

***Generation Interconnection Request
System Impact Study Report
For
PJM Generation Interconnection Request
Queue Position AD2-102

Wempletown 345 kV
200 MW Energy / 120 MW Capacity***

Revision 1: June 2022

Revision 0: November 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 – Issued November 2021

Revision 1 – Issued June 2022. The revised report updates the Summer Peak Analysis to include retooled load flow analysis results.

General

The Interconnection Customer (IC) has proposed a solar generating facility located in Winnebago County, Illinois. The installed facilities will have a total capability of 200 MW with 120 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is 12/31/2021. This study does not imply a TO commitment to this in-service date.

Point of Interconnection

The AD2-102 project will interconnect with the ComEd transmission system by connecting to the 345kV bus at the Wempletown TSS 171.

Cost Summary

The AD2-102 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)*	\$ 0
Allocation towards System Network Upgrade Costs (PJM Identified - Light Load)*	\$ 0
Allocation towards System Network Upgrade Costs (TO Identified)*	\$ 0
Total Costs	\$ 4,000,000

*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

Attachment Facilities

The IC AD2-102 generator lead would interconnect to the 345kV bus at the Wempletown TSS 171. This interconnection would require one 345kV line MOD, a dead-end structure and revenue metering as shown in the one-line diagram. The cost for the attachment facilities is estimated at \$1M.

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

Direct Connection Network Upgrades

None,

Non- Direct Connection Network Upgrades

To accommodate interconnection of AD2-102, 345kV switchgear at TSS 171 Wempletown would be expanded to create a line position for the IC's generator lead.

The scope of work includes installation of one 345kV circuit breaker and bus work, as shown in the one-line diagram below. The IC is responsible for constructing all the facilities on the IC side of the point of interconnection outside of the Interconnection Substation. The estimated cost of the Direct Connection Upgrade is given below:

Scope of Work	Cost Estimate
Installation of a one 345kV circuit breaker and bus work at TSS 171 Wempletown as described above	\$3,000,000
Total Cost Estimate	\$3,000,000

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

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. Per the PJM Tariff, IC will be responsible for paying all actual costs of ComEd's work.
- 4) The IC is responsible for all engineering, procurement, testing and construction of all equipment on the IC's side of the Point of Interconnection (POI).

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 AD2-102 was evaluated as a 200.0 MW (Capacity 120.0 MW) injection at the Wempletown 345 kV substation in the ComEd area. Project AD2-102 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AD2-102 was studied with a commercial probability of 100%.

Potential network impacts were as follows:

Summer Peak Analysis - 2021

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)

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
1	LFFB	COMED_P4_116-45-TR82	CE - CE	GOODINGS ;4B-GOODINGS ;3B 345 kV line	270770	270766	1	AC	99.6	100.38	LDR	1802	16.43	1
2	BUS	COMED_P2-2_116_GG-345R_2	CE - CE	GOODINGS ;4B-GOODINGS ;3B 345 kV line	270770	270766	1	AC	99.6	100.38	LDR	1802	16.43	
3	LFFB	COMED_P4_112-65-BT5-6	CE - CE	WILTON ; B-WILTON ;3M 345 kV line	270926	275232	1	AC	95.89	97.79	LDR	1379	28.99	2
4	LFFB	COMED_P4_112-65-BT2-3	CE - CE	WILTON ; R-WILTON ;4M 345 kV line	270927	275233	1	AC	97.9	99.84	LDR	1379	29.61	3

5	LFFB	COMED_P4_112-65-BT5-6	CE - CE	WILTON ; 765/345 kV transformer	275232	270644	1	AC	95.87	97.77	LDR	1379	28.99	4
6	LFFB	COMED_P4_112-65-BT2-3	CE - CE	WILTON ; 765/345 kV transformer	275233	270644	1	AC	97.88	99.82	LDR	1379	29.61	5

Notes:

Violation 1: ComEd SSTE rating is 2083 MVA (Not a violation)

Violation 2: ComEd SSTE rating is 2083 MVA (Not a violation)

Violation 3: Loading below 100% (Not a violation)

Violation 4: Loading below 100% (Not a violation)

Violation 5: Loading below 100% (Not a violation)

Violation 6: Loading below 100% (Not a violation)

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
7	LFFB	AEP_P4_#2978_05DUMONT 765	MISO NIPS - AEP	17STILLWELL-05DUMONT 345 kV line	255113	243219	1	AC	109.84	111.51	ER	1409	27.5	6
8	LFFB	COMED_P4_144-45-BT6-8	CE - CE	CHERRY VA; B-GARDEN PR; R 345 kV line	270694	270759	1	AC	100.38	103.58	LDR	1479	46.86	7
9	LFFB	COMED_P4_144-45-BT6-8	CE - CE	GARDEN PR; R-SILVER LK; R 345 kV line	270759	270883	1	AC	100.38	103.58	LDR	1479	46.86	8

Notes:

Violation 7: AEP end ratings: 1409 MVA SE. MISO end ratings: 1779 MVA SE (Violation for AEP portion only).

Violation 8: ComEd SSTE rating is 1568 MVA (Not a violation)

Violation 9: ComEd SSTE rating is 1568 MVA (Not a violation)

Steady-State Voltage Requirements

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

None

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 Number	Contingency		Affected Area	Facility Description	Bus			Power Flow	Loading %		Rating		MW Contribution
	Type	Name			From	To	Circuit		Initial	Final	Type	MVA	
10	N-1	COMED_P1- 2_695_B2	MISO NIPS - AEP	17STILLWELL- 05DUMONT 345 kV line	255113	243219	1	AC	105.9	107.61	NR	1409	28.13
11	N-1	COMED_P1- 2_345-L0626__B- R_B	CE - CE	CHERRY VA; B-GARDEN PR; R 345 kV line	270694	270759	1	AC	99.58	102.83	ER	1479	47.78
12	N-1	COMED_P1- 2_345-L0626__B- R_B	CE - CE	GARDEN PR; R-SILVER LK; R 345 kV line	270759	270883	1	AC	99.58	102.83	ER	1479	47.78

Short Circuit

(Summary of impacted circuit breakers)

No overdutied breakers were identified.

Affected System Analysis & Mitigation

MISO Impacts:

The following MISO contingent facilities describes the transmission assumptions modeled in the studies that MISO deemed necessary to allow for the Interconnection Service:

- **MTEP11**: Pana to Mt. Zion to Kansas to Sugar Creek 345 kV line. Install transformers at Mt. Zion and Kansas. Project is in service (In service date: 12/14/2020)

Stability and Reactive Power Requirement

(Results of the dynamic studies should be inserted here)

No mitigations were found to be required.

Light Load Analysis – 2021

Not Required.

