138 1

OPEN BRANCH FROM BUS 243039 TO BUS 243110 CKT 1 / 243039

05MELMOR 138 243110 05STIFFI 138 1

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932051	AC2-015 C	5.01
932052	AC2-015 E	5.85
937021	AD2-136 C O2	4.88
937022	AD2-136 E O2	32.65
937381	AD2-191 C	3.18
937382	AD2-191 E	21.25
LTF	AMIL	0.05
LTF	BAYOU	0.13
LTF	BIG_CAJUN1	0.19
LTF	BIG_CAJUN2	0.38
LTF	BLUEG	0.26
LTF	CALDERWOOD	0.05
LTF	CANNELTON	0.05
LTF	CATAWBA	0.02
LTF	CBM-N	0.02
LTF	CELEVELAND	0.05
LTF	CHEOAH	0.04
LTF	CHILHOWEE	0.02
LTF	CHOCTAW	0.12
LTF	CLIFTY	0.76
LTF	COTTONWOOD	0.51
LTF	DEARBORN	0.29
LTF	EDWARDS	0.1
LTF	ELMERSMITH	0.13
LTF	FARMERCITY	0.06
LTF	G-007A	0.16
LTF	GIBSON	0.1
LTF	HAMLET	0.05
LTF	MORGAN	0.19
LTF	NEWTON	0.22

<i>LTF</i>	<i>NYISO</i>	<i>0.36</i>
<i>LTF</i>	<i>PRAIRIE</i>	<i>0.41</i>
<i>LTF</i>	<i>ROWAN</i>	<i>0.03</i>
<i>LTF</i>	<i>SANTEETLA</i>	<i>0.01</i>
<i>LTF</i>	<i>SMITHLAND</i>	<i>0.03</i>
<i>LTF</i>	<i>TATANKA</i>	<i>0.11</i>
<i>LTF</i>	<i>TILTON</i>	<i>0.12</i>
<i>LTF</i>	<i>TRIMBLE</i>	<i>0.05</i>
<i>LTF</i>	<i>TVA</i>	<i>0.09</i>
<i>247542</i>	<i>U4-001 C</i>	<i>1.72</i>
<i>247934</i>	<i>U4-001 E</i>	<i>11.5</i>
<i>247551</i>	<i>U4-028 C</i>	<i>1.59</i>
<i>247940</i>	<i>U4-028 E</i>	<i>10.63</i>
<i>247552</i>	<i>U4-029 C</i>	<i>1.59</i>
<i>247941</i>	<i>U4-029 E</i>	<i>10.63</i>
<i>LTF</i>	<i>UNIONPOWER</i>	<i>0.06</i>
<i>247548</i>	<i>V4-010 C</i>	<i>3.36</i>
<i>247947</i>	<i>V4-010 E</i>	<i>22.52</i>
<i>LTF</i>	<i>VFT</i>	<i>0.43</i>
<i>925751</i>	<i>AC1-051 C</i>	<i>0.83</i>
<i>925752</i>	<i>AC1-051 E</i>	<i>5.52</i>

Appendix 21

(AEP - AEP) The 05MAULE RD-05DAVIS STSS 69 kV line (from bus 245648 to bus 247480 ckt 1) loads from 108.88% to 160.29% (**DC power flow**) of its emergency rating (73 MVA) for the tower line contingency outage of 'AEP_P7-1_#7731'. This project contributes approximately 37.53 MW to the thermal violation.

CONTINGENCY 'AEP_P7-1_#7731'

OPEN BRANCH FROM BUS 243006 TO BUS 243039 CKT 1 / 243006
05FOSTOR 138 243039 05MELMOR 138 1

OPEN BRANCH FROM BUS 243039 TO BUS 243110 CKT 1 / 243039
05MELMOR 138 243110 05STIFFI 138 1

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932051	AC2-015 C	5.01
932052	AC2-015 E	5.85
937021	AD2-136 C O2	4.88
937022	AD2-136 E O2	32.65
937381	AD2-191 C	3.18
937382	AD2-191 E	21.25
LTF	AMIL	0.05
LTF	BAYOU	0.13
LTF	BIG_CAJUN1	0.19
LTF	BIG_CAJUN2	0.38
LTF	BLUEG	0.26
LTF	CALDERWOOD	0.05
LTF	CANNELTON	0.05
LTF	CATAWBA	0.02
LTF	CBM-N	0.02
LTF	CELEVELAND	0.05
LTF	CHEOAH	0.04
LTF	CHILHOWEE	0.02
LTF	CHOCTAW	0.12
LTF	CLIFTY	0.76
LTF	COTTONWOOD	0.51
LTF	DEARBORN	0.29
LTF	EDWARDS	0.1
LTF	ELMERSMITH	0.13
LTF	FARMERCITY	0.06
LTF	G-007A	0.16
LTF	GIBSON	0.1
LTF	HAMLET	0.05
LTF	MORGAN	0.19
LTF	NEWTON	0.22

