

***Generation Interconnection Request
System Impact Study Report
For
PJM Generation Interconnection Request
Queue Position AD2-047

Davis Creek 138 kV***

Revision 0: November 2021

Revision 1: June 2022

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

June 2022 – This revision is being issued to reflect a retooled light load and summer peak analysis.

General

The Interconnection Customer (“IC”) for Queue AD2-047 Davis Creek 138kV project has proposed a 200 MW Energy (34 MW Capacity) wind farm to be located in Kankakee County,

IL. The IC has proposed a service date for this project of September 30, 2020. This study does not imply a Transmission Owner commitment to this date.

Point of Interconnection

The Interconnection Customer (IC) for AD2-047 proposes to interconnect 200 MW windfarm to ComEd transmission system by connecting to TSS 86 Davis Creek 138 kV red bus.

Cost Summary

Description	Cost Estimate
Total Physical Interconnection Costs	\$3,000,000
Allocation towards System Network Upgrade Costs (PJM Identified - Summer Peak)*	\$0
Allocation towards System Network Upgrade Costs (PJM Identified - Light Load)*	\$10,475,000
Allocation towards System Network Upgrade Costs (TO Identified)*	\$0
Total Costs	\$13,475,000

*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	\$3,000,000
Direct Connection Network Upgrades	\$ 0
Non-Direct Connection Network Upgrades	\$ 0
Total Physical Interconnection Costs	\$ 0

The AD2-047 generator lead will interconnect to TSS 86 Davis Creek 138 kV red bus. This interconnection would require one 138kV circuit breaker, a dead-end structure and revenue metering as shown in the one-line diagram.

The estimated cost for the attachment facilities is given below.

Scope of Work	Cost Estimate
Installation of one 138kV circuit breaker, one dead-end structures and one set of revenue metering (see notes below on cost estimate)	\$3.0M

Direct Connection Network Upgrades

None.

Non-Direct Connection Network Upgrades

None

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

Schedule:

The estimated schedule is 24-months to complete the physical interconnection scope of work after the ISA / ICSA are signed.

Revenue Metering and SCADA Requirements

PJM Requirements

The Interconnection Customer will be required to install equipment necessary to provide Revenue Metering (KWH, KVARH) and real time data (KW, KVAR) for IC's generating Resource. See PJM Manuals M-01 and M-14D, and PJM Tariff Section 8 of Attachment O.

Meteorological Data Reporting Requirements

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

- Wind speed (meters/second) - (Required)
- Wind direction (decimal degrees from true north) - (Required)
- Ambient air temperature (Fahrenheit) - (Required)
- Air Pressure (Hectopascals) - (Required)
- Humidity (Percent) (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 AD2-047 was evaluated as a 200.0 MW (Capacity 34.0 MW) injection at the Davis Creek 138kV substation in the ComEd area. Project AD2-047 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AD2-047 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		Affected Area	Facility Description	Bus			Power Flow	Loading %		Rating		MW Contribution	Flowgate Appendix
	Type	Name			From	To	Circuit		Initial	Final	Type	MVA		
1	LFFB	COMED_P4_112-65-BT5-6__	CE - CE	WILTON ; B-WILTON ;3M 345 kV line	270926	275232	1	AC	92.33	94.53	LDR	1379	33.5	1
2	LFFB	COMED_P4_112-65-BT2-3__	CE - CE	WILTON ; R-WILTON ;4M 345 kV line	270927	275233	1	AC	94.27	96.51	LDR	1379	34.2	2
3	LFFB	COMED_P4_112-65-BT5-6__	CE - CE	WILTON ; 765/345 kV transformer	275232	270644	1	AC	92.31	94.51	LDR	1379	33.5	3
4	LFFB	COMED_P4_112-65-BT2-3__	CE - CE	WILTON ; 765/345 kV transformer	275233	270644	1	AC	94.25	96.49	LDR	1379	34.2	4

Notes:

Overload 1: Facility loading below 100% (Not a violation)

Overload 2: Facility loading below 100% (Not a violation)

Overload 3: Facility loading below 100% (Not a violation)

Overload 4: Facility 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	Affected Area	Facility Description	Bus		Circuit	Power Flow	Loading %		Rating		MW Contribution	Flowgate Appendix
		Name			From	To			Initial	Final	Type	MVA		
5	LFFB	AEP_P4_#2978_05DUMONT 765	MISO NIPS - AEP	17STILLWELL-05DUMONT 345 kV line	255113	243219	1	AC	106.69	108.65	ER	1409	32.19	5

Notes:

Violation 5:AEP SE: 1409 MVA (Valid violation) MISO end ratings: 1779 MVA SE (Violation for AEP portion only).)