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	AEP Portion: Project ID: N4058 Description: Sag study results from Z1-043 & Z1-070 Facilities Studies To 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. Based on updated Sag study results, the cost to rebuild the entire 8.6 mile section of line if it is deemed necessary is \$20M. Sag study time estimate is 6-12 months and the construction time for the rebuild is 2-3 years after execution of the ISA/CSA. PJM Network Upgrade N4058. Cost: \$1,613,000 Time Estimate: 6-12 Months for study (If needed, 2-3 years for rebuild). Ratings: 1718 MVA SE MISO Portion: MISO end SE rating is 1779 MVA. No upgrades required. Notes: 1. Since the cost of the upgrade is less than \$5M, based on PJM cost allocation criteria, AD2-102 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.) AD2-102 could receive cost allocation. 3. Although Queue Project AD2-102 may not presently have cost responsibility for this upgrade, Queue Project AD2-102 may need this upgrade in-service to be deliverable to the PJM system. 4. If Queue Project AD2-102 comes into service prior to completion of the upgrade, Queue Project AD2-102 will need an interim study.	\$1,613,000	\$0	N4058
	Total Cost	\$1,613,000	\$0	

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
AEP_P4_#2978_05DUMONT 765	CONTINGENCY 'AEP_P4_#2978_05DUMONT 765' OPEN BRANCH FROM BUS 243206 TO BUS 243207 CKT 1 / 243206 05DUMONT 765 05GRNTWN OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1 / 243206 05DUMONT 765 270644 WILTON ; 765 1 END
COMED_P1-2_345- L0626__B-R_B	CONTINGENCY 'COMED_P1-2_345-L0626__B-R_B' TRIP BRANCH FROM BUS 930480 TO BUS 270916 CKT 1 / AB1-089 TAP 345 WAYNE ; B 345 END
COMED_P1-2_695_B2	CONTINGENCY 'COMED_P1-2_695_B2' OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1 / 243206 05DUMONT 765 270644 WILTO; 765 1 END
COMED_P2-2_116_GG- 345R__2	CONTINGENCY 'COMED_P2-2_116_GG-345R__2' 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-TR82__	CONTINGENCY 'COMED_P4_116-45-TR82__' TRIP BRANCH FROM BUS 270769 TO BUS 271565 TO BUS 275324 CKT 1 / GOODINGS ;2R 345 GOODINGS ; R 138 GOODINGS ;2C 34.5 DISCONNECT BUS 270769 / GOODINGS ;2R 345 END
COMED_P4_144-45-BT6-8__	CONTINGENCY 'COMED_P4_144-45-BT6-8__' TRIP BRANCH FROM BUS 930480 TO BUS 270916 CKT 1 / AB1-089 TAP 345 WAYNE ; B 345 TRIP BRANCH FROM BUS 270730 TO BUS 270916 CKT 1 / ELEC JUNC; B 345 WAYNE ; B 345 TRIP BRANCH FROM BUS 270916 TO BUS 270917 CKT 1 / WAYNE ; B 345 WAYNE ; R 345 END

Appendices (Summer Peak Analysis)

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

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

Appendix 1

(CE - CE) The GOODINGS ;4B-GOODINGS ;3B 345 kV line (from bus 270770 to bus 270766 ckt 1) loads from 99.6% to 100.38% (AC power flow) of its load dump rating (1802 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_116-45-TR82____'. This project contributes approximately 16.43 MW to the thermal violation.

CONTINGENCY 'COMED_P4_116-45-TR82____'

TRIP BRANCH FROM BUS 270769 TO BUS 271565 TO BUS 275324 CKT 1 /

GOODINGS ;2R 345 GOODINGS ; R 138 GOODINGS ;2C 34.5

DISCONNECT BUS 270769

/ GOODINGS ;2R 345

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932881	AC2-115 1	1.64
932891	AC2-115 2	1.64
932921	AC2-116	0.58
933911	AD1-013 C OI	1.2
933912	AD1-013 E OI	1.92
933931	AD1-016 C	0.63
933932	AD1-016 E	1.03
934051	AD1-031 C OI	2.2
934052	AD1-031 E OI	3.59
934431	AD1-067 C	0.09
934432	AD1-067 E	0.36
934701	AD1-098 C OI	4.52
934702	AD1-098 E OI	3.3
934871	AD1-116 C	1.11
934872	AD1-116 E	1.81
934971	AD1-129 C	0.62
934972	AD1-129 E	0.41
935001	AD1-133 C OI	14.29
935002	AD1-133 E OI	9.52
934101	AD2-000 1	5.24
934111	AD2-000 2	7.57
936291	AD2-038 C OI	3.92
936292	AD2-038 E OI	18.35
936511	AD2-066 C OI	6.45
936512	AD2-066 E OI	4.3
936791	AD2-102 C	9.86
936792	AD2-102 E	6.57
937001	AD2-134 C	1.69
937002	AD2-134 E	6.76
937311	AD2-172 C	1.72

937312	AD2-172 E	2.38
937401	AD2-194 C1	12.01
937411	AD2-194 C2	11.94
937531	AD2-214 C	3.31
937532	AD2-214 E	2.21
LTF	BLUEG	1.05
294401	BSHIL;1U E	6.58
294410	BSHIL;2U E	6.58
LTF	CANNELTON	0.04
LTF	CARR	0.37
LTF	CATAWBA	0.05
LTF	CBM-S1	1.91
LTF	CBM-W1	38.01
LTF	CBM-W2	32.17
LTF	CLIFTY	6.08
274849	CRESCENT ;1U	3.57
274859	EASYR;U1 E	7.91
274860	EASYR;U2 E	7.91
LTF	ELMERSMITH	0.03
274733	ELWOOD EC;3P	5.33
274735	ELWOOD EC;4P	5.33
274728	ELWOOD EC;5P	5.36
274730	ELWOOD EC;6P	5.36
274732	ELWOOD EC;7P	5.36
274734	ELWOOD EC;8P	5.36
274736	ELWOOD EC;9P	5.36
LTF	G-007	0.96
LTF	GIBSON	0.06
290051	GSG-6; E	6.84
LTF	HAMLET	0.14
990901	L-005 E	9.71
290108	LEEDK;1U E	15.36
LTF	MEC	29.71
274850	MENDOTA H;RU	3.53
293516	O-009 E1	6.73
293517	O-009 E2	3.42
293518	O-009 E3	3.77
293715	O-029 E	7.2
293716	O-029 E	3.95
293717	O-029 E	3.63
293771	O-035 E	4.72
LTF	O-066	6.19
293644	O22 E1	23.73
293645	O22 E2	46.07
290021	O50 E	25.06

294763	<i>P-046 E</i>	6.56
<i>LTF</i>	<i>RENSSELAER</i>	0.29
295111	<i>SUBLETTE E</i>	1.78
274861	<i>TOP CROP ;1U</i>	1.06
274862	<i>TOP CROP ;2U</i>	2.06
<i>LTF</i>	<i>TRIMBLE</i>	0.21
<i>LTF</i>	<i>WEC</i>	5.63
295109	<i>WESTBROOK E</i>	3.66
915011	<i>Y3-013 1</i>	2.6
915021	<i>Y3-013 2</i>	2.6
915031	<i>Y3-013 3</i>	2.6
916502	<i>Z1-106 E1</i>	0.81
916504	<i>Z1-106 E2</i>	0.81
916522	<i>Z1-108 E</i>	1.67
918051	<i>AA1-018 C</i>	2.85
918052	<i>AA1-018 E</i>	19.04
919221	<i>AA1-146</i>	12.93
919581	<i>AA2-030</i>	12.93
920272	<i>AA2-123 E</i>	1.66
930481	<i>AB1-089</i>	45.37
930761	<i>AB1-122 1</i>	64.74
930771	<i>AB1-122 2</i>	93.62
925301	<i>AB2-191 C</i>	0.66
925302	<i>AB2-191 E</i>	0.91
925581	<i>AC1-033 C</i>	1.08
925582	<i>AC1-033 E</i>	7.22
926311	<i>AC1-109 1</i>	1.14
926321	<i>AC1-109 2</i>	1.14
926331	<i>AC1-110 1</i>	1.24
926341	<i>AC1-110 2</i>	1.24
926351	<i>AC1-111 1</i>	0.45
926361	<i>AC1-111 2</i>	0.45
926371	<i>AC1-111 3</i>	0.45
926381	<i>AC1-111 4</i>	0.45
926391	<i>AC1-111 5</i>	0.45
926401	<i>AC1-111 6</i>	0.45
927511	<i>AC1-113 1</i>	0.82
927522	<i>AC1-113 2</i>	0.82
926431	<i>AC1-114</i>	1.64
927451	<i>AC1-142A 1</i>	3.92
927461	<i>AC1-142A 2</i>	3.95
926841	<i>AC1-171 C</i>	0.78
926842	<i>AC1-171 E</i>	5.25
927531	<i>AC1-185 1</i>	0.49
927541	<i>AC1-185 2</i>	0.49

