

***Generation Interconnection Request
System Impact Study Report
For
PJM Generation Interconnection Request
Queue Position AE2-341

Sandwich-Plano 138 kV***

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.

General

The Interconnection Customer (IC), has proposed a Solar generating facility located in Kendall County, Illinois. The installed facilities will have a total capability of 150 MW with 100.6 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is December 1, 2022. This study does not imply a TO commitment to this in-service date.

Queue Number	AE2-341
Project Name	SANDWICH-PLANO
State	None
County	Kendall
Transmission Owner	ComEd
MFO	150
MWE	150
MWC	100.6
Fuel	Solar
Basecase Study Year	2022

Point of Interconnection

Queue Position AE2-341, a 150 MW solar facility Kendall County Solar, proposes to interconnect with the ComEd transmission system by tying into the Sandwich–Plano 138kV line 14609, approximately 6.3 miles from Sandwich.

Cost Summary

The AE2-341 project will be responsible for the following costs.

Description	Cost Estimate
Total Physical Interconnection Costs	\$20,500,000
Allocation towards System Network Upgrade Costs (PJM Identified - Summer Peak)*	\$941,870
Allocation towards System Network Upgrade Costs (PJM Identified - Light Load)*	\$0
Allocation towards System Network Upgrade Costs (TO Identified)*	\$0
Total Costs	\$21,441,870

*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	\$17,000,000
Non-Direct Connection Network Upgrades	\$2,500,000
Total Physical Interconnection Costs	\$20,500,000

Attachment Facilities

The AE2-341 generator lead would interconnect to a new 138kV Interconnection Substation (see details in Direct Connection section below). The required Attachment Facilities are one 138kV line MOD, a dead-end structure and revenue metering as shown in the one-line diagram. The preliminary cost estimate for the Attachment Facilities is given below:

Scope of Work	Cost Estimate
Installation of one 138kV line MOD, one dead-end structure and one set of revenue metering (see notes below on cost estimate)	\$1,000,000

Direct Connection Cost Estimate

To accommodate interconnection of AE2-341, a new 138kV Interconnection Substation would need to be built close to the Sandwich–Plano 138kV line 14609, approximately 6.3 miles from Sandwich.

The scope of work includes the installation of three 138kV circuit breakers in a “breaker-and-a-half” bus configuration and cutting in the Interconnection Substation to Sandwich–Plano 138kV line 14609, as shown in the one-line diagram below.

The Interconnection Customer (“IC”) is responsible for constructing all of the facilities on the IC side of the Point of Interconnection (“POI”). It is assumed for the purposes of this report that the IC will obtain the site for the Interconnection Substation and right-of-way between the Interconnection Substation and the 138kV transmission line.

In the event that the IC exercises the option to build the Interconnecting Substation, the IC will be required to construct all interconnection facilities that will be turned over to ComEd in accordance with ComEd published standards and the PJM Tariff.

ComEd would design, engineer and construct the tie in of the Interconnection Substation to the Sandwich–Plano 138kV line 14609.

The preliminary cost estimate for Direct Connection Network Upgrade is given in the following tables.

For Option to Build Direct Connection cost estimates:

Scope of Work	Cost Estimate
Installation of a new 138kV substation as described above	N/A
Transmission line tie in work (foundations, structures, conductors)	\$ 2,000,000
ComEd oversight and testing	\$ 1,000,000
Total Cost Estimate (see notes below on cost estimate)	\$ 3,000,000

For ComEd building the interconnecting substation cost estimates:

Scope of Work	Cost Estimate
Installation of a new 138kV substation as described above	\$ 15,000,000
Transmission line tie in work (foundations, structures, conductors)	\$ 2,000,000
Total Cost Estimate (see notes below on cost estimate)	\$ 17,000,000

Non-Direct Connection Cost Estimate

The integration of the new 138kV Interconnection Substation would require relay, communication and SCADA upgrades at the Sandwich TSS 146, Plano TSS 167 and Plano West TDC 527. The ComEd cost is given below:

Scope of Work	Cost Estimate
Relay/communications/SCADA upgrades at Sandwich TSS 146	\$ 1,000,000
Relay/communications/SCADA upgrades at Plano TSS 167	\$ 1,000,000
Relay/communications/SCADA upgrades at Plano West TDC 527	\$ 500,000
Total Cost Estimate (see notes below on cost estimate)	\$ 2,500,000

Schedule:

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. IC will be responsible for paying actual costs of ComEd's work in accordance with Sections 212.1 and 217 of the PJM Open Access Transmission Tariff.
- 4) The IC is responsible for all engineering, procurement, testing and construction of all equipment on the IC's side of the POI.
- 5) These cost estimates do not include cost of acquiring right-of-way for the transmission line and purchasing any additional land, if needed, for the line terminations. The need and cost of acquiring property and associated legal costs will be investigated during Facilities Study for this project.

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 AE2-341 was evaluated as a 150.0 MW (Capacity 100.6 MW) injection tapping the West Plano – Sandwich 138 kV Line in the ComEd area. Project AE2-341 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AE2-341 was studied with a commercial probability of 100%. Potential network impacts were as follows:

Summer Peak Analysis - 2022

Generator Deliverability

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

None

Multiple Facility Contingency

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

Overload Number	Type	Contingency Name	Affected Area	Facility Description	Bus		Circuit	Power Flow	Loading %		Rating		MW Contribution	Flowgate Appendix
					From	To			Initial	Final	Type	MVA		
1	LFFB	COMED_P4_167- 38-L14609_	CE - CE	WATERMAN ; B- GLIDDEN ;BT 138 kV line	272728	271560	1	AC	91.72	115.07		344	79.44	1

Note:

Violation#1: ComEd ALDR: 396 MVA (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
2	LFFB	COMED_P4_023-65-BT2-3__	MISO NIPS - CE	17STJOHN-ST JOHN ; T 345 kV line	255112	270886	1	DC	120.79	120.97	ER	1091	14.19	2
3	LFFB	AEP_P4_#2978_05DUMONT 765_B	MISO NIPS - CE	17STJOHN-ST JOHN ; T 345 kV line	255112	270886	1	DC	120.69	120.87	ER	1091	14.02	
4	LFFB	COMED_P4_112-65-BT4-5__	MISO NIPS - CE	17STJOHN-ST JOHN ; T 345 kV line	255112	270886	1	DC	120.3	120.48	ER	1091	14.13	
5	LFFB	COMED_P4_112-65-BT3-4__	MISO NIPS - CE	17STJOHN-ST JOHN ; T 345 kV line	255112	270886	1	DC	120.29	120.48	ER	1091	14.13	
6	LFFB	AEP_P4_#2978_05DUMONT 765_B	MISO NIPS - AEP	17STILLWELL-05DUMONT 345 kV line	255113	243219	1	AC	122.43	122.74	ER	1409	21.87	3
7	LFFB	AEP_P4_#2978_05DUMONT 765_B	CE - CE	E FRANKFO; B-CRETE EC ;BP 345 kV line	270728	274750	1	DC	101.12	101.32		1399	19.87	4
8	LFFB	COMED_P4_023-65-BT2-3__	CE - CE	E FRANKFO; B-CRETE EC ;BP 345 kV line	270728	274750	1	DC	100.73	100.94		1399	20.14	
9	LFFB	COMED_P4_112-65-BT4-5__	CE - CE	E FRANKFO; B-CRETE EC ;BP 345 kV line	270728	274750	1	DC	100.66	100.86		1399	20	
10	LFFB	COMED_P4_112-65-BT3-4__	CE - CE	E FRANKFO; B-CRETE EC ;BP 345 kV line	270728	274750	1	DC	100.65	100.86		1399	20	
11	LFFB	AEP_P4_#2978_05DUMONT 765_B	CE - AEP	GREENACRE; T-05OLIVE 345 kV line	270771	243229	1	DC	107.94	108.06	ER	971	12.66	5
12	LFFB	COMED_P4_023-65-BT2-3__	CE - MISO NIPS	ST JOHN ; T-17GREEN_ACRE 345 kV line	270886	255104	1	DC	120.79	120.97	ER	1091	14.19	6
13	LFFB	AEP_P4_#2978_05DUMONT 765_B	CE - MISO NIPS	ST JOHN ; T-17GREEN_ACRE 345 kV line	270886	255104	1	DC	120.69	120.87	ER	1091	14.02	
14	LFFB	COMED_P4_112-65-BT4-5__	CE - MISO NIPS	ST JOHN ; T-17GREEN_ACRE 345 kV line	270886	255104	1	DC	120.3	120.48	ER	1091	14.13	

15	LFFB	COMED_P4_112-65-BT3-4__	CE - MISO NIPS	ST JOHN ; T-17GREEN ACRE 345 kV line	270886	255104	1	DC	120.29	120.48	ER	1091	14.13	
16	LFFB	COMED_P4_112-65-BT5-6__	CE - CE	WILTON ; B-WILTON ;3M 345 kV line	270926	275232	1	AC	137.52	138.73		1379	23.35	7
17	LFFB	COMED_P4_112-65-BT2-3__	CE - CE	WILTON ; R-WILTON ;4M 345 kV line	270927	275233	1	AC	140.37	141.61		1379	23.84	8
18	LFFB	AEP_P4_#2978_05DUMONT 765_B	CE - MISO NIPS	CRETE EC ;BP-17STJOHN 345 kV line	274750	255112	1	DC	145.88	146.07	ER	1399	19.64	9
19	LFFB	COMED_P4_023-65-BT2-3__	CE - MISO NIPS	CRETE EC ;BP-17STJOHN 345 kV line	274750	255112	1	DC	145.5	145.7	ER	1399	19.9	
20	LFFB	COMED_P4_112-65-BT4-5__	CE - MISO NIPS	CRETE EC ;BP-17STJOHN 345 kV line	274750	255112	1	DC	145.44	145.64	ER	1399	19.76	
21	LFFB	COMED_P4_112-65-BT3-4__	CE - MISO NIPS	CRETE EC ;BP-17STJOHN 345 kV line	274750	255112	1	DC	145.43	145.63	ER	1399	19.76	
22	LFFB	AEP_P4_#2978_05DUMONT 765_B	CE - AEP	UNIV PK N;RP-05OLIVE 345 kV line	274804	243229	1	AC	120.6	122.02	ER	971	15.42	10
23	LFFB	COMED_P4_023-65-BT2-3__	CE - AEP	UNIV PK N;RP-05OLIVE 345 kV line	274804	243229	1	AC	119.57	121.01	ER	971	15.58	
24	LFFB	COMED_P4_112-65-BT4-5__	CE - AEP	UNIV PK N;RP-05OLIVE 345 kV line	274804	243229	1	AC	119.56	121	ER	971	15.56	
25	LFFB	COMED_P4_112-65-BT3-4__	CE - AEP	UNIV PK N;RP-05OLIVE 345 kV line	274804	243229	1	AC	119.56	121	ER	971	15.56	
26	LFFB	COMED_P4_023-65-BT4-5__	CE - AEP	UNIV PK N;RP-05OLIVE 345 kV line	274804	243229	1	AC	119.55	120.99	ER	971	15.55	
27	LFFB	COMED_P4_112-65-BT5-6__	CE - CE	WILTON ; 765/345 kV transformer	275232	270644	1	AC	137.31	138.52		1379	23.35	11
28	LFFB	COMED_P4_112-65-BT2-3__	CE - CE	WILTON ; 765/345 kV transformer	275233	270644	1	AC	140.16	141.4		1379	23.84	12

Note:

Violation#2: No violation for MISO. ComEd SSTE: 1134 MVA (violation valid).
Violation#3: No violation for MISO. ComEd SSTE: 1134 MVA (violation valid).
Violation#4: No violation for MISO. ComEd SSTE: 1134 MVA (violation valid).
Violation#5: No violation for MISO. ComEd SSTE: 1134 MVA (violation valid).
Violation#6: No violation for MISO. AEP violation valid
Violation#7: SSTE: 1483 MVA (No violation for ComEd
Violation#8: SSTE: 1483 MVA (No violation for ComEd
Violation#9: SSTE: 1483 MVA (No violation for ComEd
Violation#10: SSTE: 1483 MVA (No violation for ComEd
Violation#11: ComEd SSTE: 1134 MVA. AEP SE 971 MVA (Violation for AEP)
Violation#12: MISO: 1313/1591 MVA. ComEd SSTE: 1134 MVA (Violation for ComEd)
Violation#13: MISO: 1313/1591 MVA. ComEd SSTE: 1134 MVA (Violation for ComEd)
Violation#14: MISO: 1313/1591 MVA. ComEd SSTE: 1134 MVA (Violation for ComEd)
Violation#15: MISO: 1313/1591 MVA. ComEd SSTE: 1134 MVA (Violation for ComEd)
Violation#16: ComEd SSTE: 1469 MVA (Violation for ComEd)
Violation#17: ComEd SSTE: 1469 MVA (Violation for ComEd)
Violation#18: MISO: 1206/1508 MVA. ComEd SSTE: 1483 MVA (Violation for ComEd & MISO)
Violation#20: 1206/1508 MVA. ComEd SSTE: 1483 MVA (Violation for ComEd & MISO)
Violation#21: 1206/1508 MVA. ComEd SSTE: 1483 MVA (Violation for ComEd & MISO)
Violation#22: AEP SE: 971 MVA. ComEd SSTE: 1134 MVA (Violation for AEP & ComEd)
Violation#23: AEP SE: 971 MVA. ComEd SSTE: 1134 MVA (Violation for AEP & ComEd)
Violation#24: AEP SE: 971 MVA. ComEd SSTE: 1134 MVA (Violation for AEP & ComEd)
Violation#25: AEP SE: 971 MVA. ComEd SSTE: 1134 MVA (Violation for AEP & ComEd)
Violation#26: AEP SE: 971 MVA. ComEd SSTE: 1134 MVA (Violation for AEP & ComEd)
Violation#27: ComEd SSTE: 1469 MVA (Violation ComEd)
Violation#28: ComEd SSTE: 1469 MVA (Violation ComEd)

Steady-State Voltage Requirements

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

To be determined.