Steady-State Voltage Requirements

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

None

Short Circuit

(Summary of impacted circuit breakers)

No overdutied breakers identified.

Affected System Analysis & Mitigation

MISO Impacts:

Preliminary MISO impacts have been identified and summarized in the table below:

Facility	Upgrade Description	Cost	Cost Allocation
Angola – S. Milford 69 kV line (NIPSCO)	Description: NIPSCO upgrade to rebuild 4.68 miles of the 69 kV line with 477 ACSR at an estimated cost of \$3.74 M. (AD2-047 cost allocation is \$127,810). Cost: \$3,740,000 New Ratings: 68 MVA	\$3,740,000	\$127,810
Stillwell-Dumont 345 kV (MISO-PJM tie)	AEP Upgrade: Description: AEP Sag study results show 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. Cost: \$1,613,000 New Ratings: 1718 MVA SE NIPSCO: NIPS end rating is 1779 MVA SE (no upgrade required)	\$1,613,000	\$222,845
Crete - St John 345 kV line (MISO-PJM tie)	ComEd Upgrades: Description: ComEd upgrade is to replace a circuit breaker and associated equipment at Crete at an estimated cost of \$6.0 M. AD2-214 cost allocation is \$1.25M. Upon completion of this upgrade the new ratings will be 1754/2246/2297/2488 MVA (SN/SLTE/SSTE/SLD). Note: This upgrade is on top of the upgrade (to Reconductor the line) assigned to prior AE2 queued cycle projects. Cost: \$6,000,000 New Ratings: 1754/2246/2297/2488 MVA (SN/SLTE/SSTE/SLD) Time: 30 Months NIPSCO Upgrades: NIPSCO upgrades required for prior queued cycle projects are sufficient. Hence project studied as part of this study do not get a cost. If the projects from prior cycle drop out, this cost may get assigned to projects in this cycle.	\$6,000,000	\$1,250,000

St John – St. John Tap 345 kV line	ComEd Upgrades: Description: ComEd upgrade will be to mitigate the sag on the line. Upon completion of this work the new line will be a minimum of 1091/1399/1483/1674 MVA (SN/SLTE/SSTE/SLD). Note: <i>This estimate and timeline do not include potential tower replacement work</i> Cost: \$3,100,000 New Ratings: 1091/1399/1483/1674 MVA (SN/SLTE/SSTE/SLD). Time: 30-36 Months NIPSCO Upgrades: No upgrades required.	\$3,100,000	\$390,000
Total Cost		\$14,453,000	\$1,990,655

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 Type	Name	Affected Area	Facility Description	Bus From	Bus To	Circuit	Power Flow	Loading % Initial	Loading % Final	Rating Type	Rating MVA	MW Contribution	Flowgate Appendix
6	N-1	COMED_P1-2_695_B2	MISO NIPS - AEP	17STILLWELL-05DUMONT 345 kV line	255113	243219	1	AC	102.66	104.68	NR	1409	33.19	
7	N-1	COMED_P1-2_345-L8014_T-S-B	CE - CE	AD1-100 TAP-WILTON ; B 345 kV line	934720	270926	1	AC	111.66	112.91	ER	1528	18.76	

Light Load Analysis – 2021

The Queue Project AD2-047 was evaluated as a 200.0 MW (Capacity 200.0 MW) injection at the Davis Creek 138kV substation in the ComEd area. Project AD2-047 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC

Regional Reliability Councils, and Transmission Owners). Project AD2-047 was studied with a commercial probability of 100%. Potential network impacts were as follows:

Generator Deliverability

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

None

Multiple Facility Contingency

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

None

Contribution to Previously Identified Overloads

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

Overload		Contingency		Bus				Loading %		Rating		Appendix		
Number	Type	Name	Affected Area	Facility Description	From	To	Circuit	Power Flow	Initial	MW Contribution	Type	MVA	MW Contribution	
1	LFFB	COMED_P4_112-65-BT5-6__	CE - CE	WILTON ; B-WILTON ;3M 345 kV line	270926	275232	1	DC	110.04	111.19	LDR	1379	25.82	1
2	LFFB	COMED_P4_112-65-BT2-3__	CE - CE	WILTON ; R-WILTON ;4M 345 kV line	270927	275233	1	DC	112.45	113.63	LDR	1379	26.37	2
3	LFFB	COMED_P4_112-65-BT2-3__	CE - CE	WILTON ; 765/345 kV transformer	275233	270644	1	DC	101.26	103.17	LDR	1379	26.37	3
4	DCTL	COMED_P7_345-L2001__B-S+_345-L2003__R-S	AREA14 - CE	AD2-137 TAP-WILTON ; B 345 kV line	937030	270926	1	AC	109.4	110.51	ER	1528	20.89	4
5	N-1	COMED_P1-2_765-L11216__-S	AREA14 - CE	AD2-137 TAP-WILTON ; B 345 kV line	937030	270926	1	DC	107.54	108.83	ER	1528	19.61	