<i>927551</i>	<i>ACI-185 3</i>	<i>0.49</i>
<i>927561</i>	<i>ACI-185 4</i>	<i>0.49</i>
<i>927571</i>	<i>ACI-185 5</i>	<i>0.49</i>
<i>927581</i>	<i>ACI-185 6</i>	<i>0.49</i>
<i>927591</i>	<i>ACI-185 7</i>	<i>0.49</i>
<i>927601</i>	<i>ACI-185 8</i>	<i>0.49</i>
<i>927091</i>	<i>ACI-204 1</i>	<i>111.68</i>
<i>927101</i>	<i>ACI-204 2</i>	<i>111.07</i>
<i>927201</i>	<i>ACI-214 C</i>	<i>1.51</i>
<i>927202</i>	<i>ACI-214 E</i>	<i>4.81</i>

Appendix 2

(CE - CE) The WILTON ; B-WILTON ;3M 345 kV line (from bus 270926 to bus 275232 ckt 1) loads from 95.89% to 97.79% (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 28.99 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

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932881	AC2-115 1	2.93
932891	AC2-115 2	2.93
932921	AC2-116	1.02
932931	AC2-117	6.55
933411	AC2-154 C	3.18
933412	AC2-154 E	5.19
933911	AD1-013 C OI	2.26
933912	AD1-013 E OI	3.61
933931	AD1-016 C	1.14
933932	AD1-016 E	1.86
934051	AD1-031 C OI	3.53
934052	AD1-031 E OI	5.77
934431	AD1-067 C	0.16
934432	AD1-067 E	0.68
934701	AD1-098 C OI	8.46
934702	AD1-098 E OI	6.18
934721	AD1-100 C	29.38
934722	AD1-100 E	137.09
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 OI	27.56
935002	AD1-133 E OI	18.37
934101	AD2-000 1	7.26

934111	AD2-000 2	7.33
936291	AD2-038 C O1	3.92
936292	AD2-038 E O1	18.36
936371	AD2-047 C O1	5.7
936372	AD2-047 E O1	27.81
936461	AD2-060	3.35
936511	AD2-066 C O1	10.39
936512	AD2-066 E O1	6.93
936791	AD2-102 C	17.4
936792	AD2-102 E	11.6
937001	AD2-134 C	3.18
937002	AD2-134 E	12.71
937311	AD2-172 C	3.03
937312	AD2-172 E	4.18
937401	AD2-194 C1	9.6
937411	AD2-194 C2	9.6
937531	AD2-214 C	5.43
937532	AD2-214 E	3.62
LTF	BLUEG	2.68
294401	BSHIL;1U E	10.63
294410	BSHIL;2U E	10.63
LTF	CALDERWOOD	0.06
LTF	CANNELTON	0.13
LTF	CARR	0.95
LTF	CATAWBA	0.35
274890	CAYUG;1U E	20.38
274891	CAYUG;2U E	20.38
LTF	CBM-S1	1.88
LTF	CBM-W1	75.21
LTF	CBM-W2	52.82
LTF	CHEOAH	0.07
LTF	CLIFTY	16.
274849	CRESCENT ;1U	6.01
274859	EASYR;U1 E	13.53
274860	EASYR;U2 E	13.53
LTF	ELMERSMITH	0.25
LTF	G-007	2.58
LTF	GIBSON	0.01
290051	GSG-6; E	12.85
LTF	HAMLET	0.67
275149	KEMPTON ;1E	23.45
990901	L-005 E	15.64
290108	LEEDK;1U E	29.84
274770	LINCOLN ;1U	3.94
274771	LINCOLN ;2U	3.94

274772	LINCOLN ;3U	3.94
274773	LINCOLN ;4U	3.94
274774	LINCOLN ;5U	3.94
274775	LINCOLN ;6U	3.94
274776	LINCOLN ;7U	3.94
274777	LINCOLN ;8U	3.94
LTF	MEC	46.95
274850	MENDOTA H;RU	6.63
293061	N-015 E	19.46
293516	O-009 E1	11.24
293517	O-009 E2	5.71
293518	O-009 E3	6.29
293715	O-029 E	12.02
293716	O-029 E	6.59
293717	O-029 E	6.06
293771	O-035 E	7.95
LTF	O-066	16.56
293644	O22 E1	12.61
293645	O22 E2	24.49
290021	O50 E	23.86
294392	P-010 E	24.72
294763	P-046 E	11.53
274888	PILOT HIL;1E	23.45
LTF	RENSSELAER	0.75
295111	SUBLETTE E	3.34
LTF	TRIMBLE	0.55
274853	TWINGROVE;U1	20.55
274854	TWINGROVE;U2	20.55
299993	U3-031C	11.47
LTF	WEC	9.81
295109	WESTBROOK E	6.88
910542	X3-005 E	0.9
915011	Y3-013 1	4.6
915021	Y3-013 2	4.6
915031	Y3-013 3	4.6
916502	Z1-106 E1	1.55
916504	Z1-106 E2	1.55
916512	Z1-107 E	3.18
916522	Z1-108 E	3.06
917501	Z2-087 C	3.87
917502	Z2-087 E	25.91
918051	AA1-018 C	3.02
918052	AA1-018 E	20.23
919221	AA1-146	21.65
919581	AA2-030	21.65

920272	AA2-123 E	3.
930481	AB1-089	80.85
930761	AB1-122 1	89.75
930771	AB1-122 2	90.68
924041	AB2-047 C O1	4.84
924042	AB2-047 E O1	32.39
925301	AB2-191 C	1.23
925302	AB2-191 E	1.7
925581	AC1-033 C	1.74
925582	AC1-033 E	11.65
926311	AC1-109 1	2.35
926321	AC1-109 2	2.35
926331	AC1-110 1	2.33
926341	AC1-110 2	2.33
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
927522	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	1.45
926822	AC1-168 E	9.72
926841	AC1-171 C	1.25
926842	AC1-171 E	8.36
927531	AC1-185 1	0.85
927541	AC1-185 2	0.85
927551	AC1-185 3	0.85
927561	AC1-185 4	0.85
927571	AC1-185 5	0.85
927581	AC1-185 6	0.85
927591	AC1-185 7	0.85
927601	AC1-185 8	0.85
927091	AC1-204 1	89.32
927101	AC1-204 2	89.32
927201	AC1-214 C	2.55
927202	AC1-214 E	8.11