Delivery of Energy Portion of Interconnection Request

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

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

Overload Number	Contingency		Affected Area	Facility Description	Bus		Circuit	Power Flow	Loading %		Rating		MW Contribution
	Type	Name			From	To			Initial	Final	Type	MVA	
29	N-1	AEP_P1-2_#695A	MISO NIPS - CE	17STJOHN-ST JOHN ; T 345 kV line	255112	270886	1	DC	120.28	120.47	ER	1091	14.12
30	N-1	AEP_P1-2_#695A	CE - CE	E FRANKFO; B-CRETE EC ;BP 345 kV line	270728	274750	1	DC	100.61	100.81	ER	1399	19.97
31	N-1	AEP_P1-2_#695A	CE - AEP	GREENACRE; T-05OLIVE 345 kV line	270771	243229	1	DC	106.78	106.91	NR	971	12.81
32	N-1	AEP_P1-2_#695A	CE - MISO NIPS	ST JOHN ; T-17GREEN_ACRE 345 kV line	270886	255104	1	DC	120.28	120.47	ER	1091	14.12
33	N-1	COMED_P1-2_138-L14604_R-R_AE2-341A	CE - CE	WATERMAN ; B-GLIDDEN ;BT 138 kV line	272728	271560	1	AC	98.19	123.22	ER	321	79.45

34	N-1	AEP_P1-2_#695A	CE - MISO NIPS	CRETE EC ;BP-17STJOHN 345 kV line	274750	255112	1	DC	145.4	145.6	ER	1399	19.73
35	Non	Non	CE - MISO NIPS	CRETE EC ;BP-17STJOHN 345 kV line	274750	255112	1	DC	116.12	117.08	NR	1091	12.11
36	N-1	AEP_P1-2_#695A	CE - AEP	UNIV PK N;RP-05OLIVE 345 kV line	274804	243229	1	AC	119.54	120.98	NR	971	15.55

Short Circuit

(Summary of impacted circuit breakers)

No overdutied breakers

Affected System Analysis & Mitigation

MISO Impacts:

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

Stability and Reactive Power Requirement

(Results of the dynamic studies should be inserted here)

To be determined during the Facilities Study

Light Load Analysis – 2021

Not required.

System Reinforcements

Summer Peak Load Flow Analysis Reinforcement

New System Reinforcements

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

None.

Contribution to Previously Identified System Reinforcements

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

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

Facility	Upgrade Description	Cost	Cost Allocation	Upgrade Number
17STJOHN-ST JOHN ; T 345 kV Ckt. 1	<u>MISO Reinforcement:</u> MISO Rating 1313/1591 MVA sufficient. No reinforcement required. <u>ComEd Reinforcement:</u> Project ID: n5833 Description: The upgrade will be to mitigate the sag on the line. A preliminary estimate for the upgrade is \$ 3.1M with a construction estimated timeline of 30 months. The estimate provided does not include potential tower upgrades. The cost for this potential work will not be identified until the Facilities Study phase. Upon completion of this work the new line will be a minimum of 1091/1399/1483/1674 MVA (SN/SLTE/SSTE/SLD). PJM Network Upgrade N5833. Type: FAC Cost: \$3,100,000 Time Estimate: 30 Months Ratings: 1091/1399/1483/1674 MVA (SN/SLTE/SSTE/SLD) Notes: 1. Since the cost of the upgrade is less than \$5M, based on PJM cost allocation criteria, AE2-341 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.) AE2-341 could receive cost allocation.	\$3,100,000	\$0	N5833

	3. Although Queue Project AE2-341 may not presently have cost responsibility for this upgrade, Queue Project AE2-341 may need this upgrade in-service to be deliverable to the PJM system. 4. If Queue Project AE2-341 comes into service prior to completion of the upgrade, Queue Project AE2-341 will need an interim study.			
ST JOHN ; T-17GREEN_ACRE 345 kV Ckt. 1	<u>MISO Reinforcement:</u> MISO Rating 1313/1591 MVA sufficient. No reinforcement required. <u>ComEd Reinforcement:</u> Project ID: n5834 Description: The upgrade will be to mitigate the sag on the line. A preliminary estimate for the upgrade is \$ 3.8M with a construction estimated timeline of 30 months. The estimate provided does not include potential tower upgrades. The cost for this potential work will not be identified until the Facilities Study phase. Upon completion of this work the new line will be a minimum of 1091/1399/1483/1674 MVA (SN/SLTE/SSTE/SLD). PJM Network Upgrade N5834. Type: FAC Cost: \$3,800,000 Time Estimate: 30 Months Ratings: 1091/1399/1483/1674 MVA (SN/SLTE/SSTE/SLD) Notes: 1. Since the cost of the upgrade is less than \$5M, based on PJM cost allocation criteria, AE2-341 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.) AE2-341 could receive cost allocation. 3. Although Queue Project AE2-341 may not presently have cost responsibility for this upgrade, Queue Project AE2-341 may need this upgrade in-service to be deliverable to the PJM system. 4. If Queue Project AE2-341 comes into service prior to completion of the upgrade, Queue Project AE2-341 will need an interim study.	\$3,800,000	\$0	N5834
17STILLWELL-05DUMONT 345 kV Ckt. 1	<u>MISO Reinforcement:</u> MISO Rating 1409/1779 MVA (SN/SE) sufficient. No reinforcement needed. <u>AEP Reinforcement:</u> Project ID: n4058 Description: Sag mitigation work will include the replacement of tower 20 with a custom steel pole, replacement of tower 24 with a custom H-frame and the removal of swing angle brackets on 2 structures. Cost estimate is \$1.613M. New SE rating will be 1718 MVA limited by a Dumont wave trap. Type: FAC Cost: \$1,613,000 Time Estimate: Projected in service date 6/1/2022 Ratings:	\$1,813,000	\$0	N4058 N4790

	AEP SE: 1718 MVA MISO SE: 1779 MVA (MISO rating is sufficient) <u>Project ID:</u> n4790 <u>Description:</u> Upgrade Dumont 2500A wave trap. <u>Type:</u> FAC <u>Cost:</u> \$200,000 <u>Time Estimate:</u> N/A <u>Ratings:</u> AEP SE: 1740/1790 MVA (SN/SE) MISO SE: 1779 MVA (MISO rating is sufficient) <u>Notes:</u> 1. Since the cost of the upgrade is less than \$5M, based on PJM cost allocation criteria, AE2-341 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.) AE2-341 could receive cost allocation. 3. Although Queue Project AE2-341 may not presently have cost responsibility for this upgrade, Queue Project AE2-341 may need this upgrade in-service to be deliverable to the PJM system. 4. If Queue Project AE2-341 comes into service prior to completion of the upgrade, Queue Project AE2-341 will need an interim study.			
GREENACRE; T-05OLIVE 345 kV Ckt. 1	<u>Project ID:</u> n5913 <u>Description:</u> Upgrade is a sag study will be required for the entire 40.64 miles of ACSR/PE ~ 1414 ~ 62/19 Conductor section 1 to determine if the line can be operated above its emergency rating 971 MVA. Estimated Cost: \$162,560. If deemed necessary to rebuild the entire 40.64 miles of the section of the line, Estimated Cost: \$81,280,000. New expected SE rating is 1318 MVA. PJM NUN N5913. <u>Type:</u> FAC <u>Cost:</u> \$162,560 <u>Time Estimate:</u> N/A <u>Ratings:</u> Existing Ratings are as follows: AEP SE: 971 MVA ComEd SE: 1134 MVA <u>Notes:</u> 1. Since the cost of the upgrade is less than \$5M, based on PJM cost allocation criteria, AE2-341 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.) AE2-341 could receive cost allocation. 3. Although Queue Project AE2-341 may not presently have cost responsibility for this upgrade, Queue Project AE2-341 may need this upgrade in-service to be deliverable to the PJM system. 4. If Queue Project AE2-341 comes into service prior to completion of the upgrade, Queue Project AE2-341 will need an interim study.	\$162,560	\$0	N5913

WILTON ; B-WILTON ;3M 345 kV Ckt. 1 & WILTON ; R-WILTON ;4M 345 kV Ckt. 1 & WILTON 764/345 kV Ckt. 1	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 estimate is \$12M. Time estimate is 30 months. This will eliminate the stuck breaker contingency '112-65-BT5-6__'. No other contingency updates needed. Type: CON Cost: \$12,000,000 Time Estimate: 30 Months Ratings: N/A <table><tr><th>Queue</th><th>MW</th><th>Cost %</th><th>Cost</th></tr><tr><td>AD1-100</td><td>116.8</td><td>15.19%</td><td>\$1,823,338</td></tr><tr><td>AD2-047</td><td>26.4</td><td>3.43%</td><td>\$ 412,124</td></tr><tr><td>AD2-066</td><td>17.7</td><td>2.31%</td><td>\$ 276,623</td></tr><tr><td>AD2-102</td><td>29.7</td><td>3.86%</td><td>\$ 462,859</td></tr><tr><td>AD2-134</td><td>17.6</td><td>2.29%</td><td>\$ 275,062</td></tr><tr><td>AD2-194</td><td>19.7</td><td>2.56%</td><td>\$ 306,908</td></tr><tr><td>AE1-113</td><td>44.5</td><td>5.79%</td><td>\$ 694,367</td></tr><tr><td>AE1-114</td><td>21.2</td><td>2.76%</td><td>\$ 331,104</td></tr><tr><td>AE1-163</td><td>51.7</td><td>6.72%</td><td>\$ 806,609</td></tr><tr><td>AE1-166</td><td>27.9</td><td>3.63%</td><td>\$ 435,697</td></tr><tr><td>AE1-172</td><td>45.9</td><td>5.98%</td><td>\$ 717,003</td></tr><tr><td>AE1-193</td><td>45.8</td><td>5.96%</td><td>\$ 715,286</td></tr><tr><td>AE1-194</td><td>45.8</td><td>5.96%</td><td>\$ 715,286</td></tr><tr><td>AE1-195</td><td>45.8</td><td>5.96%</td><td>\$ 715,286</td></tr><tr><td>AE1-205</td><td>29.7</td><td>3.86%</td><td>\$ 463,172</td></tr><tr><td>AE1-252</td><td>27.0</td><td>3.52%</td><td>\$ 421,803</td></tr><tr><td>AE2-107</td><td>15.2</td><td>1.97%</td><td>\$ 236,659</td></tr><tr><td>AE2-152</td><td>28.5</td><td>3.70%</td><td>\$ 444,126</td></tr><tr><td>AE2-153</td><td>35.1</td><td>4.57%</td><td>\$ 548,563</td></tr><tr><td>AE2-223</td><td>22.6</td><td>2.94%</td><td>\$ 352,960</td></tr><tr><td>AE2-255</td><td>15.1</td><td>1.97%</td><td>\$ 236,191</td></tr><tr><td>AE2-321</td><td>15.2</td><td>1.98%</td><td>\$ 237,752</td></tr><tr><td>AE2-341</td><td>23.8</td><td>3.09%</td><td>\$ 371,224</td></tr></table>	Queue	MW	Cost %	Cost	AD1-100	116.8	15.19%	\$1,823,338	AD2-047	26.4	3.43%	\$ 412,124	AD2-066	17.7	2.31%	\$ 276,623	AD2-102	29.7	3.86%	\$ 462,859	AD2-134	17.6	2.29%	\$ 275,062	AD2-194	19.7	2.56%	\$ 306,908	AE1-113	44.5	5.79%	\$ 694,367	AE1-114	21.2	2.76%	\$ 331,104	AE1-163	51.7	6.72%	\$ 806,609	AE1-166	27.9	3.63%	\$ 435,697	AE1-172	45.9	5.98%	\$ 717,003	AE1-193	45.8	5.96%	\$ 715,286	AE1-194	45.8	5.96%	\$ 715,286	AE1-195	45.8	5.96%	\$ 715,286	AE1-205	29.7	3.86%	\$ 463,172	AE1-252	27.0	3.52%	\$ 421,803	AE2-107	15.2	1.97%	\$ 236,659	AE2-152	28.5	3.70%	\$ 444,126	AE2-153	35.1	4.57%	\$ 548,563	AE2-223	22.6	2.94%	\$ 352,960	AE2-255	15.1	1.97%	\$ 236,191	AE2-321	15.2	1.98%	\$ 237,752	AE2-341	23.8	3.09%	\$ 371,224	\$12,000,000	\$371,224	N5145
Queue	MW	Cost %	Cost																																																																																																	
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CRETE EC ;BP-17STJOHN 345 kV Ckt. 1	ComEd Upgrades: Project ID: n5253 Description: ComEd upgrade: The upgrade will be to Reconductor the line. A preliminary estimate for this upgrade is \$11.2 M with a preliminary construction timeline of 30-36 months. The estimate provided does not consider potential tower upgrades. This cost component will be determined during the Facilities Study phase. Upon completion of this upgrade the new will be a minimum of 1334/1726/1837/2084 MVA (SN/SLTE/SSTE/SLD). PJM Network Upgrade N5253. Type: FAC	\$20,200,000	\$0	N5253 N6629 N6603																																																																																																

	<u>Cost:</u> \$11,200,000 <u>Time Estimate:</u> 30-36 Months <u>Ratings:</u> 1334/1726/1837/2084 MVA (SN/SLTE/SSTE/SLD) <u>Project ID:</u> n6629 <u>Description:</u> ComEd upgrade: Replace a 345kV circuit breaker and associated equipment at Crete. A preliminary estimate for this upgrade is \$6.0 M with a preliminary construction timeline of 30 months. Upon completion of this upgrade the new ratings will be 1754/2246/2297/2488 MVA (SN/SLTE/SSTE/SLD). PJM Network Upgrade N6629. <u>Type:</u> FAC <u>Cost:</u> \$6,000,000 <u>Time Estimate:</u> 30 Months <u>Ratings:</u> 1754/2246/2297/2488 MVA (SN/SLTE/SSTE/SLD). <u>MISO Upgrades:</u> <u>Project ID:</u> N6603 <u>Description:</u> MISO upgrade: Upgrade substation conductor drop to bundled-1590 AL, upgrade bus conductor to bundled-1590 AL, upgrade breaker to 3000A, upgrade switches to 3000A, remove line disconnect switch (\$3M). MISO-End Rating: SN=2174 MVA, SE=2627 MVA. <u>Type:</u> FAC <u>Cost:</u> \$3,000,000 <u>Time Estimate:</u> N/A <u>Ratings:</u> 2174/2627 MVA SE <u>Notes:</u> 1. Since the cost of the upgrade is less than \$5M, based on PJM cost allocation criteria, AE2-341 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.) AE2-341 could receive cost allocation. 3. Although Queue Project AE2-341 may not presently have cost responsibility for this upgrade, Queue Project AE2-341 may need this upgrade in-service to be deliverable to the PJM system. 4. If Queue Project AE2-341 comes into service prior to completion of the upgrade, Queue Project AE2-341 will need an interim study.			
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UNIV PK N;RP-05OLIVE 345 kV Ckt. 1	<u>AEP Upgrade:</u> Project ID: n4057 Description: To increase SE rating: AEP: a sag check will be required for the ACSR/PE ~ 1414 ~ 62/19 ~ Conductor Section 1 to determine if the line section can be operated above its emergency rating of 971 MVA. The results could prove that no additional upgrades are necessary, that some upgrades on the circuit are necessary, or that the entire 40.61 mile section of line would need to be rebuilt. Estimated Cost: \$162,440 (2016 dollars). If deemed necessary to rebuild the entire 40.61 miles of the section of the line, Estimated Cost: \$81,220,000. Schedule: (1) Sag Study: 6 to 12 months. (2) Rebuild: The standard time required for construction differs from state to state. An approximate construction time would be 24 to 36 months after signing an interconnection agreement. Type: FAC Cost: \$162,440 Time Estimate: 6-12 or 24-36 Months Ratings: 971/1304 MVA SN/SE <u>ComEd Upgrade:</u> Project ID: n6281 Description: Mitigate sag on the UNIV PK N;RP-05OLIVE 345 kV line Type: FAC Cost: \$5,000,000 Time Estimate: 24 Months Ratings: 1334/1334/1391/1532 MVA (SN/SLTE/SSTE/SLD). <table><tr><th>Queue</th><th>MW</th><th>Cost %</th><th>Cost</th></tr><tr><td>AE1-163</td><td>12.1</td><td>8.97%</td><td>448,523</td></tr><tr><td>AE1-166</td><td>15.9</td><td>11.78%</td><td>588,780</td></tr><tr><td>AE1-172</td><td>23.7</td><td>17.52%</td><td>875,953</td></tr><tr><td>AE1-205</td><td>16.5</td><td>12.18%</td><td>609,133</td></tr><tr><td>AE1-252</td><td>13.9</td><td>10.31%</td><td>515,506</td></tr><tr><td>AE2-152</td><td>15.9</td><td>11.77%</td><td>588,409</td></tr><tr><td>AE2-153</td><td>21.7</td><td>16.06%</td><td>803,049</td></tr><tr><td>AE2-341</td><td>15.42</td><td>11.41%</td><td>570,646</td></tr></table>	Queue	MW	Cost %	Cost	AE1-163	12.1	8.97%	448,523	AE1-166	15.9	11.78%	588,780	AE1-172	23.7	17.52%	875,953	AE1-205	16.5	12.18%	609,133	AE1-252	13.9	10.31%	515,506	AE2-152	15.9	11.77%	588,409	AE2-153	21.7	16.06%	803,049	AE2-341	15.42	11.41%	570,646	\$5,162,440	\$570,646	N4057 N6281
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AE2-341	15.42	11.41%	570,646																																					
Total Cost		\$46,238,000	\$941,870																																					

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

Light Load Load Flow Analysis Reinforcements

Not required.

