Generation Interconnection Request
System Impact Study Report
For
PJM Generation Interconnection Request
Queue Position AE1-070

Elwood 345 kV

Revision 0: December 2021
Revision 1: 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.

Revision History

Revision 0: December 10, 2021
Revision 1: December 21, 2021. This revised reports updates the project capability information in the “General” Section of the report. There are no changes to the analysis results.

General

The Interconnection Customer (IC) has proposed an uprate to an existing Natural Gas generating facility located in Will County, Illinois. This projects requests an increase to the install capability of Elwood Energy Units 135 MW with 135 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this uprate project is 6/1/2021, as stated in Attachment N. This study does not imply a TO commitment to this in-service date.

Point of Interconnection

AE1-070 is an uprate to the existing Elwood Energy Units which interconnect with the ComEd transmission system at TSS 900 Elwood bus at the Elwood 345 kV substation.

Cost Summary

The AE1-070 project will be responsible for the following costs.

Description	Cost Estimate
Total Physical Interconnection Costs	$0
Allocation towards System Network Upgrade Costs (PJM Identified - Summer Peak)*	$18,917,200
Allocation towards System Network Upgrade Costs (PJM Identified - Light Load)*	$ 0
Allocation towards System Network Upgrade Costs (TO Identified)*	$0
Total Costs	$18,917,200

*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	None
Direct Connection Network Upgrades	None
Non-Direct Connection Network Upgrades	None
Total Physical Interconnection Costs	None

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.

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 AE1-070 was evaluated as a 135.0 MW (Capacity 135.0 MW) injection at Elwood 345 kV substation in the ComEd area. Project AE1-070 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AE1-070 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			Bus					Loading %		Rating			
Number	Type	Name	Affected Area	Facility Description	From	To	Circuit	Power Flow	Initial	Final	Type	MVA	MW Contribution	Flowgate Appendix
1	N-1	COMED_P1-2_345-L10805_B-S	CE - CE	[1]ELWOOD ; R-GOODINGS ;2R 345 kV line	270737	270769	1	AC	99.79	102.14	ER	1479	34.43	

Note: *STE rating is 1568 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	Contingency 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
2	LFFB	AEP_P4_#2978_05DUMONT 765_B	MISO NIPS - AEP	17STILLWELL-05DUMONT 345 kV line	255113	243219	1	AC	118.1	118.51	ER	1409	20.26	6
3	DCTL	COMED_P7_345-L11620_B-S_+_345-L11622_R-S	CE - CE	DRESDEN ; B-KENDALL ;BU 345 kV line	270716	274702	1	DC	106.89	108.89	LDR	1195	25.51	7
4	N-1	COMED_P1-2_345-L11622_R-S	CE - CE	ELWOOD ; B-GOODINGS ;4B 345 kV line	270736	270770	1	AC	113.79	116.78	ER	1479	44.19	8
5	LFFB	COMED_P4_116-45-L11614_	CE - CE	ELWOOD ; B-GOODINGS ;4B 345 kV line	270736	270770	1	AC	110.17	112.94	LDR	1479	44.19	
6	LFFB	COMED_P4_116-45-L9801_FSA	CE - CE	ELWOOD ; B-GOODINGS ;4B 345 kV line	270736	270770	1	AC	109.25	112.02	LDR	1479	44.2	
7	BUS	COMED_P2-2_116_GG-345R__2_NO_FSA	CE - CE	ELWOOD ; B-GOODINGS ;4B 345 kV line	270736	270770	1	AC	109.25	112.02	LDR	1479	44.2	
8	BUS	COMED_P2-2_116_GG-345R__2_FSA	CE - CE	ELWOOD ; B-GOODINGS ;4B 345 kV line	270736	270770	1	AC	109.21	111.98	LDR	1479	44.2	
9	Non	Non	CE - CE	ELWOOD ; B-GOODINGS ;4B 345 kV line	270736	270770	1	AC	102.6	105.31	NR	1201	32.49	
10	N-1	COMED_P1-2_345-L10805_B-S	CE - CE	ELWOOD ; B-GOODINGS ;4B 345 kV line	270736	270770	1	AC	102.69	105.04	ER	1479	34.65	
11	N-1	COMED_P1-2_345-L11620_B-S	CE - CE	ELWOOD ; R-GOODINGS ;2R 345 kV line	270737	270769	1	AC	115.4	118.4	ER	1479	44.39	9
12	LFFB	COMED_P4_116-45-L11613_	CE - CE	ELWOOD ; R-GOODINGS ;2R 345 kV line	270737	270769	1	AC	111.65	114.48	LDR	1479	45.31	
13	LFFB	COMED_P4_116-45-TR84___	CE - CE	ELWOOD ; R-GOODINGS ;2R 345 kV line	270737	270769	1	AC	110.75	113.58	LDR	1479	45.33	
14	BUS	COMED_P2-2_116_GG-345B__4	CE - CE	ELWOOD ; R-GOODINGS ;2R 345 kV line	270737	270769	1	AC	110.75	113.58	LDR	1479	45.33	