Appendix 3

(CE - CE) The WILTON ; R-WILTON ;4M 345 kV line (from bus 270927 to bus 275233 ckt 1) loads from 97.9% to 99.84% (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 29.61 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

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932881	AC2-115 1	2.99
932891	AC2-115 2	2.99
932921	AC2-116	1.05
932931	AC2-117	6.69
933411	AC2-154 C	3.25
933412	AC2-154 E	5.3
933911	AD1-013 C O1	2.31
933912	AD1-013 E O1	3.69
933931	AD1-016 C	1.16
933932	AD1-016 E	1.9
934051	AD1-031 C O1	3.61
934052	AD1-031 E O1	5.89
934431	AD1-067 C	0.16
934432	AD1-067 E	0.69
934701	AD1-098 C O1	8.64
934702	AD1-098 E O1	6.31
934721	AD1-100 C	29.96
934722	AD1-100 E	139.8
934871	AD1-116 C	1.2
934872	AD1-116 E	1.96
934971	AD1-129 C	1.13
934972	AD1-129 E	0.76
935001	AD1-133 C O1	28.13
935002	AD1-133 E O1	18.75

934101	AD2-000 1	7.41
934111	AD2-000 2	7.49
936291	AD2-038 C O1	4.01
936292	AD2-038 E O1	18.76
936371	AD2-047 C O1	5.81
936372	AD2-047 E O1	28.39
936461	AD2-060	3.42
936511	AD2-066 C O1	10.61
936512	AD2-066 E O1	7.08
936791	AD2-102 C	17.76
936792	AD2-102 E	11.84
937001	AD2-134 C	3.25
937002	AD2-134 E	12.98
937311	AD2-172 C	3.09
937312	AD2-172 E	4.27
937401	AD2-194 C1	9.81
937411	AD2-194 C2	9.81
937531	AD2-214 C	5.55
937532	AD2-214 E	3.7
LTF	BIG_CAJUNI /* 35% REVERSE 4646887 4392735	< 0.01
LTF	BLUEG	2.74
294401	BSHIL;1U E	10.85
294410	BSHIL;2U E	10.85
LTF	CALDERWOOD	0.06
LTF	CANNELTON	0.13
LTF	CARR	0.97
LTF	CATAWBA	0.36
274890	CAYUG;1U E	20.78
274891	CAYUG;2U E	20.78
LTF	CBM-S1	1.91
LTF	CBM-W1	76.82
LTF	CBM-W2	53.91
LTF	CHEOAH	0.07
LTF	CLIFTY	16.34
274849	CRESCENT ;1U	6.14
274859	EASYR;U1 E	13.81
274860	EASYR;U2 E	13.81
LTF	ELMERSMITH	0.26
LTF	G-007	2.64
LTF	GIBSON	0.01
290051	GSG-6; E	13.12
LTF	HAMLET	0.69
275149	KEMPTON ;1E	23.94
990901	L-005 E	15.97

290108	LEEDK;1U E	30.48
274770	LINCOLN ;1U	4.05
274771	LINCOLN ;2U	4.05
274772	LINCOLN ;3U	4.05
274773	LINCOLN ;4U	4.05
274774	LINCOLN ;5U	4.05
274775	LINCOLN ;6U	4.05
274776	LINCOLN ;7U	4.05
274777	LINCOLN ;8U	4.05
LTF	MEC	47.95
274850	MENDOTA H;RU	6.77
293061	N-015 E	19.87
293516	O-009 E1	11.48
293517	O-009 E2	5.83
293518	O-009 E3	6.42
293715	O-029 E	12.28
293716	O-029 E	6.73
293717	O-029 E	6.19
293771	O-035 E	8.12
LTF	O-066	16.91
293644	O22 E1	12.88
293645	O22 E2	25.
290021	O50 E	24.37
294392	P-010 E	25.24
294763	P-046 E	11.78
274888	PILOT HIL;1E	23.94
LTF	RENSSELAER	0.77
LTF	ROWAN /* 35% REVERSE 4479078	< 0.01
295111	SUBLETTE E	3.42
LTF	TRIMBLE	0.56
274853	TWINGROVE;U1	20.97
274854	TWINGROVE;U2	20.97
299993	U3-031C	11.78
LTF	WEC	10.02
295109	WESTBROOK E	7.03
910542	X3-005 E	0.92
915011	Y3-013 1	4.7
915021	Y3-013 2	4.7
915031	Y3-013 3	4.7
916502	Z1-106 E1	1.59
916504	Z1-106 E2	1.59
916512	Z1-107 E	3.24
916522	Z1-108 E	3.12
917501	Z2-087 C	3.95
917502	Z2-087 E	26.44

918051	AA1-018 C	3.09
918052	AA1-018 E	20.67
919221	AA1-146	22.11
919581	AA2-030	22.11
920272	AA2-123 E	3.06
930481	AB1-089	82.57
930761	AB1-122 1	91.65
930771	AB1-122 2	92.61
924041	AB2-047 C OI	4.94
924042	AB2-047 E OI	33.05
925301	AB2-191 C	1.26
925302	AB2-191 E	1.74
925581	AC1-033 C	1.78
925582	AC1-033 E	11.9
926311	AC1-109 1	2.4
926321	AC1-109 2	2.4
926331	AC1-110 1	2.38
926341	AC1-110 2	2.38
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	1.49
927522	AC1-113 2	1.49
926431	AC1-114	2.99
927451	AC1-142A 1	5.26
927461	AC1-142A 2	5.26
926821	AC1-168 C	1.48
926822	AC1-168 E	9.93
926841	AC1-171 C	1.27
926842	AC1-171 E	8.53
927531	AC1-185 1	0.86
927541	AC1-185 2	0.86
927551	AC1-185 3	0.86
927561	AC1-185 4	0.86
927571	AC1-185 5	0.86
927581	AC1-185 6	0.86
927591	AC1-185 7	0.86
927601	AC1-185 8	0.86
927091	AC1-204 1	91.23
927101	AC1-204 2	91.22
927201	AC1-214 C	2.61
927202	AC1-214 E	8.29

Appendix 4

(CE - CE) The WILTON ; 765/345 kV transformer (from bus 275232 to bus 270644 ckt 1) loads from 95.87% to 97.77% (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 28.99 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

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932881	AC2-115 1	2.93
932891	AC2-115 2	2.93
932921	AC2-116	1.02
932931	AC2-117	6.55
933411	AC2-154 C	3.18
933412	AC2-154 E	5.19
933911	AD1-013 C OI	2.26
933912	AD1-013 E OI	3.61
933931	AD1-016 C	1.14
933932	AD1-016 E	1.86
934051	AD1-031 C OI	3.53
934052	AD1-031 E OI	5.77
934431	AD1-067 C	0.16
934432	AD1-067 E	0.68
934701	AD1-098 C OI	8.46
934702	AD1-098 E OI	6.18
934721	AD1-100 C	29.38
934722	AD1-100 E	137.09
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 OI	27.56
935002	AD1-133 E OI	18.37
934101	AD2-000 1	7.26