Contingencies (Summer Peak Analysis)

Contingency Name	Description
AEP_P1-2_#695A	CONTINGENCY 'AEP_P1-2_#695A' OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1 / 243206 05DUMONT 765 270644 WILTON ; 765 1 END
AEP_P4_#2978_05DUMONT 765_B	CONTINGENCY 'AEP_P4_#2978_05DUMONT 765_B' OPEN BRANCH FROM BUS 243206 TO BUS 243207 CKT 1 / 243206 05DUMONT 765 243207 05GRNTWN 765 1 OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1 / 243206 05DUMONT 765 270644 WILTON ; 765 1 END
COMED_P1-2_138-L14604_R- R_AE2-341A	CONTINGENCY 'COMED_P1-2_138-L14604_R-R_AE2-341A' TRIP BRANCH FROM BUS 272251 TO BUS 272803 CKT 1 / PLANO; R 138 W PLANO ; R 138 TRIP BRANCH FROM BUS 272803 TO BUS 943120 CKT 1 / W PLANO ; R 138 SANDWICH ; B 138 MOVE 25 PERCENT LOAD FROM BUS 272803 TO BUS 271116 / W PLANO ; R 138 BRISTOL ; B 138 MOVE 25 PERCENT LOAD FROM BUS 272803 TO BUS 271117 / W PLANO ; R 138 BRISTOL ; R 138 MOVE 50 PERCENT LOAD FROM BUS 272803 TO BUS 272445 / W PLANO ; R 138 SANDWICH ; R 138 END
COMED_P4_023-65-BT2-3__	CONTINGENCY 'COMED_P4_023-65-BT2-3__' TRIP BRANCH FROM BUS 270644 TO BUS 243206 CKT 1 / WILTO; 765 05DUMONT 765 TRIP BRANCH FROM BUS 270607 TO BUS 270630 CKT 1 / COLLI; 765 PLANO; 765 END

COMED_P4_023-65-BT4-5__	CONTINGENCY 'COMED_P4_023-65-BT4-5__' TRIP BRANCH FROM BUS 275168 TO BUS 270607 CKT 1 / COLLI;2M 345 COLLI; 765 TRIP BRANCH FROM BUS 275168 TO BUS 270697 CKT 1 / COLLI;2M 345 COLLI; R 345 TRIP BRANCH FROM BUS 275168 TO BUS 275268 CKT 1 / COLLI;2M 345 COLLI;2C 33 TRIP BRANCH FROM BUS 270644 TO BUS 243206 CKT 1 / WILTO; 765 05DUMONT 765 END
COMED_P4_112-65-BT2-3__	CONTINGENCY 'COMED_P4_112-65-BT2-3__' TRIP BRANCH FROM BUS 270644 TO BUS 270607 CKT 1 / WILTO; 765 COLLI; 765 TRIP BRANCH FROM BUS 275232 TO BUS 270644 CKT 1 / WILTO;3M 345 WILTO; 765 TRIP BRANCH FROM BUS 275232 TO BUS 270926 CKT 1 / WILTO;3M 345 WILTO; B 345 TRIP BRANCH FROM BUS 275232 TO BUS 275332 CKT 1 / WILTO;3M 345 WILTO;3C 33 END
COMED_P4_112-65-BT3-4__	CONTINGENCY 'COMED_P4_112-65-BT3-4__' TRIP BRANCH FROM BUS 270644 TO BUS 243206 CKT 1 / WILTO; 765 05DUMONT 765 TRIP BRANCH FROM BUS 275232 TO BUS 270644 CKT 1 / WILTO;3M 345 WILTO; 765 TRIP BRANCH FROM BUS 275232 TO BUS 270926 CKT 1 / WILTO;3M 345 WILTO; B 345 TRIP BRANCH FROM BUS 275232 TO BUS 275332 CKT 1 / WILTO;3M 345 WILTO;3C 33 END
COMED_P4_112-65-BT4-5__	CONTINGENCY 'COMED_P4_112-65-BT4-5__' TRIP BRANCH FROM BUS 270644 TO BUS 243206 CKT 1 / WILTO; 765 05DUMONT 765 TRIP BRANCH FROM BUS 275233 TO BUS 270644 CKT 1 / WILTO;4M 345 WILTO; 765 TRIP BRANCH FROM BUS 275233 TO BUS 270927 CKT 1 / WILTO;4M 345 WILTO; R 345

	TRIP BRANCH FROM BUS 275233 TO BUS 275333 CKT 1 / WILTO;4M 345 WILTO;4C 33 END
COMED_P4_112-65-BT5-6__	CONTINGENCY 'COMED_P4_112-65-BT5-6__' TRIP BRANCH FROM BUS 270644 TO BUS 270607 CKT 1 / WILTO; 765 COLLI; 765 TRIP BRANCH FROM BUS 275233 TO BUS 270644 CKT 1 / WILTO;4M 345 WILTO; 765 TRIP BRANCH FROM BUS 275233 TO BUS 270927 CKT 1 / WILTO;4M 345 WILTO; R 345 TRIP BRANCH FROM BUS 275233 TO BUS 275333 CKT 1 / WILTO;4M 345 WILTO;4C 33 END
COMED_P4_167-38-L14609_	CONTINGENCY 'COMED_P4_167-38-L14609_' TRIP BRANCH FROM BUS 272251 TO BUS 272803 CKT 1 / PLANO; R 138 W PLANO ; R 138 TRIP BRANCH FROM BUS 272803 TO BUS 943120 CKT 1 / W PLANO ; R 138 SANDWICH ; B 138 MOVE 25 PERCENT LOAD FROM BUS 272803 TO BUS 271116 / W PLANO ; R 138 BRISTOL ; B 138 MOVE 25 PERCENT LOAD FROM BUS 272803 TO BUS 271117 / W PLANO ; R 138 BRISTOL ; R 138 MOVE 50 PERCENT LOAD FROM BUS 272803 TO BUS 272445 / W PLANO ; R 138 SANDWICH ; R 138 DISCONNECT BUS 272251 / PLANO; R 138 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 WATERMAN ; B-GLIDDEN ;BT 138 kV line (from bus 272728 to bus 271560 ckt 1) loads from 91.72% to 115.07% (AC power flow) of its load dump rating (344 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_167-38-L14609_'. This project contributes approximately 79.44 MW to the thermal violation.

CONTINGENCY 'COMED_P4_167-38-L14609_'

TRIP BRANCH FROM BUS 272251 TO BUS 272803 CKT 1 / PLANO; R 138 W
PLANO ; R 138

TRIP BRANCH FROM BUS 272803 TO BUS 943120 CKT 1 / W PLANO ; R 138
SANDWICH ; B 138

MOVE 25 PERCENT LOAD FROM BUS 272803 TO BUS 271116 / W PLANO ; R
138 BRISTOL ; B 138

MOVE 25 PERCENT LOAD FROM BUS 272803 TO BUS 271117 / W PLANO ; R
138 BRISTOL ; R 138

MOVE 50 PERCENT LOAD FROM BUS 272803 TO BUS 272445 / W PLANO ; R
138 SANDWICH ; R 138

DISCONNECT BUS 272251 / PLANO; R 138

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
933911	AD1-013 C	5.61
933912	AD1-013 E	8.96
934431	AD1-067 C	0.39
934432	AD1-067 E	1.65
934701	AD1-098 C O1	19.67
934702	AD1-098 E O1	14.36
937001	AD2-134 C	7.72
937002	AD2-134 E	30.82
941131	AE2-107 C	24.88
941132	AE2-107 E	16.58
943121	AE2-341 C	53.28
943122	AE2-341 E	26.16
LTF	BLUEG	0.2
LTF	CARR	0.02
LTF	CBM-S1	0.29
LTF	CBM-S2	0.03
LTF	CBM-W1	2.23
LTF	CBM-W2	4.53
272363	ESS H440 ; R	1.23
LTF	G-007	0.06
LTF	GIBSON	< 0.01

274855	GSG-6 ;RU	1.21
290051	GSG-6; E	31.16
274872	LEE DEKAL;1U	3.42
290108	LEEDK;1U E	92.14
LTF	MEC	4.34
274850	MENDOTA H;RU	0.29
LTF	O-066	0.4
LTF	RENSSELAER	0.02
295110	SUBLETTE C	0.19
295111	SUBLETTE E	8.11
LTF	TRIMBLE	0.02
LTF	WEC	0.14
295108	WESTBROOK C	0.42
295109	WESTBROOK E	16.68
916221	Z1-073 E	16.08
925301	AB2-191 C	0.46
925302	AB2-191 E	4.13

Appendix 2

(MISO NIPS - CE) The 17STJOHN-ST JOHN ; T 345 kV line (from bus 255112 to bus 270886 ckt 1) loads from 120.79% to 120.97% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_023-65-BT2-3__'. This project contributes approximately 14.19 MW to the thermal violation.

CONTINGENCY 'COMED_P4_023-65-BT2-3__'

TRIP BRANCH FROM BUS 270644 TO BUS 243206 CKT 1 / WILTO; 765
05DUMONT 765

TRIP BRANCH FROM BUS 270607 TO BUS 270630 CKT 1 / COLLI; 765
PLANO; 765

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932881	AC2-115 1	1.78
932891	AC2-115 2	1.78
932921	AC2-116	0.62
933411	AC2-154 C	1.74
933412	AC2-154 E	2.84
933911	AD1-013 C	1.37
933912	AD1-013 E	2.19
933931	AD1-016 C	0.7
933932	AD1-016 E	1.13
934101	AD1-039 1	5.2
934111	AD1-039 2	5.53
934431	AD1-067 C	0.1
934432	AD1-067 E	0.41
934701	AD1-098 C O1	5.12
934702	AD1-098 E O1	3.74
934721	AD1-100 C	14.29
934722	AD1-100 E	66.68
934871	AD1-116 C	0.68
934872	AD1-116 E	1.11
934971	AD1-129 C	0.68
934972	AD1-129 E	0.45
935001	AD1-133 C O1	15.18
935002	AD1-133 E O1	10.12
936291	AD2-038 C O1	1.71
936292	AD2-038 E O1	11.47
936371	AD2-047 C O1	3.12
936372	AD2-047 E O1	15.21
936461	AD2-060	1.83

936511	AD2-066 C O1	6.2
936512	AD2-066 E O1	4.14
936791	AD2-102 C	10.56
936792	AD2-102 E	7.04
937001	AD2-134 C	1.93
937002	AD2-134 E	7.7
937311	AD2-172 C	1.83
937312	AD2-172 E	2.53
937401	AD2-194 1	5.94
937411	AD2-194 2	5.93
937531	AD2-214 C	3.26
937532	AD2-214 E	2.17
938511	AE1-070 1	6.98
938521	AE1-070 2	6.38
938851	AE1-113 C O1	6.05
938852	AE1-113 E O1	21.46
938861	AE1-114 C O1	2.93
938862	AE1-114 E O1	9.98
939051	AE1-134 1	1.01
939061	AE1-134 2	1.01
939321	AE1-163 C O1	4.31
939322	AE1-163 E O1	26.45
939351	AE1-166 C O1	7.61
939352	AE1-166 E O1	7.03
939401	AE1-172 C O1	3.81
939402	AE1-172 E O1	17.83
939641	AE1-194 C	18.97
939642	AE1-194 E	126.92
939651	AE1-195 C	18.97
939652	AE1-195 E	126.92
940101	AE1-252 C O1	7.64
940102	AE1-252 E O1	5.09
940501	AE2-035 C	1.83
940502	AE2-035 E	2.53
940752	AE2-062 E	0.1
941131	AE2-107 C	4.89
941132	AE2-107 E	3.26
941551	AE2-152 C O1	8.78
941552	AE2-152 E O1	5.86
941561	AE2-153 C O1	3.5
941562	AE2-153 E O1	16.39
942421	AE2-255 C O1	2.29
942422	AE2-255 E O1	6.88
942651	AE2-281 C O1	0.62
942652	AE2-281 E O1	3.78

942991	AE2-321 C	6.12
942992	AE2-321 E	3.01
943121	AE2-341 C	9.52
943122	AE2-341 E	4.67
LTF	BLUEG	4.99
274654	BRAIDWOOD;1U	19.26
274655	BRAIDWOOD;2U	18.43
LTF	CALDERWOOD	0.08
LTF	CANNELTON	0.1
LTF	CARR	0.56
LTF	CATAWBA	0.23
274890	CAYUG;1U E	9.76
274891	CAYUG;2U E	9.76
LTF	CBM-S1	0.79
LTF	CBM-W1	20.14
LTF	CBM-W2	37.59
LTF	CHEOAH	0.08
LTF	CHILHOWEE	0.03
LTF	CHOCTAW /* 35% REVERSE 4566958 4511400	< 0.01
274751	CRETE EC ;1U	3.4
274752	CRETE EC ;2U	3.4
274753	CRETE EC ;3U	3.4
274754	CRETE EC ;4U	3.4
274859	EASYR;U1 E	8.18
274860	EASYR;U2 E	8.18
LTF	G-007	1.56
LTF	GIBSON	0.06
290051	GSG-6; E	7.79
LTF	HAMLET	0.43
275149	KEMPTON ;1E	12.83
274704	KENDALL ;1C	2.84
274705	KENDALL ;1S	1.9
274706	KENDALL ;2C	2.84
274707	KENDALL ;2S	1.9
274661	LASCO STA;2U	17.79
290108	LEEDK;1U E	18.11
LTF	LGE-0092018	< 0.01
LTF	MEC	27.63
293061	N-015 E	11.63
293516	O-009 E1	6.76
293517	O-009 E2	3.43
293518	O-009 E3	3.78
293715	O-029 E	7.23
293716	O-029 E	3.96