Notes:

Violation 1: ComEd SSTE 1469 MVA (Violation Valid)

Violation 2: ComEd SSTE 1469 MVA (Violation Valid).

Violation 3: ComEd SSTE 1469 MVA. (Not a violation)

Violation 4: ComEd SSTE 1846 MVA. (Not a violation).

Violation 5: ComEd SSTE 1846 MVA. (Not a violation).

Delivery of Energy Portion of Interconnection Request

PJM also studied the delivery of the energy portion of this interconnection request. Any problems identified below are likely to result in operational restrictions to the project under study. The developer can proceed with network upgrades to eliminate the operational restriction at their discretion by submitting a Merchant Transmission Interconnection request.

Only the most severely overloaded conditions are listed. There is no guarantee of full delivery of energy for this project by fixing only the conditions listed in this section. With a Transmission Interconnection Request, a subsequent analysis will be performed, which will study all overload conditions associated with the overloaded element(s) identified.

Not Applicable

System Reinforcements

The cost allocation for system reinforcements is summarized below:

Short Circuit

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

None

Stability and Reactive Power Requirement

(Results of the dynamic studies should be inserted here)

No mitigations are required.

Summer Peak Load Flow Analysis Reinforcements

New System Reinforcements

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

None

Contribution to Previously Identified System Reinforcements

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

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

Facility	Upgrade Description	Cost	Cost Allocation	Upgrade Number
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: N/A Ratings: 1718 MVA SE Notes: 1. Since the cost of the upgrade is less than \$5M, based on PJM cost allocation criteria, AD2-047 currently does not receive cost allocation towards this upgrade. This upgrade is driver by prior AD1 queue. 2. As changes to the PJM queue process occur (such as prior queued projects withdrawing from the queue, reducing in size, etc.) AD2-047 could receive cost allocation. 3. Although Queue Project AD2-047 may not presently have cost responsibility for this upgrade, Queue Project AD2-047 may need this upgrade in-service to be deliverable to the PJM system. 4. If Queue Project AD2-047 comes into service prior to completion of the upgrade, Queue Project AD2-047 will need an interim study. MISO Portion: MISO end SE rating is 1779 MVA. No upgrades required.	\$1,613,000	\$0	N4058
	Total Cost	\$1,613,000	\$0	

Light Load Load Flow Analysis Reinforcements

Facility	Upgrade Description	Cost	Cost Allocation	Upgrade Number																
WILTON ; B- WILTON ;3M 345 kV line (from bus 270926 to bus 275232 Ckt 1) & WILTON ; R- WILTON ;4M 345 kV line (from bus 270927 to bus 275233 Ckt 1)	ComEd: ComEd SSTE rating is 1469 MVA. ComEd Reinforcement: Project ID: N5145 Description: Build out the Wilton 765kV bus thereby allowing for 765kV L11216 (currently on Bus 6) to be relocated to Bus 8. Along with this line relocation, installation of 2- 765kV BT CB’s (6-8 & 8-2). Cost: \$50,000,000 *Note: ComEd cost estimate increased from \$12M to \$50M. Time Estimate: 30 Months Ratings: This will eliminate the stuck breaker contingencies '112-65-BT2-3__' & '112-65- BT5-6__'. No other contingency updates needed. Cost Allocation table: <table><tr><th>Queue</th><th>MW Contribution</th><th>Cost %</th><th>Cost (\$50M)</th></tr><tr><td>AD1-100</td><td>82.2</td><td>65.23%</td><td>\$32.616 M</td></tr><tr><td>AD2-038</td><td>17.4</td><td>13.82%</td><td>\$6.908 M</td></tr><tr><td>AD2-047</td><td>26.4</td><td>20.95%</td><td>\$10.475 M</td></tr></table>	Queue	MW Contribution	Cost %	Cost (\$50M)	AD1-100	82.2	65.23%	\$32.616 M	AD2-038	17.4	13.82%	\$6.908 M	AD2-047	26.4	20.95%	\$10.475 M	\$50,000,000	\$10,475,000	N5145
Queue	MW Contribution	Cost %	Cost (\$50M)																	
AD1-100	82.2	65.23%	\$32.616 M																	
AD2-038	17.4	13.82%	\$6.908 M																	
AD2-047	26.4	20.95%	\$10.475 M																	
AD2-137 TAP- WILTON ; B 345 kV line	ComEd SSTE: 1846 MVA is sufficient. No upgrades required.	\$0	\$0																	
	Total	\$50,000,000	\$10,475,000																	

