Generation Interconnection Request
System Impact Study Report
For
PJM Generation Interconnection Request
Queue Position AE1-252

Loretto-Wilton Center

December 2021

Preface

The intent of the System Impact Study is to determine a plan, with approximate cost and construction time estimates, to connect the subject generation interconnection project to the PJM network at a location specified by the Interconnection Customer. As a requirement for interconnection, the Interconnection Customer may be responsible for the cost of constructing: Network Upgrades, which are facility additions, or upgrades to existing facilities, that are needed to maintain the reliability of the PJM system. All facilities required for interconnection of a generation interconnection project must be designed to meet the technical specifications (on PJM web site) for the appropriate transmission owner.

In some instances an Interconnection Customer may not be responsible for 100% of the identified network upgrade cost because other transmission network uses, e.g. another generation interconnection or merchant transmission upgrade, may also contribute to the need for the same network reinforcement. The possibility of sharing the reinforcement costs with other projects may be identified in the Feasibility Study, but the actual allocation will be deferred until the System Impact Study is performed.

The System Impact Study estimates do not include the feasibility, cost, or time required to obtain property rights and permits for construction of the required facilities. The 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. The Interconnection Customer seeking to interconnect a wind or solar generation facility shall maintain meteorological data facilities as well as provide that meteorological data which is required per Schedule H to the Interconnection Service Agreement and Section 8 of Manual 14D.

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

General

The Interconnection Customer (IC) has proposed a solar generating facility located in Livingston County, Illinois. The installed facilities will have a total capability of 150 MW with 90 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is October 1, 2021. This study does not imply a TO commitment to this in-service date.

Point of Interconnection

Queue Position AE1-252, a 150 MW solar facility, proposes to interconnect with the ComEd transmission system by tying into the 345kV bus at the Interconnection Substation proposed in the AE1-172 project on the Loretto; B to Wilton; B 345 kV line.

Cost Summary

The AE1-252 project will be responsible for the following costs.

Description	Cost Estimate
Total Physical Interconnection Costs	$4,000,000
Allocation towards System Network Upgrade Costs (PJM Identified - Summer Peak)*	$1,954,359
Allocation towards System Network Upgrade Costs (PJM Identified - Light Load)*	$0
Total Costs	$5,954,359

*As your project progresses through the study process and other projects modify their request or withdraw, then your cost allocation could change.

This cost excludes a Federal Income Tax Gross Up charges. This tax may or may not be charged based on whether this project meets the eligibility requirements of IRS Notice 88-129. If at a future date it is determined that the Federal Income Tax Gross charge is required, the Transmission Owner shall be reimbursed by the Interconnection Customer for such taxes.

Note 1: PJM Open Access Transmission Tariff (OATT) section 217.3A outline cost allocation rules. The rules are further clarified in PJM Manual 14A Attachment B. The allocation of costs for a network upgrade will start with the first Queue project to cause the need for the upgrade. Later queue projects will receive cost allocation contingent on their contribution to the violation and are allocated to the queues that have not closed less than 5 years following the execution of the first Interconnection Service Agreement which identifies the need for this upgrade.

Note 2: For customers with System Reinforcements listed: If your present cost allocation to a System Reinforcement indicates $0, then please be aware that as changes to the interconnection process occur, such as prior queued projects withdrawing from the queue, reducing in size, etc., the cost responsibilities can change and a cost allocation may be assigned to your project. In addition, although your present cost allocation to a System Reinforcement is presently $0, your project may need this system reinforcement completed to be deliverable to the PJM system. If your project comes into service prior to completion of the system reinforcement, an interim deliverability study for your project will be required

Transmission Owner Scope of Work

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

Description	Cost Estimate
Attachment Facilities	$1,000,000
Direct Connection Network Upgrades	$0
Non-Direct Connection Network Upgrades	$3,000,000
Total Physical Interconnection Costs	$4,000,000

a. Attachment Facilities

The AE1-252 generator lead would interconnect to the 345kV bus at the Interconnection Substation proposed in the AE1-172 project. The required Attachment Facilities are one 345kV line MOD, a dead-end structure and revenue metering as shown in the one-line diagram.

Scope of Work	Cost Estimate
Installation of one 345kV line MOD, one dead-end structure and one set of revenue metering (see notes below on cost estimate)	$1,000,000

b. Direct Connection Cost Estimate

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

None.

c. Non-Direct Connection Cost Estimate

Prior to the AE1-252 queue project, AE1-172 would create an Interconnection Substation named "Fivemile Creek" in a breaker-and-a-half configuration. The generator lead for AE1-252 would be interconnected to this substation by expanding it.

The scope of work includes the installation of one 345 kV circuit breaker at this Interconnection Substation to create a line position for the IC's generator lead, as shown in the one-line diagram below. Please note that if the AE1-172 project withdraws from the New Services queue, the interconnection scope for AE1-252 would change.

The Interconnection Customer ("IC") is responsible for constructing all of the facilities on the IC side of the Point of Interconnection ("POI") outside of the substation.

The estimated cost for the Non-Direct Connection Network upgrade is given below.

Scope of Work	Cost Estimate
Installation of one 345kV circuit breaker at Fivemile Creek TSS and relay/protection work	$3,000,000

Notes on Cost Estimate:

1) These estimates are Order-of-Magnitude estimates of the costs that ComEd would bill to the customer for this interconnection. These estimates are based on a one-line electrical diagram of the project and the information provided by the IC.

2) There were no site visits performed for these estimates. There may be costs related to specific site related issues that are not identified in these estimates. The site reviews will be performed during the Facilities Study or during detailed engineering.

3) These estimates are not a guarantee of the maximum amount payable by the IC and the actual costs of ComEd's work may differ significantly from these estimates. The IC will be responsible for paying actual costs of ComEd's work in accordance with Sections 212.1 and 217 of the PJM Open Access Transmission Tariff.

4) The IC is responsible for all engineering, procurement, testing and construction of all equipment on the IC's side of the POI.

5) These cost estimates do not include cost of acquiring right-of-way for the transmission line and purchasing any additional land, if needed, for the line terminations. The need and cost of acquiring property and associated legal costs will be investigated during Facilities Study for this project.

Schedule:

ComEd would take approximately 24-months to construct the substation and transmission line work after the ISA / ICSA are signed.

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 Section 8 of Attachment O.

Meteorological Data Reporting Requirements

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

- Back Panel temperature (Fahrenheit) - (Required for plants with Maximum Facility Output of 3 MW or higher)

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

Interconnected Transmission Owner Requirements

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

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

Network Impacts

The Queue Project AE1-252 was evaluated as a 150 MW (Capacity 90 MW) injection tapping the Loretto – Wilton 345 kV Bus in the ComEd area. Project AE1-252 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AE1-252 was studied with a commercial probability of 100%. Potential network impacts were as follows:

Summer Peak Analysis - 2022

Generator Deliverability

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

Overload	Contingency		Affected		Bus			Power	Loading %		Rating		MW	Flowgate
Number	Type	Name	Area	Facility Description	From	To	Circuit	Flow	Initial	Final	Type	MVA	Contribution	Appendix
1	N-1	COMED_P1-2_345-L11212_B-S-C-A	CE - CE	AD1-133 TAP-DRESDEN ; R 345 kV line	935000	270717	1	AC	99.83	102.56	ER	1528	41.89	1
2	N-1	COMED_P1-2_345-L8014___-S-A	CE - CE	AE1-172 TAP-AD1-100 TAP 345 kV line	939400	934720	1	AC	97.89	101.7	ER	1528	60.5	

Notes:
Violation 1: ComEd SSTE rating is 1797 MVA (Not a violation)
Violation 2: ComEd SSTE rating is 2107 MVA (Not a violation)

Multiple Facility Contingency

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

None

Contribution to Previously Identified Overloads

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

Overload Number	Type	Contingency Name	Affected Area	Facility Description	Bus From	Bus To	Circuit	Power Flow	Loading % Initial	Loading % Final	Rating Type	Rating MVA	MW Contribution	Flowgate Appendix
3	LFFB	AEP_P4_#2978_05DUMONT 765_B	MISO NIPS - CE	17GREEN_ACRE-GREENACRE; T 345 kV line	255104	270771	1	AC	100.61	100.68	ER	1091	11.7	2
4	LFFB	COMED_P4_023-65-BT2-3__	MISO NIPS - CE	17STJOHN-ST JOHN ; T 345 kV line	255112	270886	1	AC	132.32	133.3	ER	1091	12.79	3
5	LFFB	AEP_P4_#2978_05DUMONT 765_B	MISO NIPS - CE	17STJOHN-ST JOHN ; T 345 kV line	255112	270886	1	DC	132.2	133.19	ER	1091	12.73	
6	LFFB	COMED_P4_112-65-BT4-5__	MISO NIPS - CE	17STJOHN-ST JOHN ; T 345 kV line	255112	270886	1	DC	131.57	132.57	ER	1091	12.8	
7	LFFB	COMED_P4_112-65-BT3-4__	MISO NIPS - CE	17STJOHN-ST JOHN ; T 345 kV line	255112	270886	1	DC	131.57	132.57	ER	1091	12.8	
8	LFFB	AEP_P4_#2978_05DUMONT 765_B	MISO NIPS - AEP	17STILLWELL-05DUMONT 345 kV line	255113	243219	1	AC	128.3	128.71	ER	1409	20.6	4
9	LFFB	ADD AD1-100 5	CE - CE	BRAIDWOOD; B-BRAIDWOOD; R 345 kV line	270670	270671	1	AC	127.7	130.93		1341	43.4	5
10	LFFB	AEP_P4_#2978_05DUMONT 765_B	CE - AEP	GREENACRE; T-05OLIVE 345 kV line	270771	243229	1	AC	113.05	113.12	ER	971	11.7	6
11	LFFB	COMED_P4_023-65-BT2-3__	CE - MISO NIPS	ST JOHN ; T-17GREEN_ACRE 345 kV line	270886	255104	1	AC	132.31	133.29	ER	1091	12.79	7
12	LFFB	AEP_P4_#2978_05DUMONT 765_B	CE - MISO NIPS	ST JOHN ; T-17GREEN_ACRE 345 kV line	270886	255104	1	DC	132.19	133.18	ER	1091	12.73	
13	LFFB	COMED_P4_112-65-BT4-5__	CE - MISO NIPS	ST JOHN ; T-17GREEN_ACRE 345 kV line	270886	255104	1	DC	131.57	132.57	ER	1091	12.8	
14	LFFB	COMED_P4_112-65-BT3-4__	CE - MISO NIPS	ST JOHN ; T-17GREEN_ACRE 345 kV line	270886	255104	1	DC	131.57	132.57	ER	1091	12.8	
15	LFFB	COMED_P4_112-65-BT5-6__	CE - CE	WILTON ; B-WILTON ;3M 345 kV line	270926	275232	1	AC	116.24	117.98		1379	27.17	8
16	LFFB	COMED_P4_112-65-BT2-3__	CE - CE	WILTON ; R-WILTON ;4M 345 kV line	270927	275233	1	AC	118.65	120.43		1379	27.7	9

17	LFFB	COMED_P4_112-65-BT4-5__	CE - MISO NIPS	CRETE EC ;BP-17STJOHN 345 kV line	274750	255112	1	AC	162.01	163.1	ER	1399	17.69	10
18	LFFB	COMED_P4_112-65-BT3-4__	CE - MISO NIPS	CRETE EC ;BP-17STJOHN 345 kV line	274750	255112	1	AC	162.01	163.09	ER	1399	17.69	
19	LFFB	AEP_P4_#2978_05DUMONT 765_B	CE - MISO NIPS	CRETE EC ;BP-17STJOHN 345 kV line	274750	255112	1	AC	159.9	160.98	ER	1399	17.64	
20	LFFB	COMED_P4_112-65-BT5-6__	CE - CE	WILTON ; 765/345 kV transformer	275232	270644	1	AC	115.96	117.7		1379	27.17	11
21	LFFB	COMED_P4_112-65-BT2-3__	CE - CE	WILTON ; 765/345 kV transformer	275233	270644	1	AC	118.37	120.15		1379	27.7	12
22	DCTL	COMED_P7_345-L2001__B-S_+_345-L2003__R-S	CE - CE	AD1-100 TAP-AD2-137 TAP 345 kV line	934720	937030	1	DC	119.84	122.3		1846	45.32	13
23	DCTL	COMED_P7_345-L0101__B-S_+_345-L0102__R-S	CE - CE	AD1-100 TAP-AD2-137 TAP 345 kV line	934720	937030	1	AC	111.1	113.41		1846	42.64	
24	LFFB	ADD AD1-100 5	CE - CE	AD1-100 TAP-BRAIDWOOD; B 345 kV line	934730	270670	1	AC	131.23	135.88		1528	73.51	14
25	DCTL	COMED_P7_345-L2001__B-S_+_345-L2003__R-S	CE - CE	AD2-137 TAP-WILTON ; B 345 kV line	937030	270926	1	DC	119.76	122.21		1846	45.32	15
26	DCTL	COMED_P7_345-L0101__B-S_+_345-L0102__R-S	CE - CE	AD2-137 TAP-WILTON ; B 345 kV line	937030	270926	1	AC	111.1	113.41		1846	42.64	
27	N-1	COMED_P1-2_345-L8014___-S-B	CE - CE	AE1-172 TAP-AD1-100 TAP 345 kV line	939400	934720	1	AC	103.74	107.57	ER	1528	60.5	16

Notes:

Violation 3: ComEd SSTE rating is 1134 MVA (Not a violation), MISO-end ratings are 1195/1195 MVA SN/SE (Not a violation)

Violation 4: AEP SE rating is 1134 MVA (Violation Valid), MISO STE ratings are 1591 MVA (Not a violation)

Violation 5: ComEd SSTE rating is 1134 MVA (Violation Violation), MISO STE rating is1591 MVA (Not a violation)

Violation 6: ComEd SSTE rating is 1134 MVA (Violation Violation), MISO STE rating is1591 MVA (Not a violation)

Violation 7: ComEd SSTE rating is 1134 MVA (Violation Violation), MISO STE rating is 1591 MVA (Not a violation)

Violation 8: AEP SE rating is 1409 MVA (Violation Valid), MISO STE rating is 1779 MVA (Violation Valid)

Violation 9: ComEd SSTE rating is 1837 MVA (Not a violation)

Violation 10: ComEd SSTE rating is 1134 MVA (Not a violation), AEP SE rating is 971 MVA (Violation Valid)

Violation 11: ComEd SSTE rating is 1134 MVA (Violation Violation), MISO ratings are 1313/1591 MVA (Not a violation)

Violation 12: ComEd SSTE rating is 1134 MVA (Violation Violation), MISO ratings are 1313/1591 MVA (Not a violation)

Violation 13: ComEd SSTE rating is 1134 MVA (Violation Violation), MISO ratings are 1313/1591 MVA (Not a violation)
Violation 14: ComEd SSTE rating is 1134 MVA (Violation Violation), MISO ratings are 1313/1591 MVA (Not a violation)
Violation 15: ComEd SSTE rating is 1469 MVA (Violation Violation)
Violation 16: ComEd SSTE rating is 1469 MVA (Violation Violation)
Violation 17: ComEd SSTE rating is 1483 MVA (Violation Violation)
Violation 18: ComEd SSTE rating is 1483 MVA (Violation Violation)
Violation 19: ComEd SSTE rating is 1483 MVA (Violation Violation)
Violation 20: ComEd SSTE rating is 1469 MVA (Violation Violation)
Violation 21: ComEd SSTE rating is 1469 MVA (Violation Violation)
Violation 22: ComEd ALDR rating is 2554 MVA (Not a violation)
Violation 23: ComEd ALDR rating is 2554 MVA (Not a violation)
Violation 24: ComEd SSTE rating is 1837 MVA (Violation Violation)
Violation 25: ComEd ALDR rating is 2554 MVA (Not a violation)
Violation 26: ComEd ALDR rating is 2554 MVA (Not a violation)
Violation 27: ComEd SSTE rating is 2107 MVA (Not a violation)

Steady-State Voltage Requirements

To be determined during the Facilities study.

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.

Overload		Contingency			Bus				Loading %		Rating		
Number	Type	Name	Affected Area	Facility Description	From	To	Circuit	Power Flow	Initial	Final	Type	MVA	MW Contribution
28	N-1	AEP_P1-2_#695A	MISO NIPS - CE	17STJOHN-ST JOHN ; T 345 kV line	255112	270886	1	DC	131.56	132.57	ER	1091	12.8
29	N-1	AEP_P1-2_#695A	MISO NIPS - AEP	17STILLWELL-05DUMONT 345 kV line	255113	243219	1	AC	125.2	125.62	NR	1409	21.02
30	N-1	COMED_P1-2_345-L8014___-S-B	CE - CE	LORETTO ; B-AE1-172 TAP 345 kV line	270704	939400	1	AC	169.81	171.42	ER	1528	24.58
31	Non	Non	CE - CE	LORETTO ; B-AE1-172 TAP 345 kV line	270704	939400	1	AC	124.48	126.7	NR	1364	31.08
32	N-1	COMED_P1-2_345-L8014___-S-B	CE - CE	PONTIAC ; B-LORETTO ; B 345 kV line	270852	270704	1	DC	159.23	160.83	ER	1528	24.56
33	Non	Non	CE - CE	PONTIAC ; B-LORETTO ; B 345 kV line	270852	270704	1	DC	113.4	115.67	NR	1364	31.06
34	N-1	COMED_P1-2_345-L11212_B-S-C-A	CE - CE	PONTIAC ; R-AD1-133 TAP 345 kV line	270853	935000	1	AC	155.45	160.02	ER	1528	69.82
35	Non	Non	CE - CE	PONTIAC ; R-AD1-133 TAP 345 kV line	270853	935000	1	AC	105.3	106.93	NR	1334	22.72
36	N-1	AEP_P1-2_#695A	CE - MISO NIPS	ST JOHN ; T-17GREEN_ACRE 345 kV line	270886	255104	1	DC	131.55	132.56	ER	1091	12.8
37	N-1	AEP_P1-2_#695A	CE - MISO NIPS	CRETE EC ;BP-17STJOHN 345 kV line	274750	255112	1	AC	159.44	160.52	ER	1399	17.71
38	N-1	COMED_P1-2_345-L8002___-S	MISO AMIL - CE	7BROKAW-AD2-153 TAP 345 kV line	348847	937160	1	AC	130.7	131.76	ER	1528	16.25
39	N-1	COMED_P1-2_345-L8002___-S	CE - CE	Z2-087 TAP-PONTIAC ; R 345 kV line	917500	270853	1	AC	156.78	157.79	ER	1528	16.26
40	N-1	COMED_P1-2_345-L8014___-S-B	CE - CE	AD1-100 TAP-AD2-137 TAP 345 kV line	934720	937030	1	AC	130.61	133.58	ER	1528	46.25
41	Non	Non	CE - CE	AD1-100 TAP-AD2-137 TAP 345 kV line	934720	937030	1	AC	117.01	119.95	NR	1364	40.71
42	N-1	COMED_P1-2_345-L11212_B-S-C-A	CE - CE	AD1-133 TAP-DRESDEN ; R 345 kV line	935000	270717	1	AC	168.04	172.64	ER	1528	69.82
43	Non	Non	CE - CE	AD1-133 TAP-DRESDEN ; R 345 kV line	935000	270717	1	AC	115.27	116.92	NR	1334	22.72

44	N-1	COMED_P1-2_345-L8014___-S-B	CE - CE	AD2-137 TAP-WILTON ; B 345 kV line	937030	270926	1	AC	130.58	133.55	ER	1528	46.25
45	Non	Non	CE - CE	AD2-137 TAP-WILTON ; B 345 kV line	937030	270926	1	AC	116.98	119.92	NR	1364	40.71
46	N-1	COMED_P1-2_345-L8002___-S	CE - CE	AD2-153 TAP-Z2-087 TAP 345 kV line	937160	917500	1	AC	130.7	131.76	ER	1528	16.25
47	N-1	COMED_P1-2_345-L8014___-S-B	CE - CE	AE1-172 TAP-AD1-100 TAP 345 kV line	939400	934720	1	AC	178.91	185.31	ER	1528	100.83
48	Non	Non	CE - CE	AE1-172 TAP-AD1-100 TAP 345 kV line	939400	934720	1	AC	133.45	139.62	NR	1364	87.84

Short Circuit

(Summary of impacted circuit breakers)

No overdutied breakers

Affected System Analysis & Mitigation

MISO Impacts:

Preliminary MISO impacts have been identified. Please refer to the MISO Affected System report for details. Final MISO impacts to be determined by MISO during the Facilities Study phase.