<i>LTF</i>	<i>NYISO</i>	<i>0.36</i>
<i>LTF</i>	<i>PRAIRIE</i>	<i>0.41</i>
<i>LTF</i>	<i>ROWAN</i>	<i>0.03</i>
<i>LTF</i>	<i>SANTEETLA</i>	<i>0.01</i>
<i>LTF</i>	<i>SMITHLAND</i>	<i>0.03</i>
<i>LTF</i>	<i>TATANKA</i>	<i>0.11</i>
<i>LTF</i>	<i>TILTON</i>	<i>0.12</i>
<i>LTF</i>	<i>TRIMBLE</i>	<i>0.05</i>
<i>LTF</i>	<i>TVA</i>	<i>0.09</i>
<i>247542</i>	<i>U4-001 C</i>	<i>1.72</i>
<i>247934</i>	<i>U4-001 E</i>	<i>11.5</i>
<i>247551</i>	<i>U4-028 C</i>	<i>1.59</i>
<i>247940</i>	<i>U4-028 E</i>	<i>10.63</i>
<i>247552</i>	<i>U4-029 C</i>	<i>1.59</i>
<i>247941</i>	<i>U4-029 E</i>	<i>10.63</i>
<i>LTF</i>	<i>UNIONPOWER</i>	<i>0.06</i>
<i>247548</i>	<i>V4-010 C</i>	<i>3.36</i>
<i>247947</i>	<i>V4-010 E</i>	<i>22.52</i>
<i>LTF</i>	<i>VFT</i>	<i>0.43</i>
<i>925751</i>	<i>AC1-051 C</i>	<i>0.83</i>
<i>925752</i>	<i>AC1-051 E</i>	<i>5.52</i>

Appendix 22

(AEP - AEP) The 05CARROTHR-05ST.STEPHSS 69 kV line (from bus 245655 to bus 245674 ckt 1) loads from 134.83% to 325.04% (**DC power flow**) of its emergency rating (31 MVA) for the tower line contingency outage of 'AEP_P7-1_#7734'. This project contributes approximately 58.96 MW to the thermal violation.

CONTINGENCY 'AEP_P7-1_#7734'

OPEN BRANCH FROM BUS 242984 TO BUS 243039 CKT 1 / 242984

05CHATFL 138 243039 05MELMOR 138 1

OPEN BRANCH FROM BUS 243024 TO BUS 243039 CKT 1 / 243024

05HOWARD 138 243039 05MELMOR 138 1

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932051	AC2-015 C	7.72
932052	AC2-015 E	9.01
937021	AD2-136 C O2	7.67
937022	AD2-136 E O2	51.3
LTF	AMIL	0.03
LTF	BAYOU	0.04
LTF	BIG_CAJUN1	0.06
LTF	BIG_CAJUN2	0.11
LTF	BLUEG	0.07
LTF	CALDERWOOD	< 0.01
LTF	CANNELTON	0.02
LTF	CBM-N	< 0.01
LTF	CBM-S2	0.06
LTF	CHEOAH	< 0.01
LTF	CHILHOWEE	< 0.01
LTF	CHOCTAW	0.03
LTF	COTTONWOOD	0.17
LTF	CPL	0.02
LTF	DEARBORN	0.62
LTF	EDWARDS	0.07
LTF	ELMERSMITH	0.05
LTF	FARMERCITY	0.03
LTF	G-007A	0.14
LTF	GIBSON	0.04
LTF	MORGAN	0.04
LTF	NEWTON	0.12
LTF	NYISO	0.11
LTF	PRAIRIE	0.21
LTF	SMITHLAND	0.01
LTF	TATANKA	0.07