15	Non	Non	CE - CE	ELWOOD ; R-GOODINGS ;2R 345 kV line	270737	270769	1	AC	106.01	108.77	NR	1201	32.92	
16	LFFB	AEP_P4_#2978_05DUMONT 765_B	CE - AEP	GREENACRE; T-05OLIVE 345 kV line	270771	243229	1	AC	110.08	110.15	ER	971	11.86	10
17	LFFB	COMED_P4_112-65-BT5-6__	CE - CE	WILTON ; B-WILTON ;3M 345 kV line[2]	270926	275232	1	AC	100.39	101.78	LDR	1379	21.63	11
18	LFFB	COMED_P4_112-65-BT2-3__	CE - CE	WILTON ; R-WILTON ;4M 345 kV line	270927	275233	1	AC	102.47	103.89	LDR	1379	22.09	12
19	DCTL	COMED_P7_345-L11620_B-S_+_345-L11622_R-S	CE - CE	KENDALL ;BU-LOCKPORT ; B 345 kV line	274702	270810	1	DC	101.5	102.73	LDR	1768	25.08	13
20	LFFB	COMED_P4_112-65-BT5-6__	CE - CE	WILTON ; 765/345 kV transformer	275232	270644	1	AC	100.11	101.5	LDR	1379	21.63	14
21	LFFB	COMED_P4_112-65-BT2-3__	CE - CE	WILTON ; 765/345 kV transformer	275233	270644	1	AC	102.19	103.61	LDR	1379	22.09	15

NOTE:
Violation # 2: *Not a violation for MISO. Violation valid for AEP section.*
Violation # 3: *ALDR rating is 1477 MVA (Not a violation)*
Violation # 10: *SE rating is 1568 MVA (Not a violation)*
Violation # 16: *Not a violation for ComEd. Violation valid for AEP section. (See Reinforcement Section)*
Violation # 17, 18, 20 & 21: *SE rating is 1469 MVA (Not a violation)*
Violation # 19: *ALDR rating is 2033 MVA (Not a violation)*

Steady-State Voltage Requirements

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

To be determined

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.

Not Applicable

Short Circuit

(Summary of impacted circuit breakers)

No short circuit is required.

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 in 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 not required for project

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)

Facility	Upgrade Description	Cost	Cost Allocation	Upgrade Number
17STILLWELL-05DUMONT 345 kV Ckt. 1	**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: 1409 MVA MISO SE: 1779 MVA (MISO rating is sufficient) **Notes**: 1. Since the cost of the upgrade is less than $5M, based on PJM cost allocation criteria, AE1-070 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.) AE1-070 could receive cost allocation. 3. Although Queue Project AE1-070 may not presently have cost responsibility for this upgrade, Queue Project AE1-070 may need this upgrade in-service to be deliverable to the PJM system. 4. If Queue Project AE1-070 comes into service prior to completion of the upgrade, Queue Project AE1-070 will need an interim study.	$1,613,000	$0	N4058
ELWOOD ; B-GOODINGS ;4B Ckt. 1	**Project ID**: n5915 **Description**: To relieve the Elwood; B – Goodings; 4B 345 kV line overload: The upgrade will be to Reconductor 18.1 miles of the line with 2156 kcmil ACSR (84/19) Str. Bluebird conductor and replace some towers. Estimate for this is $39.352 M (per AC1-204 Facility Study) with a 30 month estimated construction timeline.	$39,352,000	$9,886,700	N5915