Stability and Reactive Power Requirement

(Results of the dynamic studies should be inserted here)

To be determined during the Facilities Study.

Light Load Analysis – 2022

Light Load Studies to be conducted during the System Impact Study phase (as required by PJM Manual 14B).

The Queue Project AE1-114 was evaluated as a 75 MW Withdrawal tapping the Loretto – Wilton 345 kV Bus in the ComEd area. Project AE1-114 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AE1-114 was studied with a commercial probability of 100%. Potential network impacts were as follows:

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)

None

Contribution to Previously Identified Overloads

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

Overload	Contingency		Affected		Bus			Power	Loading %		Rating		MW	Flowgate
Number	Type	Name	Area	Facility Description	From	To	Circuit	Flow	Initial	Final	Type	MVA	Contribution	Appendix
3	DCTL	COMED_P7_345-L0101__B-S_+_345-L0102__R-S	CE - AREA14	BRAIDWOOD; B-AD1-100 TAP 345 kV line	270670	934730	1	AC	107.77	108.93	ER	1528	17.35	17

Notes:
Violation 49: ComEd SSTE rating is 1837 MVA (Not a violation)

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.

None

System Reinforcements

Summer Peak Load Flow Analysis Reinforcement

New System Reinforcements

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

None

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)

<table>
<tr><th>Facility</th><th>Upgrade Description</th><th>Cost</th><th>Cost Allocated to AE1-252</th><th>Upgrade Number</th></tr>
<tr><td>17STJOHN-ST JOHN ; T 345 kV Ckt. 1</td><td>MISO Reinforcement:
MISO Rating 1313/1591 MVA sufficient. No reinforcement required.

ComEd Reinforcement:
Project ID: n5833
Description: The upgrade will be to mitigate the sag on the line. Upon completion of this work the new line will be a minimum of 1091/1399/1483/1674 MVA (SN/SLTE/SSTE/SLD).
PJM Network Upgrade N5833.

Type: FAC
Cost: $3,800,000
Time Estimate: 30 Months
Ratings: 1091/1399/1483/1674 MVA (SN/SLTE/SSTE/SLD)

<table>
<tr><th>Queue</th><th>MW</th><th>Cost %</th><th>Cost</th></tr>
<tr><td>AE1-194</td><td>146.07</td><td>40.4 %</td><td>$1,535,495</td></tr>
<tr><td>AE1-195</td><td>146.07</td><td>40.4%</td><td>$1,535,495</td></tr>
<tr><td>AE1-198</td><td>56.56</td><td>15.6 %</td><td>$594,561</td></tr>
<tr><td>AE1-252</td><td>12.79</td><td>3.5%</td><td>$134,449</td></tr>
</table>
</td><td>$3,800,000</td><td>$134,449</td><td>N5833</td></tr>
</table>

<table>
<tr><th>Facility</th><th>Upgrade Description</th><th>Cost</th><th>Cost Allocated to AE1-252</th><th>Upgrade Number</th></tr>
<tr><td>17STILLWELL-05DUMONT 345 kV Ckt. 1</td><td>
MISO Reinforcement:
Project ID: N/A
Description: Upgrade Stillwell substation terminal equipment (upgrade substation conductor to bundled 954 ACSR and replace wave trap.
Type: FAC
Cost: $1,500,000
Time Estimate: N/A
Ratings: 1832 MVA SE
Notes: AE1-198 is driver and is cost allocated 100%.

<table>
<tr><th>Queue</th><th>MW</th><th>Cost %</th><th>Cost</th></tr>
<tr><td>AE1-198</td><td>56.56</td><td>73.4%</td><td>$1,100,960,890</td></tr>
<tr><td>AE1-252</td><td>20.5</td><td>26.6%</td><td>$399,039</td></tr>
</table>

AEP Reinforcement:
Project ID: n4058
Description: Sag mitigation work will include the replacement of tower 20 with a custom steel pole, replacement of tower 24 with a custom H-frame and the removal of swing angle brackets on 2 structures. Cost estimate is $1.613M. New SE rating will be 1718 MVA limited by a Dumont wave trap.
Type: FAC
Cost: $1,613,000
Time Estimate: Projected in service date 6/1/2022
Ratings: AEP SE: 1718 MVA

Project ID: n4790
Description: Upgrade Dumont 2500A wave trap.
Type: FAC
Cost: $200,000
Time Estimate: N/A
Ratings: AEP SE: 1740/1790 MVA (SN/SE)
Notes: Since the cost of the upgrade is less than $5M, based on PJM cost allocation criteria, AE1-198 currently does not receive cost allocation towards this upgrade.

Project ID: n5769.1
Description: An Engineering study ($25,000) will need to be conducted to determine if the Dumont CT Thermal Limit settings can be adjusted to mitigate the overload. New relay package will be required if the settings cannot be adjusted ($600,000)
Type: FAC
Cost:
1. Cost Estimate for the study: $25,000
2. Cost Estimate for new relay package: $600,000
Time Estimate: Projected in service date 6/1/2022
Ratings: 1409/1868 MVA SN/SE

<table>
<tr><th>Queue</th><th>MW</th><th>Cost %</th><th>Cost</th></tr>
<tr><td>AE1-198</td><td>56.56</td><td>73.4%</td><td>$458,733</td></tr>
<tr><td>AE1-252</td><td>20.5</td><td>26.6%</td><td>$166,267</td></tr>
</table>
</td><td>$3,938,000</td><td>$565,306</td><td>N4058
N4790
N5769.1</td></tr>
</table>

Facility	Upgrade Description	Cost	Cost Allocated to AE1-252	Upgrade Number
GREENACRE; T-05OLIVE 345 kV Ckt. 1	**Project ID**: n5913 **Description**: Upgrade is a sag study will be required for the entire 40.64 miles of ACSR/PE ~ 1414 ~ 62/19 Conductor section 1 to determine if the line can be operated above its emergency rating 971 MVA. Estimated Cost: $162,560. If deemed necessary to rebuild the entire 40.64 miles of the section of the line, Estimated Cost: $81,280,000. New expected SE rating is 1318 MVA. PJM NUN N5913. **Type**: FAC **Cost:** $162,560 **Time Estimate**: N/A **Ratings**: 1318 MVA **Notes**: 1. Since the cost of the upgrade is less than $5M, based on PJM cost allocation criteria, AE1-198 currently does not receive cost allocation towards this upgrade. 2. As changes to the PJM queue process occur (such as prior queued projects withdrawing from the queue, reducing in size, etc.) AE1-198 could receive cost allocation. 3. Although Queue Project AE1-198 may not presently have cost responsibility for this upgrade, Queue Project AE1-198 may need this upgrade in-service to be deliverable to the PJM system. 4. If Queue Project AE1-198 comes into service prior to completion of the upgrade, Queue Project AE1-198 will need an interim study.	$162,560	$0	N5913

<table>
<tr><th>Facility</th><th>Upgrade Description</th><th>Cost</th><th>Cost Allocated to AE1-252</th><th>Upgrade Number</th></tr>
<tr>
<td>17ST JOHN ; T - 17GREEN_ACRE 345 kV line</td>
<td><u>ComEd</u>
ComEd SSTE rating is 1134 MVA.

<u>ComEd Reinforcement:</u>
<u>Project ID</u>: n5834
<u>Description</u>: The upgrade is to mitigate the sag on the line. A preliminary estimate for this upgrade is $3.8 M with a preliminary construction timeline of 30 months. The estimate provided does not include potential tower upgrades. The cost for this potential work will not be identified until the Facilities Study phase. Upon completion of the upgrade the new ratings will be 1091/1399/1483/1674 MVA (SN/SLTE/SSTE/SLD).
<u>Type</u>: FAC
<u>Cost:</u> $3,800,000
<u>Time Estimate</u>: 30 Months
<u>Ratings</u>: 1091/1399/1483/1674 MVA (SN/SLTE/SSTE/SLD)

<u>Notes</u>:
Portion of this facility was purchased and is now owned by NEXTERA. NEXTERA will evaluate this violation in the Facility Study phase.

<table>
<tr><th>Queue</th><th>MW</th><th>Cost %</th><th>Cost</th></tr>
<tr><td>AE1-194</td><td>146.07</td><td>35.7%</td><td>$1,356,367</td></tr>
<tr><td>AE1-195</td><td>146.07</td><td>35.7%</td><td>$1,356,367</td></tr>
<tr><td>AE1-198</td><td>104.3</td><td>25.5%</td><td>$968,502</td></tr>
<tr><td>AE1-252</td><td>12.79</td><td>4.9%</td><td>$118,765</td></tr>
</table>

<u>MISO</u>
MISO-end ratings (1313/1591 MVA -SN/SE) are sufficient.</td>
<td>$3,800,000</td>
<td>$118,765</td>
<td>n5834</td>
</tr>
</table>

<table>
<tr><th>Facility</th><th>Upgrade Description</th><th>Cost</th><th>Cost Allocated to AE1-252</th><th>Upgrade Number</th></tr>
<tr>
<td>WILTON ; B-WILTON ;3M 345 kV line Ckt 1 (from bus 270926 to bus 275232)

&

WILTON ; R-WILTON ;4M 345 kV line Ckt 1 (from bus 270927 to bus 275233)

&

WILTON ; 765/345 kV transformer Ckt 1 (from bus 275233 to bus 270644)</td>
<td><u>ComEd</u>
ComEd SSTE rating is 1469 MVA.

<u>ComEd Reinforcement:</u>
<u>Project ID</u>: n5145
<u>Description</u>: Build out the Wilton 765kV bus thereby allowing for 765kV L11216 (currently on Bus 6) to be relocated to Bus 8. Along with this line relocation, installation of 2-765kV BT CB’s (6-8 & 8-2).
<u>Type</u>: CON
<u>Cost:</u> $12,000,000
<u>Time Estimate</u>: 36-40 Months
<u>Ratings</u>: N/A
The cost allocation is as follows:

<table>
<tr><th>Queue</th><th>MW Contribution</th><th>Cost %</th><th>Cost $ (12M)</th></tr>
<tr><td>AD1-100</td><td>116.8</td><td>18.4%</td><td>$2,209,506</td></tr>
<tr><td>AD2-047</td><td>26.4</td><td>4.2%</td><td>$499,409</td></tr>
<tr><td>AD2-066</td><td>17.7</td><td>2.8%</td><td>$335,209</td></tr>
<tr><td>AD2-102</td><td>29.7</td><td>4.7%</td><td>$560,889</td></tr>
<tr><td>AD2-134</td><td>16.2</td><td>2.6%</td><td>$306,455</td></tr>
<tr><td>AD2-159</td><td>16.6</td><td>2.6%</td><td>$314,022</td></tr>
<tr><td>AD2-194</td><td>19.6</td><td>3.1%</td><td>$371,152</td></tr>
<tr><td>AE1-113</td><td>44.5</td><td>7.2%</td><td>$864,507</td></tr>
<tr><td>AE1-114</td><td>21.2</td><td>3.4%</td><td>$412,391</td></tr>
<tr><td>AE1-163</td><td>53.1</td><td>8.4%</td><td>$1,004,493</td></tr>
<tr><td>AE1-166</td><td>28.6</td><td>4.5%</td><td>$541,405</td></tr>
<tr><td>AE1-172</td><td>47.1</td><td>7.4%</td><td>$890,991</td></tr>
<tr><td>AE1-193</td><td>45.8</td><td>7.2%</td><td>$866,777</td></tr>
<tr><td>AE1-194</td><td>45.8</td><td>7.2%</td><td>$866,777</td></tr>
<tr><td>AE1-195</td><td>45.8</td><td>7.2%</td><td>$866,777</td></tr>
<tr><td>AE1-205</td><td>30.4</td><td>4.8%</td><td>$574,699</td></tr>
<tr><td>AE1-252</td><td>27.2</td><td>4.3%</td><td>$514,542</td></tr>
</table>
</td>
<td>$12,000,000</td>
<td>$514,542</td>
<td>N5145</td>
</tr>
</table>

<table>
<tr>
<td>Crete – St John 345 kV line Ckt 1</td>
<td>
<u>ComEd</u>
ComEd SSTE rating is 1483 MVA.

<u>ComEd Reinforcement:</u>
<u>Project ID</u>: n5253
<u>Description</u>: The upgrade will be to Reconductor the line. A preliminary estimate for this upgrade is $14.9M with a preliminary construction timeline of 30-36 months. The estimate provided does not consider potential tower upgrades. This cost component will be determined during the Facilities Study phase. Upon completion of this upgrade, the new will be a minimum of 1334/1726/1837/2084 MVA (SN/SLTE/SSTE/SLD).
<u>Type</u>: FAC
<u>Cost:</u> $14,900,000
<u>Time Estimate</u>: 30-36 Months
<u>Ratings</u>: 1334/1726/1837/2084 MVA (SN/SLTE/SSTE/SLD)

The cost allocation is as follows:
<table>
<tr><th>Queue</th><th>MW contribution</th><th>Cost %</th><th>Cost ($14.9 M)</th></tr>
<tr><td>AE1-193</td><td>251.82</td><td>27.02%</td><td>$3,950,679</td></tr>
<tr><td>AE1-194</td><td>249.95</td><td>27.02%</td><td>$3,950,679</td></tr>
<tr><td>AE1-195</td><td>249.95</td><td>26.32%</td><td>$3,921,342</td></tr>
<tr><td>AE1-198</td><td>178.46</td><td>18.79%</td><td>$2,799,770</td></tr>
<tr><td>AE1-252</td><td>17.69</td><td>1.86%</td><td>$277,530</td></tr>
</table>
<u>Project ID</u>: n6629
<u>Description</u>: ComEd upgrade: Replace a 345kV circuit breaker and associated equipment at Crete. A preliminary estimate for this upgrade is $6 M with a preliminary construction timeline of 30 months. Upon completion of this upgrade the new ratings will be 1754/2246/2297/2488 MVA (SN/SLTE/SSTE/SLD). PJM Network Upgrade N6629
<u>Type</u>: FAC
<u>Cost:</u> $6,000,000
<u>Time Estimate</u>: 30 Months
<u>Ratings</u>: 1754/2246/2297/2488 MVA (SN/SLTE/SSTE/SLD)

The cost allocation is as follows:
<table>
<tr><th>Queue</th><th>MW contribution</th><th>Cost %</th><th>Cost ($6M)</th></tr>
<tr><td>AE1-195</td><td>248.03</td><td>55.84%</td><td>$3,350,398</td></tr>
<tr><td>AE1-198</td><td>178.46</td><td>40.18%</td><td>$2,410,644</td></tr>
<tr><td>AE1-252</td><td>17.69</td><td>3.98%</td><td>$238,957</td></tr>
</table>
<u>Notes</u>:
This facility was purchased and is now owned by NEXTERA. NEXTERA will evaluate this violation in the Facility Study phase.

<u>MISO</u>
MISO end ratings are 1206/1508 MVA (SN/SE)
</td>
<td>$23,900,000</td>
<td>$621,297</td>
<td>N5253
N6629</td>
</tr>
</table>

<table>
<tr><th>Facility</th><th>Upgrade Description</th><th>Cost</th><th>Cost Allocated to AE1-252</th><th>Upgrade Number</th></tr>
<tr><td></td><td>
MISO Reinforcement:
Project ID: Reinforcement #1
Description: MISO-End upgrade: Upgrade St John substation conductor drop and switch ($1M).
New MISO end SE rating will be 1900 MVA.
Type: FAC
Cost: $1,000,000
Time Estimate: N/A Months
Ratings: 1900 MVA (SE)

<table>
<tr><th>Queue</th><th>MW contribution</th><th>Cost %</th><th>Cost ($1M)</th></tr>
<tr><td>AE1-193</td><td>251.82</td><td>37.02%</td><td>$360,794</td></tr>
<tr><td>AE1-194</td><td>249.95</td><td>36.74%</td><td>$358,115</td></tr>
<tr><td>AE1-198</td><td>178.46</td><td>26.24%</td><td>$255,745</td></tr>
<tr><td>AE1-252</td><td>17.69</td><td>2.53%</td><td>$25,345</td></tr>
</table>

Project ID: Reinforcement #2
Description: Additional MISO-end upgrades (if needed):
Upgrade switch to 4000 A and upgrade substation conductor drop to bundled 1590 AL ($2M)
New MISO-end ratings to be 1961/2390 MVA SN/SE.
Type: FAC
Cost: $2,000,000
Time Estimate: N/A Months
Ratings: 1961/2390 MVA SN/SE

<table>
<tr><th>Queue</th><th>MW contribution</th><th>Cost %</th><th>Cost ($2M)</th></tr>
<tr><td>AE1-195</td><td>249.95</td><td>55.94%</td><td>$1,118,703</td></tr>
<tr><td>AE1-198</td><td>178.46</td><td>40.09%</td><td>$801,833</td></tr>
<tr><td>AE1-252</td><td>17.69</td><td>3.97%</td><td>$79,465</td></tr>
</table>
</td><td></td><td></td><td></td></tr>
<tr><td></td><td>Total Cost</td><td>$43,800,560</td><td>$1,954,359</td><td></td></tr>
</table>

Note : For customers with System Reinforcements listed: If your present cost allocation to a System Reinforcement indicates $0, then please be aware that as changes to the interconnection process occur, such as prior queued projects withdrawing from the queue, reducing in size, etc, the cost responsibilities can change and a cost allocation may be assigned to your project. In addition, although your present cost allocation to a System Reinforcement is presently $0, your project may need this system reinforcement completed to be deliverable to the PJM system. If your project comes into service prior to completion of the system reinforcement, an interim deliverability study for your project will be required.

