

***Generation Interconnection Request
System Impact Study Report
For
PJM Generation Interconnection Request
Queue Position AE1-193

Crete 345 kV***

December 2021

Preface

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

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

The System Impact Study estimates do not include the feasibility, cost, or time required to obtain property rights and permits for construction of the required facilities. The project developer is responsible for the right of way, real estate, and construction permit issues. For properties currently owned by Transmission Owners, the costs may be included in the study. The Interconnection Customer seeking to interconnect a wind or solar generation facility shall maintain meteorological data facilities as well as provide that meteorological data which is required per Schedule H to the Interconnection Service Agreement and Section 8 of Manual 14D.

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

General

The Interconnection Customer (IC) has proposed a Wind generating facility located in Henry County, Illinois. The installed facilities will have a total capability of 500 MW with 65 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is September 1, 2021 per Attachment N. This study does not imply a TO commitment to this in-service date.

Point of Interconnection

The AE1-193 will interconnect with the ComEd transmission system via the Crete 345 kV substation.

Cost Summary

The AE1-193 project will be responsible for the following costs.

Description	Cost Estimate
Total Physical Interconnection Costs	\$6,000,000
Allocation towards System Network Upgrade Costs (PJM Identified - Summer Peak)*	\$7,256,900
Allocation towards System Network Upgrade Costs (PJM Identified - Light Load)*	\$1,182,189
Allocation towards System Network Upgrade Costs (TO Identified)*	\$0
Total Costs	\$14,439,089

*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	\$1,500,000
Direct Connection Network Upgrades	\$4,500,000
Non-Direct Connection Network Upgrades	\$0
Total Physical Interconnection Costs	\$6,000,000

Attachment Facilities

AE1-193 generator lead will interconnect to 345kV bus at Crete TSS 945 (see details in Direct Connection section below). The required Attachment Facilities are one 345kV line MOD, one dead-end structure and one revenue-metering as shown in the one-line diagram.

Scope of Work	Cost Estimate
Installation of one 345kV line MOD, one dead-end structure and one set of revenue metering	\$1,500,000

Direct Connection Network Upgrades

In order to accommodate interconnection of AE1-193, Crete TSS 945 would need to be expanded to create a bus position.

The scope of work includes installation of one 345kV circuit breaker converting Crete TSS 945 into breaker-and-a-half bus configuration, to create a line position for AE1-193 generator lead, as shown in the one-line diagram below.

The Interconnection Customer (“IC”) is responsible for constructing all the facilities on the Interconnection Customer side of the Point of Interconnection (POI).

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

Scope of Work	Cost Estimate
Installation of one 345kV circuit breaker at 345kV TSS 945 Crete.	\$4,500,000

Notes on Cost Estimate:

- 1) These estimates are Order-of-Magnitude estimates of the costs that ComEd would bill to the customer for this interconnection. These estimates are based on a one-line electrical diagram of the project and the information provided by the Interconnection Customer.
- 2) There were no site visits performed for these estimates. There may be costs related to specific site related issues that are not identified in these estimates. The site reviews will be performed during the Facilities Study or during detailed engineering.
- 3) These estimates are not a guarantee of the maximum amount payable by the Interconnection Customer and the actual costs of ComEd's work may differ significantly from these estimates. Interconnection Customer 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 Interconnection Customer is responsible for all engineering, procurement, testing and construction of all equipment on the Interconnection Customer'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 for acquiring property and associated legal costs will be investigation during Facilities Study for this project.

Schedule:

Normally it takes about 24-months to engineer, design, procure material and construct 345kV facilities after ISA/ICSA are signed.

Revenue Metering and SCADA Requirements

PJM Requirements

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

Meteorological Data Reporting Requirements

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

- Wind speed (meters/second) - (Required)
- Wind direction (decimal degrees from true north) - (Required)
- Ambient air temperature (Fahrenheit) - (Required)
- Air Pressure (Hectopascals) - (Required)
- Humidity (Percent) (Accepted, not required)

Interconnected Transmission Owner Requirements

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

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

Network Impacts

The Queue Project AE1-193 was evaluated as a 500 MW (Capacity 65 MW) injection at the Crete 345 kV substation in the ComEd area. Project AE1-193 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AE1-193 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	Contingency			Bus				Loading %		Rating		MW	Flowgate	
Number	Type	Name	Affected Area	Facility Description	From	To	Circuit	Power Flow	Initial	Final	Type	MVA	Contribution	Appendix
1	LFFB	COMED_P4_112-65-BT4-5__	CE - MISO NIPS	CRETE EC ;BP-17STJOHN 345 kV line	274750	255112	1	AC	95.17	113.17	ER	1399	249.95	1
2	LFFB	COMED_P4_112-65-BT3-4__	CE - MISO NIPS	CRETE EC ;BP-17STJOHN 345 kV line	274750	255112	1	AC	95.17	113.16	ER	1399	249.95	
3	LFFB	AEP_P4_#2978_05DUMONT 765_B	CE - MISO NIPS	CRETE EC ;BP-17STJOHN 345 kV line	274750	255112	1	AC	93.19	111.15	ER	1399	249.47	

Note:

Violation 1: MISO: 1508 SE MVA. ComEd SSTE: 1483 MVA. Violation valid for ComEd & MISO.

Violation 2: MISO: 1508 SE MVA. ComEd SSTE: 1483 MVA. (Violation valid for ComEd & MISO).

Violation 3: MISO: 1508 SE MVA. ComEd SSTE: 1483 MVA. (Violation valid for ComEd & MISO).

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			Power Flow	Loading %		Rating		MW Contribution	Flowgate Appendix
					From	To	Circuit		Initial	Final	Type	MVA		
4	LFFB	AEP_P4_#2978_05DUMONT 765_B	MISO NIPS - AEP	17STILLWELL-05DUMONT 345 kV line	255113	243219	1	AC	121.94	123.52	ER	1409	79.21	2
5	LFFB	AEP_P4_#2978_05DUMONT 765_B	CE - AEP	GREENACRE; T-05OLIVE 345 kV line	270771	243229	1	AC	110.75	111.34	ER	971	83.95	3

Note:

Violation 4: MISO: 1779 SE MVA. AEP: 1409 MVA SE. (Violation valid for AEP)

Violation 5: ComEd: 1134 MVA SSTE. AEP: 971 MVA SE. (Violation valid for AEP)