<i>LTF</i>	<i>TILTON</i>	<i>0.07</i>
<i>LTF</i>	<i>TRIMBLE</i>	<i>0.01</i>
<i>LTF</i>	<i>TVA</i>	<i>0.02</i>
<i>247542</i>	<i>U4-001 C</i>	<i>2.46</i>
<i>247934</i>	<i>U4-001 E</i>	<i>16.45</i>
<i>LTF</i>	<i>UNIONPOWER</i>	<i>< 0.01</i>
<i>LTF</i>	<i>VFT</i>	<i>0.37</i>
<i>925751</i>	<i>AC1-051 C</i>	<i>1.82</i>
<i>925752</i>	<i>AC1-051 E</i>	<i>12.16</i>

Appendix 23

(AEP - AEP) The 05DAVIS STSS-05TIFFIN T 69 kV line (from bus 247480 to bus 245638 ckt 1) loads from 108.88% to 160.29% (**DC power flow**) of its emergency rating (73 MVA) for the tower line contingency outage of 'AEP_P7-1_#7731'. This project contributes approximately 37.53 MW to the thermal violation.

CONTINGENCY 'AEP_P7-1_#7731'

OPEN BRANCH FROM BUS 243006 TO BUS 243039 CKT 1 / 243006

05FOSTOR 138 243039 05MELMOR 138 1

OPEN BRANCH FROM BUS 243039 TO BUS 243110 CKT 1 / 243039

05MELMOR 138 243110 05STIFFI 138 1

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932051	AC2-015 C	5.01
932052	AC2-015 E	5.85
937021	AD2-136 C O2	4.88
937022	AD2-136 E O2	32.65
937381	AD2-191 C	3.18
937382	AD2-191 E	21.25
LTF	AMIL	0.05
LTF	BAYOU	0.13
LTF	BIG_CAJUN1	0.19
LTF	BIG_CAJUN2	0.38
LTF	BLUEG	0.26
LTF	CALDERWOOD	0.05
LTF	CANNELTON	0.05
LTF	CATAWBA	0.02
LTF	CBM-N	0.02
LTF	CELEVELAND	0.05
LTF	CHEOAH	0.04
LTF	CHILHOWEE	0.02
LTF	CHOCTAW	0.12
LTF	CLIFTY	0.76
LTF	COTTONWOOD	0.51
LTF	DEARBORN	0.29
LTF	EDWARDS	0.1
LTF	ELMERSMITH	0.13
LTF	FARMERCITY	0.06
LTF	G-007A	0.16
LTF	GIBSON	0.1
LTF	HAMLET	0.05
LTF	MORGAN	0.19
LTF	NEWTON	0.22

<i>LTF</i>	<i>NYISO</i>	<i>0.36</i>
<i>LTF</i>	<i>PRAIRIE</i>	<i>0.41</i>
<i>LTF</i>	<i>ROWAN</i>	<i>0.03</i>
<i>LTF</i>	<i>SANTEETLA</i>	<i>0.01</i>
<i>LTF</i>	<i>SMITHLAND</i>	<i>0.03</i>
<i>LTF</i>	<i>TATANKA</i>	<i>0.11</i>
<i>LTF</i>	<i>TILTON</i>	<i>0.12</i>
<i>LTF</i>	<i>TRIMBLE</i>	<i>0.05</i>
<i>LTF</i>	<i>TVA</i>	<i>0.09</i>
<i>247542</i>	<i>U4-001 C</i>	<i>1.72</i>
<i>247934</i>	<i>U4-001 E</i>	<i>11.5</i>
<i>247551</i>	<i>U4-028 C</i>	<i>1.59</i>
<i>247940</i>	<i>U4-028 E</i>	<i>10.63</i>
<i>247552</i>	<i>U4-029 C</i>	<i>1.59</i>
<i>247941</i>	<i>U4-029 E</i>	<i>10.63</i>
<i>LTF</i>	<i>UNIONPOWER</i>	<i>0.06</i>
<i>247548</i>	<i>V4-010 C</i>	<i>3.36</i>
<i>247947</i>	<i>V4-010 E</i>	<i>22.52</i>
<i>LTF</i>	<i>VFT</i>	<i>0.43</i>
<i>925751</i>	<i>AC1-051 C</i>	<i>0.83</i>
<i>925752</i>	<i>AC1-051 E</i>	<i>5.52</i>