Light Load Load Flow Analysis Reinforcements

New System Reinforcements

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

None

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)

Facility	Upgrade Description	Cost	Cost Allocation	Upgrade Number
AD1-100 TAP-BRAIDWOOD; B 345 kV	**ComEd** ComEd SSTE rating is 1837 MVA. ComEd Reinforcement: **Project ID**: n7206 **Description**: Move and re-terminate the L2002 Davis Creek line into the same breaker bay as the AD1-100 attachment at the AD1-100 interconnection substation. This eliminates the stuck breaker contingency loss of the Wilton Center line and Davis Creek L2002 line. Estimated cost for this AD1-100 interconnection sub work would cost $3M. Time estimate is 24 months. Revised AD1-100 breaker diagram in AD1-133 public folder. PJM Network Upgrade N7206. **Type**: CON **Cost:** $3,000,000 **Time Estimate**: 24 Months **Ratings**: N/A **Notes**: This upgrade is driven by a prior AD2 Queue. Per PJM Cost Allocation rules, AE1-252 does not receive Cost Allocation for this upgrade. This may change as projects ahead in Queue Withdraws.	$3,000,000	$0	N7206
	Total Cost	**$3,000,000**	**$0**	

Note : For customers with System Reinforcements listed: If your present cost allocation to a System Reinforcement indicates $0, then please be aware that as changes to the interconnection process occur, such as prior queued projects withdrawing from the queue, reducing in size, etc, the cost responsibilities can change and a cost allocation may be assigned to your project. In addition, although your present cost allocation to a System Reinforcement is presently $0, your

project may need this system reinforcement completed to be deliverable to the PJM system. If your project comes into service prior to completion of the system reinforcement, an interim deliverability study for your project will be required.

Short Circuit System Reinforcement

(Summary form of Cost allocation for breakers will be inserted here if any)

None

Contingencies (Summer Peak Analysis)

Contingency Name	Description
ADD AD1-100 5	CONTINGENCY 'ADD AD1-100 5' OPEN BRANCH FROM BUS 934730 TO BUS 270710 CKT 1 / AD1-100 - DAVIS CREEK OPEN BRANCH FROM BUS 934720 TO BUS 937030 CKT 1 / AD1-100 - AD2-137 TAP (WILTON) END
AEP_P1-2_#695A	CONTINGENCY 'AEP_P1-2_#695A' OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1 / 243206 05DUMONT 765 270644 WILTON ; 765 1 END
AEP_P4_#2978_05DUMONT 765_B	CONTINGENCY 'AEP_P4_#2978_05DUMONT 765_B' OPEN BRANCH FROM BUS 243206 TO BUS 243207 CKT 1 / 243206 05DUMONT 765 243207 05GRNTWN 765 1 OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1 / 243206 05DUMONT 765 270644 WILTON ; 765 1 END

COMED_P1-2_345-L11212_B-S-C-A	CONTINGENCY 'COMED_P1-2_345-L11212_B-S-C-A' TRIP BRANCH FROM BUS 934720 TO BUS 939400 CKT 1 / AD1-100 TAP 345 AE1-172 TAP 345 END
COMED_P1-2_345-L8002___-S	CONTINGENCY 'COMED_P1-2_345-L8002___-S' TRIP BRANCH FROM BUS 270852 TO BUS 270668 CKT 1 / PONTI; B 345 BLUEM; B 345 END
COMED_P1-2_345-L8014___-S-A	CONTINGENCY 'COMED_P1-2_345-L8014___-S-A' TRIP BRANCH FROM BUS 270853 TO BUS 935000 CKT 1 / PONTIAC ; R 345 AD1-133 TAP 345 END
COMED_P1-2_345-L8014___-S-B	CONTINGENCY 'COMED_P1-2_345-L8014___-S-B' TRIP BRANCH FROM BUS 935000 TO BUS 270717 CKT 1 / AD1-133 TAP 345 DRESDEN ; R 345 END
COMED_P4_023-65-BT2-3__	CONTINGENCY 'COMED_P4_023-65-BT2-3__' TRIP BRANCH FROM BUS 270644 TO BUS 243206 CKT 1 / WILTO; 765 05DUMONT 765 TRIP BRANCH FROM BUS 270607 TO BUS 270630 CKT 1 / COLLI; 765 PLANO; 765 END
COMED_P4_112-65-BT2-3__	CONTINGENCY 'COMED_P4_112-65-BT2-3__' TRIP BRANCH FROM BUS 270644 TO BUS 270607 CKT 1 / WILTO; 765 COLLI; 765 TRIP BRANCH FROM BUS 275232 TO BUS 270644 CKT 1 / WILTO;3M 345 WILTO; 765 TRIP BRANCH FROM BUS 275232 TO BUS 270926 CKT 1 / WILTO;3M 345 WILTO; B 345 TRIP BRANCH FROM BUS 275232 TO BUS 275332 CKT 1 / WILTO;3M 345 WILTO;3C 33

	END
COMED_P4_112-65-BT3-4__	CONTINGENCY 'COMED_P4_112-65-BT3-4__' TRIP BRANCH FROM BUS 270644 TO BUS 243206 CKT 1 / WILTO; 765 05DUMONT 765 TRIP BRANCH FROM BUS 275232 TO BUS 270644 CKT 1 / WILTO;3M 345 WILTO; 765 TRIP BRANCH FROM BUS 275232 TO BUS 270926 CKT 1 / WILTO;3M 345 WILTO; B 345 TRIP BRANCH FROM BUS 275232 TO BUS 275332 CKT 1 / WILTO;3M 345 WILTO;3C 33 END
COMED_P4_112-65-BT4-5__	CONTINGENCY 'COMED_P4_112-65-BT4-5__' TRIP BRANCH FROM BUS 270644 TO BUS 243206 CKT 1 / WILTO; 765 05DUMONT 765 TRIP BRANCH FROM BUS 275233 TO BUS 270644 CKT 1 / WILTO;4M 345 WILTO; 765 TRIP BRANCH FROM BUS 275233 TO BUS 270927 CKT 1 / WILTO;4M 345 WILTO; R 345 TRIP BRANCH FROM BUS 275233 TO BUS 275333 CKT 1 / WILTO;4M 345 WILTO;4C 33 END
COMED_P4_112-65-BT5-6__	CONTINGENCY 'COMED_P4_112-65-BT5-6__' TRIP BRANCH FROM BUS 270644 TO BUS 270607 CKT 1 / WILTO; 765 COLLI; 765 TRIP BRANCH FROM BUS 275233 TO BUS 270644 CKT 1 / WILTO;4M 345 WILTO; 765 TRIP BRANCH FROM BUS 275233 TO BUS 270927 CKT 1 / WILTO;4M 345 WILTO; R 345 TRIP BRANCH FROM BUS 275233 TO BUS 275333

	CKT 1 / WILTO;4M 345 WILTO;4C 33 END
COMED_P7_345-L0101__B-S_+_345-L0102__R-S	CONTINGENCY 'COMED_P7_345-L0101__B-S_+_345-L0102__R-S' TRIP BRANCH FROM BUS 270802 TO BUS 270846 CKT 1 / LASCO STA; B 345 PLANO ; B 345 TRIP BRANCH FROM BUS 270846 TO BUS 270847 CKT 1 / PLANO ; B 345 PLANO ; R 345 TRIP BRANCH FROM BUS 270803 TO BUS 270847 CKT 1 / LASCO STA; R 345 PLANO ; R 345 END
COMED_P7_345-L2001__B-S_+_345-L2003__R-S	CONTINGENCY 'COMED_P7_345-L2001__B-S_+_345-L2003__R-S' TRIP BRANCH FROM BUS 270670 TO BUS 270728 CKT 1 / BRAID; B 345 E FRA; B 345 TRIP BRANCH FROM BUS 270728 TO BUS 270766 CKT 1 / E FRA; B 345 GOODI;3B 345 TRIP BRANCH FROM BUS 270728 TO BUS 274750 CKT 1 / E FRA; B 345 CRETE;BP 345 TRIP BRANCH FROM BUS 270671 TO BUS 270729 CKT 1 / BRAID; R 345 E FRA; R 345 END

Appendices (Summer Peak Analysis)

Appendix 1

(CE - CE) The AD1-133 TAP-DRESDEN ; R 345 kV line (from bus 935000 to bus 270717 ckt 1) loads from 99.83% to 102.56% (AC power flow) of its emergency rating (1528 MVA) for the single line contingency outage of 'COMED_P1-2_345-L11212_B-S-C-A'. This project contributes approximately 41.89 MW to the thermal violation.

CONTINGENCY 'COMED_P1-2_345-L11212_B-S-C-A'
TRIP BRANCH FROM BUS 934720 TO BUS 939400 CKT 1 / AD1-100 TAP 345 AE1-172 TAP 345
END

Bus Number	*Bus Name*	*Full Contribution*
933441	*AC2-157 C*	*3.96*
935001	*AD1-133 C O1*	*120.35*
935141	*AD1-148*	*12.28*
LTF	*AD2-098*	*0.26*
936771	*AD2-100 C O1*	*21.8*
936971	*AD2-131 C O1*	*1.44*
937211	*AD2-159 C*	*10.32*
939401	*AE1-172 C O1*	*20.89*
939741	*AE1-205 C O1*	*39.05*
940101	*AE1-252 C O1*	*41.89*
274863	*CAYUGA RI;1U*	*2.46*
274864	*CAYUGA RI;2U*	*2.46*
LTF	*CBM-N*	*0.65*
LTF	*CBM-S1*	*9.82*
LTF	*CBM-S2*	*3.11*
LTF	*CBM-W2*	*112.48*
LTF	*CHILHOWEE /* 35% REVERSE 4476971*	*< 0.01*
LTF	*CIN*	*10.78*
LTF	*CPLE*	*1.11*
LTF	*EDWARDS*	*0.07*
LTF	*G-007A*	*2.15*
LTF	*IPL*	*5.88*
950701	*J196 C*	*1.11*
951001	*J339*	*12.1*
954761	*J468 C*	*3.94*
951741	*J474 C*	*4.81*

952271	*J644*	*12.23*
952321	*J734*	*10.16*
954721	*J750 C*	*3.3*
952651	*J756 C*	*4.36*
952871	*J757 C*	*5.19*
953401	*J811*	*10.28*
953651	*J815*	*34.81*
953741	*J826 C*	*3.01*
953851	*J845 C*	*2.96*
953881	*J848 C*	*5.05*
954411	*J912*	*13.28*
274650	*KINCAID ;1U*	*17.77*
274651	*KINCAID ;2U*	*17.8*
LTF	*LGEE*	*1.64*
LTF	*MEC*	*2.63*
LTF	*NYISO*	*2.81*
LTF	*TATANKA*	*0.43*
274853	*TWINGROVE;U1*	*2.64*
274854	*TWINGROVE;U2*	*2.64*
LTF	*VFT*	*5.76*
905081	*W4-005 C*	*2.51*
917501	*Z2-087 C*	*2.13*
930461	*AB1-087*	*28.65*
930471	*AB1-088*	*28.65*
924041	*AB2-047 C O1*	*15.11*
924261	*AB2-070 C O1*	*6.97*
925771	*AC1-053 C*	*6.83*
926841	*AC1-171 C O1*	*0.75*

Appendix 2

(MISO NIPS - CE) The 17GREEN_ACRE-GREENACRE; T 345 kV line (from bus 255104 to bus 270771 ckt 1) loads from 100.61% to 100.68% (AC power flow) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of 'AEP_P4_#2978_05DUMONT 765_B'. This project contributes approximately 11.7 MW to the thermal violation.

CONTINGENCY 'AEP_P4_#2978_05DUMONT 765_B'
OPEN BRANCH FROM BUS 243206 TO BUS 243207 CKT 1 / 243206 05DUMONT 765 243207 05GRNTWN 765 1
OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1 / 243206 05DUMONT 765 270644 WILTON ; 765 1
END

Bus Number	*Bus Name*	*Full Contribution*
932881	*AC2-115 1*	*1.59*
932891	*AC2-115 2*	*1.59*
932921	*AC2-116*	*0.56*
933411	*AC2-154 C*	*1.69*
933412	*AC2-154 E*	*2.76*
933911	*AD1-013 C*	*1.23*
933912	*AD1-013 E*	*1.96*
933931	*AD1-016 C*	*0.62*
933932	*AD1-016 E*	*1.02*
934051	*AD1-031 C O1*	*1.88*
934052	*AD1-031 E O1*	*3.07*
934101	*AD1-039 1*	*4.69*
934111	*AD1-039 2*	*4.9*
934431	*AD1-067 C*	*0.09*
934432	*AD1-067 E*	*0.37*
934701	*AD1-098 C O1*	*4.6*
934702	*AD1-098 E O1*	*3.35*
934721	*AD1-100 C*	*13.01*
934722	*AD1-100 E*	*60.71*
934871	*AD1-116 C*	*0.62*
934872	*AD1-116 E*	*1.01*
934971	*AD1-129 C*	*0.61*
934972	*AD1-129 E*	*0.4*
935001	*AD1-133 C O1*	*13.81*
935002	*AD1-133 E O1*	*9.21*
936291	*AD2-038 C O1*	*1.55*
936292	*AD2-038 E O1*	*10.38*

936371	*AD2-047 C O1*	*3.03*
936372	*AD2-047 E O1*	*14.78*
936461	*AD2-060*	*1.78*
936511	*AD2-066 C O1*	*5.6*
936512	*AD2-066 E O1*	*3.73*
936791	*AD2-102 C*	*9.47*
936792	*AD2-102 E*	*6.31*
937001	*AD2-134 C*	*1.73*
937002	*AD2-134 E*	*6.9*
937311	*AD2-172 C*	*1.65*
937312	*AD2-172 E*	*2.27*
937401	*AD2-194 1*	*5.27*
937411	*AD2-194 2*	*5.27*
937531	*AD2-214 C*	*2.94*
937532	*AD2-214 E*	*1.96*
938511	*AE1-070 1*	*6.19*
938521	*AE1-070 2*	*5.66*
938851	*AE1-113 C O1*	*5.39*
938852	*AE1-113 E O1*	*19.1*
938861	*AE1-114 C O1*	*2.63*
938862	*AE1-114 E O1*	*8.96*
939051	*AE1-134 1*	*0.91*
939061	*AE1-134 2*	*0.91*
939321	*AE1-163 C O1*	*3.9*
939322	*AE1-163 E O1*	*23.94*
939351	*AE1-166 C O1*	*6.87*
939352	*AE1-166 E O1*	*6.34*
939401	*AE1-172 C O1*	*3.5*
939402	*AE1-172 E O1*	*16.4*
939631	*AE1-193 C O1*	*10.91*
939632	*AE1-193 E O1*	*73.04*
939641	*AE1-194 C*	*10.91*
939642	*AE1-194 E*	*73.04*
939651	*AE1-195 C*	*10.91*
939652	*AE1-195 E*	*73.04*
939681	*AE1-198 C O1*	*32.41*
939682	*AE1-198 E O1*	*27.54*
939741	*AE1-205 C O1*	*5.79*
939742	*AE1-205 E O1*	*8.*
940101	*AE1-252 C O1*	*7.02*
940102	*AE1-252 E O1*	*4.68*
LTF	*BLUEG*	*2.63*
294401	*BSHIL;1U E*	*5.66*
294410	*BSHIL;2U E*	*5.66*
LTF	*CARR*	*0.48*

LTF	*CATAWBA*	*0.15*
274890	*CAYUG;1U E*	*8.97*
274891	*CAYUG;2U E*	*8.97*
LTF	*CBM-S1*	*1.49*
LTF	*CBM-W1*	*20.35*
LTF	*CBM-W2*	*39.71*
LTF	*CHOCTAW /* 35% REVERSE 4566958 4511400*	*< 0.01*
LTF	*CIN*	*0.23*
274751	*CRETE EC ;1U*	*2.22*
274752	*CRETE EC ;2U*	*2.22*
274753	*CRETE EC ;3U*	*2.22*
274754	*CRETE EC ;4U*	*2.22*
274859	*EASYR;U1 E*	*7.34*
274860	*EASYR;U2 E*	*7.34*
LTF	*G-007*	*1.33*
290051	*GSG-6; E*	*6.98*
LTF	*HAMLET*	*0.3*
953871	*J847*	*2.7*
275149	*KEMPTON ;1E*	*12.46*
990901	*L-005 E*	*8.29*
290108	*LEEDK;1U E*	*16.23*
LTF	*MEC*	*25.26*
293061	*N-015 E*	*10.29*
293516	*O-009 E1*	*6.08*
293517	*O-009 E2*	*3.09*
293518	*O-009 E3*	*3.4*
293715	*O-029 E*	*6.5*
293716	*O-029 E*	*3.56*
293717	*O-029 E*	*3.28*
293771	*O-035 E*	*4.23*
LTF	*O-066*	*8.55*
293644	*O22 E1*	*7.28*
293645	*O22 E2*	*14.13*
290021	*O50 E*	*13.06*
294392	*P-010 E*	*13.07*
294763	*P-046 E*	*6.27*
274888	*PILOT HIL;1E*	*12.46*
270859	*PWR VTR EC;R*	*8.1*
LTF	*RENSSELAER*	*0.38*
274722	*S-055 E*	*7.56*
295111	*SUBLETTE E*	*1.82*
LTF	*TRIMBLE*	*0.32*
LTF	*WEC*	*5.35*
295109	*WESTBROOK E*	*3.74*

910542	*X3-005 E*	*0.52*
915011	*Y3-013 1*	*2.52*
915021	*Y3-013 2*	*2.52*
915031	*Y3-013 3*	*2.52*
916211	*Z1-072 E*	*3.2*
916221	*Z1-073 E*	*3.6*
916502	*Z1-106 E1*	*0.85*
916504	*Z1-106 E2*	*0.85*
916512	*Z1-107 E*	*1.72*
916522	*Z1-108 E*	*1.67*
917502	*Z2-087 E*	*11.99*
918052	*AA1-018 E*	*10.68*
919221	*AA1-146*	*11.73*
919581	*AA2-030*	*11.73*
920272	*AA2-123 E*	*1.64*
930481	*AB1-089*	*44.01*
930501	*AB1-091 O1*	*49.4*
930741	*AB1-122 1O1*	*47.85*
930751	*AB1-122 2O1*	*50.02*
924041	*AB2-047 C O1*	*2.24*
924042	*AB2-047 E O1*	*14.99*
924471	*AB2-096*	*28.36*
925302	*AB2-191 E*	*0.92*
925581	*AC1-033 C*	*0.93*
925582	*AC1-033 E*	*6.21*
926311	*AC1-109 1*	*1.28*
926321	*AC1-109 2*	*1.28*
926331	*AC1-110 1*	*1.27*
926341	*AC1-110 2*	*1.27*
926351	*AC1-111 1*	*0.51*
926361	*AC1-111 2*	*0.51*
926371	*AC1-111 3*	*0.51*
926381	*AC1-111 4*	*0.51*
926391	*AC1-111 5*	*0.51*
926401	*AC1-111 6*	*0.51*
927511	*AC1-113 1*	*0.8*
927521	*AC1-113 2*	*0.8*
926431	*AC1-114*	*1.59*
927451	*AC1-142A 1*	*2.85*
927461	*AC1-142A 2*	*2.85*
926821	*AC1-168 C O1*	*0.76*
926822	*AC1-168 E O1*	*5.11*
927091	*AC1-204 1*	*49.02*
927101	*AC1-204 2*	*48.98*
927201	*AC1-214 C O1*	*1.36*

927202	*AC1-214 E O1*	*4.32*

Appendix 3

(MISO NIPS - CE) The 17STJOHN-ST JOHN ; T 345 kV line (from bus 255112 to bus 270886 ckt 1) loads from 132.32% to 133.3% (AC power flow) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_023-65-BT2-3__'. This project contributes approximately 12.79 MW to the thermal violation.