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 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
6	N-1	AEP_P1-2_#695A	MISO NIPS - CE	17STJOHN-ST JOHN ; T 345 kV line	255112	270886	1	DC	81.6	95.05	ER	1091	146.08	
7	N-1	AEP_P1-2_#695A	MISO NIPS - AEP	17STILLWELL-05DUMONT 345 kV line	255113	243219	1	AC	118.55	120.21	NR	1409	82.32	
8	N-1	COMED_P1-2_345-L94507_B-S	CE - CE	E FRANKFO; B-GOODINGS ;3B 345 kV line	270728	270766	1	AC	58.02	78.06	ER	1726	356.95	
9	Non	Non	CE - CE	E FRANKFO; B-GOODINGS ;3B 345 kV line	270728	270766	1	AC	79.07	92.62	NR	1334	187.94	
10	N-1	AEP_P1-2_#695A	CE - MISO NIPS	ST JOHN ; T-17GREEN_ACRE 345 kV line	270886	255104	1	DC	81.59	95.04	ER	1091	146.08	
11	N-1	AEP_P1-2_#695A	CE - MISO NIPS	CRETE EC ;BP-17STJOHN 345 kV line	274750	255112	1	AC	92.73	110.69	ER	1399	249.96	
12	Non	Non	CE - MISO NIPS	CRETE EC ;BP-17STJOHN 345 kV line	274750	255112	1	AC	26.68	48.15	NR	1091	234.34	
13	N-1	COMED_P1-2_345-L94507_B-S	CE - CE	CRETE EC ;BP-E FRANKFO; B 345 kV line	274750	270728	1	AC	22.01	56.59	ER	1399	499.22	
14	Non	Non	CE - CE	CRETE EC ;BP-E FRANKFO; B 345 kV line	274750	270728	1	AC	43.83	67.21	NR	1091	264.89	

Short Circuit

(Summary of impacted circuit breakers)

Short circuit study is complete with no violations.

Affected System Analysis & Mitigation

MISO Impacts:

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

Stability and Reactive Power Requirement

(Results of the dynamic studies should be inserted here)

To be determined during the Facilities Study.

Light Load Analysis – 2022

Generator Deliverability

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

Overload Number	Contingency Type	Contingency Name	Affected Area	Facility Description	Bus		Circuit	Power Flow	Loading %		Rating Type	MVA	MW Contribution	Flowgate Appendix
					From	To			Initial	Final				
1	N-1	AEP_P1-2_#7441-B	AEP - AEP	05ALLEN-05RPMONE 345 kV line	243211	242933	1	DC	97.51	101.04	NR	897	30.9	4
2	N-1	AEP_P1-2_#7441-A	AEP - AEP	05ALLEN-05RPMONE 345 kV line	243211	242933	1	DC	97.45	100.99	NR	897	30.9	
3	N-1	AEP_P1-2_#695A	CE - MISO NIPS	CRETE EC ;BP-17STJOHN 345 kV line	274750	255112	1	DC	93.42	105.42	ER	1557	197.88	
4	N-1	AEP_P1-2_#695A	CE - AEP	UNIV PK N;RP-05OLIVE 345 kV line	274804	243229	1	DC	98.37	100.81	NR	971	23.62	5

Note:

Violation 1: AEP: 897 MVA SE. Violation Valid, see LL Reinforcement

Violation 2: AEP: 897 MVA SE. Violation Valid, see LL Reinforcement

Violation 3: MISO: 1508 SE MVA. ComEd SSTE: 1483 MVA. Violation valid for ComEd & MISO. Refer to Summer Peak Reinforcement section.

Violation 4: AEP: 971 MVA SE. ComEd SSTE: 1134 MVA. (AEP Violation, see LL Reinforcement)

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 From	Bus To	Circuit	Power Flow	Loading % Initial	Loading % Final	Rating Type	Rating MVA	MW Contribution	Flowgate Appendix
5	LFFB	AEP_P4_#2978_05DUMONT 765_B	MISO NIPS - AEP	17STILLWELL-05DUMONT 345 kV line	255113	243219	1	DC	93.25	97.57	ER	1409	61.11	6
6	LFFB	AEP_P4_#2978_05DUMONT 765_B	CE - MISO NIPS	CRETE EC ;BP-17STJOHN 345 kV line	274750	255112	1	AC	92.74	105.12	ER	1557	197.48	7
7	LFFB	COMED_P4_023-65-BT4-5__	CE - MISO NIPS	CRETE EC ;BP-17STJOHN 345 kV line	274750	255112	1	AC	92.31	104.77	ER	1557	197.88	

Note:

Violation 5: *Not a violation*

Violation 6: *MISO: 1508 SE MVA. ComEd SSTE: 1483 MVA. Violation valid for ComEd & MISO. Refer to Summer Peak Reinforcement section.*

Violation 7: *MISO: 1508 SE MVA. ComEd SSTE: 1483 MVA. Violation valid for ComEd & MISO. Refer to Summer Peak Reinforcement section.*

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
8	DCT L	COMED_P7_345-L0101__B-S_+ _345-L0102__R-S	CE - AREA14	BRAIDWOOD ; B-AD1-100 TAP 345 kV line	270670	934730	1	AC	103.29	104.78	ER	1528	26.45	8
9	LFFB	COMED_P4_112-65-BT5-6__	CE - CE	WILTON ; B-WILTON ;3M 345 kV line	270926	275232	1	DC	117.16	119.08		1379	44.86	9
10	LFFB	COMED_P4_112-65-BT2-3__	CE - CE	WILTON ; R-WILTON ;4M 345 kV line	270927	275233	1	DC	119.63	121.59		1379	45.82	10

11	LFFB	COMED_P4_112-65-BT5-6__	CE - CE	WILTON ; 765/345 kV transformer	275232	270644	1	DC	105.72	108.98		1379	44.86	11
12	LFFB	COMED_P4_112-65-BT2-3__	CE - CE	WILTON ; 765/345 kV transformer	275233	270644	1	DC	109.04	112.36		1379	45.82	12

Note:

Violation 8: *ComEd SSTE: 1837 MVA (Not a violation)*

Violation 9: *ComEd SSTE: 1469 MVA (Violation for ComEd)*

Violation 10: *ComEd SSTE: 1469 MVA (Violation for ComEd)*

Violation 11: *ComEd SSTE: 1469 MVA (Violation for ComEd)*

Violation 12: *ComEd SSTE: 1469 MVA (Violation for ComEd)*

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)