293717	O-029 E	3.64
LTF	O-066	10.01
293644	O22 E1	8.51
293645	O22 E2	16.53
290021	O50 E	14.67
294392	P-010 E	14.77
294763	P-046 E	6.99
274888	PILOT HIL;1E	12.83
270859	PWR VTR EC;R	9.05
LTF	RENSSELAER	0.44
274722	S-055 E	8.46
LTF	SANTEETLA	0.03
295111	SUBLETTE E	2.03
274861	TOP CROP ;1U	0.33
274862	TOP CROP ;2U	0.64
LTF	TRIMBLE	0.59
LTF	WEC	5.98
295109	WESTBROOK E	4.17
274687	WILL CNTY;4U	8.11
910542	X3-005 E	0.45
915011	Y3-013 1	2.82
915021	Y3-013 2	2.82
915031	Y3-013 3	2.82
916221	Z1-073 E	4.02
916502	Z1-106 E1	0.95
916504	Z1-106 E2	0.95
916512	Z1-107 E	1.85
916522	Z1-108 E	1.86
918052	AA1-018 E	11.66
919221	AA1-146	13.06
919581	AA2-030	13.06
920272	AA2-123 E	1.83
930481	AB1-089	49.11
930501	AB1-091 O1	50.68
930741	AB1-122 1O1	53.06
930751	AB1-122 2O1	56.4
924471	AB2-096	31.67
925302	AB2-191 E	1.03
926311	AC1-109 1	1.42
926321	AC1-109 2	1.42
926331	AC1-110 1	1.42
926341	AC1-110 2	1.42
926351	AC1-111 1	0.57
926361	AC1-111 2	0.57
926371	AC1-111 3	0.57

926381	AC1-111 4	0.57
926391	AC1-111 5	0.57
926401	AC1-111 6	0.57
927511	AC1-113 1	0.89
927521	AC1-113 2	0.89
926431	AC1-114	1.78
927451	AC1-142A 1	3.2
927461	AC1-142A 2	3.21
926821	AC1-168 C O1	0.85
926822	AC1-168 E O1	5.69
927091	AC1-204 1	55.26
927101	AC1-204 2	55.19
927201	AC1-214 C O1	0.57
927202	AC1-214 E O1	1.82

Appendix 3

(MISO NIPS - AEP) The 17STILLWELL-05DUMONT 345 kV line (from bus 255113 to bus 243219 ckt 1) loads from 122.43% to 122.74% (AC power flow) of its emergency rating (1409 MVA) for the line fault with failed breaker contingency outage of 'AEP_P4_#2978_05DUMONT 765_B'. This project contributes approximately 21.87 MW to the thermal violation.

CONTINGENCY 'AEP_P4_#2978_05DUMONT 765_B'

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

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

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932881	AC2-115 1	2.74
932891	AC2-115 2	2.74
932921	AC2-116	0.96
932931	AC2-117	5.82
933411	AC2-154 C	3.03
933412	AC2-154 E	4.94
933911	AD1-013 C	2.12
933912	AD1-013 E	3.39
933931	AD1-016 C	1.07
933932	AD1-016 E	1.75
934051	AD1-031 C O1	3.29
934052	AD1-031 E O1	5.36
934101	AD1-039 1	8.09
934111	AD1-039 2	8.34
934431	AD1-067 C	0.15
934432	AD1-067 E	0.64
934701	AD1-098 C O1	7.92
934702	AD1-098 E O1	5.79
934721	AD1-100 C	22.48
934722	AD1-100 E	104.92
934871	AD1-116 C	1.09
934872	AD1-116 E	1.78
934971	AD1-129 C	1.04
934972	AD1-129 E	0.69
935001	AD1-133 C O1	24.1
935002	AD1-133 E O1	16.07
936291	AD2-038 C O1	2.7

936292	AD2-038 E O1	18.05
936371	AD2-047 C O1	5.42
936372	AD2-047 E O1	26.48
936461	AD2-060	3.19
936511	AD2-066 C O1	9.69
936512	AD2-066 E O1	6.46
936791	AD2-102 C	16.32
936792	AD2-102 E	10.88
937001	AD2-134 C	2.98
937002	AD2-134 E	11.91
937311	AD2-172 C	2.84
937312	AD2-172 E	3.92
937401	AD2-194 1	8.97
937411	AD2-194 2	8.96
937531	AD2-214 C	5.1
937532	AD2-214 E	3.4
938511	AE1-070 1	10.54
938521	AE1-070 2	9.64
938851	AE1-113 C O1	9.22
938852	AE1-113 E O1	32.69
938861	AE1-114 C O1	4.53
938862	AE1-114 E O1	15.47
939051	AE1-134 1	1.58
939061	AE1-134 2	1.58
939321	AE1-163 C O1	6.78
939322	AE1-163 E O1	41.64
939351	AE1-166 C O1	11.81
939352	AE1-166 E O1	10.91
939401	AE1-172 C O1	6.14
939402	AE1-172 E O1	28.72
939631	AE1-193 C O1	8.03
939632	AE1-193 E O1	53.74
939641	AE1-194 C	10.26
939642	AE1-194 E	68.64
939651	AE1-195 C	10.26
939652	AE1-195 E	68.64
939681	AE1-198 C O1	23.85
939682	AE1-198 E O1	20.26
939741	AE1-205 C O1	3.29
939742	AE1-205 E O1	4.55
940101	AE1-252 C O1	12.3
940102	AE1-252 E O1	8.2
940501	AE2-035 C	2.84
940502	AE2-035 E	3.92
940752	AE2-062 E	0.15

941131	AE2-107 C	7.55
941132	AE2-107 E	5.03
941551	AE2-152 C O1	13.63
941552	AE2-152 E O1	9.09
941561	AE2-153 C O1	5.44
941562	AE2-153 E O1	25.46
942421	AE2-255 C O1	3.49
942422	AE2-255 E O1	10.48
942651	AE2-281 C O1	0.97
942652	AE2-281 E O1	5.95
942991	AE2-321 C	9.42
942992	AE2-321 E	4.64
943121	AE2-341 C	14.67
943122	AE2-341 E	7.2
LTF	BLUEG	0.95
294401	BSHIL;1U E	9.88
294410	BSHIL;2U E	9.88
LTF	CARR	0.89
LTF	CATAWBA	0.21
274890	CAYUG;1U E	15.79
274891	CAYUG;2U E	15.79
LTF	CBM-S1	4.01
LTF	CBM-W1	36.06
LTF	CBM-W2	82.98
LTF	CHOCTAW /* 35% REVERSE 4566958 4511400	< 0.01
LTF	CIN	3.36
274859	EASYR;U1 E	12.69
274860	EASYR;U2 E	12.69
LTF	G-007	2.48
290051	GSG-6; E	12.04
LTF	HAMLET	0.46
LTF	IPL	1.15
275149	KEMPTON ;1E	22.33
290108	LEEDK;1U E	27.96
LTF	LGE-0092018	< 0.01
LTF	MEC	44.8
293061	N-015 E	17.56
293516	O-009 E1	10.54
293517	O-009 E2	5.35
293518	O-009 E3	5.89
293715	O-029 E	11.27
293716	O-029 E	6.18
293717	O-029 E	5.68
293771	O-035 E	7.38

<i>LTF</i>	<i>O-066</i>	<i>15.91</i>
293644	<i>O22 E1</i>	<i>11.97</i>
293645	<i>O22 E2</i>	<i>23.24</i>
290021	<i>O50 E</i>	<i>22.35</i>
294392	<i>P-010 E</i>	<i>22.31</i>
294763	<i>P-046 E</i>	<i>10.81</i>
274888	<i>PILOT HIL;1E</i>	<i>22.33</i>
270859	<i>PWR VTR EC;R</i>	<i>13.94</i>
<i>LTF</i>	<i>RENSSELAER</i>	<i>0.71</i>
274724	<i>RIVER EC ;11</i>	<i>4.8</i>
274722	<i>S-055 E</i>	<i>12.97</i>
274795	<i>SE CHICAG;2U</i>	<i>1.13</i>
274788	<i>SE CHICAG;5U</i>	<i>1.15</i>
274789	<i>SE CHICAG;6U</i>	<i>1.15</i>
274790	<i>SE CHICAG;7U</i>	<i>1.15</i>
274791	<i>SE CHICAG;8U</i>	<i>1.15</i>
295111	<i>SUBLETTE E</i>	<i>3.13</i>
<i>LTF</i>	<i>TRIMBLE</i>	<i>0.15</i>
<i>LTF</i>	<i>WEC</i>	<i>9.21</i>
295109	<i>WESTBROOK E</i>	<i>6.45</i>
910542	<i>X3-005 E</i>	<i>1.</i>
915011	<i>Y3-013 1</i>	<i>4.32</i>
915021	<i>Y3-013 2</i>	<i>4.32</i>
915031	<i>Y3-013 3</i>	<i>4.32</i>
916211	<i>Z1-072 E</i>	<i>5.59</i>
916221	<i>Z1-073 E</i>	<i>6.21</i>
916502	<i>Z1-106 E1</i>	<i>1.45</i>
916504	<i>Z1-106 E2</i>	<i>1.45</i>
916512	<i>Z1-107 E</i>	<i>3.04</i>
916522	<i>Z1-108 E</i>	<i>2.86</i>
918052	<i>AA1-018 E</i>	<i>18.77</i>
919221	<i>AA1-146</i>	<i>20.31</i>
919581	<i>AA2-030</i>	<i>20.31</i>
920272	<i>AA2-123 E</i>	<i>2.82</i>
930481	<i>AB1-089</i>	<i>75.78</i>
930501	<i>AB1-091 O1</i>	<i>88.35</i>
930741	<i>AB1-122 1O1</i>	<i>82.55</i>
930751	<i>AB1-122 2O1</i>	<i>85.08</i>
924471	<i>AB2-096</i>	<i>48.81</i>
925302	<i>AB2-191 E</i>	<i>1.59</i>
925581	<i>AC1-033 C</i>	<i>1.62</i>
925582	<i>AC1-033 E</i>	<i>10.84</i>
926311	<i>AC1-109 1</i>	<i>2.19</i>
926321	<i>AC1-109 2</i>	<i>2.19</i>
926331	<i>AC1-110 1</i>	<i>2.19</i>

926341	AC1-110 2	2.19
926351	AC1-111 1	0.88
926361	AC1-111 2	0.88
926371	AC1-111 3	0.88
926381	AC1-111 4	0.88
926391	AC1-111 5	0.88
926401	AC1-111 6	0.88
927511	AC1-113 1	1.37
927521	AC1-113 2	1.37
926431	AC1-114	2.74
927451	AC1-142A 1	4.84
927461	AC1-142A 2	4.84
926821	AC1-168 C O1	1.32
926822	AC1-168 E O1	8.87
927091	AC1-204 1	83.39
927101	AC1-204 2	83.36
927201	AC1-214 C O1	2.37
927202	AC1-214 E O1	7.53

Appendix 4

(CE - CE) The E FRANKFO; B-CRETE EC ;BP 345 kV line (from bus 270728 to bus 274750 ckt 1) loads from 101.12% to 101.32% (**DC power flow**) of its load dump rating (1399 MVA) for the line fault with failed breaker contingency outage of 'AEP_P4_#2978_05DUMONT 765_B'. This project contributes approximately 19.87 MW to the thermal violation.

CONTINGENCY 'AEP_P4_#2978_05DUMONT 765_B'

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

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

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932881	AC2-115 1	2.5
932891	AC2-115 2	2.5
932921	AC2-116	0.88
933411	AC2-154 C	2.32
933412	AC2-154 E	3.79
933911	AD1-013 C	1.93
933912	AD1-013 E	3.08
933931	AD1-016 C	0.98
933932	AD1-016 E	1.6
934051	AD1-031 C O1	2.95
934052	AD1-031 E O1	4.82
934101	AD1-039 1	7.33
934111	AD1-039 2	7.84
934431	AD1-067 C	0.14
934432	AD1-067 E	0.58
934701	AD1-098 C O1	7.21
934702	AD1-098 E O1	5.26
934721	AD1-100 C	19.98
934722	AD1-100 E	93.23
934871	AD1-116 C	0.94
934872	AD1-116 E	1.54
934971	AD1-129 C	0.95
934972	AD1-129 E	0.63
935001	AD1-133 C O1	21.37
935002	AD1-133 E O1	14.25
936291	AD2-038 C O1	2.41
936292	AD2-038 E O1	16.12
936371	AD2-047 C O1	4.16

936372	AD2-047 E O1	20.31
936461	AD2-060	2.45
936511	AD2-066 C O1	8.73
936512	AD2-066 E O1	5.82
936791	AD2-102 C	14.88
936792	AD2-102 E	9.92
937001	AD2-134 C	2.71
937002	AD2-134 E	10.83
937311	AD2-172 C	2.59
937312	AD2-172 E	3.57
937401	AD2-194 1	8.43
937411	AD2-194 2	8.42
937531	AD2-214 C	4.61
937532	AD2-214 E	3.07
938511	AE1-070 1	9.91
938521	AE1-070 2	9.05
938851	AE1-113 C O1	8.59
938852	AE1-113 E O1	30.45
938861	AE1-114 C O1	4.12
938862	AE1-114 E O1	14.07
939051	AE1-134 1	1.43
939061	AE1-134 2	1.43
939321	AE1-163 C O1	6.05
939322	AE1-163 E O1	37.18
939351	AE1-166 C O1	10.68
939352	AE1-166 E O1	9.86
939401	AE1-172 C O1	5.32
939402	AE1-172 E O1	24.93
939681	AE1-198 C O1	18.81
939682	AE1-198 E O1	15.98
940101	AE1-252 C O1	10.68
940102	AE1-252 E O1	7.12
940501	AE2-035 C	2.59
940502	AE2-035 E	3.57
940752	AE2-062 E	0.14
941131	AE2-107 C	6.87
941132	AE2-107 E	4.58
941551	AE2-152 C O1	12.32
941552	AE2-152 E O1	8.22
941561	AE2-153 C O1	4.9
941562	AE2-153 E O1	22.93
942421	AE2-255 C O1	3.25
942422	AE2-255 E O1	9.76
942651	AE2-281 C O1	0.86
942652	AE2-281 E O1	5.31