CONTINGENCY 'COMED_P4_023-65-BT2-3__'
TRIP BRANCH FROM BUS 270644 TO BUS 243206 CKT 1 / WILTO; 765 05DUMONT 765
TRIP BRANCH FROM BUS 270607 TO BUS 270630 CKT 1 / COLLI; 765 PLANO; 765
END

Bus Number	*Bus Name*	*Full Contribution*
932881	*AC2-115 1*	*1.78*
932891	*AC2-115 2*	*1.78*
932921	*AC2-116*	*0.62*
933411	*AC2-154 C*	*1.75*
933412	*AC2-154 E*	*2.85*
933911	*AD1-013 C*	*1.38*
933912	*AD1-013 E*	*2.2*
933931	*AD1-016 C*	*0.7*
933932	*AD1-016 E*	*1.14*
934101	*AD1-039 1*	*5.22*
934111	*AD1-039 2*	*5.55*
934431	*AD1-067 C*	*0.1*
934432	*AD1-067 E*	*0.41*
934701	*AD1-098 C O1*	*5.14*
934702	*AD1-098 E O1*	*3.76*
934721	*AD1-100 C*	*14.35*
934722	*AD1-100 E*	*66.95*
934871	*AD1-116 C*	*0.68*
934872	*AD1-116 E*	*1.11*
934971	*AD1-129 C*	*0.68*
934972	*AD1-129 E*	*0.45*
935001	*AD1-133 C O1*	*15.25*
935002	*AD1-133 E O1*	*10.17*
936291	*AD2-038 C O1*	*1.72*
936292	*AD2-038 E O1*	*11.52*
936371	*AD2-047 C O1*	*3.13*
936372	*AD2-047 E O1*	*15.27*
936461	*AD2-060*	*1.84*

936511	*AD2-066 C O1*	*6.23*
936512	*AD2-066 E O1*	*4.15*
936791	*AD2-102 C*	*10.6*
936792	*AD2-102 E*	*7.07*
937001	*AD2-134 C*	*1.94*
937002	*AD2-134 E*	*7.73*
937311	*AD2-172 C*	*1.84*
937312	*AD2-172 E*	*2.54*
937401	*AD2-194 1*	*5.97*
937411	*AD2-194 2*	*5.96*
938511	*AE1-070 1*	*7.01*
938521	*AE1-070 2*	*6.4*
938851	*AE1-113 C O1*	*6.08*
938852	*AE1-113 E O1*	*21.55*
938861	*AE1-114 C O1*	*2.94*
938862	*AE1-114 E O1*	*10.02*
939051	*AE1-134 1*	*1.02*
939061	*AE1-134 2*	*1.02*
939321	*AE1-163 C O1*	*4.32*
939322	*AE1-163 E O1*	*26.57*
939351	*AE1-166 C O1*	*7.64*
939352	*AE1-166 E O1*	*7.05*
939401	*AE1-172 C O1*	*3.83*
939402	*AE1-172 E O1*	*17.91*
939631	*AE1-193 C O1*	*18.99*
939632	*AE1-193 E O1*	*127.09*
939641	*AE1-194 C*	*18.99*
939642	*AE1-194 E*	*127.09*
939651	*AE1-195 C*	*18.99*
939652	*AE1-195 E*	*127.09*
939681	*AE1-198 C O1*	*56.38*
939682	*AE1-198 E O1*	*47.91*
940101	*AE1-252 C O1*	*7.67*
940102	*AE1-252 E O1*	*5.12*
LTF	*BLUEG*	*4.79*
274654	*BRAIDWOOD;1U*	*22.*
274655	*BRAIDWOOD;2U*	*21.06*
LTF	*CALDERWOOD*	*0.06*
LTF	*CANNELTON*	*0.09*
LTF	*CARR*	*0.54*
LTF	*CATAWBA*	*0.21*
274890	*CAYUG;1U E*	*8.79*
274891	*CAYUG;2U E*	*8.79*
LTF	*CBM-S1*	*0.91*
LTF	*CBM-W1*	*20.43*

LTF	*CBM-W2*	*38.51*
LTF	*CHEOAH*	*0.06*
LTF	*CHOCTAW /* 35% REVERSE 4566958 4511400*	*< 0.01*
274751	*CRETE EC ;1U*	*3.87*
274752	*CRETE EC ;2U*	*3.87*
274753	*CRETE EC ;3U*	*3.87*
274754	*CRETE EC ;4U*	*3.87*
274859	*EASYR;U1 E*	*8.22*
274860	*EASYR;U2 E*	*8.22*
LTF	*G-007*	*1.52*
LTF	*GIBSON*	*0.05*
290051	*GSG-6; E*	*7.82*
LTF	*HAMLET*	*0.4*
275149	*KEMPTON ;1E*	*12.88*
274704	*KENDALL ;1C*	*3.25*
274705	*KENDALL ;1S*	*2.17*
274706	*KENDALL ;2C*	*3.25*
274707	*KENDALL ;2S*	*2.17*
274661	*LASCO STA;2U*	*20.32*
290108	*LEEDK;1U E*	*18.19*
LTF	*MEC*	*27.81*
293061	*N-015 E*	*11.68*
293516	*O-009 E1*	*6.79*
293517	*O-009 E2*	*3.45*
293518	*O-009 E3*	*3.8*
293715	*O-029 E*	*7.26*
293716	*O-029 E*	*3.98*
293717	*O-029 E*	*3.66*
LTF	*O-066*	*9.77*
293644	*O22 E1*	*8.54*
293645	*O22 E2*	*16.59*
290021	*O50 E*	*14.73*
294392	*P-010 E*	*14.83*
294763	*P-046 E*	*7.02*
274888	*PILOT HIL;1E*	*12.88*
270859	*PWR VTR EC;R*	*9.09*
LTF	*RENSSELAER*	*0.43*
274722	*S-055 E*	*8.49*
295111	*SUBLETTE E*	*2.04*
274861	*TOP CROP ;1U*	*0.38*
274862	*TOP CROP ;2U*	*0.73*
LTF	*TRIMBLE*	*0.56*
LTF	*WEC*	*6.*
295109	*WESTBROOK E*	*4.19*

274687	*WILL CNTY;4U*	*9.27*
915011	*Y3-013 1*	*2.83*
915021	*Y3-013 2*	*2.83*
915031	*Y3-013 3*	*2.83*
916221	*Z1-073 E*	*4.03*
916502	*Z1-106 E1*	*0.95*
916504	*Z1-106 E2*	*0.95*
916512	*Z1-107 E*	*1.86*
916522	*Z1-108 E*	*1.87*
918052	*AA1-018 E*	*11.7*
919221	*AA1-146*	*13.12*
919581	*AA2-030*	*13.12*
920272	*AA2-123 E*	*1.84*
930481	*AB1-089*	*49.32*
930501	*AB1-091 O1*	*50.89*
930741	*AB1-122 1O1*	*53.27*
930751	*AB1-122 2O1*	*56.61*
924471	*AB2-096*	*31.8*
925302	*AB2-191 E*	*1.04*
926311	*AC1-109 1*	*1.43*
926321	*AC1-109 2*	*1.43*
926331	*AC1-110 1*	*1.43*
926341	*AC1-110 2*	*1.43*
926351	*AC1-111 1*	*0.57*
926361	*AC1-111 2*	*0.57*
926371	*AC1-111 3*	*0.57*
926381	*AC1-111 4*	*0.57*
926391	*AC1-111 5*	*0.57*
926401	*AC1-111 6*	*0.57*
927511	*AC1-113 1*	*0.89*
927521	*AC1-113 2*	*0.89*
926431	*AC1-114*	*1.78*
927451	*AC1-142A 1*	*3.22*
927461	*AC1-142A 2*	*3.22*
926821	*AC1-168 C O1*	*0.85*
926822	*AC1-168 E O1*	*5.72*
927091	*AC1-204 1*	*55.48*
927101	*AC1-204 2*	*55.4*

Appendix 4

(MISO NIPS - AEP) The 17STILLWELL-05DUMONT 345 kV line (from bus 255113 to bus 243219 ckt 1) loads from 128.3% to 128.71% (AC power flow) of its emergency rating (1409 MVA) for the line fault with failed breaker contingency outage of 'AEP_P4_#2978_05DUMONT 765_B'. This project contributes approximately 20.6 MW to the thermal violation.

CONTINGENCY 'AEP_P4_#2978_05DUMONT 765_B'
OPEN BRANCH FROM BUS 243206 TO BUS 243207 CKT 1 / 243206 05DUMONT 765 243207 05GRNTWN 765 1
OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1 / 243206 05DUMONT 765 270644 WILTON ; 765 1
END

Bus Number	*Bus Name*	*Full Contribution*
932881	*AC2-115 1*	*2.76*
932891	*AC2-115 2*	*2.76*
932921	*AC2-116*	*0.96*
932931	*AC2-117*	*5.85*
933411	*AC2-154 C*	*3.04*
933412	*AC2-154 E*	*4.96*
933911	*AD1-013 C*	*2.13*
933912	*AD1-013 E*	*3.4*
933931	*AD1-016 C*	*1.07*
933932	*AD1-016 E*	*1.75*
934051	*AD1-031 C O1*	*3.3*
934052	*AD1-031 E O1*	*5.39*
934101	*AD1-039 1*	*8.13*
934111	*AD1-039 2*	*8.37*
934431	*AD1-067 C*	*0.15*
934432	*AD1-067 E*	*0.64*
934701	*AD1-098 C O1*	*7.96*
934702	*AD1-098 E O1*	*5.81*
934721	*AD1-100 C*	*22.58*
934722	*AD1-100 E*	*105.36*
934871	*AD1-116 C*	*1.1*
934872	*AD1-116 E*	*1.79*
934971	*AD1-129 C*	*1.05*
934972	*AD1-129 E*	*0.7*
935001	*AD1-133 C O1*	*24.22*
935002	*AD1-133 E O1*	*16.14*
936291	*AD2-038 C O1*	*2.71*

936292	*AD2-038 E O1*	*18.14*
936371	*AD2-047 C O1*	*5.44*
936372	*AD2-047 E O1*	*26.58*
936461	*AD2-060*	*3.2*
936511	*AD2-066 C O1*	*9.74*
936512	*AD2-066 E O1*	*6.49*
936791	*AD2-102 C*	*16.39*
936792	*AD2-102 E*	*10.93*
937001	*AD2-134 C*	*3.*
937002	*AD2-134 E*	*11.96*
937311	*AD2-172 C*	*2.85*
937312	*AD2-172 E*	*3.94*
937401	*AD2-194 1*	*9.*
937411	*AD2-194 2*	*9.*
937531	*AD2-214 C*	*5.12*
937532	*AD2-214 E*	*3.42*
938511	*AE1-070 1*	*10.58*
938521	*AE1-070 2*	*9.68*
938851	*AE1-113 C O1*	*9.26*
938852	*AE1-113 E O1*	*32.83*
938861	*AE1-114 C O1*	*4.56*
938862	*AE1-114 E O1*	*15.54*
939051	*AE1-134 1*	*1.59*
939061	*AE1-134 2*	*1.59*
939321	*AE1-163 C O1*	*6.81*
939322	*AE1-163 E O1*	*41.83*
939351	*AE1-166 C O1*	*11.86*
939352	*AE1-166 E O1*	*10.95*
939401	*AE1-172 C O1*	*6.16*
939402	*AE1-172 E O1*	*28.85*
939631	*AE1-193 C O1*	*10.3*
939632	*AE1-193 E O1*	*68.91*
939641	*AE1-194 C*	*10.3*
939642	*AE1-194 E*	*68.91*
939651	*AE1-195 C*	*10.3*
939652	*AE1-195 E*	*68.91*
939681	*AE1-198 C O1*	*30.58*
939682	*AE1-198 E O1*	*25.98*
939741	*AE1-205 C O1*	*10.32*
939742	*AE1-205 E O1*	*14.25*
940101	*AE1-252 C O1*	*12.36*
940102	*AE1-252 E O1*	*8.24*
LTF	*BLUEG*	*0.64*
294401	*BSHIL;1U E*	*9.93*
294410	*BSHIL;2U E*	*9.93*

LTF	*CARR*	*0.87*
LTF	*CATAWBA*	*0.19*
274890	*CAYUG;1U E*	*15.86*
274891	*CAYUG;2U E*	*15.86*
LTF	*CBM-S1*	*4.21*
LTF	*CBM-W1*	*36.52*
LTF	*CBM-W2*	*84.42*
LTF	*CHOCTAW /* 35% REVERSE 4566958 4511400*	*< 0.01*
LTF	*CIN*	*3.51*
274859	*EASYR;U1 E*	*12.75*
274860	*EASYR;U2 E*	*12.75*
LTF	*G-007*	*2.42*
290051	*GSG-6; E*	*12.09*
LTF	*HAMLET*	*0.43*
LTF	*IPL*	*1.25*
954751	*J351*	*165.42*
275149	*KEMPTON ;1E*	*22.42*
990901	*L-005 E*	*14.6*
290108	*LEEDK;1U E*	*28.09*
LTF	*MEC*	*45.08*
293061	*N-015 E*	*17.64*
293516	*O-009 E1*	*10.59*
293517	*O-009 E2*	*5.38*
293518	*O-009 E3*	*5.92*
293715	*O-029 E*	*11.32*
293716	*O-029 E*	*6.21*
293717	*O-029 E*	*5.71*
293771	*O-035 E*	*7.42*
LTF	*O-066*	*15.53*
293644	*O22 E1*	*12.02*
293645	*O22 E2*	*23.33*
290021	*O50 E*	*22.45*
294392	*P-010 E*	*22.4*
294763	*P-046 E*	*10.86*
274888	*PILOT HIL;1E*	*22.42*
270859	*PWR VTR EC;R*	*14.01*
LTF	*RENSSELAER*	*0.69*
274724	*RIVER EC ;11*	*5.49*
274722	*S-055 E*	*13.02*
274795	*SE CHICAG;2U*	*1.29*
274788	*SE CHICAG;5U*	*1.31*
274789	*SE CHICAG;6U*	*1.31*
274790	*SE CHICAG;7U*	*1.31*
274791	*SE CHICAG;8U*	*1.31*

295111	*SUBLETTE E*	*3.15*
LTF	*TRIMBLE*	*0.12*
LTF	*WEC*	*9.25*
295109	*WESTBROOK E*	*6.48*
910542	*X3-005 E*	*1.*
915011	*Y3-013 1*	*4.34*
915021	*Y3-013 2*	*4.34*
915031	*Y3-013 3*	*4.34*
916211	*Z1-072 E*	*5.61*
916221	*Z1-073 E*	*6.24*
916502	*Z1-106 E1*	*1.46*
916504	*Z1-106 E2*	*1.46*
916512	*Z1-107 E*	*3.05*
916522	*Z1-108 E*	*2.88*
917502	*Z2-087 E*	*21.38*
918052	*AA1-018 E*	*18.85*
919221	*AA1-146*	*20.41*
919581	*AA2-030*	*20.41*
920272	*AA2-123 E*	*2.83*
930481	*AB1-089*	*76.13*
930501	*AB1-091 O1*	*88.69*
930741	*AB1-122 1O1*	*82.91*
930751	*AB1-122 2O1*	*85.44*
924041	*AB2-047 C O1*	*3.99*
924042	*AB2-047 E O1*	*26.73*
924471	*AB2-096*	*49.02*
925302	*AB2-191 E*	*1.6*
925581	*AC1-033 C*	*1.63*
925582	*AC1-033 E*	*10.89*
926311	*AC1-109 1*	*2.2*
926321	*AC1-109 2*	*2.2*
926331	*AC1-110 1*	*2.19*
926341	*AC1-110 2*	*2.19*
926351	*AC1-111 1*	*0.88*
926361	*AC1-111 2*	*0.88*
926371	*AC1-111 3*	*0.88*
926381	*AC1-111 4*	*0.88*
926391	*AC1-111 5*	*0.88*
926401	*AC1-111 6*	*0.88*
927511	*AC1-113 1*	*1.38*
927521	*AC1-113 2*	*1.38*
926431	*AC1-114*	*2.76*
927451	*AC1-142A 1*	*4.86*
927461	*AC1-142A 2*	*4.86*
926821	*AC1-168 C O1*	*1.33*

926822	*AC1-168 E O1*	*8.91*
927091	*AC1-204 1*	*83.73*
927101	*AC1-204 2*	*83.7*
927201	*AC1-214 C O1*	*2.38*
927202	*AC1-214 E O1*	*7.57*

Appendix 5

(CE - CE) The BRAIDWOOD; B-BRAIDWOOD; R 345 kV line (from bus 270670 to bus 270671 ckt 1) loads from 127.7% to 130.93% (AC power flow) of its load dump rating (1341 MVA) for the line fault with failed breaker contingency outage of 'ADD AD1-100 5'. This project contributes approximately 43.4 MW to the thermal violation.