Contingencies (Summer Peak)

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-L8014_T_-S-B	CONTINGENCY 'COMED_P1-2_345-L8014_T_-S-B' TRIP BRANCH FROM BUS 935000 TO BUS 270717 CKT 1 / AD1-133 TAP 345 DRESDEN ; R 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_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 1 345 WILTO; R 345	/ WILTO;4M
	TRIP BRANCH FROM BUS 275233 TO BUS 275333 CKT 1 345 WILTO;4C 33	/ WILTO;4M
	END	

Appendices (Summer Peak)

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 WILTON ; B-WILTON ;3M 345 kV line (from bus 270926 to bus 275232 ckt 1) loads from 92.33% to 94.53% (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 33.5 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 O1	2.26
933912	AD1-013 E O1	3.61
933931	AD1-016 C	1.14
933932	AD1-016 E	1.86
934051	AD1-031 C O1	3.53
934052	AD1-031 E O1	5.77
934431	AD1-067 C	0.16
934432	AD1-067 E	0.68
934701	AD1-098 C O1	8.46
934702	AD1-098 E O1	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 O1	27.56
935002	AD1-133 E O1	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 2

(CE - CE) The WILTON ; R-WILTON ;4M 345 kV line (from bus 270927 to bus 275233 ckt 1) loads from 94.27% to 96.51% (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 34.2 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_CAJUN1 /* 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 O1	4.94
924042	AB2-047 E O1	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 3

(CE - CE) The WILTON ; 765/345 kV transformer (from bus 275232 to bus 270644 ckt 1) loads from 92.31% to 94.51% (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 33.5 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 O1	2.26
933912	AD1-013 E O1	3.61
933931	AD1-016 C	1.14
933932	AD1-016 E	1.86
934051	AD1-031 C O1	3.53
934052	AD1-031 E O1	5.77
934431	AD1-067 C	0.16
934432	AD1-067 E	0.68
934701	AD1-098 C O1	8.46
934702	AD1-098 E O1	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 O1	27.56
935002	AD1-133 E O1	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 4

(CE - CE) The WILTON ; 765/345 kV transformer (from bus 275233 to bus 270644 ckt 1) loads from 94.25% to 96.49% (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 34.2 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_CAJUN1 /* 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 O1	4.94
924042	AB2-047 E O1	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 5

(MISO NIPS - AEP) The 17STILLWELL-05DUMONT 345 kV line (from bus 255113 to bus 243219 ckt 1) loads from 106.69% to 108.65% (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 32.19 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 O1	2.14
933912	AD1-013 E O1	3.42
933931	AD1-016 C	1.08
933932	AD1-016 E	1.76
934051	AD1-031 C O1	3.32
934052	AD1-031 E O1	5.42
934431	AD1-067 C	0.15
934432	AD1-067 E	0.64
934701	AD1-098 C O1	8.01
934702	AD1-098 E O1	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 O1	24.37
935002	AD1-133 E O1	16.25
934101	AD2-000 1	6.74
934111	AD2-000 2	6.95
936291	AD2-038 C O1	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_CAJUN1 /* 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

Contingencies (Light Load)