Facility	Upgrade Description	Cost	Cost Allocation	Upgrade Number																																				
CRETE EC ;BP-17STJOHN 345 kV line Ckt. 1	<u>ComEd Upgrade:</u> Project ID: n5253 Description: 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 Cost: \$11,200,000 Time Estimate: 30-36 Months Ratings: 1334/1726/1873/2084 MVA	\$14,200,000	\$7,256,900	N5253 N6603																																				
	<table><tr><th>Queue</th><th>MW</th><th>Cost %</th><th>Cost \$</th></tr><tr><td>AD2-194</td><td>6.82</td><td>2.59 %</td><td>\$289,596.60</td></tr><tr><td>AD2-214</td><td>7.62</td><td>2.89 %</td><td>\$323,566.88</td></tr><tr><td>AE1-113</td><td>38.47</td><td>14.59 %</td><td>\$1,633,545.65</td></tr><tr><td>AE1-114</td><td>17.92</td><td>6.79 %</td><td>\$760,934.18</td></tr><tr><td>AE1-163</td><td>42.56</td><td>16.14 %</td><td>\$1,807,218.68</td></tr><tr><td>AE1-166</td><td>20.35</td><td>7.72 %</td><td>\$864,118.90</td></tr><tr><td>AE1-172</td><td>29.77</td><td>11.29 %</td><td>\$1,264,118.90</td></tr><tr><td>AE1-193</td><td>100.25</td><td>38.01 %</td><td>\$4,256,900.21</td></tr></table>				Queue	MW	Cost %	Cost \$	AD2-194	6.82	2.59 %	\$289,596.60	AD2-214	7.62	2.89 %	\$323,566.88	AE1-113	38.47	14.59 %	\$1,633,545.65	AE1-114	17.92	6.79 %	\$760,934.18	AE1-163	42.56	16.14 %	\$1,807,218.68	AE1-166	20.35	7.72 %	\$864,118.90	AE1-172	29.77	11.29 %	\$1,264,118.90	AE1-193	100.25	38.01 %	\$4,256,900.21
	Queue				MW	Cost %	Cost \$																																	
	AD2-194				6.82	2.59 %	\$289,596.60																																	
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	AE1-163				42.56	16.14 %	\$1,807,218.68																																	
	AE1-166				20.35	7.72 %	\$864,118.90																																	
	AE1-172				29.77	11.29 %	\$1,264,118.90																																	
AE1-193	100.25	38.01 %	\$4,256,900.21																																					
<u>MISO Upgrade:</u> Project ID: n6603 Description: Additional MISO-end upgrades: 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 at \$3M. MISO-End Rating: SN=2174 MVA, SE=2627 MVA. Type: FAC Cost: \$3,000,000 Time Estimate: N/A Ratings: 2174/2627 MVA																																								
Notes: AE1-193 is driver for this upgrade.																																								
<table><tr><th>Queue</th><th>MW</th><th>Cost %</th><th>Cost \$</th></tr><tr><td>AE1-193</td><td>75.3</td><td>100 %</td><td>\$3,000,000</td></tr></table>	Queue	MW	Cost %	Cost \$	AE1-193	75.3	100 %	\$3,000,000																																
Queue	MW	Cost %	Cost \$																																					
AE1-193	75.3	100 %	\$3,000,000																																					
Total Cost		\$14,200,000	\$7,256,900																																					

Contribution to Previously Identified System Reinforcements

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

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

Facility	Upgrade Description	Cost	Cost Allocation	Upgrade Number
17STILLWELL-05DUMONT 345 kV Ckt. 1	Project ID: n4058 Description: Sag mitigation work will include the replacement of tower 20 with a custom steel pole, replacement of tower 24 with a custom H-frame and the removal of swing angle brackets on 2 structures. Cost estimate is \$1.613M. New SE rating will be 1718 MVA limited by a Dumont wave trap. Type: FAC Cost: \$1,613,000 Time Estimate: Projected in service date 6/1/2022 Ratings: AEP SE: 1409 MVA MISO SE: 1779 MVA (MISO rating is sufficient) Notes: 1. Since the cost of the upgrade is less than \$5M, based on PJM cost allocation criteria, AE1-193 currently does not receive cost allocation towards this upgrade. 2. As changes to the PJM queue process occur (such as prior queued projects withdrawing from the queue, reducing in size, etc.) AE1-193 could receive cost allocation. 3. Although Queue Project AE1-193 may not presently have cost responsibility for this upgrade, Queue Project AE1-193 may need this upgrade in-service to be deliverable to the PJM system. 4. If Queue Project AE1-193 comes into service prior to completion of the upgrade, Queue Project AE1-193 will need an interim study.	\$1,613,000	\$0	N4058
GREENACRE; T-05OLIVE 345 kV Ckt. 1	Project ID: n5913 Description: Upgrade is a sag study will be required for the entire 40.64 miles of ACSR/PE ~ 1414 ~ 62/19 Conductor section 1 to determine if the line can be operated above its emergency rating 971 MVA. Estimated Cost: \$162,560. If deemed necessary to rebuild the entire 40.64 miles of the section of the line, Estimated Cost: \$81,280,000. New expected SE rating is 1318 MVA. PJM NUN N5913. Type: FAC Cost: \$162,560 Time Estimate: N/A Ratings: Existing Ratings are as follows: AEP SE: 971 MVA ComEd SE: 1134 MVA Notes: 1. Since the cost of the upgrade is less than \$5M, based on PJM cost allocation criteria, AE1-193 currently does not receive cost allocation towards this upgrade. 2. As changes to the PJM queue process occur (such as prior queued projects withdrawing from the queue, reducing in size, etc.) AE1-193 could receive cost allocation.	\$162,560	\$0	N5913

	3. Although Queue Project AE1-193 may not presently have cost responsibility for this upgrade, Queue Project AE1-193 may need this upgrade in-service to be deliverable to the PJM system. 4. If Queue Project AE1-193 comes into service prior to completion of the upgrade, Queue Project AE1-193 will need an interim study.			
	Total Cost	\$1,775,560	\$0	

Light Load - Load Flow Analysis Reinforcements

New System Reinforcements

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

Facility	Upgrade Description	Cost	Cost Allocation	Upgrade Number
05ALLEN-05RPMONE 345 kV Ckt. 1	Project ID: n6740 & N6740.1 Description: A sag study will be required on ACSR/PE~ 1275 ~ 54/19, conductor section 3, 12.25 miles of line. Cost of sag study is \$49,000. New SE rating of conductor section 3 after sag study: 1301 MVA SE. New expected SE rating of line to be 971 MVA. If the sag study concludes a complete Rebuild/Reconductor is required, the estimated cost is \$24.5M. PJM Network Upgrade N6740. A sag study will be required on ACSR/PE~ 1414 ~ 62/19, conductor section 2, 6.07 miles of line. The cost of the sag study is expected to be \$24,280. New Ratings of conductor section 2 after sag study: S/N: 971 MVA S/E: 1419 MVA. New expected SE rating of line to be 1301 MVA. Rebuild/Reconductor, cost: \$12.14M. PJM Network Upgrade N6740.1 Both Sag studies would be required. Type: FAC Cost: \$73,280 Time Estimate: N/A Ratings: AEP SE: 971 MVA Notes: 1. Since the cost of the upgrade is less than \$5M, based on PJM cost allocation criteria, AE1-193 currently does not receive cost allocation towards this upgrade. 2. As changes to the PJM queue process occur (such as prior queued projects withdrawing from the queue, reducing in size, etc.) AE1-193 could receive cost allocation. 3. Although Queue Project AE1-193 may not presently have cost responsibility for this upgrade, Queue Project AE1-193 may need this upgrade in-service to be deliverable to the PJM system. 4. If Queue Project AE1-193 comes into service prior to completion of the upgrade, Queue Project AE1-193 will need an interim study.	\$73,280	\$0	N6740 N6740.1