<table>
<tr>
<td></td>
<td>Upon completion of the work the ratings are expected to be 1334/1726/1837/2084 MVA (SN/SLTE/SSTE/SLD). PJM Network Upgrade N5915.
<u>Type</u>: FAC
<u>Cost:</u> $39,352,000
<u>Time Estimate</u>:30 Months
<u>Ratings</u>: 1334/1726/1837/2084 MVA
<u>Notes</u>: AC1-204 is the driver for this project.

<table>
<tr><th>Queue</th><th>MW</th><th>Cost %</th><th>Cost $</th></tr>
<tr><td>AC1-204</td><td>59.4</td><td>33.77%</td><td>$13,289,600</td></tr>
<tr><td>AD1-039</td><td>15.9</td><td>9.04%</td><td>$3,557,300</td></tr>
<tr><td>AD1-133</td><td>17.3</td><td>9.84%</td><td>$3,870,500</td></tr>
<tr><td>AD2-194</td><td>39.1</td><td>22.23%</td><td>$8,747,900</td></tr>
<tr><td>AE1-070</td><td>44.2</td><td>25.12</td><td>$9,886,700</td></tr>
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<tr>
<td>ELWOOD ; R-GOODINGS ;2R
Ckt. 1</td>
<td><u>Project ID</u>: n5916
<u>Description</u>: The upgrade will be to Reconductor 18.1 miles of the line with 2156 kcmil ACSR (84/19) Str. Bluebird conductor and replace some towers. Estimate for this is $39.352 M (per AC1-204 Facility Study) with a 30 month estimated construction timeline.
Upon completion of the work the ratings are expected to be 1334/1726/1837/2084 MVA (SN/SLTE/SSTE/SLD). PJM Network Upgrade N5916.
<u>Type</u>: FAC
<u>Cost:</u> $39,352,000
<u>Time Estimate</u>:30 Months
<u>Ratings</u>: 1334/1726/1837/2084 MVA
<u>Notes</u>: AC1-204 is the driver for this project.

<table>
<tr><th>Queue</th><th>MW</th><th>Cost %</th><th>Cost $</th></tr>
<tr><td>AC1-204</td><td>76.7</td><td>39.64%</td><td>$15,600,100</td></tr>
<tr><td>AD1-039</td><td>16.2</td><td>8.37%</td><td>$3,294,900</td></tr>
<tr><td>AD1-133</td><td>16.9</td><td>8.73%</td><td>$3,437,300</td></tr>
<tr><td>AD2-194</td><td>39.3</td><td>20.3%</td><td>$7,989,200</td></tr>
<tr><td>AE1-070</td><td>44.4</td><td>22.95%</td><td>$9,030,500</td></tr>
</table>
</td>
<td>$39,352,000</td>
<td>$9,030,500</td>
<td>N5916</td>
</tr>
<tr>
<td>GREENACRE; T-05OLIVE 345 kV Ckt. 1</td>
<td><u>AEP Reinforcement:</u>

<u>Project ID</u>: n5913
<u>Description</u>: 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.</td>
<td>$162,560</td>
<td>$0</td>
<td>N5913</td>
</tr>
</table>

	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**: Existing Ratings are as follows: AEP SE: 971 MVA ComEd SE: 1134 MVA (Rating is sufficient) **Notes**: 1. Since the cost of the upgrade is less than $5M, based on PJM cost allocation criteria, AE1-070 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.) AE1-070 could receive cost allocation. 3. Although Queue Project AE1-070 may not presently have cost responsibility for this upgrade, Queue Project AE1-070 may need this upgrade in-service to be deliverable to the PJM system. 4. If Queue Project AE1-070 comes into service prior to completion of the upgrade, Queue Project AE1-070 will need an interim study.			
	Total Cost	$80,479,560	$18,917,200	

Short Circuit System Reinforcement

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

No short circuit is required.