Contingency Name	Description
COMED_P1-2_765-L11216__-S	CONTINGENCY 'COMED_P1-2_765-L11216__-S' TRIP BRANCH FROM BUS 270644 TO BUS 270607 CKT 1 / WILTO; 765 COLLI; 765 END
COMED_P4_112-65-BT2-3__	CONTINGENCY 'COMED_P4_112-65-BT2-3__' TRIP BRANCH FROM BUS 270644 TO BUS 270607 CKT 1 / WILTO; 765 COLLI; 765 TRIP BRANCH FROM BUS 275232 TO BUS 270644 CKT 1 / WILTO;3M 345 WILTO; 765 TRIP BRANCH FROM BUS 275232 TO BUS 270926 CKT 1 / WILTO;3M 345 WILTO; B 345 TRIP BRANCH FROM BUS 275232 TO BUS 275332 CKT 1 / WILTO;3M 345 WILTO;3C 33 END
COMED_P4_112-65-BT5-6__	CONTINGENCY 'COMED_P4_112-65-BT5-6__' TRIP BRANCH FROM BUS 270644 TO BUS 270607 CKT 1 / WILTO; 765 COLLI; 765 TRIP BRANCH FROM BUS 275233 TO BUS 270644 CKT 1 / WILTO;4M 345 WILTO; 765 TRIP BRANCH FROM BUS 275233 TO BUS 270927 CKT 1 / WILTO;4M 345 WILTO; R 345 TRIP BRANCH FROM BUS 275233 TO BUS 275333 CKT 1 / WILTO;4M 345 WILTO;4C 33 END

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

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 WILTON ; B-WILTON ;3M 345 kV line (from bus 270926 to bus 275232 ckt 1) loads from 110.04% to 111.19% (**DC 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 25.83 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>
934431	AD1-067 C	0.12
934432	AD1-067 E	0.52
934721	AD1-100 C	26.88
934722	AD1-100 E	125.84
935141	AD1-148	3.78
936291	AD2-038 C O1	2.22
936292	AD2-038 E O1	14.82
936371	AD2-047 C O1	2.2
936372	AD2-047 E O1	23.63
937001	AD2-134 C	2.43
937002	AD2-134 E	9.71
274857	BIG SKY ;U1	1.29
274858	BIG SKY ;U2	1.29
274877	BISHOP HL;1U	1.01
274878	BISHOP HL;2U	1.01
294401	BSHIL;1U E	4.04
294410	BSHIL;2U E	4.04
274848	CAMPGROVE;RU	1.49
274890	CAYUG;1U E	7.83
274891	CAYUG;2U E	7.83
274863	CAYUGA RI;1U	1.96
274864	CAYUGA RI;2U	1.96

274849	CRESCENT ;1U	2.78
274859	EASYR;U1 E	5.15
274860	EASYR;U2 E	5.15
274856	ECOGROVE ;U1	1.1
937871	G858	2.27
274871	GR RIDGE ;2U	2.38
274847	GR RIDGE ;BU	1.87
274855	GSG-6 ;RU	1.23
290051	GSG-6; E	4.91
937751	H008	2.36
937881	H071	2.39
937801	J112	0.33
938091	J395	7.79
938111	J407	12.06
938131	J416	12.24
938231	J443	2.71
938241	J449	12.89
938691	J614	4.23
939261	J715	1.67
939262	J715 E	6.66
939861	J844	4.33
939862	J844 E	17.31
939571	J855	1.24
939572	J855 E	4.98
939711	J897	1.48
939712	J897 E	5.93
939721	J898	1.28
939722	J898 E	5.13
939771	J926	1.36
939772	J926 E	5.45
939791	J928	1.34
939792	J928 E	5.34
275149	KEMPTON ;1E	9.04
990901	L-005 E	5.95
274872	LEE DEKAL;1U	2.74
290108	LEEDK;1U E	11.41
274850	MENDOTA H;RU	2.82
274879	MINONK ;1U	2.28
293061	N-015 E	7.5
293513	O-009 C1	1.07
293514	O-009 C2	0.54
293515	O-009 C3	0.6
293516	O-009 E1	4.29
293517	O-009 E2	2.18
293518	O-009 E3	2.4

293712	O-029 C	1.14
293713	O-029 C	0.63
293714	O-029 C	0.58
293715	O-029 E	4.58
293716	O-029 E	2.51
293717	O-029 E	2.31
293771	O-035 E	3.03
293644	O22 E1	4.83
293645	O22 E2	9.37
290021	O50 E	9.1
294392	P-010 E	9.52
294763	P-046 E	4.38
274888	PILOT HIL;1E	9.04
274887	PILOT HIL;1U	2.26
274881	PLEAS RDG;2U	2.26
274851	PROVIDENC;RU	0.76
274662	QUAD CITI;1U	115.18
274663	QUAD CITI;2U	115.24
290261	S-027 C	1.95
290265	S-028 C	1.95
295110	SUBLETTE C	0.18
295111	SUBLETTE E	1.28
274861	TOP CROP ;1U	1.21
274862	TOP CROP ;2U	2.34
274853	TWINGROVE;U1	7.8
274854	TWINGROVE;U2	7.8
276150	W2-048 E	1.04
905082	W4-005 E	22.54
274874	WALNR;2U	2.24
294502	WALNR;2U E	8.96
295108	WESTBROOK C	0.4
295109	WESTBROOK E	2.63
909052	X2-022 E	14.46
916211	Z1-072	0.51
916221	Z1-073	0.34
917501	Z2-087 C	1.48
917502	Z2-087 E	19.81
918051	AA1-018 C	2.32
918052	AA1-018 E	15.49
920272	AA2-123 E	2.86
924041	AB2-047 C O1	3.65
924042	AB2-047 E O1	24.43
924261	AB2-070 C O1	2.07
924262	AB2-070 E O1	13.84
925301	AB2-191 C	1.18