UNIV PK N;RP-05OLIVE 345 kV Ckt. 1	AEP Upgrade: 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 Notes: 1. Since the cost of the upgrade is less than \$5M, based on PJM cost allocation criteria, this upgrade stays in the previous queue. AE1-193 currently does not receive cost allocation towards this upgrade. 2. As changes to the PJM queue process occur (such as prior queued projects withdrawing from the queue, reducing in size, etc.) AE1-193 could receive cost allocation. 3. Although Queue Project AE1-193 may not presently have cost responsibility for this upgrade, Queue Project AE1-193 may need this upgrade in-service to be deliverable to the PJM system. 4. If Queue Project AE1-193 comes into service prior to completion of the upgrade, Queue Project AE1-193 will need an interim study.	\$162,410	\$0	N4057
	Total Cost	\$235,690	\$0	

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																																																				
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><thead><tr><th>Queue</th><th>MW</th><th>Cost %</th><th>Cost</th></tr></thead><tbody><tr><td>AD1-100</td><td>116.8</td><td>25.12%</td><td>\$ 3,014,841.90</td></tr><tr><td>AD2-047</td><td>26.4</td><td>5.68%</td><td>\$ 681,436.87</td></tr><tr><td>AD2-066</td><td>17.7</td><td>3.81%</td><td>\$ 456,872.45</td></tr><tr><td>AD2-102</td><td>29.7</td><td>6.39%</td><td>\$ 766,616.48</td></tr><tr><td>AD2-134</td><td>17.6</td><td>3.79%</td><td>\$ 454,291.25</td></tr><tr><td>AD2-194</td><td>19.7</td><td>4.24%</td><td>\$ 508,496.45</td></tr><tr><td>AE1-113</td><td>44.5</td><td>9.57%</td><td>\$ 1,148,634.11</td></tr><tr><td>AE1-114</td><td>21.2</td><td>4.56%</td><td>\$ 547,214.45</td></tr><tr><td>AE1-163</td><td>51.7</td><td>11.12%</td><td>\$ 1,334,480.53</td></tr><tr><td>AE1-166</td><td>27.9</td><td>6.00%</td><td>\$ 720,154.87</td></tr><tr><td>AE1-172</td><td>45.9</td><td>9.87%</td><td>\$ 1,184,770.92</td></tr><tr><td>AE1-193</td><td>45.8</td><td>9.85%</td><td>\$ 1,182,189.72</td></tr></tbody></table>	Queue	MW	Cost %	Cost	AD1-100	116.8	25.12%	\$ 3,014,841.90	AD2-047	26.4	5.68%	\$ 681,436.87	AD2-066	17.7	3.81%	\$ 456,872.45	AD2-102	29.7	6.39%	\$ 766,616.48	AD2-134	17.6	3.79%	\$ 454,291.25	AD2-194	19.7	4.24%	\$ 508,496.45	AE1-113	44.5	9.57%	\$ 1,148,634.11	AE1-114	21.2	4.56%	\$ 547,214.45	AE1-163	51.7	11.12%	\$ 1,334,480.53	AE1-166	27.9	6.00%	\$ 720,154.87	AE1-172	45.9	9.87%	\$ 1,184,770.92	AE1-193	45.8	9.85%	\$ 1,182,189.72	\$12,000,000	\$1,182,189	N5145
Queue	MW	Cost %	Cost																																																					
AD1-100	116.8	25.12%	\$ 3,014,841.90																																																					
AD2-047	26.4	5.68%	\$ 681,436.87																																																					
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AD2-134	17.6	3.79%	\$ 454,291.25																																																					
AD2-194	19.7	4.24%	\$ 508,496.45																																																					
AE1-113	44.5	9.57%	\$ 1,148,634.11																																																					
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AE1-172	45.9	9.87%	\$ 1,184,770.92																																																					
AE1-193	45.8	9.85%	\$ 1,182,189.72																																																					
	Total Cost	\$12,000,000	\$1,182,189																																																					

Short Circuit System Reinforcement

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

Short circuit study is complete with no violations.

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_345-L94507_B-S	CONTINGENCY 'COMED_P1-2_345-L94507_B-S' TRIP BRANCH FROM BUS 274750 TO BUS 255112 CKT 1 / CRETE;BP 345 17STJOHN 345 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

Contingencies (Light Load)

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_P1-2_#7441-A	CONTINGENCY 'AEP_P1-2_#7441-A' OPEN BRANCH FROM BUS 242928 TO BUS 932800 CKT 1

	/ 242928 05MARYSV 765 932800 AC2-104 TAP 765 1 END
AEP_P1-2_#7441-B	CONTINGENCY 'AEP_P1-2_#7441-B' OPEN BRANCH FROM BUS 932800 TO BUS 246999 CKT 1 / 932800 AC2-104 TAP 765 246999 05SORENS 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_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-BT5-6__	CONTINGENCY 'COMED_P4_112-65-BT5-6__' TRIP BRANCH FROM BUS 270644 TO BUS 270607 CKT 1 / WILTO; 765 COLLI; 765 TRIP BRANCH FROM BUS 275233 TO BUS 270644 CKT 1 / WILTO;4M 345 WILTO; 765

	TRIP BRANCH FROM BUS 275233 TO BUS 270927 CKT 1 / WILTO;4M 345 WILTO; R 345 TRIP BRANCH FROM BUS 275233 TO BUS 275333 CKT 1 / WILTO;4M 345 WILTO;4C 33 END
COMED_P7_345-L0101__B- S+_345-L0102__R-S	CONTINGENCY 'COMED_P7_345-L0101__B-S+_345-L0102__R-S' TRIP BRANCH FROM BUS 270802 TO BUS 270846 CKT 1 / LASCO STA; B 345 PLANO ; B 345 TRIP BRANCH FROM BUS 270846 TO BUS 270847 CKT 1 / PLANO ; B 345 PLANO ; R 345 TRIP BRANCH FROM BUS 270803 TO BUS 270847 CKT 1 / LASCO STA; R 345 PLANO ; R 345 END

Appendices (Summer Peak Analysis)

Appendix 1 (SP)

(CE - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line (from bus 274750 to bus 255112 ckt 1) loads from 95.17% to 113.17% (AC power flow) of its emergency rating (1399 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT4-5__'. This project contributes approximately 249.95 MW to the thermal violation.