Contingencies (Summer Peak Analysis)

Contingency Name	Description
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-L10805_B-S	CONTINGENCY 'COMED_P1-2_345-L10805_B-S' TRIP BRANCH FROM BUS 270810 TO BUS 274702 CKT 1 / LOCKP; B 345 KENDA;BU 345

	END
COMED_P1-2_345-L11620_B-S	CONTINGENCY 'COMED_P1-2_345-L11620_B-S' TRIP BRANCH FROM BUS 270736 TO BUS 270770 CKT 1 / ELWOO; B 345 GOODI;3B 345 END
COMED_P1-2_345-L11622_R-S	CONTINGENCY 'COMED_P1-2_345-L11622_R-S' TRIP BRANCH FROM BUS 270737 TO BUS 270769 CKT 1 / ELWOO; R 345 GOODI;1R 345 END
COMED_P2-2_116_GG-345B__4	CONTINGENCY 'COMED_P2-2_116_GG-345B__4' DISCONNECT BUS 270770 / GOODI;4B 345 END
COMED_P2-2_116_GG-345R__2_FSA	CONTINGENCY 'COMED_P2-2_116_GG-345R__2_FSA' DISCONNECT BUS 270769 / GOODI;2R 345 DISCONNECT BUS 918050 / AA1-018 TAP /ADDED FOR NO FSA CASE END
COMED_P2-2_116_GG-345R__2_NO_FSA	CONTINGENCY 'COMED_P2-2_116_GG-345R__2_NO_FSA' DISCONNECT BUS 270769 / GOODI;2R 345

	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-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_P4_116-45-L11613_	CONTINGENCY 'COMED_P4_116-45-L11613_' TRIP BRANCH FROM BUS 270666 TO BUS 270664 CKT 1 / B ISL;BT 345 B ISL; B 345

	TRIP BRANCH FROM BUS 270666 TO BUS 270926 CKT 1 / B ISL;BT 345 WILTO; B 345 TRIP BRANCH FROM BUS 270770 TO BUS 270666 CKT 1 / GOODI;4B 345 B ISL;BT 345 DISCONNECT BUS 270770 / GOODI;4B 345 END
COMED_P4_116-45-L11614_	CONTINGENCY 'COMED_P4_116-45-L11614_' TRIP BRANCH FROM BUS 270667 TO BUS 270665 CKT 1 / B ISL;RT 345 B ISL; R 345 TRIP BRANCH FROM BUS 270667 TO BUS 270927 CKT 1 / B ISL;RT 345 WILTO; R 345 TRIP BRANCH FROM BUS 270769 TO BUS 270667 CKT 1 / GOODI;2R 345 B ISL;RT 345 DISCONNECT BUS 270769 / GOODI;2R 345 END
COMED_P4_116-45-L9801_FSA	CONTINGENCY 'COMED_P4_116-45-L9801_FSA' TRIP BRANCH FROM BUS 918050 TO BUS 270769 CKT 1 / AA1-018 GOODINGS ;2R 345 DISCONNECT BUS 270769 / GOODI;2R 345 END
COMED_P4_116-45-TR84___	CONTINGENCY 'COMED_P4_116-45-TR84___' TRIP BRANCH FROM BUS 270770 TO BUS 271564 TO BUS 275368 CKT 1 / GOODINGS ;4B 345 GOODINGS ; B 138 GOODINGS ;4C 34.5

	DISCONNECT BUS 270770 / GOODINGS ;4B 345 END
COMED_P7_345-L11620_B-S_+_345-L11622_R-S	CONTINGENCY 'COMED_P7_345-L11620_B-S_+_345-L11622_R-S' TRIP BRANCH FROM BUS 270736 TO BUS 270770 CKT 1 / ELWOO; B 345 GOODI;3B 345 TRIP BRANCH FROM BUS 270737 TO BUS 270769 CKT 1 / ELWOO; R 345 GOODI;1R 345 END

Appendices (Summer Peak Analysis)

Appendix 6

(MISO NIPS - AEP) The 17STILLWELL-05DUMONT 345 kV line (from bus 255113 to bus 243219 ckt 1) loads from 118.1% to 118.51% (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 20.26 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 7

(CE - CE) The DRESDEN ; B-KENDALL ;BU 345 kV line (from bus 270716 to bus 274702 ckt 1) loads from 106.89% to 108.89% (**DC power flow**) of its load dump rating (1195 MVA) for the tower line contingency outage of 'COMED_P7_345-L11620_B-S_+_345-L11622_R-S'. This project contributes approximately 25.51 MW to the thermal violation.