942991	AE2-321 C	8.62
942992	AE2-321 E	4.24
943121	AE2-341 C	13.33
943122	AE2-341 E	6.55
LTF	BLUEG	5.77
274654	BRAIDWOOD;1U	27.55
274655	BRAIDWOOD;2U	26.36
LTF	CALDERWOOD	0.02
LTF	CANNELTON	0.09
LTF	CARR	0.73
LTF	CATAWBA	0.26
274890	CAYUG;1U E	13.66
274891	CAYUG;2U E	13.66
LTF	CBM-S1	1.69
LTF	CBM-W1	26.62
LTF	CBM-W2	56.43
LTF	CHEOAH	0.03
LTF	CHILHOWEE	< 0.01
LTF	CHOCTAW /* 35% REVERSE 4566958 4511400	< 0.01
274859	EASYR;U1 E	11.54
274860	EASYR;U2 E	11.54
274736	ELWOOD EC;9P	3.26
LTF	G-007	2.04
LTF	GIBSON	0.04
290051	GSG-6; E	10.96
LTF	HAMLET	0.5
274675	JOLIET 29;7U	11.37
274676	JOLIET 29;8U	11.38
275149	KEMPTON ;1E	17.13
274704	KENDALL ;1C	4.05
274705	KENDALL ;1S	2.7
274706	KENDALL ;2C	4.05
274707	KENDALL ;2S	2.7
274660	LASCO STA;1U	25.16
274661	LASCO STA;2U	25.21
290108	LEEDK;1U E	25.46
LTF	LGE-0092018	< 0.01
LTF	MEC	39.27
293061	N-015 E	16.45
293516	O-009 E1	9.54
293517	O-009 E2	4.85
293518	O-009 E3	5.34
293715	O-029 E	10.21
293716	O-029 E	5.6

293717	O-029 E	5.14
293771	O-035 E	6.63
LTF	O-066	13.07
293644	O22 E1	12.36
293645	O22 E2	23.99
290021	O50 E	20.82
294392	P-010 E	20.89
294763	P-046 E	9.85
274888	PILOT HIL;1E	17.13
270859	PWR VTR EC;R	12.75
LTF	RENSSELAER	0.58
274722	S-055 E	11.92
LTF	SANTEETLA	0.01
295111	SUBLETTE E	2.85
274861	TOP CROP ;1U	0.48
274862	TOP CROP ;2U	0.93
LTF	TRIMBLE	0.68
LTF	WEC	8.43
295109	WESTBROOK E	5.87
274687	WILL CNTY;4U	11.49
915011	Y3-013 1	3.97
915021	Y3-013 2	3.97
915031	Y3-013 3	3.97
916211	Z1-072 E	5.02
916221	Z1-073 E	5.65
916502	Z1-106 E1	1.33
916504	Z1-106 E2	1.33
916512	Z1-107 E	2.55
916522	Z1-108 E	2.63
918052	AA1-018 E	16.22
919221	AA1-146	18.43
919581	AA2-030	18.43
920272	AA2-123 E	2.58
930481	AB1-089	69.18
930501	AB1-091 O1	67.48
930741	AB1-122 1O1	74.78
930751	AB1-122 2O1	79.96
924471	AB2-096	44.61
925302	AB2-191 E	1.45
925581	AC1-033 C	1.45
925582	AC1-033 E	9.73
926311	AC1-109 1	2.
926321	AC1-109 2	2.
926331	AC1-110 1	2.
926341	AC1-110 2	2.

926351	AC1-111 1	0.8
926361	AC1-111 2	0.8
926371	AC1-111 3	0.8
926381	AC1-111 4	0.8
926391	AC1-111 5	0.8
926401	AC1-111 6	0.8
927511	AC1-113 1	1.25
927521	AC1-113 2	1.25
926431	AC1-114	2.5
927451	AC1-142A 1	4.54
927461	AC1-142A 2	4.54
926821	AC1-168 C O1	1.2
926822	AC1-168 E O1	8.05
927091	AC1-204 1	78.41
927101	AC1-204 2	78.27
927201	AC1-214 C O1	2.13
927202	AC1-214 E O1	6.76

Appendix 5

(CE - AEP) The GREENACRE; T-05OLIVE 345 kV line (from bus 270771 to bus 243229 ckt 1) loads from 107.94% to 108.06% (**DC power flow**) of its emergency rating (971 MVA) for the line fault with failed breaker contingency outage of 'AEP_P4_#2978_05DUMONT 765_B'. This project contributes approximately 12.66 MW to the thermal violation.

CONTINGENCY 'AEP_P4_#2978_05DUMONT 765_B'

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

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

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932881	AC2-115 1	1.59
932891	AC2-115 2	1.59
932921	AC2-116	0.56
933411	AC2-154 C	1.68
933412	AC2-154 E	2.75
933911	AD1-013 C	1.22
933912	AD1-013 E	1.96
933931	AD1-016 C	0.62
933932	AD1-016 E	1.01
934051	AD1-031 C O1	1.87
934052	AD1-031 E O1	3.06
934101	AD1-039 1	4.67
934111	AD1-039 2	4.88
934431	AD1-067 C	0.09
934432	AD1-067 E	0.37
934701	AD1-098 C O1	4.58
934702	AD1-098 E O1	3.34
934721	AD1-100 C	12.96
934722	AD1-100 E	60.48
934871	AD1-116 C	0.62
934872	AD1-116 E	1.01
934971	AD1-129 C	0.6
934972	AD1-129 E	0.4
935001	AD1-133 C O1	13.75
935002	AD1-133 E O1	9.17
936291	AD2-038 C O1	1.54
936292	AD2-038 E O1	10.33
936371	AD2-047 C O1	3.02

936372	AD2-047 E O1	14.72
936461	AD2-060	1.77
936511	AD2-066 C O1	5.57
936512	AD2-066 E O1	3.71
936791	AD2-102 C	9.42
936792	AD2-102 E	6.28
937001	AD2-134 C	1.72
937002	AD2-134 E	6.88
937311	AD2-172 C	1.64
937312	AD2-172 E	2.26
937401	AD2-194 1	5.25
937411	AD2-194 2	5.25
937531	AD2-214 C	2.92
937532	AD2-214 E	1.95
938511	AE1-070 1	6.17
938521	AE1-070 2	5.64
938851	AE1-113 C O1	5.36
938852	AE1-113 E O1	19.02
938861	AE1-114 C O1	2.61
938862	AE1-114 E O1	8.92
939051	AE1-134 1	0.91
939061	AE1-134 2	0.91
939321	AE1-163 C O1	3.88
939322	AE1-163 E O1	23.83
939351	AE1-166 C O1	6.85
939352	AE1-166 E O1	6.32
939401	AE1-172 C O1	3.49
939402	AE1-172 E O1	16.32
939631	AE1-193 C O1	4.58
939632	AE1-193 E O1	30.65
939641	AE1-194 C	10.89
939642	AE1-194 E	72.9
939651	AE1-195 C	10.89
939652	AE1-195 E	72.9
939681	AE1-198 C O1	13.6
939682	AE1-198 E O1	11.56
940101	AE1-252 C O1	6.99
940102	AE1-252 E O1	4.66
940501	AE2-035 C	1.64
940502	AE2-035 E	2.26
940752	AE2-062 E	0.09
941131	AE2-107 C	4.36
941132	AE2-107 E	2.91
941551	AE2-152 C O1	7.9
941552	AE2-152 E O1	5.27

941561	AE2-153 C O1	3.15
941562	AE2-153 E O1	14.76
942421	AE2-255 C O1	2.03
942422	AE2-255 E O1	6.1
942651	AE2-281 C O1	0.55
942652	AE2-281 E O1	3.4
942991	AE2-321 C	5.46
942992	AE2-321 E	2.69
943121	AE2-341 C	8.49
943122	AE2-341 E	4.17
LTF	BLUEG	2.8
294401	BSHIL;1U E	3.25
294410	BSHIL;2U E	3.25
LTF	CANNELTON	< 0.01
LTF	CARR	0.49
LTF	CATAWBA	0.16
274890	CAYUG;1U E	8.94
274891	CAYUG;2U E	8.94
LTF	CBM-S1	1.39
LTF	CBM-W1	20.1
LTF	CBM-W2	38.93
LTF	CHOCTAW /* 35% REVERSE 4566958 4511400	< 0.01
LTF	CIN	0.15
274751	CRETE EC ;1U	1.95
274752	CRETE EC ;2U	1.95
274753	CRETE EC ;3U	1.95
274754	CRETE EC ;4U	1.95
274859	EASYR;U1 E	7.31
274860	EASYR;U2 E	7.31
LTF	G-007	1.37
290051	GSG-6; E	6.95
LTF	HAMLET	0.31
965711	J1058	< 0.01
275149	KEMPTON ;1E	12.42
290108	LEEDK;1U E	16.17
LTF	LGE-0092018	< 0.01
LTF	MEC	25.11
293061	N-015 E	10.25
293516	O-009 E1	6.05
293517	O-009 E2	3.07
293518	O-009 E3	3.38
293715	O-029 E	6.47
293716	O-029 E	3.55
293717	O-029 E	3.26

293771	O-035 E	4.21
LTF	O-066	8.76
293644	O22 E1	7.25
293645	O22 E2	14.08
290021	O50 E	13.
294392	P-010 E	13.02
294763	P-046 E	6.24
274888	PILOT HIL;1E	12.42
270859	PWR VTR EC;R	8.07
LTF	RENSSELAER	0.39
274722	S-055 E	7.53
295111	SUBLETTE E	1.81
LTF	TRIMBLE	0.34
LTF	WEC	5.33
295109	WESTBROOK E	3.72
910542	X3-005 E	0.52
915011	Y3-013 1	2.51
915021	Y3-013 2	2.51
915031	Y3-013 3	2.51
916211	Z1-072 E	3.19
916221	Z1-073 E	3.59
916502	Z1-106 E1	0.84
916504	Z1-106 E2	0.84
916512	Z1-107 E	1.72
916522	Z1-108 E	1.66
918052	AA1-018 E	10.64
919221	AA1-146	11.68
919581	AA2-030	11.68
920272	AA2-123 E	1.63
930481	AB1-089	43.82
930501	AB1-091 O1	49.21
930741	AB1-122 1O1	47.66
930751	AB1-122 2O1	49.82
924471	AB2-096	28.25
925302	AB2-191 E	0.92
925581	AC1-033 C	0.92
925582	AC1-033 E	6.18
926311	AC1-109 1	1.27
926321	AC1-109 2	1.27
926331	AC1-110 1	1.27
926341	AC1-110 2	1.27
926351	AC1-111 1	0.51
926361	AC1-111 2	0.51
926371	AC1-111 3	0.51
926381	AC1-111 4	0.51

926391	AC1-111 5	0.51
926401	AC1-111 6	0.51
927511	AC1-113 1	0.79
927521	AC1-113 2	0.79
926431	AC1-114	1.59
927451	AC1-142A 1	2.83
927461	AC1-142A 2	2.84
926821	AC1-168 C O1	0.76
926822	AC1-168 E O1	5.09
927091	AC1-204 1	48.84
927101	AC1-204 2	48.8
927201	AC1-214 C O1	1.35
927202	AC1-214 E O1	4.3

Appendix 6

(CE - MISO NIPS) The ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 120.79% to 120.97% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_023-65-BT2-3__'. This project contributes approximately 14.19 MW to the thermal violation.

CONTINGENCY 'COMED_P4_023-65-BT2-3__'

TRIP BRANCH FROM BUS 270644 TO BUS 243206 CKT 1 / WILTO; 765
05DUMONT 765

TRIP BRANCH FROM BUS 270607 TO BUS 270630 CKT 1 / COLLI; 765
PLANO; 765

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932881	AC2-115 1	1.78
932891	AC2-115 2	1.78
932921	AC2-116	0.62
933411	AC2-154 C	1.74
933412	AC2-154 E	2.84
933911	AD1-013 C	1.37
933912	AD1-013 E	2.19
933931	AD1-016 C	0.7
933932	AD1-016 E	1.13
934101	AD1-039 1	5.2
934111	AD1-039 2	5.53
934431	AD1-067 C	0.1
934432	AD1-067 E	0.41
934701	AD1-098 C O1	5.12
934702	AD1-098 E O1	3.74
934721	AD1-100 C	14.29
934722	AD1-100 E	66.68
934871	AD1-116 C	0.68
934872	AD1-116 E	1.11
934971	AD1-129 C	0.68
934972	AD1-129 E	0.45
935001	AD1-133 C O1	15.18
935002	AD1-133 E O1	10.12
936291	AD2-038 C O1	1.71
936292	AD2-038 E O1	11.47
936371	AD2-047 C O1	3.12
936372	AD2-047 E O1	15.21
936461	AD2-060	1.83

936511	AD2-066 C O1	6.2
936512	AD2-066 E O1	4.14
936791	AD2-102 C	10.56
936792	AD2-102 E	7.04
937001	AD2-134 C	1.93
937002	AD2-134 E	7.7
937311	AD2-172 C	1.83
937312	AD2-172 E	2.53
937401	AD2-194 1	5.94
937411	AD2-194 2	5.93
937531	AD2-214 C	3.26
937532	AD2-214 E	2.17
938511	AE1-070 1	6.98
938521	AE1-070 2	6.38
938851	AE1-113 C O1	6.05
938852	AE1-113 E O1	21.46
938861	AE1-114 C O1	2.93
938862	AE1-114 E O1	9.98
939051	AE1-134 1	1.01
939061	AE1-134 2	1.01
939321	AE1-163 C O1	4.31
939322	AE1-163 E O1	26.45
939351	AE1-166 C O1	7.61
939352	AE1-166 E O1	7.03
939401	AE1-172 C O1	3.81
939402	AE1-172 E O1	17.83
939641	AE1-194 C	18.97
939642	AE1-194 E	126.92
939651	AE1-195 C	18.97
939652	AE1-195 E	126.92
940101	AE1-252 C O1	7.64
940102	AE1-252 E O1	5.09
940501	AE2-035 C	1.83
940502	AE2-035 E	2.53
940752	AE2-062 E	0.1
941131	AE2-107 C	4.89
941132	AE2-107 E	3.26
941551	AE2-152 C O1	8.78
941552	AE2-152 E O1	5.86
941561	AE2-153 C O1	3.5
941562	AE2-153 E O1	16.39
942421	AE2-255 C O1	2.29
942422	AE2-255 E O1	6.88
942651	AE2-281 C O1	0.62
942652	AE2-281 E O1	3.78

942991	AE2-321 C	6.12
942992	AE2-321 E	3.01
943121	AE2-341 C	9.52
943122	AE2-341 E	4.67
LTF	BLUEG	4.99
274654	BRAIDWOOD;1U	19.26
274655	BRAIDWOOD;2U	18.43
LTF	CALDERWOOD	0.08
LTF	CANNELTON	0.1
LTF	CARR	0.56
LTF	CATAWBA	0.23
274890	CAYUG;1U E	9.76
274891	CAYUG;2U E	9.76
LTF	CBM-S1	0.79
LTF	CBM-W1	20.14
LTF	CBM-W2	37.59
LTF	CHEOAH	0.08
LTF	CHILHOWEE	0.03
LTF	CHOCTAW /* 35% REVERSE 4566958 4511400	< 0.01
274751	CRETE EC ;1U	3.4
274752	CRETE EC ;2U	3.4
274753	CRETE EC ;3U	3.4
274754	CRETE EC ;4U	3.4
274859	EASYR;U1 E	8.18
274860	EASYR;U2 E	8.18
LTF	G-007	1.56
LTF	GIBSON	0.06
290051	GSG-6; E	7.79
LTF	HAMLET	0.43
275149	KEMPTON ;1E	12.83
274704	KENDALL ;1C	2.84
274705	KENDALL ;1S	1.9
274706	KENDALL ;2C	2.84
274707	KENDALL ;2S	1.9
274661	LASCO STA;2U	17.79
290108	LEEDK;1U E	18.11
LTF	LGE-0092018	< 0.01
LTF	MEC	27.63
293061	N-015 E	11.63
293516	O-009 E1	6.76
293517	O-009 E2	3.43
293518	O-009 E3	3.78
293715	O-029 E	7.23
293716	O-029 E	3.96