934111	AD2-000 2	7.33
936291	AD2-038 C O1	3.92
936292	AD2-038 E O1	18.36
936371	AD2-047 C O1	5.7
936372	AD2-047 E O1	27.81
936461	AD2-060	3.35
936511	AD2-066 C O1	10.39
936512	AD2-066 E O1	6.93
936791	AD2-102 C	17.4
936792	AD2-102 E	11.6
937001	AD2-134 C	3.18
937002	AD2-134 E	12.71
937311	AD2-172 C	3.03
937312	AD2-172 E	4.18
937401	AD2-194 C1	9.6
937411	AD2-194 C2	9.6
937531	AD2-214 C	5.43
937532	AD2-214 E	3.62
LTF	BLUEG	2.68
294401	BSHIL;1U E	10.63
294410	BSHIL;2U E	10.63
LTF	CALDERWOOD	0.06
LTF	CANNELTON	0.13
LTF	CARR	0.95
LTF	CATAWBA	0.35
274890	CAYUG;1U E	20.38
274891	CAYUG;2U E	20.38
LTF	CBM-S1	1.88
LTF	CBM-W1	75.21
LTF	CBM-W2	52.82
LTF	CHEOAH	0.07
LTF	CLIFTY	16.
274849	CRESCENT ;1U	6.01
274859	EASYR;U1 E	13.53
274860	EASYR;U2 E	13.53
LTF	ELMERSMITH	0.25
LTF	G-007	2.58
LTF	GIBSON	0.01
290051	GSG-6; E	12.85
LTF	HAMLET	0.67
275149	KEMPTON ;1E	23.45
990901	L-005 E	15.64
290108	LEEDK;1U E	29.84
274770	LINCOLN ;1U	3.94
274771	LINCOLN ;2U	3.94

274772	LINCOLN ;3U	3.94
274773	LINCOLN ;4U	3.94
274774	LINCOLN ;5U	3.94
274775	LINCOLN ;6U	3.94
274776	LINCOLN ;7U	3.94
274777	LINCOLN ;8U	3.94
LTF	MEC	46.95
274850	MENDOTA H;RU	6.63
293061	N-015 E	19.46
293516	O-009 E1	11.24
293517	O-009 E2	5.71
293518	O-009 E3	6.29
293715	O-029 E	12.02
293716	O-029 E	6.59
293717	O-029 E	6.06
293771	O-035 E	7.95
LTF	O-066	16.56
293644	O22 E1	12.61
293645	O22 E2	24.49
290021	O50 E	23.86
294392	P-010 E	24.72
294763	P-046 E	11.53
274888	PILOT HIL;1E	23.45
LTF	RENSSELAER	0.75
295111	SUBLETTE E	3.34
LTF	TRIMBLE	0.55
274853	TWINGROVE;U1	20.55
274854	TWINGROVE;U2	20.55
299993	U3-031C	11.47
LTF	WEC	9.81
295109	WESTBROOK E	6.88
910542	X3-005 E	0.9
915011	Y3-013 1	4.6
915021	Y3-013 2	4.6
915031	Y3-013 3	4.6
916502	Z1-106 E1	1.55
916504	Z1-106 E2	1.55
916512	Z1-107 E	3.18
916522	Z1-108 E	3.06
917501	Z2-087 C	3.87
917502	Z2-087 E	25.91
918051	AA1-018 C	3.02
918052	AA1-018 E	20.23
919221	AA1-146	21.65
919581	AA2-030	21.65

920272	AA2-123 E	3.
930481	AB1-089	80.85
930761	AB1-122 1	89.75
930771	AB1-122 2	90.68
924041	AB2-047 C O1	4.84
924042	AB2-047 E O1	32.39
925301	AB2-191 C	1.23
925302	AB2-191 E	1.7
925581	AC1-033 C	1.74
925582	AC1-033 E	11.65
926311	AC1-109 1	2.35
926321	AC1-109 2	2.35
926331	AC1-110 1	2.33
926341	AC1-110 2	2.33
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
927522	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	1.45
926822	AC1-168 E	9.72
926841	AC1-171 C	1.25
926842	AC1-171 E	8.36
927531	AC1-185 1	0.85
927541	AC1-185 2	0.85
927551	AC1-185 3	0.85
927561	AC1-185 4	0.85
927571	AC1-185 5	0.85
927581	AC1-185 6	0.85
927591	AC1-185 7	0.85
927601	AC1-185 8	0.85
927091	AC1-204 1	89.32
927101	AC1-204 2	89.32
927201	AC1-214 C	2.55
927202	AC1-214 E	8.11

Appendix 5

(CE - CE) The WILTON ; 765/345 kV transformer (from bus 275233 to bus 270644 ckt 1) loads from 97.88% to 99.82% (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 29.61 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

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932881	AC2-115 1	2.99
932891	AC2-115 2	2.99
932921	AC2-116	1.05
932931	AC2-117	6.69
933411	AC2-154 C	3.25
933412	AC2-154 E	5.3
933911	AD1-013 C O1	2.31
933912	AD1-013 E O1	3.69
933931	AD1-016 C	1.16
933932	AD1-016 E	1.9
934051	AD1-031 C O1	3.61
934052	AD1-031 E O1	5.89
934431	AD1-067 C	0.16
934432	AD1-067 E	0.69
934701	AD1-098 C O1	8.64
934702	AD1-098 E O1	6.31
934721	AD1-100 C	29.96
934722	AD1-100 E	139.8
934871	AD1-116 C	1.2
934872	AD1-116 E	1.96
934971	AD1-129 C	1.13
934972	AD1-129 E	0.76
935001	AD1-133 C O1	28.13
935002	AD1-133 E O1	18.75

934101	AD2-000 1	7.41
934111	AD2-000 2	7.49
936291	AD2-038 C O1	4.01
936292	AD2-038 E O1	18.76
936371	AD2-047 C O1	5.81
936372	AD2-047 E O1	28.39
936461	AD2-060	3.42
936511	AD2-066 C O1	10.61
936512	AD2-066 E O1	7.08
936791	AD2-102 C	17.76
936792	AD2-102 E	11.84
937001	AD2-134 C	3.25
937002	AD2-134 E	12.98
937311	AD2-172 C	3.09
937312	AD2-172 E	4.27
937401	AD2-194 C1	9.81
937411	AD2-194 C2	9.81
937531	AD2-214 C	5.55
937532	AD2-214 E	3.7
LTF	BIG_CAJUNI /* 35% REVERSE 4646887 4392735	< 0.01
LTF	BLUEG	2.74
294401	BSHIL;1U E	10.85
294410	BSHIL;2U E	10.85
LTF	CALDERWOOD	0.06
LTF	CANNELTON	0.13
LTF	CARR	0.97
LTF	CATAWBA	0.36
274890	CAYUG;1U E	20.78
274891	CAYUG;2U E	20.78
LTF	CBM-S1	1.91
LTF	CBM-W1	76.82
LTF	CBM-W2	53.91
LTF	CHEOAH	0.07
LTF	CLIFTY	16.34
274849	CRESCENT ;1U	6.14
274859	EASYR;U1 E	13.81
274860	EASYR;U2 E	13.81
LTF	ELMERSMITH	0.26
LTF	G-007	2.64
LTF	GIBSON	0.01
290051	GSG-6; E	13.12
LTF	HAMLET	0.69
275149	KEMPTON ;1E	23.94
990901	L-005 E	15.97