CONTINGENCY 'COMED_P4_112-65-BT4-5__'

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

TRIP BRANCH FROM BUS 275233 TO BUS 270644 CKT 1 / WILTO;4M 345
WILTO; 765

TRIP BRANCH FROM BUS 275233 TO BUS 270927 CKT 1 / WILTO;4M 345
WILTO; R 345

TRIP BRANCH FROM BUS 275233 TO BUS 275333 CKT 1 / WILTO;4M 345
WILTO;4C 33

END

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

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

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

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

Appendix 2 (SP)

(MISO NIPS - AEP) The 17STILLWELL-05DUMONT 345 kV line (from bus 255113 to bus 243219 ckt 1) loads from 121.94% to 123.52% (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 79.21 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	2.76
932891	AC2-115 2	2.76
932921	AC2-116	0.96
932931	AC2-117	5.85
933411	AC2-154 C	3.04
933412	AC2-154 E	4.96
933911	AD1-013 C	2.13
933912	AD1-013 E	3.4
933931	AD1-016 C	1.07
933932	AD1-016 E	1.75
934051	AD1-031 C O1	3.3
934052	AD1-031 E O1	5.39
934101	AD1-039 1	8.13
934111	AD1-039 2	8.37
934431	AD1-067 C	0.15
934432	AD1-067 E	0.64
934701	AD1-098 C O1	7.96
934702	AD1-098 E O1	5.81
934721	AD1-100 C	22.58
934722	AD1-100 E	105.36
934871	AD1-116 C	1.1
934872	AD1-116 E	1.79
934971	AD1-129 C	1.05
934972	AD1-129 E	0.7
935001	AD1-133 C O1	24.22
935002	AD1-133 E O1	16.14
936291	AD2-038 C O1	2.71
936292	AD2-038 E O1	18.14
936371	AD2-047 C O1	5.44

936372	AD2-047 E O1	26.58
936461	AD2-060	3.2
936511	AD2-066 C O1	9.74
936512	AD2-066 E O1	6.49
936791	AD2-102 C	16.39
936792	AD2-102 E	10.93
937001	AD2-134 C	3.
937002	AD2-134 E	11.96
937311	AD2-172 C	2.85
937312	AD2-172 E	3.94
937401	AD2-194 1	9.
937411	AD2-194 2	9.
937531	AD2-214 C	5.12
937532	AD2-214 E	3.42
938511	AE1-070 1	10.58
938521	AE1-070 2	9.68
938851	AE1-113 C O1	9.26
938852	AE1-113 E O1	32.83
938861	AE1-114 C O1	4.56
938862	AE1-114 E O1	15.54
939051	AE1-134 1	1.59
939061	AE1-134 2	1.59
939321	AE1-163 C O1	6.81
939322	AE1-163 E O1	41.83
939351	AE1-166 C O1	11.86
939352	AE1-166 E O1	10.95
939401	AE1-172 C O1	6.16
939402	AE1-172 E O1	28.85
939631	AE1-193 C O1	10.3
939632	AE1-193 E O1	68.91
939641	AE1-194 C	10.3
939642	AE1-194 E	68.91
939651	AE1-195 C	10.3
939652	AE1-195 E	68.91
939681	AE1-198 C O1	30.58
939682	AE1-198 E O1	25.98
939741	AE1-205 C O1	10.32
939742	AE1-205 E O1	14.25
940101	AE1-252 C O1	12.36
940102	AE1-252 E O1	8.24
LTF	BLUEG	0.64
294401	BSHIL;1U E	9.93
294410	BSHIL;2U E	9.93
LTF	CARR	0.87
LTF	CATAWBA	0.19

274890	CAYUG;1U E	15.86
274891	CAYUG;2U E	15.86
LTF	CBM-S1	4.21
LTF	CBM-W1	36.52
LTF	CBM-W2	84.42
LTF	CHOCTAW /* 35% REVERSE 4566958 4511400	< 0.01
LTF	CIN	3.51
274859	EASYR;U1 E	12.75
274860	EASYR;U2 E	12.75
LTF	G-007	2.42
290051	GSG-6; E	12.09
LTF	HAMLET	0.43
LTF	IPL	1.25
954751	J351	165.42
275149	KEMPTON ;1E	22.42
990901	L-005 E	14.6
290108	LEEDK;1U E	28.09
LTF	MEC	45.08
293061	N-015 E	17.64
293516	O-009 E1	10.59
293517	O-009 E2	5.38
293518	O-009 E3	5.92
293715	O-029 E	11.32
293716	O-029 E	6.21
293717	O-029 E	5.71
293771	O-035 E	7.42
LTF	O-066	15.53
293644	O22 E1	12.02
293645	O22 E2	23.33
290021	O50 E	22.45
294392	P-010 E	22.4
294763	P-046 E	10.86
274888	PILOT HIL;1E	22.42
270859	PWR VTR EC;R	14.01
LTF	RENSSELAER	0.69
274724	RIVER EC ;11	5.49
274722	S-055 E	13.02
274795	SE CHICAG;2U	1.29
274788	SE CHICAG;5U	1.31
274789	SE CHICAG;6U	1.31
274790	SE CHICAG;7U	1.31
274791	SE CHICAG;8U	1.31
295111	SUBLETTE E	3.15
LTF	TRIMBLE	0.12

<i>LTF</i>	<i>WEC</i>	9.25
295109	WESTBROOK E	6.48
910542	X3-005 E	1.
915011	Y3-013 1	4.34
915021	Y3-013 2	4.34
915031	Y3-013 3	4.34
916211	Z1-072 E	5.61
916221	Z1-073 E	6.24
916502	Z1-106 E1	1.46
916504	Z1-106 E2	1.46
916512	Z1-107 E	3.05
916522	Z1-108 E	2.88
917502	Z2-087 E	21.38
918052	AA1-018 E	18.85
919221	AA1-146	20.41
919581	AA2-030	20.41
920272	AA2-123 E	2.83
930481	AB1-089	76.13
930501	AB1-091 O1	88.69
930741	AB1-122 1O1	82.91
930751	AB1-122 2O1	85.44
924041	AB2-047 C O1	3.99
924042	AB2-047 E O1	26.73
924471	AB2-096	49.02
925302	AB2-191 E	1.6
925581	AC1-033 C	1.63
925582	AC1-033 E	10.89
926311	AC1-109 1	2.2
926321	AC1-109 2	2.2
926331	AC1-110 1	2.19
926341	AC1-110 2	2.19
926351	AC1-111 1	0.88
926361	AC1-111 2	0.88
926371	AC1-111 3	0.88
926381	AC1-111 4	0.88
926391	AC1-111 5	0.88
926401	AC1-111 6	0.88
927511	AC1-113 1	1.38
927521	AC1-113 2	1.38
926431	AC1-114	2.76
927451	AC1-142A 1	4.86
927461	AC1-142A 2	4.86
926821	AC1-168 C O1	1.33
926822	AC1-168 E O1	8.91
927091	AC1-204 1	83.73

927101	AC1-204 2	83.7
927201	AC1-214 C O1	2.38
927202	AC1-214 E O1	7.57

Appendix 3 (SP)

(CE - AEP) The GREENACRE; T-05OLIVE 345 kV line (from bus 270771 to bus 243229 ckt 1) loads from 110.75% to 111.34% (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 83.95 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	1.69
933412	AC2-154 E	2.76
933911	AD1-013 C	1.23
933912	AD1-013 E	1.96
933931	AD1-016 C	0.62
933932	AD1-016 E	1.02
934051	AD1-031 C O1	1.88
934052	AD1-031 E O1	3.07
934101	AD1-039 1	4.69
934111	AD1-039 2	4.9
934431	AD1-067 C	0.09
934432	AD1-067 E	0.37
934701	AD1-098 C O1	4.6
934702	AD1-098 E O1	3.35
934721	AD1-100 C	13.01
934722	AD1-100 E	60.71
934871	AD1-116 C	0.62
934872	AD1-116 E	1.01
934971	AD1-129 C	0.61
934972	AD1-129 E	0.4
935001	AD1-133 C O1	13.81
935002	AD1-133 E O1	9.21
936291	AD2-038 C O1	1.55
936292	AD2-038 E O1	10.38
936371	AD2-047 C O1	3.03
936372	AD2-047 E O1	14.78
936461	AD2-060	1.78