293717	O-029 E	3.64
LTF	O-066	10.01
293644	O22 E1	8.51
293645	O22 E2	16.53
290021	O50 E	14.67
294392	P-010 E	14.77
294763	P-046 E	6.99
274888	PILOT HIL;1E	12.83
270859	PWR VTR EC;R	9.05
LTF	RENSSELAER	0.44
274722	S-055 E	8.46
LTF	SANTEETLA	0.03
295111	SUBLETTE E	2.03
274861	TOP CROP ;1U	0.33
274862	TOP CROP ;2U	0.64
LTF	TRIMBLE	0.59
LTF	WEC	5.98
295109	WESTBROOK E	4.17
274687	WILL CNTY;4U	8.11
910542	X3-005 E	0.45
915011	Y3-013 1	2.82
915021	Y3-013 2	2.82
915031	Y3-013 3	2.82
916221	Z1-073 E	4.02
916502	Z1-106 E1	0.95
916504	Z1-106 E2	0.95
916512	Z1-107 E	1.85
916522	Z1-108 E	1.86
918052	AA1-018 E	11.66
919221	AA1-146	13.06
919581	AA2-030	13.06
920272	AA2-123 E	1.83
930481	AB1-089	49.11
930501	AB1-091 O1	50.68
930741	AB1-122 1O1	53.06
930751	AB1-122 2O1	56.4
924471	AB2-096	31.67
925302	AB2-191 E	1.03
926311	AC1-109 1	1.42
926321	AC1-109 2	1.42
926331	AC1-110 1	1.42
926341	AC1-110 2	1.42
926351	AC1-111 1	0.57
926361	AC1-111 2	0.57
926371	AC1-111 3	0.57

926381	AC1-111 4	0.57
926391	AC1-111 5	0.57
926401	AC1-111 6	0.57
927511	AC1-113 1	0.89
927521	AC1-113 2	0.89
926431	AC1-114	1.78
927451	AC1-142A 1	3.2
927461	AC1-142A 2	3.21
926821	AC1-168 C O1	0.85
926822	AC1-168 E O1	5.69
927091	AC1-204 1	55.26
927101	AC1-204 2	55.19
927201	AC1-214 C O1	0.57
927202	AC1-214 E O1	1.82

Appendix 7

(CE - CE) The WILTON ; B-WILTON ;3M 345 kV line (from bus 270926 to bus 275232 ckt 1) loads from 137.52% to 138.73% (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 23.35 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	2.92
932891	AC2-115 2	2.92
932921	AC2-116	1.02
932931	AC2-117	6.53
933411	AC2-154 C	3.21
933412	AC2-154 E	5.23
933911	AD1-013 C	2.26
933912	AD1-013 E	3.6
933931	AD1-016 C	1.14
933932	AD1-016 E	1.86
934051	AD1-031 C O1	3.52
934052	AD1-031 E O1	5.75
934101	AD1-039 1	8.77
934111	AD1-039 2	8.86
934431	AD1-067 C	0.16
934432	AD1-067 E	0.68
934701	AD1-098 C O1	8.43
934702	AD1-098 E O1	6.16
934721	AD1-100 C	29.46
934722	AD1-100 E	137.48
934871	AD1-116 C	1.17
934872	AD1-116 E	1.91
934971	AD1-129 C	1.11
934972	AD1-129 E	0.74

935001	AD1-133 C O1	27.45
935002	AD1-133 E O1	18.3
936291	AD2-038 C O1	2.89
936292	AD2-038 E O1	19.31
936371	AD2-047 C O1	5.74
936372	AD2-047 E O1	28.03
936461	AD2-060	3.38
936511	AD2-066 C O1	10.37
936512	AD2-066 E O1	6.92
936791	AD2-102 C	17.33
936792	AD2-102 E	11.55
937001	AD2-134 C	3.17
937002	AD2-134 E	12.67
937311	AD2-172 C	3.02
937312	AD2-172 E	4.16
937401	AD2-194 1	9.57
937411	AD2-194 2	9.57
937531	AD2-214 C	5.41
937532	AD2-214 E	3.61
938511	AE1-070 1	11.25
938521	AE1-070 2	10.29
938851	AE1-113 C O1	9.81
938852	AE1-113 E O1	34.77
938861	AE1-114 C O1	4.82
938862	AE1-114 E O1	16.44
939051	AE1-134 1	1.68
939061	AE1-134 2	1.68
939321	AE1-163 C O1	7.25
939322	AE1-163 E O1	44.54
939351	AE1-166 C O1	14.54
939352	AE1-166 E O1	13.42
939401	AE1-172 C O1	8.1
939402	AE1-172 E O1	37.92
939631	AE1-193 C O1	8.6
939632	AE1-193 E O1	57.58
939681	AE1-198 C O1	25.55
939682	AE1-198 E O1	21.71
939741	AE1-205 C O1	12.49
939742	AE1-205 E O1	17.25
940101	AE1-252 C O1	16.24
940102	AE1-252 E O1	10.83
940501	AE2-035 C	3.02
940502	AE2-035 E	4.16
940752	AE2-062 E	0.16
941131	AE2-107 C	8.04

941132	AE2-107 E	5.36
941551	AE2-152 C O1	16.77
941552	AE2-152 E O1	11.18
941561	AE2-153 C O1	6.08
941562	AE2-153 E O1	28.45
941731	AE2-173 O1	7.41
942111	AE2-223 C	2.89
942112	AE2-223 E	19.34
942421	AE2-255 C O1	3.71
942422	AE2-255 E O1	11.14
942651	AE2-281 C O1	1.04
942652	AE2-281 E O1	6.36
942991	AE2-321 C	10.02
942992	AE2-321 E	4.93
943121	AE2-341 C	15.66
943122	AE2-341 E	7.69
LTF	BLUEG	7.78
294401	BSHIL;1U E	10.59
294410	BSHIL;2U E	10.59
LTF	CALDERWOOD	0.09
LTF	CANNELTON	0.08
LTF	CARR	0.95
LTF	CATAWBA	0.38
274890	CAYUG;1U E	20.28
274891	CAYUG;2U E	20.28
LTF	CBM-S1	1.88
LTF	CBM-W1	37.47
LTF	CBM-W2	71.85
LTF	CHEOAH	0.09
LTF	CHILHOWEE	0.03
LTF	CHOCTAW /* 35% REVERSE 4566958 4511400	< 0.01
LTF	CIN	< 0.01
274859	EASYR;U1 E	13.48
274860	EASYR;U2 E	13.48
LTF	G-007	2.67
290051	GSG-6; E	12.82
LTF	HAMLET	0.71
275149	KEMPTON ;1E	23.64
990901	L-005 E	15.57
290108	LEEDK;1U E	29.77
LTF	LGE-0092018	< 0.01
274772	LINCOLN ;3U	3.39
274773	LINCOLN ;4U	3.39
274774	LINCOLN ;5U	3.39

274775	LINCOLN ;6U	3.39
274776	LINCOLN ;7U	3.39
274777	LINCOLN ;8U	3.39
LTF	MEC	46.65
293061	N-015 E	19.47
293516	O-009 E1	11.21
293517	O-009 E2	5.69
293518	O-009 E3	6.27
293715	O-029 E	11.98
293716	O-029 E	6.57
293717	O-029 E	6.04
293771	O-035 E	7.93
LTF	O-066	17.15
293644	O22 E1	12.57
293645	O22 E2	24.4
290021	O50 E	23.78
294392	P-010 E	24.72
294763	P-046 E	11.49
274888	PILOT HIL;1E	23.64
270859	PWR VTR EC;R	14.83
LTF	RENSSELAER	0.75
290265	S-028 E	9.83
274722	S-055 E	13.77
LTF	SANTEETLA	0.03
295111	SUBLETTE E	3.34
LTF	TRIMBLE	0.93
LTF	WEC	9.76
295109	WESTBROOK E	6.86
910542	X3-005 E	0.9
915011	Y3-013 1	4.59
915021	Y3-013 2	4.59
915031	Y3-013 3	4.59
916211	Z1-072 E	6.
916221	Z1-073 E	6.61
916502	Z1-106 E1	1.55
916504	Z1-106 E2	1.55
916512	Z1-107 E	3.17
916522	Z1-108 E	3.05
917502	Z2-087 E	25.79
918052	AA1-018 E	20.15
919221	AA1-146	21.57
919581	AA2-030	21.57
920272	AA2-123 E	2.99
930481	AB1-089	80.59
930501	AB1-091 O1	94.07

930741	AB1-122 1O1	89.45
930751	AB1-122 2O1	90.41
924041	AB2-047 C O1	4.82
924042	AB2-047 E O1	32.24
924471	AB2-096	51.89
925302	AB2-191 E	1.7
925581	AC1-033 C	1.73
925582	AC1-033 E	11.61
926311	AC1-109 1	2.34
926321	AC1-109 2	2.34
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
927521	AC1-113 2	1.46
926431	AC1-114	2.92
927451	AC1-142A 1	5.13
927461	AC1-142A 2	5.13
926821	AC1-168 C O1	1.43
926822	AC1-168 E O1	9.61
927091	AC1-204 1	89.02
927101	AC1-204 2	89.02
927201	AC1-214 C O1	2.54
927202	AC1-214 E O1	8.09

Appendix 8

(CE - CE) The WILTON ; R-WILTON ;4M 345 kV line (from bus 270927 to bus 275233 ckt 1) loads from 140.37% to 141.61% (AC power flow) of its load dump rating (1379 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT2-3__'. This project contributes approximately 23.84 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	2.98
932891	AC2-115 2	2.98
932921	AC2-116	1.04
932931	AC2-117	6.67
933411	AC2-154 C	3.28
933412	AC2-154 E	5.34
933911	AD1-013 C	2.3
933912	AD1-013 E	3.68
933931	AD1-016 C	1.16
933932	AD1-016 E	1.9
934051	AD1-031 C O1	3.6
934052	AD1-031 E O1	5.87
934101	AD1-039 1	8.95
934111	AD1-039 2	9.05
934431	AD1-067 C	0.16
934432	AD1-067 E	0.69
934701	AD1-098 C O1	8.61
934702	AD1-098 E O1	6.29
934721	AD1-100 C	30.04
934722	AD1-100 E	140.21
934871	AD1-116 C	1.2
934872	AD1-116 E	1.96
934971	AD1-129 C	1.13
934972	AD1-129 E	0.75

935001	AD1-133 C O1	28.02
935002	AD1-133 E O1	18.68
936291	AD2-038 C O1	2.95
936292	AD2-038 E O1	19.73
936371	AD2-047 C O1	5.86
936372	AD2-047 E O1	28.62
936461	AD2-060	3.45
936511	AD2-066 C O1	10.59
936512	AD2-066 E O1	7.06
936791	AD2-102 C	17.7
936792	AD2-102 E	11.8
937001	AD2-134 C	3.24
937002	AD2-134 E	12.94
937311	AD2-172 C	3.08
937312	AD2-172 E	4.25
937401	AD2-194 1	9.78
937411	AD2-194 2	9.78
937531	AD2-214 C	5.53
937532	AD2-214 E	3.68
938511	AE1-070 1	11.49
938521	AE1-070 2	10.51
938851	AE1-113 C O1	10.02
938852	AE1-113 E O1	35.51
938861	AE1-114 C O1	4.92
938862	AE1-114 E O1	16.79
939051	AE1-134 1	1.71
939061	AE1-134 2	1.71
939321	AE1-163 C O1	7.41
939322	AE1-163 E O1	45.5
939351	AE1-166 C O1	14.83
939352	AE1-166 E O1	13.69
939401	AE1-172 C O1	8.26
939402	AE1-172 E O1	38.67
939631	AE1-193 C O1	8.79
939632	AE1-193 E O1	58.79
939681	AE1-198 C O1	26.09
939682	AE1-198 E O1	22.17
939741	AE1-205 C O1	12.74
939742	AE1-205 E O1	17.6
940101	AE1-252 C O1	16.56
940102	AE1-252 E O1	11.04
940501	AE2-035 C	3.08
940502	AE2-035 E	4.25
940752	AE2-062 E	0.16
941131	AE2-107 C	8.21

941132	AE2-107 E	5.47
941551	AE2-152 C O1	17.11
941552	AE2-152 E O1	11.41
941561	AE2-153 C O1	6.2
941562	AE2-153 E O1	29.03
941731	AE2-173 O1	7.56
942111	AE2-223 C	2.95
942112	AE2-223 E	19.73
942421	AE2-255 C O1	3.79
942422	AE2-255 E O1	11.38
942651	AE2-281 C O1	1.06
942652	AE2-281 E O1	6.5
942991	AE2-321 C	10.23
942992	AE2-321 E	5.04
943121	AE2-341 C	15.99
943122	AE2-341 E	7.85
LTF	BLUEG	7.95
294401	BSHIL;1U E	10.81
294410	BSHIL;2U E	10.81
LTF	CALDERWOOD	0.09
LTF	CANNELTON	0.09
LTF	CARR	0.97
LTF	CATAWBA	0.39
274890	CAYUG;1U E	20.68
274891	CAYUG;2U E	20.68
LTF	CBM-S1	1.91
LTF	CBM-W1	38.27
LTF	CBM-W2	73.31
LTF	CHEOAH	0.1
LTF	CHILHOWEE	0.03
LTF	CHOCTAW /* 35% REVERSE 4566958 4511400	< 0.01
LTF	CIN	< 0.01
274859	EASYR;U1 E	13.76
274860	EASYR;U2 E	13.76
LTF	G-007	2.73
290051	GSG-6; E	13.09
LTF	HAMLET	0.73
275149	KEMPTON ;1E	24.13
990901	L-005 E	15.9
290108	LEEDK;1U E	30.41
LTF	LGE-0092018	< 0.01
274772	LINCOLN ;3U	3.49
274773	LINCOLN ;4U	3.49
274774	LINCOLN ;5U	3.49

274775	LINCOLN ;6U	3.49
274776	LINCOLN ;7U	3.49
274777	LINCOLN ;8U	3.49
LTF	MEC	47.64
293061	N-015 E	19.87
293516	O-009 E1	11.44
293517	O-009 E2	5.81
293518	O-009 E3	6.4
293715	O-029 E	12.24
293716	O-029 E	6.71
293717	O-029 E	6.17
293771	O-035 E	8.09
LTF	O-066	17.52
293644	O22 E1	12.83
293645	O22 E2	24.91
290021	O50 E	24.28
294392	P-010 E	25.24
294763	P-046 E	11.73
274888	PILOT HIL;1E	24.13
270859	PWR VTR EC;R	15.14
LTF	RENSSELAER	0.77
290265	S-028 E	10.03
274722	S-055 E	14.06
LTF	SANTEETLA	0.03
295111	SUBLETTE E	3.41
LTF	TRIMBLE	0.95
LTF	WEC	9.97
295109	WESTBROOK E	7.01
910542	X3-005 E	0.92
915011	Y3-013 1	4.69
915021	Y3-013 2	4.69
915031	Y3-013 3	4.69
916211	Z1-072 E	6.13
916221	Z1-073 E	6.75
916502	Z1-106 E1	1.58
916504	Z1-106 E2	1.58
916512	Z1-107 E	3.24
916522	Z1-108 E	3.11
917502	Z2-087 E	26.31
918052	AA1-018 E	20.59
919221	AA1-146	22.03
919581	AA2-030	22.03
920272	AA2-123 E	3.06
930481	AB1-089	82.3
930501	AB1-091 O1	96.01

930741	AB1-122 1O1	91.35
930751	AB1-122 2O1	92.33
924041	AB2-047 C O1	4.91
924042	AB2-047 E O1	32.89
924471	AB2-096	53.
925302	AB2-191 E	1.73
925581	AC1-033 C	1.77
925582	AC1-033 E	11.85
926311	AC1-109 1	2.39
926321	AC1-109 2	2.39
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
927521	AC1-113 2	1.49
926431	AC1-114	2.98
927451	AC1-142A 1	5.24
927461	AC1-142A 2	5.24
926821	AC1-168 C O1	1.46
926822	AC1-168 E O1	9.81
927091	AC1-204 1	90.93
927101	AC1-204 2	90.93
927201	AC1-214 C O1	2.6
927202	AC1-214 E O1	8.26

Appendix 9

(CE - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line (from bus 274750 to bus 255112 ckt 1) loads from 145.88% to 146.07% (**DC power flow**) of its emergency rating (1399 MVA) for the line fault with failed breaker contingency outage of 'AEP_P4_#2978_05DUMONT 765_B'. This project contributes approximately 19.64 MW to the thermal violation.