290108	LEEDK;1U E	30.48
274770	LINCOLN ;1U	4.05
274771	LINCOLN ;2U	4.05
274772	LINCOLN ;3U	4.05
274773	LINCOLN ;4U	4.05
274774	LINCOLN ;5U	4.05
274775	LINCOLN ;6U	4.05
274776	LINCOLN ;7U	4.05
274777	LINCOLN ;8U	4.05
LTF	MEC	47.95
274850	MENDOTA H;RU	6.77
293061	N-015 E	19.87
293516	O-009 E1	11.48
293517	O-009 E2	5.83
293518	O-009 E3	6.42
293715	O-029 E	12.28
293716	O-029 E	6.73
293717	O-029 E	6.19
293771	O-035 E	8.12
LTF	O-066	16.91
293644	O22 E1	12.88
293645	O22 E2	25.
290021	O50 E	24.37
294392	P-010 E	25.24
294763	P-046 E	11.78
274888	PILOT HIL;1E	23.94
LTF	RENSSELAER	0.77
LTF	ROWAN /* 35% REVERSE 4479078	< 0.01
295111	SUBLETTE E	3.42
LTF	TRIMBLE	0.56
274853	TWINGROVE;U1	20.97
274854	TWINGROVE;U2	20.97
299993	U3-031C	11.78
LTF	WEC	10.02
295109	WESTBROOK E	7.03
910542	X3-005 E	0.92
915011	Y3-013 1	4.7
915021	Y3-013 2	4.7
915031	Y3-013 3	4.7
916502	Z1-106 E1	1.59
916504	Z1-106 E2	1.59
916512	Z1-107 E	3.24
916522	Z1-108 E	3.12
917501	Z2-087 C	3.95
917502	Z2-087 E	26.44

918051	AA1-018 C	3.09
918052	AA1-018 E	20.67
919221	AA1-146	22.11
919581	AA2-030	22.11
920272	AA2-123 E	3.06
930481	AB1-089	82.57
930761	AB1-122 1	91.65
930771	AB1-122 2	92.61
924041	AB2-047 C OI	4.94
924042	AB2-047 E OI	33.05
925301	AB2-191 C	1.26
925302	AB2-191 E	1.74
925581	AC1-033 C	1.78
925582	AC1-033 E	11.9
926311	AC1-109 1	2.4
926321	AC1-109 2	2.4
926331	AC1-110 1	2.38
926341	AC1-110 2	2.38
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	1.49
927522	AC1-113 2	1.49
926431	AC1-114	2.99
927451	AC1-142A 1	5.26
927461	AC1-142A 2	5.26
926821	AC1-168 C	1.48
926822	AC1-168 E	9.93
926841	AC1-171 C	1.27
926842	AC1-171 E	8.53
927531	AC1-185 1	0.86
927541	AC1-185 2	0.86
927551	AC1-185 3	0.86
927561	AC1-185 4	0.86
927571	AC1-185 5	0.86
927581	AC1-185 6	0.86
927591	AC1-185 7	0.86
927601	AC1-185 8	0.86
927091	AC1-204 1	91.23
927101	AC1-204 2	91.22
927201	AC1-214 C	2.61
927202	AC1-214 E	8.29

Appendix 6

(MISO NIPS - AEP) The 17STILLWELL-05DUMONT 345 kV line (from bus 255113 to bus 243219 ckt 1) loads from 109.84% to 111.51% (AC power flow) of its emergency rating (1409 MVA) for the line fault with failed breaker contingency outage of 'AEP_P4_#2978_05DUMONT 765'. This project contributes approximately 27.5 MW to the thermal violation.

CONTINGENCY 'AEP_P4_#2978_05DUMONT 765'

OPEN BRANCH FROM BUS 243206 TO BUS 243207 CKT 1 / 243206
05DUMONT 765 05GRNTWN

OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1 / 243206
05DUMONT 765 270644 WILTON ; 765 1

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932881	AC2-115 1	2.77
932891	AC2-115 2	2.77
932921	AC2-116	0.97
932931	AC2-117	5.87
933411	AC2-154 C	3.06
933412	AC2-154 E	4.99
933911	AD1-013 C OI	2.14
933912	AD1-013 E OI	3.42
933931	AD1-016 C	1.08
933932	AD1-016 E	1.76
934051	AD1-031 C OI	3.32
934052	AD1-031 E OI	5.42
934431	AD1-067 C	0.15
934432	AD1-067 E	0.64
934701	AD1-098 C OI	8.01
934702	AD1-098 E OI	5.85
934721	AD1-100 C	22.64
934722	AD1-100 E	105.64
934871	AD1-116 C	1.1
934872	AD1-116 E	1.8
934971	AD1-129 C	1.05
934972	AD1-129 E	0.7
935001	AD1-133 C OI	24.37
935002	AD1-133 E OI	16.25
934101	AD2-000 1	6.74
934111	AD2-000 2	6.95
936291	AD2-038 C OI	3.69

936292	AD2-038 E O1	17.27
936371	AD2-047 C O1	5.47
936372	AD2-047 E O1	26.72
936461	AD2-060	3.22
936511	AD2-066 C O1	9.79
936512	AD2-066 E O1	6.53
936791	AD2-102 C	16.5
936792	AD2-102 E	11.
937001	AD2-134 C	3.01
937002	AD2-134 E	12.03
937311	AD2-172 C	2.87
937312	AD2-172 E	3.96
937401	AD2-194 C1	9.06
937411	AD2-194 C2	9.05
937531	AD2-214 C	5.16
937532	AD2-214 E	3.44
LTF	BIG_CAJUNI /* 35% REVERSE 4646887 4392735	< 0.01
LTF	BLUEG	0.19
294401	BSHIL;1U E	9.99
294410	BSHIL;2U E	9.99
LTF	CARR	0.91
LTF	CATAWBA	0.18
274890	CAYUG;1U E	15.98
274891	CAYUG;2U E	15.98
LTF	CBM-S1	4.04
LTF	CBM-W1	73.51
LTF	CBM-W2	62.69
LTF	CIN	3.03
LTF	CLIFTY	8.19
274849	CRESCENT ;1U	5.64
274859	EASYR;U1 E	12.83
274860	EASYR;U2 E	12.83
LTF	G-007	2.39
290051	GSG-6; E	12.17
LTF	HAMLET	0.41
LTF	IPL	1.29
940531	J351	434.12
951131	J643	25.78
938961	J847	13.12
275149	KEMPTON ;1E	22.53
990901	L-005 E	14.7
290108	LEEDK;1U E	28.24
LTF	MEC	45.43
274850	MENDOTA H;RU	6.28