CONTINGENCY 'ADD AD1-100 5'
OPEN BRANCH FROM BUS 934730 TO BUS 270710 CKT 1 / AD1-100 - DAVIS CREEK
OPEN BRANCH FROM BUS 934720 TO BUS 937030 CKT 1 / AD1-100 - AD2-137 TAP (WILTON)
END

Bus Number	*Bus Name*	*Full Contribution*
934721	*AD1-100 C*	*62.25*
934722	*AD1-100 E*	*290.51*
935001	*AD1-133 C O1*	*15.08*
935002	*AD1-133 E O1*	*10.06*
935141	*AD1-148*	*4.56*
937211	*AD2-159 C*	*3.8*
937212	*AD2-159 E*	*17.79*
939351	*AE1-166 C O1*	*34.51*
939352	*AE1-166 E O1*	*31.86*
939401	*AE1-172 C O1*	*12.99*
939402	*AE1-172 E O1*	*60.79*
939741	*AE1-205 C O1*	*14.09*
939742	*AE1-205 E O1*	*19.46*
940101	*AE1-252 C O1*	*26.04*
940102	*AE1-252 E O1*	*17.36*
274654	*BRAIDWOOD;1U*	*104.01*
274890	*CAYUG;1U E*	*29.51*
274891	*CAYUG;2U E*	*29.51*
274863	*CAYUGA RI;1U*	*1.3*
274864	*CAYUGA RI;2U*	*1.3*
LTF	*CBM-N*	*0.11*
LTF	*CBM-S1*	*3.67*
LTF	*CBM-S2*	*1.02*
LTF	*CBM-W2*	*45.27*
LTF	*CIN*	*3.71*
LTF	*CPLE*	*0.34*
LTF	*G-007A*	*0.38*
LTF	*IPL*	*1.98*
951741	*J474 C*	*1.72*

951742	*J474 E*	*9.29*
953741	*J826 C*	*1.05*
953742	*J826 E*	*5.69*
LTF	*LGEE*	*0.51*
LTF	*MEC*	*4.89*
LTF	*NYISO*	*0.46*
290261	*S-027 E*	*21.92*
290265	*S-028 E*	*21.92*
274853	*TWINGROVE;U1*	*0.97*
274854	*TWINGROVE;U2*	*0.97*
LTF	*VFT*	*1.02*
276150	*W2-048 E*	*1.26*
905081	*W4-005 C*	*0.93*
905082	*W4-005 E*	*29.99*
909052	*X2-022 E*	*17.44*
917501	*Z2-087 C*	*0.77*
917502	*Z2-087 E*	*29.19*
924041	*AB2-047 C O1*	*5.45*
924042	*AB2-047 E O1*	*36.49*
924261	*AB2-070 C O1*	*2.57*
924262	*AB2-070 E O1*	*17.23*
925771	*AC1-053 C*	*2.52*
925772	*AC1-053 E*	*16.9*

Appendix 6

(CE - AEP) The GREENACRE; T-05OLIVE 345 kV line (from bus 270771 to bus 243229 ckt 1) loads from 113.05% to 113.12% (AC power flow) of its emergency rating (971 MVA) for the line fault with failed breaker contingency outage of 'AEP_P4_#2978_05DUMONT 765_B'. This project contributes approximately 11.7 MW to the thermal violation.

CONTINGENCY 'AEP_P4_#2978_05DUMONT 765_B'
OPEN BRANCH FROM BUS 243206 TO BUS 243207 CKT 1 / 243206 05DUMONT 765 243207 05GRNTWN 765 1
OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1 / 243206 05DUMONT 765 270644 WILTON ; 765 1
END

Bus Number	*Bus Name*	*Full Contribution*
932881	*AC2-115 1*	*1.59*
932891	*AC2-115 2*	*1.59*
932921	*AC2-116*	*0.56*
933411	*AC2-154 C*	*1.69*
933412	*AC2-154 E*	*2.76*
933911	*AD1-013 C*	*1.23*
933912	*AD1-013 E*	*1.96*
933931	*AD1-016 C*	*0.62*
933932	*AD1-016 E*	*1.02*
934051	*AD1-031 C O1*	*1.88*
934052	*AD1-031 E O1*	*3.07*
934101	*AD1-039 1*	*4.69*
934111	*AD1-039 2*	*4.9*
934431	*AD1-067 C*	*0.09*
934432	*AD1-067 E*	*0.37*
934701	*AD1-098 C O1*	*4.6*
934702	*AD1-098 E O1*	*3.35*
934721	*AD1-100 C*	*13.01*
934722	*AD1-100 E*	*60.71*
934871	*AD1-116 C*	*0.62*
934872	*AD1-116 E*	*1.01*
934971	*AD1-129 C*	*0.61*
934972	*AD1-129 E*	*0.4*
935001	*AD1-133 C O1*	*13.81*
935002	*AD1-133 E O1*	*9.21*
936291	*AD2-038 C O1*	*1.55*
936292	*AD2-038 E O1*	*10.38*
936371	*AD2-047 C O1*	*3.03*

936372	*AD2-047 E O1*	*14.78*
936461	*AD2-060*	*1.78*
936511	*AD2-066 C O1*	*5.6*
936512	*AD2-066 E O1*	*3.73*
936791	*AD2-102 C*	*9.47*
936792	*AD2-102 E*	*6.31*
937001	*AD2-134 C*	*1.73*
937002	*AD2-134 E*	*6.9*
937311	*AD2-172 C*	*1.65*
937312	*AD2-172 E*	*2.27*
937401	*AD2-194 1*	*5.27*
937411	*AD2-194 2*	*5.27*
937531	*AD2-214 C*	*2.94*
937532	*AD2-214 E*	*1.96*
938511	*AE1-070 1*	*6.19*
938521	*AE1-070 2*	*5.66*
938851	*AE1-113 C O1*	*5.39*
938852	*AE1-113 E O1*	*19.1*
938861	*AE1-114 C O1*	*2.63*
938862	*AE1-114 E O1*	*8.96*
939051	*AE1-134 1*	*0.91*
939061	*AE1-134 2*	*0.91*
939321	*AE1-163 C O1*	*3.9*
939322	*AE1-163 E O1*	*23.94*
939351	*AE1-166 C O1*	*6.87*
939352	*AE1-166 E O1*	*6.34*
939401	*AE1-172 C O1*	*3.5*
939402	*AE1-172 E O1*	*16.4*
939631	*AE1-193 C O1*	*10.91*
939632	*AE1-193 E O1*	*73.04*
939641	*AE1-194 C*	*10.91*
939642	*AE1-194 E*	*73.04*
939651	*AE1-195 C*	*10.91*
939652	*AE1-195 E*	*73.04*
939681	*AE1-198 C O1*	*32.41*
939682	*AE1-198 E O1*	*27.54*
939741	*AE1-205 C O1*	*5.79*
939742	*AE1-205 E O1*	*8.*
940101	*AE1-252 C O1*	*7.02*
940102	*AE1-252 E O1*	*4.68*
LTF	*BLUEG*	*2.63*
294401	*BSHIL;1U E*	*5.66*
294410	*BSHIL;2U E*	*5.66*
LTF	*CARR*	*0.48*
LTF	*CATAWBA*	*0.15*

274890	CAYUG;1U E	8.97
274891	CAYUG;2U E	8.97
LTF	CBM-S1	1.49
LTF	CBM-W1	20.35
LTF	CBM-W2	39.71
LTF	CHOCTAW /* 35% REVERSE 4566958 4511400	< 0.01
LTF	CIN	0.23
274751	CRETE EC ;1U	2.22
274752	CRETE EC ;2U	2.22
274753	CRETE EC ;3U	2.22
274754	CRETE EC ;4U	2.22
274859	EASYR;U1 E	7.34
274860	EASYR;U2 E	7.34
LTF	G-007	1.33
290051	GSG-6; E	6.98
LTF	HAMLET	0.3
953871	J847	2.7
275149	KEMPTON ;1E	12.46
990901	L-005 E	8.29
290108	LEEDK;1U E	16.23
LTF	MEC	25.26
293061	N-015 E	10.29
293516	O-009 E1	6.08
293517	O-009 E2	3.09
293518	O-009 E3	3.4
293715	O-029 E	6.5
293716	O-029 E	3.56
293717	O-029 E	3.28
293771	O-035 E	4.23
LTF	O-066	8.55
293644	O22 E1	7.28
293645	O22 E2	14.13
290021	O50 E	13.06
294392	P-010 E	13.07
294763	P-046 E	6.27
274888	PILOT HIL;1E	12.46
270859	PWR VTR EC;R	8.1
LTF	RENSSELAER	0.38
274722	S-055 E	7.56
295111	SUBLETTE E	1.82
LTF	TRIMBLE	0.32
LTF	WEC	5.35
295109	WESTBROOK E	3.74
910542	X3-005 E	0.52

915011	*Y3-013 1*	*2.52*
915021	*Y3-013 2*	*2.52*
915031	*Y3-013 3*	*2.52*
916211	*Z1-072 E*	*3.2*
916221	*Z1-073 E*	*3.6*
916502	*Z1-106 E1*	*0.85*
916504	*Z1-106 E2*	*0.85*
916512	*Z1-107 E*	*1.72*
916522	*Z1-108 E*	*1.67*
917502	*Z2-087 E*	*11.99*
918052	*AA1-018 E*	*10.68*
919221	*AA1-146*	*11.73*
919581	*AA2-030*	*11.73*
920272	*AA2-123 E*	*1.64*
930481	*AB1-089*	*44.01*
930501	*AB1-091 O1*	*49.4*
930741	*AB1-122 1O1*	*47.85*
930751	*AB1-122 2O1*	*50.02*
924041	*AB2-047 C O1*	*2.24*
924042	*AB2-047 E O1*	*14.99*
924471	*AB2-096*	*28.36*
925302	*AB2-191 E*	*0.92*
925581	*AC1-033 C*	*0.93*
925582	*AC1-033 E*	*6.21*
926311	*AC1-109 1*	*1.28*
926321	*AC1-109 2*	*1.28*
926331	*AC1-110 1*	*1.27*
926341	*AC1-110 2*	*1.27*
926351	*AC1-111 1*	*0.51*
926361	*AC1-111 2*	*0.51*
926371	*AC1-111 3*	*0.51*
926381	*AC1-111 4*	*0.51*
926391	*AC1-111 5*	*0.51*
926401	*AC1-111 6*	*0.51*
927511	*AC1-113 1*	*0.8*
927521	*AC1-113 2*	*0.8*
926431	*AC1-114*	*1.59*
927451	*AC1-142A 1*	*2.85*
927461	*AC1-142A 2*	*2.85*
926821	*AC1-168 C O1*	*0.76*
926822	*AC1-168 E O1*	*5.11*
927091	*AC1-204 1*	*49.02*
927101	*AC1-204 2*	*48.98*
927201	*AC1-214 C O1*	*1.36*
927202	*AC1-214 E O1*	*4.32*

Appendix 7

(CE - MISO NIPS) The ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 132.31% to 133.29% (AC power flow) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_023-65-BT2-3__'. This project contributes approximately 12.79 MW to the thermal violation.

CONTINGENCY 'COMED_P4_023-65-BT2-3__'
TRIP BRANCH FROM BUS 270644 TO BUS 243206 CKT 1 / WILTO; 765 05DUMONT 765
TRIP BRANCH FROM BUS 270607 TO BUS 270630 CKT 1 / COLLI; 765 PLANO; 765
END

Bus Number	*Bus Name*	*Full Contribution*
932881	*AC2-115 1*	*1.78*
932891	*AC2-115 2*	*1.78*
932921	*AC2-116*	*0.62*
933411	*AC2-154 C*	*1.75*
933412	*AC2-154 E*	*2.85*
933911	*AD1-013 C*	*1.38*
933912	*AD1-013 E*	*2.2*
933931	*AD1-016 C*	*0.7*
933932	*AD1-016 E*	*1.14*
934101	*AD1-039 1*	*5.22*
934111	*AD1-039 2*	*5.55*
934431	*AD1-067 C*	*0.1*
934432	*AD1-067 E*	*0.41*
934701	*AD1-098 C O1*	*5.14*
934702	*AD1-098 E O1*	*3.76*
934721	*AD1-100 C*	*14.35*
934722	*AD1-100 E*	*66.95*
934871	*AD1-116 C*	*0.68*
934872	*AD1-116 E*	*1.11*
934971	*AD1-129 C*	*0.68*
934972	*AD1-129 E*	*0.45*
935001	*AD1-133 C O1*	*15.25*
935002	*AD1-133 E O1*	*10.17*
936291	*AD2-038 C O1*	*1.72*
936292	*AD2-038 E O1*	*11.52*
936371	*AD2-047 C O1*	*3.13*
936372	*AD2-047 E O1*	*15.27*
936461	*AD2-060*	*1.84*

936511	*AD2-066 C O1*	*6.23*
936512	*AD2-066 E O1*	*4.15*
936791	*AD2-102 C*	*10.6*
936792	*AD2-102 E*	*7.07*
937001	*AD2-134 C*	*1.94*
937002	*AD2-134 E*	*7.73*
937311	*AD2-172 C*	*1.84*
937312	*AD2-172 E*	*2.54*
937401	*AD2-194 1*	*5.97*
937411	*AD2-194 2*	*5.96*
938511	*AE1-070 1*	*7.01*
938521	*AE1-070 2*	*6.4*
938851	*AE1-113 C O1*	*6.08*
938852	*AE1-113 E O1*	*21.55*
938861	*AE1-114 C O1*	*2.94*
938862	*AE1-114 E O1*	*10.02*
939051	*AE1-134 1*	*1.02*
939061	*AE1-134 2*	*1.02*
939321	*AE1-163 C O1*	*4.32*
939322	*AE1-163 E O1*	*26.57*
939351	*AE1-166 C O1*	*7.64*
939352	*AE1-166 E O1*	*7.05*
939401	*AE1-172 C O1*	*3.83*
939402	*AE1-172 E O1*	*17.91*
939631	*AE1-193 C O1*	*18.99*
939632	*AE1-193 E O1*	*127.09*
939641	*AE1-194 C*	*18.99*
939642	*AE1-194 E*	*127.09*
939651	*AE1-195 C*	*18.99*
939652	*AE1-195 E*	*127.09*
939681	*AE1-198 C O1*	*56.38*
939682	*AE1-198 E O1*	*47.91*
940101	*AE1-252 C O1*	*7.67*
940102	*AE1-252 E O1*	*5.12*
LTF	*BLUEG*	*4.79*
274654	*BRAIDWOOD;1U*	*22.*
274655	*BRAIDWOOD;2U*	*21.06*
LTF	*CALDERWOOD*	*0.06*
LTF	*CANNELTON*	*0.09*
LTF	*CARR*	*0.54*
LTF	*CATAWBA*	*0.21*
274890	*CAYUG;1U E*	*8.79*
274891	*CAYUG;2U E*	*8.79*
LTF	*CBM-S1*	*0.91*
LTF	*CBM-W1*	*20.43*

LTF	*CBM-W2*	*38.51*
LTF	*CHEOAH*	*0.06*
LTF	*CHOCTAW /* 35% REVERSE 4566958 4511400*	*< 0.01*
274751	*CRETE EC ;1U*	*3.87*
274752	*CRETE EC ;2U*	*3.87*
274753	*CRETE EC ;3U*	*3.87*
274754	*CRETE EC ;4U*	*3.87*
274859	*EASYR;U1 E*	*8.22*
274860	*EASYR;U2 E*	*8.22*
LTF	*G-007*	*1.52*
LTF	*GIBSON*	*0.05*
290051	*GSG-6; E*	*7.82*
LTF	*HAMLET*	*0.4*
275149	*KEMPTON ;1E*	*12.88*
274704	*KENDALL ;1C*	*3.25*
274705	*KENDALL ;1S*	*2.17*
274706	*KENDALL ;2C*	*3.25*
274707	*KENDALL ;2S*	*2.17*
274661	*LASCO STA;2U*	*20.32*
290108	*LEEDK;1U E*	*18.19*
LTF	*MEC*	*27.81*
293061	*N-015 E*	*11.68*
293516	*O-009 E1*	*6.79*
293517	*O-009 E2*	*3.45*
293518	*O-009 E3*	*3.8*
293715	*O-029 E*	*7.26*
293716	*O-029 E*	*3.98*
293717	*O-029 E*	*3.66*
LTF	*O-066*	*9.77*
293644	*O22 E1*	*8.54*
293645	*O22 E2*	*16.59*
290021	*O50 E*	*14.73*
294392	*P-010 E*	*14.83*
294763	*P-046 E*	*7.02*
274888	*PILOT HIL;1E*	*12.88*
270859	*PWR VTR EC;R*	*9.09*
LTF	*RENSSELAER*	*0.43*
274722	*S-055 E*	*8.49*
295111	*SUBLETTE E*	*2.04*
274861	*TOP CROP ;1U*	*0.38*
274862	*TOP CROP ;2U*	*0.73*
LTF	*TRIMBLE*	*0.56*
LTF	*WEC*	*6.*
295109	*WESTBROOK E*	*4.19*

274687	*WILL CNTY;4U*	*9.27*
915011	*Y3-013 1*	*2.83*
915021	*Y3-013 2*	*2.83*
915031	*Y3-013 3*	*2.83*
916221	*Z1-073 E*	*4.03*
916502	*Z1-106 E1*	*0.95*
916504	*Z1-106 E2*	*0.95*
916512	*Z1-107 E*	*1.86*
916522	*Z1-108 E*	*1.87*
918052	*AA1-018 E*	*11.7*
919221	*AA1-146*	*13.12*
919581	*AA2-030*	*13.12*
920272	*AA2-123 E*	*1.84*
930481	*AB1-089*	*49.32*
930501	*AB1-091 O1*	*50.89*
930741	*AB1-122 1O1*	*53.27*
930751	*AB1-122 2O1*	*56.61*
924471	*AB2-096*	*31.8*
925302	*AB2-191 E*	*1.04*
926311	*AC1-109 1*	*1.43*
926321	*AC1-109 2*	*1.43*
926331	*AC1-110 1*	*1.43*
926341	*AC1-110 2*	*1.43*
926351	*AC1-111 1*	*0.57*
926361	*AC1-111 2*	*0.57*
926371	*AC1-111 3*	*0.57*
926381	*AC1-111 4*	*0.57*
926391	*AC1-111 5*	*0.57*
926401	*AC1-111 6*	*0.57*
927511	*AC1-113 1*	*0.89*
927521	*AC1-113 2*	*0.89*
926431	*AC1-114*	*1.78*
927451	*AC1-142A 1*	*3.22*
927461	*AC1-142A 2*	*3.22*
926821	*AC1-168 C O1*	*0.85*
926822	*AC1-168 E O1*	*5.72*
927091	*AC1-204 1*	*55.48*
927101	*AC1-204 2*	*55.4*

Appendix 8

(CE - CE) The WILTON ; B-WILTON ;3M 345 kV line (from bus 270926 to bus 275232 ckt 1) loads from 116.24% to 117.98% (AC power flow) of its load dump rating (1379 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT5-6__'. This project contributes approximately 27.17 MW to the thermal violation.