925302	<i>AB2-191 E</i>	<i>1.62</i>
925581	<i>AC1-033 C</i>	<i>1.32</i>
925582	<i>AC1-033 E</i>	<i>8.87</i>
925771	<i>AC1-053 C</i>	<i>2.05</i>
925772	<i>AC1-053 E</i>	<i>13.71</i>
926821	<i>AC1-168 C O1</i>	<i>1.09</i>
926822	<i>AC1-168 E O1</i>	<i>7.34</i>
926841	<i>AC1-171 C O1</i>	<i>0.94</i>
926842	<i>AC1-171 E O1</i>	<i>6.3</i>
927202	<i>AC1-214 E O1</i>	<i>6.18</i>

Appendix 2

(CE - CE) The WILTON ; R-WILTON ;4M 345 kV line (from bus 270927 to bus 275233 ckt 1) loads from 112.45% to 113.63% (**DC 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 26.37 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>
934431	AD1-067 C	0.13
934432	AD1-067 E	0.53
934721	AD1-100 C	27.41
934722	AD1-100 E	128.33
935141	AD1-148	3.85
936291	AD2-038 C O1	2.26
936292	AD2-038 E O1	15.15
936371	AD2-047 C O1	2.24
936372	AD2-047 E O1	24.13
937001	AD2-134 C	2.48
937002	AD2-134 E	9.91
274857	BIG SKY ;U1	1.32
274858	BIG SKY ;U2	1.32
274877	BISHOP HL;1U	1.03
274878	BISHOP HL;2U	1.03
294401	BSHIL;1U E	4.13
294410	BSHIL;2U E	4.13
274848	CAMPGROVE;RU	1.52
274890	CAYUG;1U E	7.99
274891	CAYUG;2U E	7.99
274863	CAYUGA RI;1U	2.
274864	CAYUGA RI;2U	2.
274849	CRESCENT ;1U	2.84
274859	EASYR;U1 E	5.26
274860	EASYR;U2 E	5.26

274856	<i>ECOGROVE ;U1</i>	1.12
937871	<i>G858</i>	2.32
274871	<i>GR RIDGE ;2U</i>	2.43
274847	<i>GR RIDGE ;BU</i>	1.91
274855	<i>GSG-6 ;RU</i>	1.25
290051	<i>GSG-6; E</i>	5.01
937751	<i>H008</i>	2.41
937881	<i>H071</i>	2.44
937801	<i>J112</i>	0.33
938091	<i>J395</i>	7.96
938111	<i>J407</i>	12.31
938131	<i>J416</i>	12.5
938231	<i>J443</i>	2.77
938241	<i>J449</i>	13.16
938691	<i>J614</i>	4.32
939261	<i>J715</i>	1.7
939262	<i>J715 E</i>	6.8
939861	<i>J844</i>	4.42
939862	<i>J844 E</i>	17.68
939571	<i>J855</i>	1.27
939572	<i>J855 E</i>	5.08
939711	<i>J897</i>	0.95
939712	<i>J897 E</i>	3.8
939721	<i>J898</i>	1.31
939722	<i>J898 E</i>	5.24
939771	<i>J926</i>	1.39
939772	<i>J926 E</i>	5.57
939791	<i>J928</i>	1.36
939792	<i>J928 E</i>	5.45
275149	<i>KEMPTON ;1E</i>	9.23
990901	<i>L-005 E</i>	6.07
274872	<i>LEE DEKAL;1U</i>	2.8
290108	<i>LEEDK;1U E</i>	11.65
274850	<i>MENDOTA H;RU</i>	2.88
274879	<i>MINONK ;1U</i>	2.32
293061	<i>N-015 E</i>	7.65
293513	<i>O-009 C1</i>	1.09
293514	<i>O-009 C2</i>	0.55
293515	<i>O-009 C3</i>	0.61
293516	<i>O-009 E1</i>	4.38
293517	<i>O-009 E2</i>	2.22
293518	<i>O-009 E3</i>	2.45
293712	<i>O-029 C</i>	1.17
293713	<i>O-029 C</i>	0.64
293714	<i>O-029 C</i>	0.59