293061	N-015 E	17.74
293516	O-009 E1	10.64
293517	O-009 E2	5.4
293518	O-009 E3	5.95
293715	O-029 E	11.38
293716	O-029 E	6.24
293717	O-029 E	5.73
293771	O-035 E	7.46
LTF	O-066	15.32
293644	O22 E1	12.1
293645	O22 E2	23.49
290021	O50 E	22.59
294392	P-010 E	22.52
294763	P-046 E	10.94
274888	PILOT HIL;1E	22.53
LTF	RENSSELAER	0.72
LTF	ROWAN /* 35% REVERSE 4479078	< 0.01
274789	SE CHICAG;6U	1.34
274790	SE CHICAG;7U	1.34
274791	SE CHICAG;8U	1.34
295111	SUBLETTE E	3.17
LTF	TRIMBLE	0.06
299993	U3-031C	6.3
LTF	WEC	9.32
295109	WESTBROOK E	6.51
910542	X3-005 E	1.01
915011	Y3-013 1	4.37
915021	Y3-013 2	4.37
915031	Y3-013 3	4.37
916502	Z1-106 E1	1.47
916504	Z1-106 E2	1.47
916512	Z1-107 E	3.06
916522	Z1-108 E	2.89
917501	Z2-087 C	3.22
917502	Z2-087 E	21.53
918051	AA1-018 C	2.83
918052	AA1-018 E	18.94
919221	AA1-146	20.55
919581	AA2-030	20.55
920272	AA2-123 E	2.84
930481	AB1-089	76.61
930761	AB1-122 1	83.4
930771	AB1-122 2	85.95
924041	AB2-047 C O1	4.02
924042	AB2-047 E O1	26.91

925301	AB2-191 C	1.17
925302	AB2-191 E	1.61
925581	AC1-033 C	1.64
925582	AC1-033 E	10.95
926311	AC1-109 1	2.21
926321	AC1-109 2	2.21
926331	AC1-110 1	2.21
926341	AC1-110 2	2.21
926351	AC1-111 1	0.89
926361	AC1-111 2	0.89
926371	AC1-111 3	0.89
926381	AC1-111 4	0.89
926391	AC1-111 5	0.89
926401	AC1-111 6	0.89
927511	AC1-113 1	1.39
927522	AC1-113 2	1.39
926431	AC1-114	2.77
927451	AC1-142A 1	4.89
927461	AC1-142A 2	4.89
926821	AC1-168 C	1.35
926822	AC1-168 E	9.05
926841	AC1-171 C	1.17
926842	AC1-171 E	7.83
927531	AC1-185 1	0.8
927541	AC1-185 2	0.8
927551	AC1-185 3	0.8
927561	AC1-185 4	0.8
927571	AC1-185 5	0.8
927581	AC1-185 6	0.8
927591	AC1-185 7	0.8
927601	AC1-185 8	0.8
927091	AC1-204 1	84.21
927101	AC1-204 2	84.18
927201	AC1-214 C	2.39
927202	AC1-214 E	7.61

Appendix 7

(CE - CE) The CHERRY VA; B-GARDEN PR; R 345 kV line (from bus 270694 to bus 270759 ckt 1) loads from 100.38% to 103.58% (AC power flow) of its load dump rating (1479 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_144-45-BT6-8__'. This project contributes approximately 46.86 MW to the thermal violation.

CONTINGENCY 'COMED_P4_144-45-BT6-8__'

TRIP BRANCH FROM BUS 930480 TO BUS 270916 CKT 1 / AB1-089 TAP 345
WAYNE ; B 345

TRIP BRANCH FROM BUS 270730 TO BUS 270916 CKT 1 / ELEC JUNC; B 345
WAYNE ; B 345

TRIP BRANCH FROM BUS 270916 TO BUS 270917 CKT 1 / WAYNE ; B 345
WAYNE ; R 345

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932881	AC2-115 1	4.91
932891	AC2-115 2	4.91
932921	AC2-116	1.72
933911	AD1-013 C OI	1.55
933912	AD1-013 E OI	2.48
934431	AD1-067 C	0.11
934432	AD1-067 E	0.47
934701	AD1-098 C OI	5.97
934702	AD1-098 E OI	4.36
934971	AD1-129 C	1.34
934972	AD1-129 E	0.9
936791	AD2-102 C	28.11
936792	AD2-102 E	18.74
937001	AD2-134 C	2.21
937002	AD2-134 E	8.8
937311	AD2-172 C	4.4
937312	AD2-172 E	6.07
937531	AD2-214 C	4.69
937532	AD2-214 E	3.13
LTF	BLUEG	0.63
274656	BYRON ;1U	52.92
274657	BYRON ;2U	51.76
LTF	CANNELTON	0.04
LTF	CARR	0.18
LTF	CBM-S1	1.35
LTF	CBM-S2	0.03
LTF	CBM-W1	36.16

<i>LTF</i>	<i>CBM-W2</i>	<i>18.23</i>
<i>LTF</i>	<i>CLIFTY</i>	<i>3.33</i>
<i>274859</i>	<i>EASYR;U1 E</i>	<i>17.13</i>
<i>274860</i>	<i>EASYR;U2 E</i>	<i>17.13</i>
<i>LTF</i>	<i>ELMERSMITH</i>	<i>0.07</i>
<i>LTF</i>	<i>G-007</i>	<i>0.46</i>
<i>LTF</i>	<i>GIBSON</i>	<i>0.12</i>
<i>290051</i>	<i>GSG-6; E</i>	<i>8.9</i>
<i>LTF</i>	<i>HAMLET</i>	<i>0.03</i>
<i>940081</i>	<i>J384</i>	<i>2.62</i>
<i>940101</i>	<i>J390</i>	<i>83.76</i>
<i>940142</i>	<i>J395 E</i>	<i>9.04</i>
<i>981141</i>	<i>J760</i>	<i>5.29</i>
<i>938421</i>	<i>J818</i>	<i>14.11</i>
<i>938991</i>	<i>J850</i>	<i>20.76</i>
<i>939091</i>	<i>J864</i>	<i>4.4</i>
<i>290108</i>	<i>LEEDK;1U E</i>	<i>17.84</i>
<i>LTF</i>	<i>MEC</i>	<i>27.62</i>
<i>274850</i>	<i>MENDOTA H;RU</i>	<i>4.59</i>
<i>293516</i>	<i>O-009 E1</i>	<i>8.76</i>
<i>293517</i>	<i>O-009 E2</i>	<i>4.45</i>
<i>293518</i>	<i>O-009 E3</i>	<i>4.9</i>
<i>293715</i>	<i>O-029 E</i>	<i>9.37</i>
<i>293716</i>	<i>O-029 E</i>	<i>5.14</i>
<i>293717</i>	<i>O-029 E</i>	<i>4.72</i>
<i>LTF</i>	<i>O-066</i>	<i>2.95</i>
<i>294763</i>	<i>P-046 E</i>	<i>16.74</i>
<i>290266</i>	<i>R-018</i>	<i>0.28</i>
<i>LTF</i>	<i>RENSSELAER</i>	<i>0.14</i>
<i>274823</i>	<i>ROCKFORD ;21</i>	<i>3.48</i>
<i>295111</i>	<i>SUBLETTE E</i>	<i>2.32</i>
<i>LTF</i>	<i>TILTON</i>	<i>0.12</i>
<i>LTF</i>	<i>TRIMBLE</i>	<i>0.13</i>
<i>900371</i>	<i>V4-046</i>	<i>0.91</i>
<i>900381</i>	<i>V4-047</i>	<i>0.91</i>
<i>LTF</i>	<i>WEC</i>	<i>0.6</i>
<i>295109</i>	<i>WESTBROOK E</i>	<i>4.77</i>
<i>916522</i>	<i>Z1-108 E</i>	<i>2.07</i>
<i>919221</i>	<i>AA1-146</i>	<i>20.24</i>
<i>919581</i>	<i>AA2-030</i>	<i>20.24</i>
<i>930481</i>	<i>AB1-089</i>	<i>139.52</i>
<i>925301</i>	<i>AB2-191 C</i>	<i>0.85</i>
<i>925302</i>	<i>AB2-191 E</i>	<i>1.18</i>
<i>927511</i>	<i>AC1-113 1</i>	<i>2.46</i>
<i>927522</i>	<i>AC1-113 2</i>	<i>2.46</i>