CONTINGENCY 'COMED_P4_112-65-BT5-6__'
TRIP BRANCH FROM BUS 270644 TO BUS 270607 CKT 1 / WILTO; 765 COLLI; 765
TRIP BRANCH FROM BUS 275233 TO BUS 270644 CKT 1 / WILTO;4M 345 WILTO; 765
TRIP BRANCH FROM BUS 275233 TO BUS 270927 CKT 1 / WILTO;4M 345 WILTO; R 345
TRIP BRANCH FROM BUS 275233 TO BUS 275333 CKT 1 / WILTO;4M 345 WILTO;4C 33
END

Bus Number	*Bus Name*	*Full Contribution*
932881	*AC2-115 1*	*2.93*
932891	*AC2-115 2*	*2.93*
932921	*AC2-116*	*1.03*
932931	*AC2-117*	*6.56*
933411	*AC2-154 C*	*3.22*
933412	*AC2-154 E*	*5.25*
933911	*AD1-013 C*	*2.27*
933912	*AD1-013 E*	*3.62*
933931	*AD1-016 C*	*1.14*
933932	*AD1-016 E*	*1.86*
934051	*AD1-031 C O1*	*3.54*
934052	*AD1-031 E O1*	*5.77*
934101	*AD1-039 1*	*8.8*
934111	*AD1-039 2*	*8.9*
934431	*AD1-067 C*	*0.16*
934432	*AD1-067 E*	*0.68*
934701	*AD1-098 C O1*	*8.47*
934702	*AD1-098 E O1*	*6.18*
934721	*AD1-100 C*	*29.56*
934722	*AD1-100 E*	*137.94*
934871	*AD1-116 C*	*1.18*
934872	*AD1-116 E*	*1.92*
934971	*AD1-129 C*	*1.11*
934972	*AD1-129 E*	*0.74*

935001	*AD1-133 C O1*	*27.56*
935002	*AD1-133 E O1*	*18.38*
936291	*AD2-038 C O1*	*2.9*
936292	*AD2-038 E O1*	*19.39*
936371	*AD2-047 C O1*	*5.76*
936372	*AD2-047 E O1*	*28.14*
936461	*AD2-060*	*3.39*
936511	*AD2-066 C O1*	*10.42*
936512	*AD2-066 E O1*	*6.95*
936791	*AD2-102 C*	*17.41*
936792	*AD2-102 E*	*11.6*
937001	*AD2-134 C*	*3.19*
937002	*AD2-134 E*	*12.73*
937311	*AD2-172 C*	*3.03*
937312	*AD2-172 E*	*4.18*
937401	*AD2-194 1*	*9.61*
937411	*AD2-194 2*	*9.61*
937531	*AD2-214 C*	*5.44*
937532	*AD2-214 E*	*3.63*
938511	*AE1-070 1*	*11.29*
938521	*AE1-070 2*	*10.33*
938851	*AE1-113 C O1*	*9.85*
938852	*AE1-113 E O1*	*34.92*
938861	*AE1-114 C O1*	*4.84*
938862	*AE1-114 E O1*	*16.51*
939051	*AE1-134 1*	*1.68*
939061	*AE1-134 2*	*1.68*
939321	*AE1-163 C O1*	*7.28*
939322	*AE1-163 E O1*	*44.73*
939351	*AE1-166 C O1*	*14.59*
939352	*AE1-166 E O1*	*13.47*
939401	*AE1-172 C O1*	*8.13*
939402	*AE1-172 E O1*	*38.05*
939741	*AE1-205 C O1*	*12.5*
939742	*AE1-205 E O1*	*17.27*
940101	*AE1-252 C O1*	*16.3*
940102	*AE1-252 E O1*	*10.87*
LTF	*BLUEG*	*7.45*
294401	*BSHIL;1U E*	*10.64*
294410	*BSHIL;2U E*	*10.64*
LTF	*CALDERWOOD*	*0.05*
LTF	*CANNELTON*	*0.06*
LTF	*CARR*	*0.93*
LTF	*CATAWBA*	*0.36*
274890	*CAYUG;1U E*	*20.35*

274891	CAYUG;2U E	20.35
LTF	CBM-S1	2.09
LTF	CBM-W1	37.96
LTF	CBM-W2	73.38
LTF	CHEOAH	0.06
LTF	CHOCTAW /* 35% REVERSE 4566958 4511400	< 0.01
LTF	CIN	0.17
274859	EASYR;U1 E	13.54
274860	EASYR;U2 E	13.54
LTF	G-007	2.61
290051	GSG-6; E	12.87
LTF	HAMLET	0.68
275149	KEMPTON ;1E	23.73
990901	L-005 E	15.65
290108	LEEDK;1U E	29.9
274772	LINCOLN ;3U	3.87
274773	LINCOLN ;4U	3.87
274774	LINCOLN ;5U	3.87
274775	LINCOLN ;6U	3.87
274776	LINCOLN ;7U	3.87
274777	LINCOLN ;8U	3.87
LTF	MEC	46.95
293061	N-015 E	19.54
293516	O-009 E1	11.26
293517	O-009 E2	5.72
293518	O-009 E3	6.3
293715	O-029 E	12.04
293716	O-029 E	6.6
293717	O-029 E	6.07
293771	O-035 E	7.97
LTF	O-066	16.73
293644	O22 E1	12.62
293645	O22 E2	24.5
290021	O50 E	23.88
294392	P-010 E	24.82
294763	P-046 E	11.54
274888	PILOT HIL;1E	23.73
270859	PWR VTR EC;R	14.89
LTF	RENSSELAER	0.73
290261	S-027 E	20.54
290265	S-028 E	20.54
274722	S-055 E	13.83
295111	SUBLETTE E	3.35
LTF	TRIMBLE	0.89

LTF	WEC	9.8
295109	WESTBROOK E	6.89
910542	X3-005 E	0.9
915011	Y3-013 1	4.61
915021	Y3-013 2	4.61
915031	Y3-013 3	4.61
916211	Z1-072 E	6.03
916221	Z1-073 E	6.64
916502	Z1-106 E1	1.56
916504	Z1-106 E2	1.56
916512	Z1-107 E	3.18
916522	Z1-108 E	3.06
917502	Z2-087 E	25.9
918052	AA1-018 E	20.24
919221	AA1-146	21.67
919581	AA2-030	21.67
920272	AA2-123 E	3.01
930481	AB1-089	80.94
930501	AB1-091 O1	94.42
930741	AB1-122 1O1	89.83
930751	AB1-122 2O1	90.78
924041	AB2-047 C O1	4.84
924042	AB2-047 E O1	32.38
924471	AB2-096	52.12
925302	AB2-191 E	1.7
925581	AC1-033 C	1.74
925582	AC1-033 E	11.67
926311	AC1-109 1	2.35
926321	AC1-109 2	2.35
926331	AC1-110 1	2.34
926341	AC1-110 2	2.34
926351	AC1-111 1	0.94
926361	AC1-111 2	0.94
926371	AC1-111 3	0.94
926381	AC1-111 4	0.94
926391	AC1-111 5	0.94
926401	AC1-111 6	0.94
927511	AC1-113 1	1.46
927521	AC1-113 2	1.46
926431	AC1-114	2.93
927451	AC1-142A 1	5.15
927461	AC1-142A 2	5.15
926821	AC1-168 C O1	1.44
926822	AC1-168 E O1	9.65
927091	AC1-204 1	89.38

927101	*AC1-204 2*	*89.38*
927201	*AC1-214 C O1*	*2.56*
927202	*AC1-214 E O1*	*8.13*

Appendix 9

(CE - CE) The WILTON ; R-WILTON ;4M 345 kV line (from bus 270927 to bus 275233 ckt 1) loads from 118.65% to 120.43% (AC power flow) of its load dump rating (1379 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT2-3__'. This project contributes approximately 27.7 MW to the thermal violation.

CONTINGENCY 'COMED_P4_112-65-BT2-3__'
TRIP BRANCH FROM BUS 270644 TO BUS 270607 CKT 1 / WILTO; 765 COLLI; 765
TRIP BRANCH FROM BUS 275232 TO BUS 270644 CKT 1 / WILTO;3M 345 WILTO; 765
TRIP BRANCH FROM BUS 275232 TO BUS 270926 CKT 1 / WILTO;3M 345 WILTO; B 345
TRIP BRANCH FROM BUS 275232 TO BUS 275332 CKT 1 / WILTO;3M 345 WILTO;3C 33
END

Bus Number	*Bus Name*	*Full Contribution*
932881	*AC2-115 1*	*2.99*
932891	*AC2-115 2*	*2.99*
932921	*AC2-116*	*1.05*
932931	*AC2-117*	*6.7*
933411	*AC2-154 C*	*3.29*
933412	*AC2-154 E*	*5.36*
933911	*AD1-013 C*	*2.31*
933912	*AD1-013 E*	*3.7*
933931	*AD1-016 C*	*1.17*
933932	*AD1-016 E*	*1.9*
934051	*AD1-031 C O1*	*3.61*
934052	*AD1-031 E O1*	*5.9*
934101	*AD1-039 1*	*8.99*
934111	*AD1-039 2*	*9.09*
934431	*AD1-067 C*	*0.17*
934432	*AD1-067 E*	*0.69*
934701	*AD1-098 C O1*	*8.65*
934702	*AD1-098 E O1*	*6.32*
934721	*AD1-100 C*	*30.14*
934722	*AD1-100 E*	*140.67*
934871	*AD1-116 C*	*1.2*
934872	*AD1-116 E*	*1.96*
934971	*AD1-129 C*	*1.14*
934972	*AD1-129 E*	*0.76*

935001	*AD1-133 C O1*	*28.14*
935002	*AD1-133 E O1*	*18.76*
936291	*AD2-038 C O1*	*2.96*
936292	*AD2-038 E O1*	*19.81*
936371	*AD2-047 C O1*	*5.88*
936372	*AD2-047 E O1*	*28.72*
936461	*AD2-060*	*3.46*
936511	*AD2-066 C O1*	*10.64*
936512	*AD2-066 E O1*	*7.09*
936791	*AD2-102 C*	*17.78*
936792	*AD2-102 E*	*11.85*
937001	*AD2-134 C*	*3.26*
937002	*AD2-134 E*	*13.*
937311	*AD2-172 C*	*3.09*
937312	*AD2-172 E*	*4.27*
937401	*AD2-194 1*	*9.82*
937411	*AD2-194 2*	*9.82*
937531	*AD2-214 C*	*5.55*
937532	*AD2-214 E*	*3.7*
938511	*AE1-070 1*	*11.54*
938521	*AE1-070 2*	*10.55*
938851	*AE1-113 C O1*	*10.06*
938852	*AE1-113 E O1*	*35.67*
938861	*AE1-114 C O1*	*4.94*
938862	*AE1-114 E O1*	*16.87*
939051	*AE1-134 1*	*1.72*
939061	*AE1-134 2*	*1.72*
939321	*AE1-163 C O1*	*7.44*
939322	*AE1-163 E O1*	*45.7*
939351	*AE1-166 C O1*	*14.88*
939352	*AE1-166 E O1*	*13.74*
939401	*AE1-172 C O1*	*8.29*
939402	*AE1-172 E O1*	*38.81*
939741	*AE1-205 C O1*	*12.76*
939742	*AE1-205 E O1*	*17.62*
940101	*AE1-252 C O1*	*16.62*
940102	*AE1-252 E O1*	*11.08*
LTF	*BLUEG*	*7.61*
294401	*BSHIL;1U E*	*10.87*
294410	*BSHIL;2U E*	*10.87*
LTF	*CALDERWOOD*	*0.05*
LTF	*CANNELTON*	*0.06*
LTF	*CARR*	*0.95*
LTF	*CATAWBA*	*0.36*
274890	*CAYUG;1U E*	*20.76*

274891	CAYUG;2U E	20.76
LTF	CBM-S1	2.13
LTF	CBM-W1	38.77
LTF	CBM-W2	74.91
LTF	CHEOAH	0.06
LTF	CHOCTAW /* 35% REVERSE 4566958 4511400	< 0.01
LTF	CIN	0.17
274859	EASYR;U1 E	13.83
274860	EASYR;U2 E	13.83
LTF	G-007	2.66
290051	GSG-6; E	13.15
LTF	HAMLET	0.69
275149	KEMPTON ;1E	24.23
990901	L-005 E	15.98
290108	LEEDK;1U E	30.54
274772	LINCOLN ;3U	3.98
274773	LINCOLN ;4U	3.98
274774	LINCOLN ;5U	3.98
274775	LINCOLN ;6U	3.98
274776	LINCOLN ;7U	3.98
274777	LINCOLN ;8U	3.98
LTF	MEC	47.95
293061	N-015 E	19.95
293516	O-009 E1	11.5
293517	O-009 E2	5.84
293518	O-009 E3	6.43
293715	O-029 E	12.29
293716	O-029 E	6.74
293717	O-029 E	6.2
293771	O-035 E	8.13
LTF	O-066	17.09
293644	O22 E1	12.89
293645	O22 E2	25.02
290021	O50 E	24.39
294392	P-010 E	25.34
294763	P-046 E	11.79
274888	PILOT HIL;1E	24.23
270859	PWR VTR EC;R	15.21
LTF	RENSSELAER	0.75
290261	S-027 E	20.95
290265	S-028 E	20.95
274722	S-055 E	14.12
295111	SUBLETTE E	3.42
LTF	TRIMBLE	0.91

LTF	WEC	10.01
295109	WESTBROOK E	7.04
910542	X3-005 E	0.92
915011	Y3-013 1	4.71
915021	Y3-013 2	4.71
915031	Y3-013 3	4.71
916211	Z1-072 E	6.16
916221	Z1-073 E	6.78
916502	Z1-106 E1	1.59
916504	Z1-106 E2	1.59
916512	Z1-107 E	3.25
916522	Z1-108 E	3.13
917502	Z2-087 E	26.43
918052	AA1-018 E	20.68
919221	AA1-146	22.13
919581	AA2-030	22.13
920272	AA2-123 E	3.07
930481	AB1-089	82.66
930501	AB1-091 O1	96.38
930741	AB1-122 1O1	91.73
930751	AB1-122 2O1	92.72
924041	AB2-047 C O1	4.94
924042	AB2-047 E O1	33.03
924471	AB2-096	53.23
925302	AB2-191 E	1.74
925581	AC1-033 C	1.78
925582	AC1-033 E	11.91
926311	AC1-109 1	2.4
926321	AC1-109 2	2.4
926331	AC1-110 1	2.39
926341	AC1-110 2	2.39
926351	AC1-111 1	0.96
926361	AC1-111 2	0.96
926371	AC1-111 3	0.96
926381	AC1-111 4	0.96
926391	AC1-111 5	0.96
926401	AC1-111 6	0.96
927511	AC1-113 1	1.5
927521	AC1-113 2	1.5
926431	AC1-114	2.99
927451	AC1-142A 1	5.26
927461	AC1-142A 2	5.26
926821	AC1-168 C O1	1.47
926822	AC1-168 E O1	9.85
927091	AC1-204 1	91.3

927101	*AC1-204 2*	*91.3*
927201	*AC1-214 C O1*	*2.61*
927202	*AC1-214 E O1*	*8.3*

Appendix 10

(CE - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line (from bus 274750 to bus 255112 ckt 1) loads from 162.01% to 163.1% (AC power flow) of its emergency rating (1399 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT4-5__'. This project contributes approximately 17.69 MW to the thermal violation.

CONTINGENCY 'COMED_P4_112-65-BT4-5__'
TRIP BRANCH FROM BUS 270644 TO BUS 243206 CKT 1 / WILTO; 765 05DUMONT 765
TRIP BRANCH FROM BUS 275233 TO BUS 270644 CKT 1 / WILTO;4M 345 WILTO; 765
TRIP BRANCH FROM BUS 275233 TO BUS 270927 CKT 1 / WILTO;4M 345 WILTO; R 345
TRIP BRANCH FROM BUS 275233 TO BUS 275333 CKT 1 / WILTO;4M 345 WILTO;4C 33
END

Bus Number	*Bus Name*	*Full Contribution*
932881	*AC2-115 1*	*2.5*
932891	*AC2-115 2*	*2.5*
932921	*AC2-116*	*0.87*
933411	*AC2-154 C*	*2.32*
933412	*AC2-154 E*	*3.78*
933911	*AD1-013 C*	*1.92*
933912	*AD1-013 E*	*3.07*
933931	*AD1-016 C*	*0.98*
933932	*AD1-016 E*	*1.59*
934101	*AD1-039 1*	*7.31*
934111	*AD1-039 2*	*7.82*
934431	*AD1-067 C*	*0.14*
934432	*AD1-067 E*	*0.58*
934701	*AD1-098 C O1*	*7.19*
934702	*AD1-098 E O1*	*5.25*
934721	*AD1-100 C*	*19.9*
934722	*AD1-100 E*	*92.88*
934871	*AD1-116 C*	*0.94*
934872	*AD1-116 E*	*1.54*
934971	*AD1-129 C*	*0.95*
934972	*AD1-129 E*	*0.63*
935001	*AD1-133 C O1*	*21.27*
935002	*AD1-133 E O1*	*14.18*
936291	*AD2-038 C O1*	*2.4*

936292	*AD2-038 E O1*	*16.06*
936371	*AD2-047 C O1*	*4.15*
936372	*AD2-047 E O1*	*20.26*
936461	*AD2-060*	*2.44*
936511	*AD2-066 C O1*	*8.7*
936512	*AD2-066 E O1*	*5.8*
936791	*AD2-102 C*	*14.83*
936792	*AD2-102 E*	*9.89*
937001	*AD2-134 C*	*2.71*
937002	*AD2-134 E*	*10.8*
937311	*AD2-172 C*	*2.58*
937312	*AD2-172 E*	*3.56*
937401	*AD2-194 1*	*8.41*
937411	*AD2-194 2*	*8.4*
938511	*AE1-070 1*	*9.89*
938521	*AE1-070 2*	*9.03*
938851	*AE1-113 C O1*	*8.56*
938852	*AE1-113 E O1*	*30.35*
938861	*AE1-114 C O1*	*4.11*
938862	*AE1-114 E O1*	*14.02*
939051	*AE1-134 1*	*1.43*
939061	*AE1-134 2*	*1.43*
939321	*AE1-163 C O1*	*6.03*
939322	*AE1-163 E O1*	*37.03*
939351	*AE1-166 C O1*	*10.65*
939352	*AE1-166 E O1*	*9.83*
939401	*AE1-172 C O1*	*5.29*
939402	*AE1-172 E O1*	*24.78*
939631	*AE1-193 C O1*	*32.49*
939632	*AE1-193 E O1*	*217.46*
939641	*AE1-194 C*	*32.49*
939642	*AE1-194 E*	*217.46*
939651	*AE1-195 C*	*32.49*
939652	*AE1-195 E*	*217.46*
939681	*AE1-198 C O1*	*96.48*
939682	*AE1-198 E O1*	*81.98*
940101	*AE1-252 C O1*	*10.61*
940102	*AE1-252 E O1*	*7.08*
LTF	*BLUEG*	*7.1*
274654	*BRAIDWOOD;1U*	*31.29*
274655	*BRAIDWOOD;2U*	*29.94*
LTF	*CALDERWOOD*	*0.11*
LTF	*CANNELTON*	*0.16*
LTF	*CARR*	*0.77*
LTF	*CATAWBA*	*0.32*