936511	AD2-066 C O1	5.6
936512	AD2-066 E O1	3.73
936791	AD2-102 C	9.47
936792	AD2-102 E	6.31
937001	AD2-134 C	1.73
937002	AD2-134 E	6.9
937311	AD2-172 C	1.65
937312	AD2-172 E	2.27
937401	AD2-194 1	5.27
937411	AD2-194 2	5.27
937531	AD2-214 C	2.94
937532	AD2-214 E	1.96
938511	AE1-070 1	6.19
938521	AE1-070 2	5.66
938851	AE1-113 C O1	5.39
938852	AE1-113 E O1	19.1
938861	AE1-114 C O1	2.63
938862	AE1-114 E O1	8.96
939051	AE1-134 1	0.91
939061	AE1-134 2	0.91
939321	AE1-163 C O1	3.9
939322	AE1-163 E O1	23.94
939351	AE1-166 C O1	6.87
939352	AE1-166 E O1	6.34
939401	AE1-172 C O1	3.5
939402	AE1-172 E O1	16.4
939631	AE1-193 C O1	10.91
939632	AE1-193 E O1	73.04
939641	AE1-194 C	10.91
939642	AE1-194 E	73.04
939651	AE1-195 C	10.91
939652	AE1-195 E	73.04
939681	AE1-198 C O1	32.41
939682	AE1-198 E O1	27.54
939741	AE1-205 C O1	5.79
939742	AE1-205 E O1	8.
940101	AE1-252 C O1	7.02
940102	AE1-252 E O1	4.68
LTF	BLUEG	2.63
294401	BSHIL;1U E	5.66
294410	BSHIL;2U E	5.66
LTF	CARR	0.48
LTF	CATAWBA	0.15
274890	CAYUG;1U E	8.97
274891	CAYUG;2U E	8.97

LTF	CBM-S1	1.49
LTF	CBM-W1	20.35
LTF	CBM-W2	39.71
LTF	CHOCTAW /* 35% REVERSE 4566958 4511400	< 0.01
LTF	CIN	0.23
274751	CRETE EC ;1U	2.22
274752	CRETE EC ;2U	2.22
274753	CRETE EC ;3U	2.22
274754	CRETE EC ;4U	2.22
274859	EASYR;U1 E	7.34
274860	EASYR;U2 E	7.34
LTF	G-007	1.33
290051	GSG-6; E	6.98
LTF	HAMLET	0.3
953871	J847	2.7
275149	KEMPTON ;1E	12.46
990901	L-005 E	8.29
290108	LEEDK;1U E	16.23
LTF	MEC	25.26
293061	N-015 E	10.29
293516	O-009 E1	6.08
293517	O-009 E2	3.09
293518	O-009 E3	3.4
293715	O-029 E	6.5
293716	O-029 E	3.56
293717	O-029 E	3.28
293771	O-035 E	4.23
LTF	O-066	8.55
293644	O22 E1	7.28
293645	O22 E2	14.13
290021	O50 E	13.06
294392	P-010 E	13.07
294763	P-046 E	6.27
274888	PILOT HIL;1E	12.46
270859	PWR VTR EC;R	8.1
LTF	RENSSELAER	0.38
274722	S-055 E	7.56
295111	SUBLETTE E	1.82
LTF	TRIMBLE	0.32
LTF	WEC	5.35
295109	WESTBROOK E	3.74
910542	X3-005 E	0.52
915011	Y3-013 1	2.52
915021	Y3-013 2	2.52

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

Appendices (Light Load Analysis)

Appendix 4 (LL)

(AEP - AEP) The 05ALLEN-05RPMONE 345 kV line (from bus 243211 to bus 242933 ckt 1) loads from 97.51% to 101.04% (**DC power flow**) of its normal rating (897 MVA) for the single line contingency outage of 'AEP_P1-2_#7441-B'. This project contributes approximately 30.9 MW to the thermal violation.

CONTINGENCY 'AEP_P1-2_#7441-B'

OPEN BRANCH FROM BUS 932800 TO BUS 246999 CKT 1 / 932800 AC2-104

TAP 765 246999 05SORENS 765 1

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
243859	05FR-11G C	0.53
243862	05FR-12G C	0.52
247901	05FR-12G E	2.08
243864	05FR-21G C	0.56
247902	05FR-21G E	2.22
243866	05FR-22G C	0.53
243870	05FR-3G C	1.08
247904	05FR-3G E	4.31
243873	05FR-4G C	0.83
247905	05FR-4G E	3.24
243795	05HDWTR1G C	0.68
247963	05HDWTR1G E	1.64
246909	05MDL-1G C	1.13
247906	05MDL-1G E	4.49
246910	05MDL-2G C	0.56
247907	05MDL-2G E	2.23
246976	05MDL-3G C	0.56
247912	05MDL-3G E	2.33
246979	05MDL-4G C	1.13
247913	05MDL-4G E	2.25
246953	05TIMB G C	1.11
247911	05TIMB G E	4.46
246991	05WLD G1 C	0.34
247914	05WLD G1 E	4.51
247255	05WLD G2 C	0.35
247958	05WLD G2 E	2.38
933281	AC2-140 C	3.13
933282	AC2-140 E	0.16
933591	AC2-176 C O1	0.96
933592	AC2-176 E O1	6.39
934431	AD1-067 C	0.06

934432	AD1-067 E	0.26
934721	AD1-100 C	8.87
934722	AD1-100 E	41.39
935141	AD1-148	2.41
936291	AD2-038 C O1	1.1
936292	AD2-038 E O1	7.39
936371	AD2-047 C O1	2.03
936372	AD2-047 E O1	9.93
936721	AD2-091	6.85
936751	AD2-096 O1	3.17
936972	AD2-131 E	2.89
937001	AD2-134 C	1.22
937002	AD2-134 E	4.87
937211	AD2-159 C	1.67
937212	AD2-159 E	7.82
938851	AE1-113 C O1	4.11
938852	AE1-113 E O1	12.93
938861	AE1-114 C O1	1.72
938862	AE1-114 E O1	6.56
939321	AE1-163 C O1	2.77
939322	AE1-163 E O1	17.04
939401	AE1-172 C	2.55
939402	AE1-172 E	11.98
939631	AE1-193 C	4.02
939632	AE1-193 E	26.89
939641	AE1-194 C	4.02
939642	AE1-194 E	26.89
939651	AE1-195 C	4.02
939652	AE1-195 E	26.89
939781	AE1-209 C	0.76
939782	AE1-209 E	5.11
939791	AE1-210 C O1	0.76
939792	AE1-210 E O1	5.11
274857	BIG SKY ;U1	0.66
274858	BIG SKY ;U2	0.66
274877	BISHOP HL;1U	0.54
274878	BISHOP HL;2U	0.54
294401	BSHIL;1U E	2.16
294410	BSHIL;2U E	2.16
274848	CAMPGROVE;RU	0.8
274890	CAYUG;1U E	3.38
274891	CAYUG;2U E	3.38
274863	CAYUGA RI;1U	0.85
274864	CAYUGA RI;2U	0.85
274849	CRESCENT ;1U	0.26