CONTINGENCY 'COMED_P7_345-L11620_B-S_+_345-L11622_R-S'
TRIP BRANCH FROM BUS 270736 TO BUS 270770 CKT 1 / ELWOO; B 345 GOODI;3B 345
TRIP BRANCH FROM BUS 270737 TO BUS 270769 CKT 1 / ELWOO; R 345 GOODI;1R 345
END

Bus Number	*Bus Name*	*Full Contribution*
934101	*AD1-039 1*	*4.61*
934111	*AD1-039 2*	*16.63*
936511	*AD2-066 C O1*	*9.2*
936512	*AD2-066 E O1*	*6.13*
937401	*AD2-194 1*	*11.37*
937411	*AD2-194 2*	*11.3*
938511	*AE1-070 1*	*13.36*
938521	*AE1-070 2*	*12.14*
938851	*AE1-113 C O1*	*11.02*
938852	*AE1-113 E O1*	*39.07*
LTF	*BLUEG*	*0.14*
LTF	*CARR*	*0.08*
LTF	*CBM-S1*	*1.17*
LTF	*CBM-S2*	*0.12*
LTF	*CBM-W1*	*0.64*
LTF	*CBM-W2*	*20.51*
LTF	*CIN*	*0.5*
LTF	*CPLE*	*< 0.01*
274658	*DRESDEN ;2U*	*47.66*
274728	*ELWOOD EC;5P*	*5.01*
274730	*ELWOOD EC;6P*	*5.01*
274732	*ELWOOD EC;7P*	*5.01*
274734	*ELWOOD EC;8P*	*5.01*
274736	*ELWOOD EC;9P*	*5.01*
LTF	*G-007*	*0.22*
LTF	*IPL*	*0.2*
LTF	*MEC*	*8.05*
LTF	*O-066*	*1.42*
290021	*O50 E*	*26.72*

LTF	*RENSSELAER*	*0.06*
LTF	*TRIMBLE*	*0.03*
930741	*AB1-122 1O1*	*47.05*
930751	*AB1-122 2O1*	*169.68*
927091	*AC1-204 1*	*105.75*
927101	*AC1-204 2*	*105.04*

Appendix 8

(CE - CE) The ELWOOD ; B-GOODINGS ;4B 345 kV line (from bus 270736 to bus 270770 ckt 1) loads from 113.79% to 116.78% (AC power flow) of its emergency rating (1479 MVA) for the single line contingency outage of 'COMED_P1-2_345-L11622_R-S'. This project contributes approximately 44.19 MW to the thermal violation.

CONTINGENCY 'COMED_P1-2_345-L11622_R-S'
TRIP BRANCH FROM BUS 270737 TO BUS 270769 CKT 1 / ELWOO; R 345 GOODI;1R 345
END

Bus Number	*Bus Name*	*Full Contribution*
934101	*AD1-039 1*	*7.89*
934111	*AD1-039 2*	*8.09*
935001	*AD1-133 C O1*	*17.36*
936511	*AD2-066 C O1*	*5.14*
937401	*AD2-194 1*	*19.7*
937411	*AD2-194 2*	*19.57*
938511	*AE1-070 1*	*23.15*
938521	*AE1-070 2*	*21.04*
938851	*AE1-113 C O1*	*5.52*
LTF	*BLUEG*	*1.65*
LTF	*CANNELTON*	*0.01*
LTF	*CARR*	*0.21*
LTF	*CATAWBA*	*0.07*
LTF	*CBM-S1*	*0.54*
LTF	*CBM-W1*	*3.59*
LTF	*CBM-W2*	*17.92*
LTF	*CHEOAH*	*< 0.01*
274658	*DRESDEN ;2U*	*23.18*
274659	*DRESDEN ;3U*	*22.5*
274729	*ELWOOD EC;1P*	*8.62*
274731	*ELWOOD EC;2P*	*8.62*
274733	*ELWOOD EC;3P*	*8.62*
274735	*ELWOOD EC;4P*	*8.62*
274728	*ELWOOD EC;5P*	*8.68*
274730	*ELWOOD EC;6P*	*8.68*
274732	*ELWOOD EC;7P*	*8.68*
274734	*ELWOOD EC;8P*	*8.68*
274736	*ELWOOD EC;9P*	*8.68*
274837	*EQUISTAR ; B*	*0.81*
274836	*EQUISTAR ; R*	*1.44*
LTF	*GIBSON*	*< 0.01*