LTF	*CBM-S1*	*1.08*
LTF	*CBM-W1*	*26.5*
LTF	*CBM-W2*	*52.14*
LTF	*CHEOAH*	*0.11*
LTF	*CHOCTAW /* 35% REVERSE 4566958 4511400*	*< 0.01*
274751	*CRETE EC ;1U*	*6.62*
274752	*CRETE EC ;2U*	*6.62*
274753	*CRETE EC ;3U*	*6.62*
274754	*CRETE EC ;4U*	*6.62*
274859	*EASYR;U1 E*	*11.49*
274860	*EASYR;U2 E*	*11.49*
LTF	*G-007*	*2.16*
LTF	*GIBSON*	*0.09*
290051	*GSG-6; E*	*10.92*
LTF	*HAMLET*	*0.59*
275149	*KEMPTON ;1E*	*17.08*
274704	*KENDALL ;1C*	*4.59*
274705	*KENDALL ;1S*	*3.06*
274706	*KENDALL ;2C*	*4.59*
274707	*KENDALL ;2S*	*3.06*
274661	*LASCO STA;2U*	*28.64*
290108	*LEEDK;1U E*	*25.39*
LTF	*MEC*	*38.8*
293061	*N-015 E*	*16.42*
293516	*O-009 E1*	*9.5*
293517	*O-009 E2*	*4.82*
293518	*O-009 E3*	*5.31*
293715	*O-029 E*	*10.16*
293716	*O-029 E*	*5.57*
293717	*O-029 E*	*5.12*
LTF	*O-066*	*13.85*
293644	*O22 E1*	*12.32*
293645	*O22 E2*	*23.92*
290021	*O50 E*	*20.75*
294392	*P-010 E*	*20.85*
294763	*P-046 E*	*9.81*
274888	*PILOT HIL;1E*	*17.08*
270859	*PWR VTR EC;R*	*12.71*
LTF	*RENSSELAER*	*0.61*
274722	*S-055 E*	*11.9*
295111	*SUBLETTE E*	*2.84*
274861	*TOP CROP ;1U*	*0.54*
274862	*TOP CROP ;2U*	*1.05*
LTF	*TRIMBLE*	*0.83*

LTF	*WEC*	*8.41*
295109	*WESTBROOK E*	*5.85*
274687	*WILL CNTY;4U*	*13.05*
915011	*Y3-013 1*	*3.97*
915021	*Y3-013 2*	*3.97*
915031	*Y3-013 3*	*3.97*
916221	*Z1-073 E*	*5.64*
916502	*Z1-106 E1*	*1.33*
916504	*Z1-106 E2*	*1.33*
916512	*Z1-107 E*	*2.55*
916522	*Z1-108 E*	*2.62*
918052	*AA1-018 E*	*16.17*
919221	*AA1-146*	*18.35*
919581	*AA2-030*	*18.35*
920272	*AA2-123 E*	*2.57*
930481	*AB1-089*	*68.97*
930501	*AB1-091 O1*	*67.31*
930741	*AB1-122 1O1*	*74.6*
930751	*AB1-122 2O1*	*79.79*
924471	*AB2-096*	*44.48*
925302	*AB2-191 E*	*1.45*
926311	*AC1-109 1*	*2.*
926321	*AC1-109 2*	*2.*
926331	*AC1-110 1*	*2.*
926341	*AC1-110 2*	*2.*
926351	*AC1-111 1*	*0.8*
926361	*AC1-111 2*	*0.8*
926371	*AC1-111 3*	*0.8*
926381	*AC1-111 4*	*0.8*
926391	*AC1-111 5*	*0.8*
926401	*AC1-111 6*	*0.8*
927511	*AC1-113 1*	*1.25*
927521	*AC1-113 2*	*1.25*
926431	*AC1-114*	*2.5*
927451	*AC1-142A 1*	*4.53*
927461	*AC1-142A 2*	*4.53*
926821	*AC1-168 C O1*	*1.19*
926822	*AC1-168 E O1*	*8.01*
927091	*AC1-204 1*	*78.25*
927101	*AC1-204 2*	*78.11*

Appendix 11

(CE - CE) The WILTON ; 765/345 kV transformer (from bus 275232 to bus 270644 ckt 1) loads from 115.96% to 117.7% (AC power flow) of its load dump rating (1379 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT5-6__'. This project contributes approximately 27.17 MW to the thermal violation.

CONTINGENCY 'COMED_P4_112-65-BT5-6__'
TRIP BRANCH FROM BUS 270644 TO BUS 270607 CKT 1 / WILTO; 765 COLLI; 765
TRIP BRANCH FROM BUS 275233 TO BUS 270644 CKT 1 / WILTO;4M 345 WILTO; 765
TRIP BRANCH FROM BUS 275233 TO BUS 270927 CKT 1 / WILTO;4M 345 WILTO; R 345
TRIP BRANCH FROM BUS 275233 TO BUS 275333 CKT 1 / WILTO;4M 345 WILTO;4C 33
END

Bus Number	*Bus Name*	*Full Contribution*
932881	*AC2-115 1*	*2.93*
932891	*AC2-115 2*	*2.93*
932921	*AC2-116*	*1.03*
932931	*AC2-117*	*6.56*
933411	*AC2-154 C*	*3.22*
933412	*AC2-154 E*	*5.25*
933911	*AD1-013 C*	*2.27*
933912	*AD1-013 E*	*3.62*
933931	*AD1-016 C*	*1.14*
933932	*AD1-016 E*	*1.86*
934051	*AD1-031 C O1*	*3.54*
934052	*AD1-031 E O1*	*5.77*
934101	*AD1-039 1*	*8.8*
934111	*AD1-039 2*	*8.9*
934431	*AD1-067 C*	*0.16*
934432	*AD1-067 E*	*0.68*
934701	*AD1-098 C O1*	*8.47*
934702	*AD1-098 E O1*	*6.18*
934721	*AD1-100 C*	*29.56*
934722	*AD1-100 E*	*137.94*
934871	*AD1-116 C*	*1.18*
934872	*AD1-116 E*	*1.92*
934971	*AD1-129 C*	*1.11*
934972	*AD1-129 E*	*0.74*

935001	*AD1-133 C O1*	*27.56*
935002	*AD1-133 E O1*	*18.38*
936291	*AD2-038 C O1*	*2.9*
936292	*AD2-038 E O1*	*19.39*
936371	*AD2-047 C O1*	*5.76*
936372	*AD2-047 E O1*	*28.14*
936461	*AD2-060*	*3.39*
936511	*AD2-066 C O1*	*10.42*
936512	*AD2-066 E O1*	*6.95*
936791	*AD2-102 C*	*17.41*
936792	*AD2-102 E*	*11.6*
937001	*AD2-134 C*	*3.19*
937002	*AD2-134 E*	*12.73*
937311	*AD2-172 C*	*3.03*
937312	*AD2-172 E*	*4.18*
937401	*AD2-194 1*	*9.61*
937411	*AD2-194 2*	*9.61*
937531	*AD2-214 C*	*5.44*
937532	*AD2-214 E*	*3.63*
938511	*AE1-070 1*	*11.29*
938521	*AE1-070 2*	*10.33*
938851	*AE1-113 C O1*	*9.85*
938852	*AE1-113 E O1*	*34.92*
938861	*AE1-114 C O1*	*4.84*
938862	*AE1-114 E O1*	*16.51*
939051	*AE1-134 1*	*1.68*
939061	*AE1-134 2*	*1.68*
939321	*AE1-163 C O1*	*7.28*
939322	*AE1-163 E O1*	*44.73*
939351	*AE1-166 C O1*	*14.59*
939352	*AE1-166 E O1*	*13.47*
939401	*AE1-172 C O1*	*8.13*
939402	*AE1-172 E O1*	*38.05*
939741	*AE1-205 C O1*	*12.5*
939742	*AE1-205 E O1*	*17.27*
940101	*AE1-252 C O1*	*16.3*
940102	*AE1-252 E O1*	*10.87*
LTF	*BLUEG*	*7.45*
294401	*BSHIL;1U E*	*10.64*
294410	*BSHIL;2U E*	*10.64*
LTF	*CALDERWOOD*	*0.05*
LTF	*CANNELTON*	*0.06*
LTF	*CARR*	*0.93*
LTF	*CATAWBA*	*0.36*
274890	*CAYUG;1U E*	*20.35*

274891	CAYUG;2U E	20.35
LTF	CBM-S1	2.09
LTF	CBM-W1	37.96
LTF	CBM-W2	73.38
LTF	CHEOAH	0.06
LTF	CHOCTAW /* 35% REVERSE 4566958 4511400	< 0.01
LTF	CIN	0.17
274859	EASYR;U1 E	13.54
274860	EASYR;U2 E	13.54
LTF	G-007	2.61
290051	GSG-6; E	12.87
LTF	HAMLET	0.68
275149	KEMPTON ;1E	23.73
990901	L-005 E	15.65
290108	LEEDK;1U E	29.9
274772	LINCOLN ;3U	3.87
274773	LINCOLN ;4U	3.87
274774	LINCOLN ;5U	3.87
274775	LINCOLN ;6U	3.87
274776	LINCOLN ;7U	3.87
274777	LINCOLN ;8U	3.87
LTF	MEC	46.95
293061	N-015 E	19.54
293516	O-009 E1	11.26
293517	O-009 E2	5.72
293518	O-009 E3	6.3
293715	O-029 E	12.04
293716	O-029 E	6.6
293717	O-029 E	6.07
293771	O-035 E	7.97
LTF	O-066	16.73
293644	O22 E1	12.62
293645	O22 E2	24.5
290021	O50 E	23.88
294392	P-010 E	24.82
294763	P-046 E	11.54
274888	PILOT HIL;1E	23.73
270859	PWR VTR EC;R	14.89
LTF	RENSSELAER	0.73
290261	S-027 E	20.54
290265	S-028 E	20.54
274722	S-055 E	13.83
295111	SUBLETTE E	3.35
LTF	TRIMBLE	0.89

LTF	WEC	9.8
295109	WESTBROOK E	6.89
910542	X3-005 E	0.9
915011	Y3-013 1	4.61
915021	Y3-013 2	4.61
915031	Y3-013 3	4.61
916211	Z1-072 E	6.03
916221	Z1-073 E	6.64
916502	Z1-106 E1	1.56
916504	Z1-106 E2	1.56
916512	Z1-107 E	3.18
916522	Z1-108 E	3.06
917502	Z2-087 E	25.9
918052	AA1-018 E	20.24
919221	AA1-146	21.67
919581	AA2-030	21.67
920272	AA2-123 E	3.01
930481	AB1-089	80.94
930501	AB1-091 O1	94.42
930741	AB1-122 1O1	89.83
930751	AB1-122 2O1	90.78
924041	AB2-047 C O1	4.84
924042	AB2-047 E O1	32.38
924471	AB2-096	52.12
925302	AB2-191 E	1.7
925581	AC1-033 C	1.74
925582	AC1-033 E	11.67
926311	AC1-109 1	2.35
926321	AC1-109 2	2.35
926331	AC1-110 1	2.34
926341	AC1-110 2	2.34
926351	AC1-111 1	0.94
926361	AC1-111 2	0.94
926371	AC1-111 3	0.94
926381	AC1-111 4	0.94
926391	AC1-111 5	0.94
926401	AC1-111 6	0.94
927511	AC1-113 1	1.46
927521	AC1-113 2	1.46
926431	AC1-114	2.93
927451	AC1-142A 1	5.15
927461	AC1-142A 2	5.15
926821	AC1-168 C O1	1.44
926822	AC1-168 E O1	9.65
927091	AC1-204 1	89.38

927101	*AC1-204 2*	*89.38*
927201	*AC1-214 C O1*	*2.56*
927202	*AC1-214 E O1*	*8.13*

Appendix 12

(CE - CE) The WILTON ; 765/345 kV transformer (from bus 275233 to bus 270644 ckt 1) loads from 118.37% to 120.15% (AC power flow) of its load dump rating (1379 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT2-3__'. This project contributes approximately 27.7 MW to the thermal violation.

CONTINGENCY 'COMED_P4_112-65-BT2-3__'
TRIP BRANCH FROM BUS 270644 TO BUS 270607 CKT 1 / WILTO; 765 COLLI; 765
TRIP BRANCH FROM BUS 275232 TO BUS 270644 CKT 1 / WILTO;3M 345 WILTO; 765
TRIP BRANCH FROM BUS 275232 TO BUS 270926 CKT 1 / WILTO;3M 345 WILTO; B 345
TRIP BRANCH FROM BUS 275232 TO BUS 275332 CKT 1 / WILTO;3M 345 WILTO;3C 33
END

Bus Number	*Bus Name*	*Full Contribution*
932881	*AC2-115 1*	*2.99*
932891	*AC2-115 2*	*2.99*
932921	*AC2-116*	*1.05*
932931	*AC2-117*	*6.7*
933411	*AC2-154 C*	*3.29*
933412	*AC2-154 E*	*5.36*
933911	*AD1-013 C*	*2.31*
933912	*AD1-013 E*	*3.7*
933931	*AD1-016 C*	*1.17*
933932	*AD1-016 E*	*1.9*
934051	*AD1-031 C O1*	*3.61*
934052	*AD1-031 E O1*	*5.9*
934101	*AD1-039 1*	*8.99*
934111	*AD1-039 2*	*9.09*
934431	*AD1-067 C*	*0.17*
934432	*AD1-067 E*	*0.69*
934701	*AD1-098 C O1*	*8.65*
934702	*AD1-098 E O1*	*6.32*
934721	*AD1-100 C*	*30.14*
934722	*AD1-100 E*	*140.67*
934871	*AD1-116 C*	*1.2*
934872	*AD1-116 E*	*1.96*
934971	*AD1-129 C*	*1.14*
934972	*AD1-129 E*	*0.76*

935001	*AD1-133 C O1*	*28.14*
935002	*AD1-133 E O1*	*18.76*
936291	*AD2-038 C O1*	*2.96*
936292	*AD2-038 E O1*	*19.81*
936371	*AD2-047 C O1*	*5.88*
936372	*AD2-047 E O1*	*28.72*
936461	*AD2-060*	*3.46*
936511	*AD2-066 C O1*	*10.64*
936512	*AD2-066 E O1*	*7.09*
936791	*AD2-102 C*	*17.78*
936792	*AD2-102 E*	*11.85*
937001	*AD2-134 C*	*3.26*
937002	*AD2-134 E*	*13.*
937311	*AD2-172 C*	*3.09*
937312	*AD2-172 E*	*4.27*
937401	*AD2-194 1*	*9.82*
937411	*AD2-194 2*	*9.82*
937531	*AD2-214 C*	*5.55*
937532	*AD2-214 E*	*3.7*
938511	*AE1-070 1*	*11.54*
938521	*AE1-070 2*	*10.55*
938851	*AE1-113 C O1*	*10.06*
938852	*AE1-113 E O1*	*35.67*
938861	*AE1-114 C O1*	*4.94*
938862	*AE1-114 E O1*	*16.87*
939051	*AE1-134 1*	*1.72*
939061	*AE1-134 2*	*1.72*
939321	*AE1-163 C O1*	*7.44*
939322	*AE1-163 E O1*	*45.7*
939351	*AE1-166 C O1*	*14.88*
939352	*AE1-166 E O1*	*13.74*
939401	*AE1-172 C O1*	*8.29*
939402	*AE1-172 E O1*	*38.81*
939741	*AE1-205 C O1*	*12.76*
939742	*AE1-205 E O1*	*17.62*
940101	*AE1-252 C O1*	*16.62*
940102	*AE1-252 E O1*	*11.08*
LTF	*BLUEG*	*7.61*
294401	*BSHIL;1U E*	*10.87*
294410	*BSHIL;2U E*	*10.87*
LTF	*CALDERWOOD*	*0.05*
LTF	*CANNELTON*	*0.06*
LTF	*CARR*	*0.95*
LTF	*CATAWBA*	*0.36*
274890	*CAYUG;1U E*	*20.76*

274891	CAYUG;2U E	20.76
LTF	CBM-S1	2.13
LTF	CBM-W1	38.77
LTF	CBM-W2	74.91
LTF	CHEOAH	0.06
LTF	CHOCTAW /* 35% REVERSE 4566958 4511400	< 0.01
LTF	CIN	0.17
274859	EASYR;U1 E	13.83
274860	EASYR;U2 E	13.83
LTF	G-007	2.66
290051	GSG-6; E	13.15
LTF	HAMLET	0.69
275149	KEMPTON ;1E	24.23
990901	L-005 E	15.98
290108	LEEDK;1U E	30.54
274772	LINCOLN ;3U	3.98
274773	LINCOLN ;4U	3.98
274774	LINCOLN ;5U	3.98
274775	LINCOLN ;6U	3.98
274776	LINCOLN ;7U	3.98
274777	LINCOLN ;8U	3.98
LTF	MEC	47.95
293061	N-015 E	19.95
293516	O-009 E1	11.5
293517	O-009 E2	5.84
293518	O-009 E3	6.43
293715	O-029 E	12.29
293716	O-029 E	6.74
293717	O-029 E	6.2
293771	O-035 E	8.13
LTF	O-066	17.09
293644	O22 E1	12.89
293645	O22 E2	25.02
290021	O50 E	24.39
294392	P-010 E	25.34
294763	P-046 E	11.79
274888	PILOT HIL;1E	24.23
270859	PWR VTR EC;R	15.21
LTF	RENSSELAER	0.75
290261	S-027 E	20.95
290265	S-028 E	20.95
274722	S-055 E	14.12
295111	SUBLETTE E	3.42
LTF	TRIMBLE	0.91

LTF	WEC	10.01
295109	WESTBROOK E	7.04
910542	X3-005 E	0.92
915011	Y3-013 1	4.71
915021	Y3-013 2	4.71
915031	Y3-013 3	4.71
916211	Z1-072 E	6.16
916221	Z1-073 E	6.78
916502	Z1-106 E1	1.59
916504	Z1-106 E2	1.59
916512	Z1-107 E	3.25
916522	Z1-108 E	3.13
917502	Z2-087 E	26.43
918052	AA1-018 E	20.68
919221	AA1-146	22.13
919581	AA2-030	22.13
920272	AA2-123 E	3.07
930481	AB1-089	82.66
930501	AB1-091 O1	96.38
930741	AB1-122 1O1	91.73
930751	AB1-122 2O1	92.72
924041	AB2-047 C O1	4.94
924042	AB2-047 E O1	33.03
924471	AB2-096	53.23
925302	AB2-191 E	1.74
925581	AC1-033 C	1.78
925582	AC1-033 E	11.91
926311	AC1-109 1	2.4
926321	AC1-109 2	2.4
926331	AC1-110 1	2.39
926341	AC1-110 2	2.39
926351	AC1-111 1	0.96
926361	AC1-111 2	0.96
926371	AC1-111 3	0.96
926381	AC1-111 4	0.96
926391	AC1-111 5	0.96
926401	AC1-111 6	0.96
927511	AC1-113 1	1.5
927521	AC1-113 2	1.5
926431	AC1-114	2.99
927451	AC1-142A 1	5.26
927461	AC1-142A 2	5.26
926821	AC1-168 C O1	1.47
926822	AC1-168 E O1	9.85
927091	AC1-204 1	91.3

927101	*AC1-204 2*	*91.3*
927201	*AC1-214 C O1*	*2.61*
927202	*AC1-214 E O1*	*8.3*

Appendix 13

(CE - CE) The AD1-100 TAP-AD2-137 TAP 345 kV line (from bus 934720 to bus 937030 ckt 1) loads from 119.84% to 122.3% (**DC power flow**) of its load dump rating (1846 MVA) for the tower line contingency outage of 'COMED_P7_345-L2001__B-S_+_345-L2003__R-S'. This project contributes approximately 45.32 MW to the thermal violation.