274859	EASYR;U1 E	2.65
274860	EASYR;U2 E	2.65
274856	ECOGROVE ;U1	0.56
274871	GR RIDGE ;2U	1.12
274847	GR RIDGE ;BU	0.88
274855	GSG-6 ;RU	0.62
290051	GSG-6; E	2.48
275149	KEMPTON ;1E	4.21
990901	L-005 E	3.21
274872	LEE DEKAL;1U	1.37
290108	LEEDK;1U E	5.71
274850	MENDOTA H;RU	0.17
274879	MINONK ;1U	1.14
293061	N-015 E	3.54
293513	O-009 C1	0.56
293514	O-009 C2	0.28
293515	O-009 C3	0.31
293516	O-009 E1	2.23
293517	O-009 E2	1.13
293518	O-009 E3	1.25
293712	O-029 C	0.6
293713	O-029 C	0.33
293714	O-029 C	0.3
293715	O-029 E	2.39
293716	O-029 E	1.31
293717	O-029 E	1.2
293771	O-035 E	1.61
293644	O22 E1	2.37
293645	O22 E2	4.61
290021	O50 E	4.57
294392	P-010 E	4.49
294763	P-046 E	2.23
274888	PILOT HIL;1E	4.21
274887	PILOT HIL;1U	1.05
274881	PLEAS RDG;2U	1.05
274851	PROVIDENC;RU	0.4
290261	S-027 E	4.16
290265	S-028 E	4.16
247536	S-071 C	0.63
247929	S-071 E	2.53
295110	SUBLETTE C	0.09
247943	T-127 E	2.25
247521	T-131 C	1.3
247925	T-131 E	5.2
274861	TOP CROP ;1U	0.59

274862	TOP CROP ;2U	1.15
274853	TWINGROVE;U1	1.04
274854	TWINGROVE;U2	1.04
247543	V3-007 C	1.35
247935	V3-007 E	9.06
905081	W4-005 C	1.16
905082	W4-005 E	5.49
295108	WESTBROOK C	0.2
909052	X2-022 E	9.23
916211	Z1-072 E	1.21
916221	Z1-073 E	1.28
917501	Z2-087 C	1.42
917502	Z2-087 E	9.5
918051	AA1-018 C	1.13
918052	AA1-018 E	7.54
920272	AA2-123 E	1.42
924041	AB2-047 C O1	1.77
924042	AB2-047 E O1	11.83
924261	AB2-070 C O1	1.29
924262	AB2-070 E O1	8.66
925301	AB2-191 C	0.35
925302	AB2-191 E	0.49
925581	AC1-033 C	0.7
925582	AC1-033 E	4.7
925771	AC1-053 C	1.29
925772	AC1-053 E	8.63
926821	AC1-168 C O1	0.56
926822	AC1-168 E O1	3.77
926841	AC1-171 C O1	0.53
926842	AC1-171 E O1	3.56
926861	AC1-173 C	0.85
926862	AC1-173 E	5.69
927201	AC1-214 C O1	1.03
927202	AC1-214 E O1	3.26

Appendix 5 (LL)

(CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 98.37% to 100.81% (**DC power flow**) of its normal rating (971 MVA) for the single line contingency outage of 'AEP_P1-2_#695A'. This project contributes approximately 23.62 MW to the thermal violation.

CONTINGENCY 'AEP_P1-2_#695A'

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>
934431	AD1-067 C	0.08
934432	AD1-067 E	0.35
934721	AD1-100 C	12.14
934722	AD1-100 E	56.67
935141	AD1-148	2.14
936291	AD2-038 C O1	1.53
936292	AD2-038 E O1	10.26
936371	AD2-047 C O1	2.83
936372	AD2-047 E O1	13.8
937001	AD2-134 C	1.62
937002	AD2-134 E	6.47
937211	AD2-159 C	1.6
937212	AD2-159 E	7.49
938851	AE1-113 C O1	5.49
938852	AE1-113 E O1	17.27
938861	AE1-114 C O1	2.24
938862	AE1-114 E O1	8.58
939321	AE1-163 C O1	3.85
939322	AE1-163 E O1	23.66
939401	AE1-172 C	3.23
939402	AE1-172 E	15.14
939631	AE1-193 C	3.07
939632	AE1-193 E	20.55
939641	AE1-194 C	3.07
939642	AE1-194 E	20.55
939651	AE1-195 C	3.07
939652	AE1-195 E	20.55
274857	BIG SKY ;U1	0.86
274858	BIG SKY ;U2	0.86
274877	BISHOP HL;1U	0.66
274878	BISHOP HL;2U	0.66
294401	BSHIL;1U E	2.63
294410	BSHIL;2U E	2.63

274848	CAMPGROVE;RU	0.96
274890	CAYUG;1U E	4.15
274891	CAYUG;2U E	4.15
274863	CAYUGA RI;1U	1.04
274864	CAYUGA RI;2U	1.04
274849	CRESCENT ;1U	0.32
274859	EASYR;U1 E	3.44
274860	EASYR;U2 E	3.44
274856	ECOGROVE ;U1	0.74
274871	GR RIDGE ;2U	1.57
274847	GR RIDGE ;BU	1.24
274855	GSG-6 ;RU	0.82
290051	GSG-6; E	3.29
950141	J395	5.2
953201	J715	5.32
954741	J928	4.51
275149	KEMPTON ;1E	5.85
990901	L-005 E	3.84
274872	LEE DEKAL;1U	1.84
290108	LEEDK;1U E	7.66
274850	MENDOTA H;RU	0.23
274879	MINONK ;1U	1.52
293061	N-015 E	4.94
293513	O-009 C1	0.7
293514	O-009 C2	0.36
293515	O-009 C3	0.4
293516	O-009 E1	2.82
293517	O-009 E2	1.43
293518	O-009 E3	1.58
293712	O-029 C	0.75
293713	O-029 C	0.41
293714	O-029 C	0.38
293715	O-029 E	3.02
293716	O-029 E	1.65
293717	O-029 E	1.52
293771	O-035 E	1.97
293644	O22 E1	3.08
293645	O22 E2	5.98
290021	O50 E	6.1
294392	P-010 E	6.27
294763	P-046 E	2.95
274888	PILOT HIL;1E	5.85
274887	PILOT HIL;1U	1.46
274881	PLEAS RDG;2U	1.46
274851	PROVIDENC;RU	0.49