LTF	*HAMLET*	*0.14*
274704	*KENDALL ;1C*	*2.87*
274705	*KENDALL ;1S*	*1.92*
274706	*KENDALL ;2C*	*2.87*
274707	*KENDALL ;2S*	*1.92*
LTF	*MEC*	*9.81*
274879	*MINONK ;1U*	*0.59*
LTF	*RENSSELAER*	*0.17*
LTF	*TRIMBLE*	*0.2*
904211	*W3-135*	*0.2*
905493	*W4-086*	*0.03*
LTF	*WEC*	*1.02*
930741	*AB1-122 1O1*	*80.51*
930751	*AB1-122 2O1*	*82.58*
927091	*AC1-204 1*	*183.23*
927101	*AC1-204 2*	*181.98*

Appendix 9

(CE - CE) The ELWOOD ; R-GOODINGS ;2R 345 kV line (from bus 270737 to bus 270769 ckt 1) loads from 115.4% to 118.4% (AC power flow) of its emergency rating (1479 MVA) for the single line contingency outage of 'COMED_P1-2_345-L11620_B-S'. This project contributes approximately 44.39 MW to the thermal violation.

CONTINGENCY 'COMED_P1-2_345-L11620_B-S'
TRIP BRANCH FROM BUS 270736 TO BUS 270770 CKT 1 / ELWOO; B 345 GOODI;3B 345
END

Bus Number	*Bus Name*	*Full Contribution*
934101	*AD1-039 1*	*7.75*
934111	*AD1-039 2*	*8.56*
935001	*AD1-133 C O1*	*17.*
936511	*AD2-066 C O1*	*5.22*
937401	*AD2-194 1*	*19.67*
937411	*AD2-194 2*	*19.79*
938511	*AE1-070 1*	*23.11*
938521	*AE1-070 2*	*21.28*
938851	*AE1-113 C O1*	*5.89*
LTF	*BLUEG*	*1.63*
LTF	*CANNELTON*	*0.01*
LTF	*CARR*	*0.21*
LTF	*CATAWBA*	*0.07*
LTF	*CBM-S1*	*0.58*
LTF	*CBM-W1*	*4.02*
LTF	*CBM-W2*	*18.46*
274658	*DRESDEN ;2U*	*24.52*
274659	*DRESDEN ;3U*	*22.08*
274729	*ELWOOD EC;1P*	*8.72*
274731	*ELWOOD EC;2P*	*8.72*
274733	*ELWOOD EC;3P*	*8.72*
274735	*ELWOOD EC;4P*	*8.72*
274728	*ELWOOD EC;5P*	*8.66*
274730	*ELWOOD EC;6P*	*8.66*
274732	*ELWOOD EC;7P*	*8.66*
274734	*ELWOOD EC;8P*	*8.66*
274736	*ELWOOD EC;9P*	*8.66*
274837	*EQUISTAR ; B*	*0.79*
274836	*EQUISTAR ; R*	*1.47*
LTF	*HAMLET*	*0.14*
274704	*KENDALL ;1C*	*3.43*