CONTINGENCY 'COMED_P7_345-L2001__B-S_+_345-L2003__R-S'
TRIP BRANCH FROM BUS 270670 TO BUS 270728 CKT 1 / BRAID; B 345 E FRA; B 345
TRIP BRANCH FROM BUS 270728 TO BUS 270766 CKT 1 / E FRA; B 345 GOODI;3B 345
TRIP BRANCH FROM BUS 270728 TO BUS 274750 CKT 1 / E FRA; B 345 CRETE;BP 345
TRIP BRANCH FROM BUS 270671 TO BUS 270729 CKT 1 / BRAID; R 345 E FRA; R 345
END

Bus Number	*Bus Name*	*Full Contribution*
933411	*AC2-154 C*	*2.77*
933412	*AC2-154 E*	*4.52*
934721	*AD1-100 C*	*51.76*
934722	*AD1-100 E*	*241.53*
935001	*AD1-133 C O1*	*18.14*
935002	*AD1-133 E O1*	*12.09*
935141	*AD1-148*	*5.06*
936371	*AD2-047 C O1*	*4.95*
936372	*AD2-047 E O1*	*24.18*
936461	*AD2-060*	*2.91*
936771	*AD2-100 C O1*	*9.35*
936772	*AD2-100 E O1*	*6.23*
936971	*AD2-131 C O1*	*0.62*
936972	*AD2-131 E O1*	*3.09*
937211	*AD2-159 C*	*4.15*
937212	*AD2-159 E*	*19.44*
939351	*AE1-166 C O1*	*22.63*
939352	*AE1-166 E O1*	*20.89*
939401	*AE1-172 C O1*	*13.56*
939402	*AE1-172 E O1*	*63.48*
939741	*AE1-205 C O1*	*15.21*
939742	*AE1-205 E O1*	*21.*
940101	*AE1-252 C O1*	*27.19*
940102	*AE1-252 E O1*	*18.13*
LTF	*BLUEG*	*0.06*

274654	*BRAIDWOOD;1U*	*49.21*
274655	*BRAIDWOOD;2U*	*47.*
LTF	*CARR*	*0.27*
274890	*CAYUG;1U E*	*31.06*
274891	*CAYUG;2U E*	*31.06*
274863	*CAYUGA RI;1U*	*1.37*
274864	*CAYUGA RI;2U*	*1.37*
LTF	*CBM-S1*	*2.65*
LTF	*CBM-S2*	*0.03*
LTF	*CBM-W1*	*4.27*
LTF	*CBM-W2*	*48.29*
LTF	*CIN*	*2.54*
LTF	*G-007*	*0.75*
274871	*GR RIDGE ;2U*	*0.85*
274847	*GR RIDGE ;BU*	*0.67*
LTF	*HAMLET*	*0.04*
LTF	*IPL*	*1.1*
951001	*J339*	*4.12*
951741	*J474 C*	*1.79*
951742	*J474 E*	*9.68*
952321	*J734*	*3.46*
952651	*J756 C*	*1.81*
952652	*J756 E*	*9.81*
953741	*J826 C*	*1.05*
953742	*J826 E*	*5.67*
275149	*KEMPTON ;1E*	*20.4*
274660	*LASCO STA;1U*	*30.93*
274661	*LASCO STA;2U*	*30.99*
LTF	*LGEE*	*0.02*
LTF	*MEC*	*12.6*
293061	*N-015 E*	*15.21*
LTF	*O-066*	*4.81*
294392	*P-010 E*	*19.32*
274888	*PILOT HIL;1E*	*20.4*
274887	*PILOT HIL;1U*	*0.9*
274881	*PLEAS RDG;2U*	*0.9*
LTF	*RENSSELAER*	*0.22*
290261	*S-027 E*	*23.78*
290265	*S-028 E*	*23.78*
LTF	*TRIMBLE*	*0.04*
274853	*TWINGROVE;U1*	*1.05*
274854	*TWINGROVE;U2*	*1.05*
276150	*W2-048 E*	*1.39*
905081	*W4-005 C*	*1.01*
905082	*W4-005 E*	*32.77*

LTF	*WEC*	*0.89*
909052	*X2-022 E*	*19.37*
917501	*Z2-087 C*	*0.83*
917502	*Z2-087 E*	*31.5*
930501	*AB1-091 O1*	*92.66*
924041	*AB2-047 C O1*	*5.88*
924042	*AB2-047 E O1*	*39.38*
924261	*AB2-070 C O1*	*2.85*
924262	*AB2-070 E O1*	*19.07*
925771	*AC1-053 C*	*2.8*
925772	*AC1-053 E*	*18.72*
926821	*AC1-168 C O1*	*0.69*
926822	*AC1-168 E O1*	*4.63*
926841	*AC1-171 C O1*	*0.6*
926842	*AC1-171 E O1*	*4.*

Appendix 14

(CE - CE) The AD1-100 TAP-BRAIDWOOD; B 345 kV line (from bus 934730 to bus 270670 ckt 1) loads from 131.23% to 135.88% (AC power flow) of its load dump rating (1528 MVA) for the line fault with failed breaker contingency outage of 'ADD AD1-100 5'. This project contributes approximately 73.51 MW to the thermal violation.

CONTINGENCY 'ADD AD1-100 5'
OPEN BRANCH FROM BUS 934730 TO BUS 270710 CKT 1 / AD1-100 - DAVIS CREEK
OPEN BRANCH FROM BUS 934720 TO BUS 937030 CKT 1 / AD1-100 - AD2-137 TAP (WILTON)
END

Bus Number	*Bus Name*	*Full Contribution*
934721	*AD1-100 C*	*105.32*
934722	*AD1-100 E*	*491.5*
935001	*AD1-133 C O1*	*25.92*
935002	*AD1-133 E O1*	*17.28*
935141	*AD1-148*	*7.74*
936771	*AD2-100 C O1*	*14.1*
936772	*AD2-100 E O1*	*9.4*
936971	*AD2-131 C O1*	*0.93*
936972	*AD2-131 E O1*	*4.67*
937211	*AD2-159 C*	*6.46*
937212	*AD2-159 E*	*30.22*
939351	*AE1-166 C O1*	*58.38*
939352	*AE1-166 E O1*	*53.89*
939401	*AE1-172 C O1*	*21.99*
939402	*AE1-172 E O1*	*102.97*
939741	*AE1-205 C O1*	*23.93*
939742	*AE1-205 E O1*	*33.04*
940101	*AE1-252 C O1*	*44.11*
940102	*AE1-252 E O1*	*29.4*
274890	*CAYUG;1U E*	*50.01*
274891	*CAYUG;2U E*	*50.01*
274863	*CAYUGA RI;1U*	*2.2*
274864	*CAYUGA RI;2U*	*2.2*
LTF	*CBM-N*	*0.42*
LTF	*CBM-S1*	*6.86*
LTF	*CBM-S2*	*2.15*
LTF	*CBM-W2*	*79.3*
LTF	*CIN*	*6.87*
LTF	*CPLE*	*0.76*

LTF	*G-007A*	*1.41*
LTF	*IPL*	*3.75*
951001	*J339*	*7.18*
951741	*J474 C*	*2.91*
951742	*J474 E*	*15.76*
952321	*J734*	*6.03*
954721	*J750 C*	*2.08*
954722	*J750 E*	*11.26*
952651	*J756 C*	*2.79*
952652	*J756 E*	*15.12*
953651	*J815*	*21.29*
953741	*J826 C*	*1.79*
953742	*J826 E*	*9.7*
953851	*J845 C*	*1.74*
953852	*J845 E*	*9.44*
953881	*J848 C*	*3.07*
953882	*J848 E*	*16.95*
274650	*KINCAID ;1U*	*11.48*
274651	*KINCAID ;2U*	*11.5*
LTF	*LGEE*	*1.06*
LTF	*MEC*	*7.03*
LTF	*NYISO*	*1.83*
290261	*S-027 E*	*37.22*
290265	*S-028 E*	*37.22*
274853	*TWINGROVE;U1*	*1.64*
274854	*TWINGROVE;U2*	*1.64*
LTF	*VFT*	*3.78*
276150	*W2-048 E*	*2.13*
905081	*W4-005 C*	*1.57*
905082	*W4-005 E*	*50.94*
909052	*X2-022 E*	*29.6*
917501	*Z2-087 C*	*1.3*
917502	*Z2-087 E*	*49.57*
924041	*AB2-047 C O1*	*9.26*
924042	*AB2-047 E O1*	*61.96*
924261	*AB2-070 C O1*	*4.37*
924262	*AB2-070 E O1*	*29.25*
925771	*AC1-053 C*	*4.29*
925772	*AC1-053 E*	*28.68*

Appendix 15

(CE - CE) The AD2-137 TAP-WILTON ; B 345 kV line (from bus 937030 to bus 270926 ckt 1) loads from 119.76% to 122.21% (**DC power flow**) of its load dump rating (1846 MVA) for the tower line contingency outage of 'COMED_P7_345-L2001__B-S_+_345-L2003__R-S'. This project contributes approximately 45.32 MW to the thermal violation.

CONTINGENCY 'COMED_P7_345-L2001__B-S_+_345-L2003__R-S'
TRIP BRANCH FROM BUS 270670 TO BUS 270728 CKT 1 / BRAID; B 345 E FRA; B 345
TRIP BRANCH FROM BUS 270728 TO BUS 270766 CKT 1 / E FRA; B 345 GOODI;3B 345
TRIP BRANCH FROM BUS 270728 TO BUS 274750 CKT 1 / E FRA; B 345 CRETE;BP 345
TRIP BRANCH FROM BUS 270671 TO BUS 270729 CKT 1 / BRAID; R 345 E FRA; R 345
END

Bus Number	*Bus Name*	*Full Contribution*
933411	*AC2-154 C*	*2.77*
933412	*AC2-154 E*	*4.52*
934721	*AD1-100 C*	*51.76*
934722	*AD1-100 E*	*241.53*
935001	*AD1-133 C O1*	*18.14*
935002	*AD1-133 E O1*	*12.09*
935141	*AD1-148*	*5.06*
936371	*AD2-047 C O1*	*4.95*
936372	*AD2-047 E O1*	*24.18*
936461	*AD2-060*	*2.91*
936771	*AD2-100 C O1*	*9.35*
936772	*AD2-100 E O1*	*6.23*
936971	*AD2-131 C O1*	*0.62*
936972	*AD2-131 E O1*	*3.09*
937211	*AD2-159 C*	*4.15*
937212	*AD2-159 E*	*19.44*
939351	*AE1-166 C O1*	*22.63*
939352	*AE1-166 E O1*	*20.89*
939401	*AE1-172 C O1*	*13.56*
939402	*AE1-172 E O1*	*63.48*
939741	*AE1-205 C O1*	*15.21*
939742	*AE1-205 E O1*	*21.*
940101	*AE1-252 C O1*	*27.19*
940102	*AE1-252 E O1*	*18.13*
LTF	*BLUEG*	*0.06*

274654	*BRAIDWOOD;1U*	*49.21*
274655	*BRAIDWOOD;2U*	*47.*
LTF	*CARR*	*0.27*
274890	*CAYUG;1U E*	*31.06*
274891	*CAYUG;2U E*	*31.06*
274863	*CAYUGA RI;1U*	*1.37*
274864	*CAYUGA RI;2U*	*1.37*
LTF	*CBM-S1*	*2.65*
LTF	*CBM-S2*	*0.03*
LTF	*CBM-W1*	*4.27*
LTF	*CBM-W2*	*48.29*
LTF	*CIN*	*2.54*
LTF	*G-007*	*0.75*
274871	*GR RIDGE ;2U*	*0.85*
274847	*GR RIDGE ;BU*	*0.67*
LTF	*HAMLET*	*0.04*
LTF	*IPL*	*1.1*
951001	*J339*	*4.12*
951741	*J474 C*	*1.79*
951742	*J474 E*	*9.68*
952321	*J734*	*3.46*
952651	*J756 C*	*1.81*
952652	*J756 E*	*9.81*
953741	*J826 C*	*1.05*
953742	*J826 E*	*5.67*
275149	*KEMPTON ;1E*	*20.4*
274660	*LASCO STA;1U*	*30.93*
274661	*LASCO STA;2U*	*30.99*
LTF	*LGEE*	*0.02*
LTF	*MEC*	*12.6*
293061	*N-015 E*	*15.21*
LTF	*O-066*	*4.81*
294392	*P-010 E*	*19.32*
274888	*PILOT HIL;1E*	*20.4*
274887	*PILOT HIL;1U*	*0.9*
274881	*PLEAS RDG;2U*	*0.9*
LTF	*RENSSELAER*	*0.22*
290261	*S-027 E*	*23.78*
290265	*S-028 E*	*23.78*
LTF	*TRIMBLE*	*0.04*
274853	*TWINGROVE;U1*	*1.05*
274854	*TWINGROVE;U2*	*1.05*
276150	*W2-048 E*	*1.39*
905081	*W4-005 C*	*1.01*
905082	*W4-005 E*	*32.77*

LTF	*WEC*	*0.89*
909052	*X2-022 E*	*19.37*
917501	*Z2-087 C*	*0.83*
917502	*Z2-087 E*	*31.5*
930501	*AB1-091 O1*	*92.66*
924041	*AB2-047 C O1*	*5.88*
924042	*AB2-047 E O1*	*39.38*
924261	*AB2-070 C O1*	*2.85*
924262	*AB2-070 E O1*	*19.07*
925771	*AC1-053 C*	*2.8*
925772	*AC1-053 E*	*18.72*
926821	*AC1-168 C O1*	*0.69*
926822	*AC1-168 E O1*	*4.63*
926841	*AC1-171 C O1*	*0.6*
926842	*AC1-171 E O1*	*4.*

Appendix 16

(CE - CE) The AE1-172 TAP-AD1-100 TAP 345 kV line (from bus 939400 to bus 934720 ckt 1) loads from 103.74% to 107.57% (AC power flow) of its emergency rating (1528 MVA) for the single line contingency outage of 'COMED_P1-2_345-L8014___-S-B'. This project contributes approximately 60.5 MW to the thermal violation.

CONTINGENCY 'COMED_P1-2_345-L8014___-S-B'
TRIP BRANCH FROM BUS 935000 TO BUS 270717 CKT 1 / AD1-133 TAP 345 DRESDEN ; R 345
END

Bus Number	*Bus Name*	*Full Contribution*
933441	*AC2-157 C*	*4.28*
935001	*AD1-133 C O1*	*90.81*
935141	*AD1-148*	*13.5*
LTF	*AD2-098*	*0.21*
936771	*AD2-100 C O1*	*24.31*
936971	*AD2-131 C O1*	*1.6*
937211	*AD2-159 C*	*11.29*
939401	*AE1-172 C O1*	*30.17*
939741	*AE1-205 C O1*	*42.26*
940101	*AE1-252 C O1*	*60.5*
274863	*CAYUGA RI;1U*	*3.23*
274864	*CAYUGA RI;2U*	*3.23*
LTF	*CBM-N*	*0.57*
LTF	*CBM-S1*	*11.04*
LTF	*CBM-S2*	*3.33*
LTF	*CBM-W2*	*130.4*
LTF	*CHILHOWEE /* 35% REVERSE 4476971*	*< 0.01*
LTF	*CIN*	*11.57*
LTF	*CPLE*	*1.16*
LTF	*G-007A*	*1.91*
LTF	*IPL*	*6.25*
950701	*J196 C*	*1.14*
951001	*J339*	*12.8*
951741	*J474 C*	*5.16*
952271	*J644*	*13.57*
952321	*J734*	*10.75*
954721	*J750 C*	*3.62*
952651	*J756 C*	*4.83*
952871	*J757 C*	*5.78*

953401	*J811*	*10.86*
953651	*J815*	*37.42*
953741	*J826 C*	*3.19*
953851	*J845 C*	*3.12*
953881	*J848 C*	*5.41*
954411	*J912*	*14.2*
274650	*KINCAID ;1U*	*19.81*
274651	*KINCAID ;2U*	*19.84*
LTF	*LGEE*	*1.7*
LTF	*MEC*	*9.12*
LTF	*NYISO*	*2.45*
274853	*TWINGROVE;U1*	*2.88*
274854	*TWINGROVE;U2*	*2.88*
LTF	*VFT*	*5.13*
905081	*W4-005 C*	*2.75*
917501	*Z2-087 C*	*2.3*
930461	*AB1-087*	*31.*
930471	*AB1-088*	*31.*
924041	*AB2-047 C O1*	*16.35*
924261	*AB2-070 C O1*	*7.64*
925771	*AC1-053 C*	*7.49*
926841	*AC1-171 C O1*	*0.96*

Contingencies (Light Load Analysis)

Contingency Name	Description
COMED_P7_345-L0101__B-S_+_345-L0102__R-S	CONTINGENCY 'COMED_P7_345-L0101__B-S_+_345-L0102__R-S' TRIP BRANCH FROM BUS 270802 TO BUS 270846 CKT 1 / LASCO STA; B 345 PLANO ; B 345 TRIP BRANCH FROM BUS 270846 TO BUS 270847 CKT 1 / PLANO ; B 345 PLANO ; R 345 TRIP BRANCH FROM BUS 270803 TO BUS 270847 CKT 1 / LASCO STA; R 345 PLANO ; R 345 END

Appendices (Light Load Analysis)

Appendix 17

(CE - AREA14) The BRAIDWOOD; B-AD1-100 TAP 345 kV line (from bus 270670 to bus 934730 ckt 1) loads from 107.77% to 108.93% (AC power flow) of its emergency rating (1528 MVA) for the tower line contingency outage of 'COMED_P7_345-L0101__B-S_+_345-L0102__R-S'. This project contributes approximately 17.35 MW to the thermal violation.

CONTINGENCY 'COMED_P7_345-L0101__B-S_+_345-L0102__R-S'
 TRIP BRANCH FROM BUS 270802 TO BUS 270846 CKT 1 / LASCO STA; B 345 PLANO ; B 345
 TRIP BRANCH FROM BUS 270846 TO BUS 270847 CKT 1 / PLANO ; B 345 PLANO ; R 345
 TRIP BRANCH FROM BUS 270803 TO BUS 270847 CKT 1 / LASCO STA; R 345 PLANO ; R 345
 END

Bus Number	*Bus Name*	*Full Contribution*
939631	*AE1-193 C*	*3.44*
939632	*AE1-193 E*	*23.01*
939641	*AE1-194 C*	*3.44*
939642	*AE1-194 E*	*23.01*
939651	*AE1-195 C*	*3.44*
939652	*AE1-195 E*	*23.01*
940102	*AE1-252 E*	*17.35*
274871	*GR RIDGE ;2U*	*4.22*
274847	*GR RIDGE ;BU*	*3.32*
953201	*J715*	*5.46*
293061	*N-015 E*	*13.28*
294392	*P-010 E*	*16.87*
917501	*Z2-087 C*	*-2.86*
926821	*AC1-168 C O1*	*0.6*
926822	*AC1-168 E O1*	*4.01*

Attachment 1: Single Line Diagram