293715	O-029 E	4.68
293716	O-029 E	2.57
293717	O-029 E	2.36
293771	O-035 E	3.09
293644	O22 E1	4.93
293645	O22 E2	9.57
290021	O50 E	9.3
294392	P-010 E	9.72
294763	P-046 E	4.48
274888	PILOT HIL;1E	9.23
274887	PILOT HIL;1U	2.31
274881	PLEAS RDG;2U	2.31
274851	PROVIDENC;RU	0.77
274662	QUAD CITI;1U	117.62
274663	QUAD CITI;2U	117.7
290261	S-027 C	1.99
290265	S-028 C	1.99
295110	SUBLETTE C	0.18
295111	SUBLETTE E	1.3
274861	TOP CROP ;1U	1.23
274862	TOP CROP ;2U	2.39
274853	TWINGROVE;U1	7.95
274854	TWINGROVE;U2	7.95
276150	W2-048 E	1.06
905082	W4-005 E	23.
274874	WALNR;2U	2.29
294502	WALNR;2U E	9.15
295108	WESTBROOK C	0.41
295109	WESTBROOK E	2.68
909052	X2-022 E	14.75
916211	Z1-072	0.52
916221	Z1-073	0.34
917501	Z2-087 C	1.51
917502	Z2-087 E	20.21
918051	AA1-018 C	2.37
918052	AA1-018 E	15.83
920272	AA2-123 E	2.92
924041	AB2-047 C O1	3.72
924042	AB2-047 E O1	24.92
924261	AB2-070 C O1	2.11
924262	AB2-070 E O1	14.13
925301	AB2-191 C	1.2
925302	AB2-191 E	1.66
925581	AC1-033 C	1.35
925582	AC1-033 E	9.06

925771	AC1-053 C	2.09
925772	AC1-053 E	13.99
926821	AC1-168 C O1	1.12
926822	AC1-168 E O1	7.49
926841	AC1-171 C O1	0.96
926842	AC1-171 E O1	6.43
927202	AC1-214 E O1	6.31

Appendix 3

(CE - CE) The WILTON ; 765/345 kV transformer (from bus 275233 to bus 270644 ckt 1) loads from 101.26% to 103.17% (**DC 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 26.37 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>
934431	AD1-067 C	0.13
934432	AD1-067 E	0.53
934721	AD1-100 C	27.41
934722	AD1-100 E	128.33
936291	AD2-038 C O1	2.26
936292	AD2-038 E O1	15.15
936371	AD2-047 C O1	2.24
936372	AD2-047 E O1	24.13
937001	AD2-134 C	2.48
937002	AD2-134 E	9.91
274857	BIG SKY ;U1	1.32
274858	BIG SKY ;U2	1.32
274877	BISHOP HL;1U	1.03
274878	BISHOP HL;2U	1.03
294401	BSHIL;1U E	4.13
294410	BSHIL;2U E	4.13
274848	CAMPGROVE;RU	1.52
274890	CAYUG;1U E	7.99
274891	CAYUG;2U E	7.99
274863	CAYUGA RI;1U	2.
274864	CAYUGA RI;2U	2.
274849	CRESCENT ;1U	2.84
274859	EASYR;U1 E	5.26
274860	EASYR;U2 E	5.26
274856	ECOGROVE ;U1	1.12

274871	GR RIDGE ;2U	2.43
274847	GR RIDGE ;BU	1.91
274855	GSG-6 ;RU	1.25
290051	GSG-6; E	5.01
275149	KEMPTON ;1E	9.23
990901	L-005 E	6.07
274872	LEE DEKAL;1U	2.8
290108	LEEDK;1U E	11.65
274850	MENDOTA H;RU	2.88
274879	MINONK ;1U	2.32
293061	N-015 E	7.65
293513	O-009 C1	1.09
293514	O-009 C2	0.55
293515	O-009 C3	0.61
293516	O-009 E1	4.38
293517	O-009 E2	2.22
293518	O-009 E3	2.45
293712	O-029 C	1.17
293713	O-029 C	0.64
293714	O-029 C	0.59
293715	O-029 E	4.68
293716	O-029 E	2.57
293717	O-029 E	2.36
293771	O-035 E	3.09
293644	O22 E1	4.93
293645	O22 E2	9.57
290021	O50 E	9.3
294392	P-010 E	9.72
294763	P-046 E	4.48
274888	PILOT HIL;1E	9.23
274887	PILOT HIL;1U	2.31
274881	PLEAS RDG;2U	2.31
274851	PROVIDENC;RU	0.77
274662	QUAD CITI;1U	117.62
274663	QUAD CITI;2U	117.7
290261	S-027 C	1.99
290265	S-028 C	1.99
295110	SUBLETTE C	0.18
295111	SUBLETTE E	1.3
274861	TOP CROP ;1U	1.23
274862	TOP CROP ;2U	2.39
274853	TWINGROVE;U1	7.95
274854	TWINGROVE;U2	7.95
905082	W4-005 E	23.
274874	WALNR;2U	2.29