<i>926431</i>	<i>ACI-114</i>	<i>4.91</i>
<i>927531</i>	<i>ACI-185 1</i>	<i>1.07</i>
<i>927541</i>	<i>ACI-185 2</i>	<i>1.07</i>
<i>927551</i>	<i>ACI-185 3</i>	<i>1.07</i>
<i>927561</i>	<i>ACI-185 4</i>	<i>1.07</i>
<i>927571</i>	<i>ACI-185 5</i>	<i>1.07</i>
<i>927581</i>	<i>ACI-185 6</i>	<i>1.07</i>
<i>927591</i>	<i>ACI-185 7</i>	<i>1.07</i>
<i>927601</i>	<i>ACI-185 8</i>	<i>1.07</i>

Appendix 8

(CE - CE) The GARDEN PR; R-SILVER LK; R 345 kV line (from bus 270759 to bus 270883 ckt 1) loads from 100.38% to 103.58% (AC power flow) of its load dump rating (1479 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_144-45-BT6-8__'. This project contributes approximately 46.86 MW to the thermal violation.

CONTINGENCY 'COMED_P4_144-45-BT6-8__'

TRIP BRANCH FROM BUS 930480 TO BUS 270916 CKT 1 / AB1-089 TAP 345
WAYNE ; B 345

TRIP BRANCH FROM BUS 270730 TO BUS 270916 CKT 1 / ELEC JUNC; B 345
WAYNE ; B 345

TRIP BRANCH FROM BUS 270916 TO BUS 270917 CKT 1 / WAYNE ; B 345
WAYNE ; R 345

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932881	AC2-115 1	4.91
932891	AC2-115 2	4.91
932921	AC2-116	1.72
933911	AD1-013 C OI	1.55
933912	AD1-013 E OI	2.48
934431	AD1-067 C	0.11
934432	AD1-067 E	0.47
934701	AD1-098 C OI	5.97
934702	AD1-098 E OI	4.36
934971	AD1-129 C	1.34
934972	AD1-129 E	0.9
936791	AD2-102 C	28.11
936792	AD2-102 E	18.74
937001	AD2-134 C	2.21
937002	AD2-134 E	8.8
937311	AD2-172 C	4.4
937312	AD2-172 E	6.07
937531	AD2-214 C	4.69
937532	AD2-214 E	3.13
LTF	BLUEG	0.63
274656	BYRON ;1U	52.92
274657	BYRON ;2U	51.76
LTF	CANNELTON	0.04
LTF	CARR	0.18
LTF	CBM-S1	1.35
LTF	CBM-S2	0.03
LTF	CBM-W1	36.16

<i>LTF</i>	<i>CBM-W2</i>	<i>18.23</i>
<i>LTF</i>	<i>CLIFTY</i>	<i>3.33</i>
<i>274859</i>	<i>EASYR;U1 E</i>	<i>17.13</i>
<i>274860</i>	<i>EASYR;U2 E</i>	<i>17.13</i>
<i>LTF</i>	<i>ELMERSMITH</i>	<i>0.07</i>
<i>LTF</i>	<i>G-007</i>	<i>0.46</i>
<i>LTF</i>	<i>GIBSON</i>	<i>0.12</i>
<i>290051</i>	<i>GSG-6; E</i>	<i>8.9</i>
<i>LTF</i>	<i>HAMLET</i>	<i>0.03</i>
<i>940081</i>	<i>J384</i>	<i>2.62</i>
<i>940101</i>	<i>J390</i>	<i>83.76</i>
<i>940142</i>	<i>J395 E</i>	<i>9.04</i>
<i>981141</i>	<i>J760</i>	<i>5.29</i>
<i>938421</i>	<i>J818</i>	<i>14.11</i>
<i>938991</i>	<i>J850</i>	<i>20.76</i>
<i>939091</i>	<i>J864</i>	<i>4.4</i>
<i>290108</i>	<i>LEEDK;1U E</i>	<i>17.84</i>
<i>LTF</i>	<i>MEC</i>	<i>27.62</i>
<i>274850</i>	<i>MENDOTA H;RU</i>	<i>4.59</i>
<i>293516</i>	<i>O-009 E1</i>	<i>8.76</i>
<i>293517</i>	<i>O-009 E2</i>	<i>4.45</i>
<i>293518</i>	<i>O-009 E3</i>	<i>4.9</i>
<i>293715</i>	<i>O-029 E</i>	<i>9.37</i>
<i>293716</i>	<i>O-029 E</i>	<i>5.14</i>
<i>293717</i>	<i>O-029 E</i>	<i>4.72</i>
<i>LTF</i>	<i>O-066</i>	<i>2.95</i>
<i>294763</i>	<i>P-046 E</i>	<i>16.74</i>
<i>290266</i>	<i>R-018</i>	<i>0.28</i>
<i>LTF</i>	<i>RENSSELAER</i>	<i>0.14</i>
<i>274823</i>	<i>ROCKFORD ;21</i>	<i>3.48</i>
<i>295111</i>	<i>SUBLETTE E</i>	<i>2.32</i>
<i>LTF</i>	<i>TILTON</i>	<i>0.12</i>
<i>LTF</i>	<i>TRIMBLE</i>	<i>0.13</i>
<i>900371</i>	<i>V4-046</i>	<i>0.91</i>
<i>900381</i>	<i>V4-047</i>	<i>0.91</i>
<i>LTF</i>	<i>WEC</i>	<i>0.6</i>
<i>295109</i>	<i>WESTBROOK E</i>	<i>4.77</i>
<i>916522</i>	<i>Z1-108 E</i>	<i>2.07</i>
<i>919221</i>	<i>AA1-146</i>	<i>20.24</i>
<i>919581</i>	<i>AA2-030</i>	<i>20.24</i>
<i>930481</i>	<i>AB1-089</i>	<i>139.52</i>
<i>925301</i>	<i>AB2-191 C</i>	<i>0.85</i>
<i>925302</i>	<i>AB2-191 E</i>	<i>1.18</i>
<i>927511</i>	<i>AC1-113 1</i>	<i>2.46</i>
<i>927522</i>	<i>AC1-113 2</i>	<i>2.46</i>

<i>926431</i>	<i>ACI-114</i>	<i>4.91</i>
<i>927531</i>	<i>ACI-185 1</i>	<i>1.07</i>
<i>927541</i>	<i>ACI-185 2</i>	<i>1.07</i>
<i>927551</i>	<i>ACI-185 3</i>	<i>1.07</i>
<i>927561</i>	<i>ACI-185 4</i>	<i>1.07</i>
<i>927571</i>	<i>ACI-185 5</i>	<i>1.07</i>
<i>927581</i>	<i>ACI-185 6</i>	<i>1.07</i>
<i>927591</i>	<i>ACI-185 7</i>	<i>1.07</i>
<i>927601</i>	<i>ACI-185 8</i>	<i>1.07</i>

Attachment 1: Single Line Diagram

TSS 171
WEMPLETOWN

AD2-102