274705	*KENDALL ;1S*	*2.29*
274706	*KENDALL ;2C*	*3.43*
274707	*KENDALL ;2S*	*2.29*
LTF	*MEC*	*10.15*
274879	*MINONK ;1U*	*0.63*
LTF	*RENSSELAER*	*0.17*
LTF	*TRIMBLE*	*0.2*
904211	*W3-135*	*0.2*
905493	*W4-086*	*0.03*
LTF	*WEC*	*1.05*
930741	*AB1-122 1O1*	*79.05*
930751	*AB1-122 2O1*	*87.37*
927091	*AC1-204 1*	*182.92*
927101	*AC1-204 2*	*184.06*

Appendix 10

(CE - AEP) The GREENACRE; T-05OLIVE 345 kV line (from bus 270771 to bus 243229 ckt 1) loads from 110.08% to 110.15% (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 11.86 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 11

(CE - CE) The WILTON ; B-WILTON ;3M 345 kV line (from bus 270926 to bus 275232 ckt 1) loads from 100.39% to 101.78% (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 21.63 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 ; R-WILTON ;4M 345 kV line (from bus 270927 to bus 275233 ckt 1) loads from 102.47% to 103.89% (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 22.09 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 KENDALL ;BU-LOCKPORT ; B 345 kV line (from bus 274702 to bus 270810 ckt 1) loads from 101.5% to 102.73% (**DC power flow**) of its load dump rating (1768 MVA) for the tower line contingency outage of 'COMED_P7_345-L11620_B-S_+_345-L11622_R-S'. This project contributes approximately 25.08 MW to the thermal violation.

CONTINGENCY 'COMED_P7_345-L11620_B-S_+_345-L11622_R-S'
TRIP BRANCH FROM BUS 270736 TO BUS 270770 CKT 1 / ELWOO; B 345 GOODI;3B 345
TRIP BRANCH FROM BUS 270737 TO BUS 270769 CKT 1 / ELWOO; R 345 GOODI;1R 345
END

Bus Number	*Bus Name*	*Full Contribution*
934101	*AD1-039 1*	*4.43*
934111	*AD1-039 2*	*16.45*
936511	*AD2-066 C O1*	*8.98*
936512	*AD2-066 E O1*	*5.99*
937401	*AD2-194 1*	*11.18*
937411	*AD2-194 2*	*11.11*
938511	*AE1-070 1*	*13.14*
938521	*AE1-070 2*	*11.94*
938851	*AE1-113 C O1*	*10.81*
938852	*AE1-113 E O1*	*38.34*
LTF	*BLUEG*	*1.73*
LTF	*CALDERWOOD*	*0.05*
LTF	*CANNELTON*	*0.04*
LTF	*CARR*	*0.2*
LTF	*CATAWBA*	*0.09*
LTF	*CBM-S1*	*0.15*
LTF	*CBM-W2*	*13.02*
LTF	*CHEOAH*	*0.05*
274658	*DRESDEN ;2U*	*47.16*
274728	*ELWOOD EC;5P*	*4.93*
274730	*ELWOOD EC;6P*	*4.93*
274732	*ELWOOD EC;7P*	*4.93*
274734	*ELWOOD EC;8P*	*4.93*
274736	*ELWOOD EC;9P*	*4.93*
LTF	*G-007*	*0.55*
LTF	*GIBSON*	*0.02*
LTF	*HAMLET*	*0.16*
274704	*KENDALL ;1C*	*15.32*
274705	*KENDALL ;1S*	*10.21*

274706	*KENDALL ;2C*	*15.32*
274707	*KENDALL ;2S*	*10.21*
LTF	*MEC*	*6.58*
LTF	*O-066*	*3.56*
290021	*O50 E*	*26.21*
LTF	*RENSSELAER*	*0.16*
LTF	*TRIMBLE*	*0.2*
930741	*AB1-122 1O1*	*45.24*
930751	*AB1-122 2O1*	*167.87*
927091	*AC1-204 1*	*104.*
927101	*AC1-204 2*	*103.28*

Appendix 14

(CE - CE) The WILTON ; 765/345 kV transformer (from bus 275232 to bus 270644 ckt 1) loads from 100.11% to 101.5% (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 21.63 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 15

(CE - CE) The WILTON ; 765/345 kV transformer (from bus 275233 to bus 270644 ckt 1) loads from 102.19% to 103.61% (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 22.09 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*

Attachment 1: Single Line Diagram