294502	WALNR;2U E	9.15
295108	WESTBROOK C	0.41
295109	WESTBROOK E	2.68
916211	Z1-072	0.52
916221	Z1-073	0.34
917501	Z2-087 C	1.51
917502	Z2-087 E	20.21
918051	AA1-018 C	2.37
918052	AA1-018 E	15.83
920272	AA2-123 E	2.92
924041	AB2-047 C O1	3.72
924042	AB2-047 E O1	24.92
924261	AB2-070 C O1	2.11
924262	AB2-070 E O1	14.13
925301	AB2-191 C	1.2
925302	AB2-191 E	1.66
925581	AC1-033 C	1.35
925582	AC1-033 E	9.06
925771	AC1-053 C	2.09
925772	AC1-053 E	13.99
926821	AC1-168 C O1	1.12
926822	AC1-168 E O1	7.49
926841	AC1-171 C O1	0.96
926842	AC1-171 E O1	6.43
927202	AC1-214 E O1	6.31

Appendix 4

(AREA14 - CE) The AD2-137 TAP-WILTON ; B 345 kV line (from bus 937030 to bus 270926 ckt 1) loads from 109.4% to 110.51% (AC power flow) of its emergency rating (1528 MVA) for the tower line contingency outage of 'COMED_P7_345-L2001__B-S+_345-L2003__R-S'. This project contributes approximately 20.89 MW to the thermal violation.

CONTINGENCY 'COMED_P7_345-L2001__B-S+_345-L2003__R-S'

TRIP BRANCH FROM BUS 270670 TO BUS 270728 CKT 1 / BRAID; B 345 E
FRA; B 345

TRIP BRANCH FROM BUS 270728 TO BUS 270766 CKT 1 / E FRA; B 345
GOODI;3B 345

TRIP BRANCH FROM BUS 270728 TO BUS 274750 CKT 1 / E FRA; B 345
CRETE;BP 345

TRIP BRANCH FROM BUS 270671 TO BUS 270729 CKT 1 / BRAID; R 345 E
FRA; R 345

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
934721	AD1-100 C	47.83
934722	AD1-100 E	223.91
935141	AD1-148	3.74
936371	AD2-047 C O1	1.78
936372	AD2-047 E O1	19.12
274890	CAYUG;1U E	12.06
274891	CAYUG;2U E	12.06
274863	CAYUGA RI;1U	3.01
274864	CAYUGA RI;2U	3.01
274871	GR RIDGE ;2U	1.81
274847	GR RIDGE ;BU	1.42
938541	J474	11.63
939891	J750	1.71
939892	J750 E	6.82
939031	J756	2.15
939032	J756 E	8.58
939501	J826	6.71
939551	J845	1.25
939552	J845 E	5.
275149	KEMPTON ;1E	7.32
293061	N-015 E	5.69
294392	P-010 E	7.23
274888	PILOT HIL;1E	7.32
274887	PILOT HIL;1U	1.83
274881	PLEAS RDG;2U	1.83

290261	S-027 C	2.24
290265	S-028 C	2.24
274853	TWINGROVE;U1	8.98
274854	TWINGROVE;U2	8.98
276150	W2-048 E	1.03
905082	W4-005 E	24.49
909052	X2-022 E	14.3
917501	Z2-087 C	1.79
917502	Z2-087 E	23.98
924041	AB2-047 C O1	4.4
924042	AB2-047 E O1	29.44
924261	AB2-070 C O1	2.11
924262	AB2-070 E O1	14.11
925771	AC1-053 C	2.07
925772	AC1-053 E	13.84
926821	AC1-168 C O1	0.49
926822	AC1-168 E O1	3.28

Attachment 1: Single Line Diagram