CONTINGENCY 'AEP_P4_#2978_05DUMONT 765_B'

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

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

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932881	AC2-115 1	2.47
932891	AC2-115 2	2.47
932921	AC2-116	0.87
933411	AC2-154 C	2.29
933412	AC2-154 E	3.74
933911	AD1-013 C	1.9
933912	AD1-013 E	3.04
933931	AD1-016 C	0.97
933932	AD1-016 E	1.58
934101	AD1-039 1	7.24
934111	AD1-039 2	7.75
934431	AD1-067 C	0.14
934432	AD1-067 E	0.57
934701	AD1-098 C O1	7.12
934702	AD1-098 E O1	5.2
934721	AD1-100 C	19.74
934722	AD1-100 E	92.12
934871	AD1-116 C	0.93
934872	AD1-116 E	1.52
934971	AD1-129 C	0.94
934972	AD1-129 E	0.63
935001	AD1-133 C O1	21.08
935002	AD1-133 E O1	14.06
936291	AD2-038 C O1	2.38
936292	AD2-038 E O1	15.91
936371	AD2-047 C O1	4.11
936372	AD2-047 E O1	20.04

936461	AD2-060	2.42
936511	AD2-066 C O1	8.62
936512	AD2-066 E O1	5.75
936791	AD2-102 C	14.69
936792	AD2-102 E	9.79
937001	AD2-134 C	2.68
937002	AD2-134 E	10.7
937311	AD2-172 C	2.55
937312	AD2-172 E	3.52
937401	AD2-194 1	8.34
937411	AD2-194 2	8.32
937531	AD2-214 C	4.54
937532	AD2-214 E	3.03
938511	AE1-070 1	9.8
938521	AE1-070 2	8.95
938851	AE1-113 C O1	8.48
938852	AE1-113 E O1	30.08
938861	AE1-114 C O1	4.07
938862	AE1-114 E O1	13.89
939051	AE1-134 1	1.41
939061	AE1-134 2	1.41
939321	AE1-163 C O1	5.97
939322	AE1-163 E O1	36.7
939351	AE1-166 C O1	10.56
939352	AE1-166 E O1	9.74
939401	AE1-172 C O1	5.25
939402	AE1-172 E O1	24.59
939641	AE1-194 C	32.4
939642	AE1-194 E	216.8
939651	AE1-195 C	32.4
939652	AE1-195 E	216.8
940101	AE1-252 C O1	10.53
940102	AE1-252 E O1	7.02
940501	AE2-035 C	2.55
940502	AE2-035 E	3.52
940752	AE2-062 E	0.14
941131	AE2-107 C	6.79
941132	AE2-107 E	4.53
941551	AE2-152 C O1	12.18
941552	AE2-152 E O1	8.12
941561	AE2-153 C O1	4.84
941562	AE2-153 E O1	22.66
942421	AE2-255 C O1	3.21
942422	AE2-255 E O1	9.64
942651	AE2-281 C O1	0.85

942652	AE2-281 E O1	5.24
942991	AE2-321 C	8.51
942992	AE2-321 E	4.19
943121	AE2-341 C	13.17
943122	AE2-341 E	6.47
LTF	BLUEG	6.58
274654	BRAIDWOOD;1U	27.26
274655	BRAIDWOOD;2U	26.08
LTF	CALDERWOOD	0.11
LTF	CANNELTON	0.13
LTF	CARR	0.79
LTF	CATAWBA	0.32
274890	CAYUG;1U E	13.47
274891	CAYUG;2U E	13.47
LTF	CBM-S1	1.17
LTF	CBM-W1	25.69
LTF	CBM-W2	52.63
LTF	CHEOAH	0.11
LTF	CHILHOWEE	0.03
LTF	CHOCTAW /* 35% REVERSE 4566958 4511400	< 0.01
274751	CRETE EC ;1U	5.8
274752	CRETE EC ;2U	5.8
274753	CRETE EC ;3U	5.8
274754	CRETE EC ;4U	5.8
274859	EASYR;U1 E	11.38
274860	EASYR;U2 E	11.38
LTF	G-007	2.21
LTF	GIBSON	0.08
290051	GSG-6; E	10.82
LTF	HAMLET	0.59
275149	KEMPTON ;1E	16.91
274704	KENDALL ;1C	4.
274705	KENDALL ;1S	2.67
274706	KENDALL ;2C	4.
274707	KENDALL ;2S	2.67
274661	LASCO STA;2U	24.92
290108	LEEDK;1U E	25.14
LTF	LGE-0092018	< 0.01
LTF	MEC	38.52
293061	N-015 E	16.26
293516	O-009 E1	9.41
293517	O-009 E2	4.78
293518	O-009 E3	5.26
293715	O-029 E	10.07

293716	O-029 E	5.52
293717	O-029 E	5.07
LTF	O-066	14.15
293644	O22 E1	12.23
293645	O22 E2	23.74
290021	O50 E	20.57
294392	P-010 E	20.65
294763	P-046 E	9.72
274888	PILOT HIL;1E	16.91
270859	PWR VTR EC;R	12.59
LTF	RENSSELAER	0.62
274722	S-055 E	11.78
LTF	SANTEETLA	0.03
295111	SUBLETTE E	2.82
274861	TOP CROP ;1U	0.47
274862	TOP CROP ;2U	0.92
LTF	TRIMBLE	0.77
LTF	WEC	8.33
295109	WESTBROOK E	5.79
274687	WILL CNTY;4U	11.36
915011	Y3-013 1	3.93
915021	Y3-013 2	3.93
915031	Y3-013 3	3.93
916221	Z1-073 E	5.58
916502	Z1-106 E1	1.31
916504	Z1-106 E2	1.31
916512	Z1-107 E	2.52
916522	Z1-108 E	2.59
918052	AA1-018 E	16.01
919221	AA1-146	18.18
919581	AA2-030	18.18
920272	AA2-123 E	2.54
930481	AB1-089	68.31
930501	AB1-091 O1	66.61
930741	AB1-122 1O1	73.86
930751	AB1-122 2O1	79.05
924471	AB2-096	44.05
925302	AB2-191 E	1.43
926311	AC1-109 1	1.98
926321	AC1-109 2	1.98
926331	AC1-110 1	1.98
926341	AC1-110 2	1.98
926351	AC1-111 1	0.79
926361	AC1-111 2	0.79
926371	AC1-111 3	0.79

926381	AC1-111 4	0.79
926391	AC1-111 5	0.79
926401	AC1-111 6	0.79
927511	AC1-113 1	1.24
927521	AC1-113 2	1.24
926431	AC1-114	2.47
927451	AC1-142A 1	4.49
927461	AC1-142A 2	4.49
926821	AC1-168 C O1	1.18
926822	AC1-168 E O1	7.94
927091	AC1-204 1	77.52
927101	AC1-204 2	77.39
927201	AC1-214 C O1	0.95
927202	AC1-214 E O1	3.

Appendix 10

(CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 120.6% to 122.02% (AC power flow) of its emergency rating (971 MVA) for the line fault with failed breaker contingency outage of 'AEP_P4_#2978_05DUMONT 765_B'. This project contributes approximately 15.42 MW to the thermal violation.

CONTINGENCY 'AEP_P4_#2978_05DUMONT 765_B'

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

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

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932881	AC2-115 1	1.92
932891	AC2-115 2	1.92
932921	AC2-116	0.67
932931	AC2-117	10.4
933411	AC2-154 C	2.02
933412	AC2-154 E	3.29
933911	AD1-013 C	1.49
933912	AD1-013 E	2.37
933931	AD1-016 C	0.75
933932	AD1-016 E	1.23
934051	AD1-031 C O1	2.27
934052	AD1-031 E O1	3.7
934101	AD1-039 1	5.71
934111	AD1-039 2	5.86
934431	AD1-067 C	0.11
934432	AD1-067 E	0.45
934701	AD1-098 C O1	5.55
934702	AD1-098 E O1	4.05
934721	AD1-100 C	15.6
934722	AD1-100 E	72.8
934871	AD1-116 C	0.83
934872	AD1-116 E	1.36
934971	AD1-129 C	0.73
934972	AD1-129 E	0.49
935001	AD1-133 C O1	16.69
935002	AD1-133 E O1	11.13
936291	AD2-038 C O1	1.97
936292	AD2-038 E O1	13.21

936371	AD2-047 C O1	3.61
936372	AD2-047 E O1	17.64
936461	AD2-060	2.13
936511	AD2-066 C O1	6.84
936512	AD2-066 E O1	4.56
936791	AD2-102 C	11.44
936792	AD2-102 E	7.62
937001	AD2-134 C	2.09
937002	AD2-134 E	8.34
937311	AD2-172 C	1.99
937312	AD2-172 E	2.74
937401	AD2-194 1	6.37
937411	AD2-194 2	6.38
937531	AD2-214 C	3.53
937532	AD2-214 E	2.36
938511	AE1-070 1	7.49
938521	AE1-070 2	6.85
938851	AE1-113 C O1	6.45
938852	AE1-113 E O1	22.88
938861	AE1-114 C O1	3.17
938862	AE1-114 E O1	10.81
939051	AE1-134 1	1.1
939061	AE1-134 2	1.1
939321	AE1-163 C O1	4.96
939322	AE1-163 E O1	30.46
939351	AE1-166 C O1	8.29
939352	AE1-166 E O1	7.65
939401	AE1-172 C O1	4.18
939402	AE1-172 E O1	19.56
939631	AE1-193 C O1	5.54
939632	AE1-193 E O1	37.1
939681	AE1-198 C O1	16.46
939682	AE1-198 E O1	13.99
939741	AE1-205 C O1	6.94
939742	AE1-205 E O1	9.58
940101	AE1-252 C O1	8.38
940102	AE1-252 E O1	5.59
940501	AE2-035 C	1.99
940502	AE2-035 E	2.74
940752	AE2-062 E	0.1
941131	AE2-107 C	5.3
941132	AE2-107 E	3.53
941551	AE2-152 C O1	9.57
941552	AE2-152 E O1	6.38
941561	AE2-153 C O1	3.83

941562	AE2-153 E O1	17.94
941731	AE2-173 O1	4.12
942111	AE2-223 C	1.61
942112	AE2-223 E	10.75
942421	AE2-255 C O1	2.44
942422	AE2-255 E O1	7.33
942651	AE2-281 C O1	0.71
942652	AE2-281 E O1	4.35
942991	AE2-321 C	6.63
942992	AE2-321 E	3.27
943121	AE2-341 C	10.34
943122	AE2-341 E	5.08
LTF	BLUEG	4.34
294401	BSHIL;1U E	6.82
294410	BSHIL;2U E	6.82
LTF	CALDERWOOD	0.04
LTF	CANNELTON	0.06
LTF	CARR	0.61
LTF	CATAWBA	0.22
274890	CAYUG;1U E	10.71
274891	CAYUG;2U E	10.71
LTF	CBM-S1	1.25
LTF	CBM-W1	22.03
LTF	CBM-W2	43.76
LTF	CHEOAH	0.04
LTF	CHILHOWEE	0.01
LTF	CHOCTAW /* 35% REVERSE 4566958 4511400	< 0.01
274859	EASYR;U1 E	8.86
274860	EASYR;U2 E	8.86
LTF	G-007	1.7
LTF	GIBSON	0.02
290051	GSG-6; E	8.44
LTF	HAMLET	0.43
275149	KEMPTON ;1E	14.88
990901	L-005 E	9.98
290108	LEEDK;1U E	19.63
LTF	LGE-0092018	< 0.01
LTF	MEC	30.15
293061	N-015 E	12.62
293516	O-009 E1	7.32
293517	O-009 E2	3.72
293518	O-009 E3	4.1
293715	O-029 E	7.83
293716	O-029 E	4.29

293717	O-029 E	3.95
293771	O-035 E	5.1
LTF	O-066	10.89
293644	O22 E1	7.89
293645	O22 E2	15.32
290021	O50 E	15.64
294392	P-010 E	16.03
294763	P-046 E	7.57
274888	PILOT HIL;1E	14.88
270859	PWR VTR EC;R	9.81
LTF	RENSSELAER	0.48
274722	S-055 E	9.16
LTF	SANTEETLA	0.01
295111	SUBLETTE E	2.2
LTF	TRIMBLE	0.51
274814	UNIV PK N;0U	1.63
274808	UNIV PK N;4U	1.63
274809	UNIV PK N;5U	1.63
274811	UNIV PK N;7U	1.63
274812	UNIV PK N;8U	1.63
274815	UNIV PK N;XU	1.63
LTF	WEC	6.47
295109	WESTBROOK E	4.52
910542	X3-005 E	0.51
915011	Y3-013 1	3.05
915021	Y3-013 2	3.05
915031	Y3-013 3	3.05
916211	Z1-072 E	3.86
916221	Z1-073 E	4.35
916502	Z1-106 E1	1.03
916504	Z1-106 E2	1.03
916512	Z1-107 E	2.18
916522	Z1-108 E	2.02
917502	Z2-087 E	14.33
918052	AA1-018 E	14.31
919221	AA1-146	14.14
919581	AA2-030	14.14
920272	AA2-123 E	1.98
930481	AB1-089	53.19
930501	AB1-091 O1	57.2
930741	AB1-122 1O1	58.29
930751	AB1-122 2O1	59.77
924041	AB2-047 C O1	2.68
924042	AB2-047 E O1	17.92
924471	AB2-096	34.32

925302	AB2-191 E	1.12
925581	AC1-033 C	1.12
925582	AC1-033 E	7.48
926311	AC1-109 1	1.55
926321	AC1-109 2	1.55
926331	AC1-110 1	1.54
926341	AC1-110 2	1.54
926351	AC1-111 1	0.62
926361	AC1-111 2	0.62
926371	AC1-111 3	0.62
926381	AC1-111 4	0.62
926391	AC1-111 5	0.62
926401	AC1-111 6	0.62
927511	AC1-113 1	0.96
927521	AC1-113 2	0.96
926431	AC1-114	1.92
927451	AC1-142A 1	3.46
927461	AC1-142A 2	3.46
926821	AC1-168 C O1	0.92
926822	AC1-168 E O1	6.19
927091	AC1-204 1	59.25
927101	AC1-204 2	59.29
927201	AC1-214 C O1	1.64
927202	AC1-214 E O1	5.21

Appendix 11

(CE - CE) The WILTON ; 765/345 kV transformer (from bus 275232 to bus 270644 ckt 1) loads from 137.31% to 138.52% (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 23.35 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	2.92
932891	AC2-115 2	2.92
932921	AC2-116	1.02
932931	AC2-117	6.53
933411	AC2-154 C	3.21
933412	AC2-154 E	5.23
933911	AD1-013 C	2.26
933912	AD1-013 E	3.6
933931	AD1-016 C	1.14
933932	AD1-016 E	1.86
934051	AD1-031 C O1	3.52
934052	AD1-031 E O1	5.75
934101	AD1-039 1	8.77
934111	AD1-039 2	8.86
934431	AD1-067 C	0.16
934432	AD1-067 E	0.68
934701	AD1-098 C O1	8.43
934702	AD1-098 E O1	6.16
934721	AD1-100 C	29.46
934722	AD1-100 E	137.48
934871	AD1-116 C	1.17
934872	AD1-116 E	1.91
934971	AD1-129 C	1.11
934972	AD1-129 E	0.74

935001	AD1-133 C O1	27.45
935002	AD1-133 E O1	18.3
936291	AD2-038 C O1	2.89
936292	AD2-038 E O1	19.31
936371	AD2-047 C O1	5.74
936372	AD2-047 E O1	28.03
936461	AD2-060	3.38
936511	AD2-066 C O1	10.37
936512	AD2-066 E O1	6.92
936791	AD2-102 C	17.33
936792	AD2-102 E	11.55
937001	AD2-134 C	3.17
937002	AD2-134 E	12.67
937311	AD2-172 C	3.02
937312	AD2-172 E	4.16
937401	AD2-194 1	9.57
937411	AD2-194 2	9.57
937531	AD2-214 C	5.41
937532	AD2-214 E	3.61
938511	AE1-070 1	11.25
938521	AE1-070 2	10.29
938851	AE1-113 C O1	9.81
938852	AE1-113 E O1	34.77
938861	AE1-114 C O1	4.82
938862	AE1-114 E O1	16.44
939051	AE1-134 1	1.68
939061	AE1-134 2	1.68
939321	AE1-163 C O1	7.25
939322	AE1-163 E O1	44.54
939351	AE1-166 C O1	14.54
939352	AE1-166 E O1	13.42
939401	AE1-172 C O1	8.1
939402	AE1-172 E O1	37.92
939631	AE1-193 C O1	8.6
939632	AE1-193 E O1	57.58
939681	AE1-198 C O1	25.55
939682	AE1-198 E O1	21.71
939741	AE1-205 C O1	12.49
939742	AE1-205 E O1	17.25
940101	AE1-252 C O1	16.24
940102	AE1-252 E O1	10.83
940501	AE2-035 C	3.02
940502	AE2-035 E	4.16
940752	AE2-062 E	0.16
941131	AE2-107 C	8.04

941132	AE2-107 E	5.36
941551	AE2-152 C O1	16.77
941552	AE2-152 E O1	11.18
941561	AE2-153 C O1	6.08
941562	AE2-153 E O1	28.45
941731	AE2-173 O1	7.41
942111	AE2-223 C	2.89
942112	AE2-223 E	19.34
942421	AE2-255 C O1	3.71
942422	AE2-255 E O1	11.14
942651	AE2-281 C O1	1.04
942652	AE2-281 E O1	6.36
942991	AE2-321 C	10.02
942992	AE2-321 E	4.93
943121	AE2-341 C	15.66
943122	AE2-341 E	7.69
LTF	BLUEG	7.78
294401	BSHIL;1U E	10.59
294410	BSHIL;2U E	10.59
LTF	CALDERWOOD	0.09
LTF	CANNELTON	0.08
LTF	CARR	0.95
LTF	CATAWBA	0.38
274890	CAYUG;1U E	20.28
274891	CAYUG;2U E	20.28
LTF	CBM-S1	1.88
LTF	CBM-W1	37.47
LTF	CBM-W2	71.85
LTF	CHEOAH	0.09
LTF	CHILHOWEE	0.03
LTF	CHOCTAW /* 35% REVERSE 4566958 4511400	< 0.01
LTF	CIN	< 0.01
274859	EASYR;U1 E	13.48
274860	EASYR;U2 E	13.48
LTF	G-007	2.67
290051	GSG-6; E	12.82
LTF	HAMLET	0.71
275149	KEMPTON ;1E	23.64
990901	L-005 E	15.57
290108	LEEDK;1U E	29.77
LTF	LGE-0092018	< 0.01
274772	LINCOLN ;3U	3.39
274773	LINCOLN ;4U	3.39
274774	LINCOLN ;5U	3.39

274775	LINCOLN ;6U	3.39
274776	LINCOLN ;7U	3.39
274777	LINCOLN ;8U	3.39
LTF	MEC	46.65
293061	N-015 E	19.47
293516	O-009 E1	11.21
293517	O-009 E2	5.69
293518	O-009 E3	6.27
293715	O-029 E	11.98
293716	O-029 E	6.57
293717	O-029 E	6.04
293771	O-035 E	7.93
LTF	O-066	17.15
293644	O22 E1	12.57
293645	O22 E2	24.4
290021	O50 E	23.78
294392	P-010 E	24.72
294763	P-046 E	11.49
274888	PILOT HIL;1E	23.64
270859	PWR VTR EC;R	14.83
LTF	RENSSELAER	0.75
290265	S-028 E	9.83
274722	S-055 E	13.77
LTF	SANTEETLA	0.03
295111	SUBLETTE E	3.34
LTF	TRIMBLE	0.93
LTF	WEC	9.76
295109	WESTBROOK E	6.86
910542	X3-005 E	0.9
915011	Y3-013 1	4.59
915021	Y3-013 2	4.59
915031	Y3-013 3	4.59
916211	Z1-072 E	6.
916221	Z1-073 E	6.61
916502	Z1-106 E1	1.55
916504	Z1-106 E2	1.55
916512	Z1-107 E	3.17
916522	Z1-108 E	3.05
917502	Z2-087 E	25.79
918052	AA1-018 E	20.15
919221	AA1-146	21.57
919581	AA2-030	21.57
920272	AA2-123 E	2.99
930481	AB1-089	80.59
930501	AB1-091 O1	94.07

930741	AB1-122 1O1	89.45
930751	AB1-122 2O1	90.41
924041	AB2-047 C O1	4.82
924042	AB2-047 E O1	32.24
924471	AB2-096	51.89
925302	AB2-191 E	1.7
925581	AC1-033 C	1.73
925582	AC1-033 E	11.61
926311	AC1-109 1	2.34
926321	AC1-109 2	2.34
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
927521	AC1-113 2	1.46
926431	AC1-114	2.92
927451	AC1-142A 1	5.13
927461	AC1-142A 2	5.13
926821	AC1-168 C O1	1.43
926822	AC1-168 E O1	9.61
927091	AC1-204 1	89.02
927101	AC1-204 2	89.02
927201	AC1-214 C O1	2.54
927202	AC1-214 E O1	8.09

Appendix 12

(CE - CE) The WILTON ; 765/345 kV transformer (from bus 275233 to bus 270644 ckt 1) loads from 140.16% to 141.4% (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 23.84 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	2.98
932891	AC2-115 2	2.98
932921	AC2-116	1.04
932931	AC2-117	6.67
933411	AC2-154 C	3.28
933412	AC2-154 E	5.34
933911	AD1-013 C	2.3
933912	AD1-013 E	3.68
933931	AD1-016 C	1.16
933932	AD1-016 E	1.9
934051	AD1-031 C O1	3.6
934052	AD1-031 E O1	5.87
934101	AD1-039 1	8.95
934111	AD1-039 2	9.05
934431	AD1-067 C	0.16
934432	AD1-067 E	0.69
934701	AD1-098 C O1	8.61
934702	AD1-098 E O1	6.29
934721	AD1-100 C	30.04
934722	AD1-100 E	140.21
934871	AD1-116 C	1.2
934872	AD1-116 E	1.96
934971	AD1-129 C	1.13
934972	AD1-129 E	0.75

935001	AD1-133 C O1	28.02
935002	AD1-133 E O1	18.68
936291	AD2-038 C O1	2.95
936292	AD2-038 E O1	19.73
936371	AD2-047 C O1	5.86
936372	AD2-047 E O1	28.62
936461	AD2-060	3.45
936511	AD2-066 C O1	10.59
936512	AD2-066 E O1	7.06
936791	AD2-102 C	17.7
936792	AD2-102 E	11.8
937001	AD2-134 C	3.24
937002	AD2-134 E	12.94
937311	AD2-172 C	3.08
937312	AD2-172 E	4.25
937401	AD2-194 1	9.78
937411	AD2-194 2	9.78
937531	AD2-214 C	5.53
937532	AD2-214 E	3.68
938511	AE1-070 1	11.49
938521	AE1-070 2	10.51
938851	AE1-113 C O1	10.02
938852	AE1-113 E O1	35.51
938861	AE1-114 C O1	4.92
938862	AE1-114 E O1	16.79
939051	AE1-134 1	1.71
939061	AE1-134 2	1.71
939321	AE1-163 C O1	7.41
939322	AE1-163 E O1	45.5
939351	AE1-166 C O1	14.83
939352	AE1-166 E O1	13.69
939401	AE1-172 C O1	8.26
939402	AE1-172 E O1	38.67
939631	AE1-193 C O1	8.79
939632	AE1-193 E O1	58.79
939681	AE1-198 C O1	26.09
939682	AE1-198 E O1	22.17
939741	AE1-205 C O1	12.74
939742	AE1-205 E O1	17.6
940101	AE1-252 C O1	16.56
940102	AE1-252 E O1	11.04
940501	AE2-035 C	3.08
940502	AE2-035 E	4.25
940752	AE2-062 E	0.16
941131	AE2-107 C	8.21

941132	AE2-107 E	5.47
941551	AE2-152 C O1	17.11
941552	AE2-152 E O1	11.41
941561	AE2-153 C O1	6.2
941562	AE2-153 E O1	29.03
941731	AE2-173 O1	7.56
942111	AE2-223 C	2.95
942112	AE2-223 E	19.73
942421	AE2-255 C O1	3.79
942422	AE2-255 E O1	11.38
942651	AE2-281 C O1	1.06
942652	AE2-281 E O1	6.5
942991	AE2-321 C	10.23
942992	AE2-321 E	5.04
943121	AE2-341 C	15.99
943122	AE2-341 E	7.85
LTF	BLUEG	7.95
294401	BSHIL;1U E	10.81
294410	BSHIL;2U E	10.81
LTF	CALDERWOOD	0.09
LTF	CANNELTON	0.09
LTF	CARR	0.97
LTF	CATAWBA	0.39
274890	CAYUG;1U E	20.68
274891	CAYUG;2U E	20.68
LTF	CBM-S1	1.91
LTF	CBM-W1	38.27
LTF	CBM-W2	73.31
LTF	CHEOAH	0.1
LTF	CHILHOWEE	0.03
LTF	CHOCTAW /* 35% REVERSE 4566958 4511400	< 0.01
LTF	CIN	< 0.01
274859	EASYR;U1 E	13.76
274860	EASYR;U2 E	13.76
LTF	G-007	2.73
290051	GSG-6; E	13.09
LTF	HAMLET	0.73
275149	KEMPTON ;1E	24.13
990901	L-005 E	15.9
290108	LEEDK;1U E	30.41
LTF	LGE-0092018	< 0.01
274772	LINCOLN ;3U	3.49
274773	LINCOLN ;4U	3.49
274774	LINCOLN ;5U	3.49

274775	LINCOLN ;6U	3.49
274776	LINCOLN ;7U	3.49
274777	LINCOLN ;8U	3.49
LTF	MEC	47.64
293061	N-015 E	19.87
293516	O-009 E1	11.44
293517	O-009 E2	5.81
293518	O-009 E3	6.4
293715	O-029 E	12.24
293716	O-029 E	6.71
293717	O-029 E	6.17
293771	O-035 E	8.09
LTF	O-066	17.52
293644	O22 E1	12.83
293645	O22 E2	24.91
290021	O50 E	24.28
294392	P-010 E	25.24
294763	P-046 E	11.73
274888	PILOT HIL;1E	24.13
270859	PWR VTR EC;R	15.14
LTF	RENSSELAER	0.77
290265	S-028 E	10.03
274722	S-055 E	14.06
LTF	SANTEETLA	0.03
295111	SUBLETTE E	3.41
LTF	TRIMBLE	0.95
LTF	WEC	9.97
295109	WESTBROOK E	7.01
910542	X3-005 E	0.92
915011	Y3-013 1	4.69
915021	Y3-013 2	4.69
915031	Y3-013 3	4.69
916211	Z1-072 E	6.13
916221	Z1-073 E	6.75
916502	Z1-106 E1	1.58
916504	Z1-106 E2	1.58
916512	Z1-107 E	3.24
916522	Z1-108 E	3.11
917502	Z2-087 E	26.31
918052	AA1-018 E	20.59
919221	AA1-146	22.03
919581	AA2-030	22.03
920272	AA2-123 E	3.06
930481	AB1-089	82.3
930501	AB1-091 O1	96.01

930741	AB1-122 1O1	91.35
930751	AB1-122 2O1	92.33
924041	AB2-047 C O1	4.91
924042	AB2-047 E O1	32.89
924471	AB2-096	53.
925302	AB2-191 E	1.73
925581	AC1-033 C	1.77
925582	AC1-033 E	11.85
926311	AC1-109 1	2.39
926321	AC1-109 2	2.39
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
927521	AC1-113 2	1.49
926431	AC1-114	2.98
927451	AC1-142A 1	5.24
927461	AC1-142A 2	5.24
926821	AC1-168 C O1	1.46
926822	AC1-168 E O1	9.81
927091	AC1-204 1	90.93
927101	AC1-204 2	90.93
927201	AC1-214 C O1	2.6
927202	AC1-214 E O1	8.26

Attachment 1: Single Line Diagram

AE2-341
PRIMARY POI