290261	S-027 E	4.37
290265	S-028 E	4.37
295110	SUBLETTE C	0.12
274861	TOP CROP ;1U	0.77
274862	TOP CROP ;2U	1.49
274853	TWINGROVE;U1	1.09
274854	TWINGROVE;U2	1.09
905081	W4-005 C	1.11
905082	W4-005 E	5.26
295108	WESTBROOK C	0.27
909052	X2-022 E	8.17
916211	Z1-072 E	1.49
916221	Z1-073 E	1.7
917501	Z2-087 C	1.64
917502	Z2-087 E	11.
918051	AA1-018 C	1.67
918052	AA1-018 E	11.16
920272	AA2-123 E	1.93
924041	AB2-047 C O1	2.03
924042	AB2-047 E O1	13.58
924261	AB2-070 C O1	1.17
924262	AB2-070 E O1	7.81
925301	AB2-191 C	0.47
925302	AB2-191 E	0.65
925581	AC1-033 C	0.86
925582	AC1-033 E	5.74
925771	AC1-053 C	1.16
925772	AC1-053 E	7.74
926821	AC1-168 C O1	0.71
926822	AC1-168 E O1	4.78
926841	AC1-171 C O1	0.59
926842	AC1-171 E O1	3.91
927201	AC1-214 C O1	1.26
927202	AC1-214 E O1	4.

Appendix 6 (LL)

(MISO NIPS - AEP) The 17STILLWELL-05DUMONT 345 kV line (from bus 255113 to bus 243219 ckt 1) loads from 93.25% to 97.57% (**DC 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 61.11 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>
934431	AD1-067 C	0.12
934432	AD1-067 E	0.49
934721	AD1-100 C	17.37
934722	AD1-100 E	81.06
935141	AD1-148	3.42
936291	AD2-038 C O1	2.08
936292	AD2-038 E O1	13.92
936371	AD2-047 C O1	4.21
936372	AD2-047 E O1	20.53
936972	AD2-131 E	3.73
937001	AD2-134 C	2.3
937002	AD2-134 E	9.18
937211	AD2-159 C	2.5
937212	AD2-159 E	11.7
938851	AE1-113 C O1	7.8
938852	AE1-113 E O1	24.51
938861	AE1-114 C O1	3.19
938862	AE1-114 E O1	12.21
939321	AE1-163 C O1	5.23
939322	AE1-163 E O1	32.1
939401	AE1-172 C	4.72
939402	AE1-172 E	22.14
939631	AE1-193 C	7.94
939632	AE1-193 E	53.17
939641	AE1-194 C	7.94
939642	AE1-194 E	53.17
939651	AE1-195 C	7.94
939652	AE1-195 E	53.17
274857	BIG SKY ;U1	1.23
274858	BIG SKY ;U2	1.23

274877	BISHOP HL;1U	0.95
274878	BISHOP HL;2U	0.95
294401	BSHIL;1U E	3.8
294410	BSHIL;2U E	3.8
274848	CAMPGROVE;RU	1.39
274890	CAYUG;1U E	6.1
274891	CAYUG;2U E	6.1
274863	CAYUGA RI;1U	1.53
274864	CAYUGA RI;2U	1.53
274849	CRESCENT ;1U	0.47
274859	EASYR;U1 E	4.91
274860	EASYR;U2 E	4.91
274856	ECOGROVE ;U1	1.05
274871	GR RIDGE ;2U	2.16
274847	GR RIDGE ;BU	1.7
274855	GSG-6 ;RU	1.17
290051	GSG-6; E	4.66
950591	H008	1.93
950671	J112	0.27
950141	J395	6.71
950491	J443	2.2
950501	J449	10.62
952021	J614	3.51
953201	J715	6.91
954701	J844	8.79
953921	J855	5.21
954091	J873	9.18
954301	J898	5.32
954511	J926	5.71
954741	J928	5.8
275149	KEMPTON ;1E	8.7
990901	L-005 E	5.58
274872	LEE DEKAL;1U	2.6
290108	LEEDK;1U E	10.83
274850	MENDOTA H;RU	0.32
274879	MINONK ;1U	2.16
293061	N-015 E	6.82
293513	O-009 C1	1.01
293514	O-009 C2	0.51
293515	O-009 C3	0.57
293516	O-009 E1	4.05
293517	O-009 E2	2.06
293518	O-009 E3	2.26
293712	O-029 C	1.08
293713	O-029 C	0.59

293714	O-029 C	0.55
293715	O-029 E	4.33
293716	O-029 E	2.37
293717	O-029 E	2.18
293771	O-035 E	2.84
293644	O22 E1	4.65
293645	O22 E2	9.02
290021	O50 E	8.66
294392	P-010 E	8.66
294763	P-046 E	4.18
274888	PILOT HIL;1E	8.7
274887	PILOT HIL;1U	2.18
274881	PLEAS RDG;2U	2.18
274851	PROVIDENC;RU	0.71
290261	S-027 E	6.65
290265	S-028 E	6.65
295110	SUBLETTE C	0.17
295111	SUBLETTE E	1.21
274861	TOP CROP ;1U	1.16
274862	TOP CROP ;2U	2.25
274853	TWINGROVE;U1	1.66
274854	TWINGROVE;U2	1.66
295108	WESTBROOK C	0.38
295109	WESTBROOK E	2.48
909052	X2-022 E	13.08
916211	Z1-072 E	2.15
916221	Z1-073 E	2.41
917501	Z2-087 C	2.44
917502	Z2-087 E	16.33
918051	AA1-018 C	2.16
918052	AA1-018 E	14.49
920272	AA2-123 E	2.72
924041	AB2-047 C O1	3.02
924042	AB2-047 E O1	20.19
924261	AB2-070 C O1	1.86
924262	AB2-070 E O1	12.43
925301	AB2-191 C	0.67
925302	AB2-191 E	0.92
925581	AC1-033 C	1.24
925582	AC1-033 E	8.3
925771	AC1-053 C	1.84
925772	AC1-053 E	12.34
926821	AC1-168 C O1	1.02
926822	AC1-168 E O1	6.82
926841	AC1-171 C O1	0.87

926842	<i>AC1-171 E O1</i>	5.83
927201	<i>AC1-214 C O1</i>	1.82
927202	<i>AC1-214 E O1</i>	5.77

Appendix 7 (LL)

(CE - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line (from bus 274750 to bus 255112 ckt 1) loads from 92.74% to 105.12% (AC power flow) of its emergency rating (1557 MVA) for the line fault with failed breaker contingency outage of 'AEP_P4_#2978_05DUMONT 765_B'. This project contributes approximately 197.48 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>
934431	AD1-067 C	0.1
934432	AD1-067 E	0.44
934721	AD1-100 C	15.25
934722	AD1-100 E	71.18
935141	AD1-148	2.69
936291	AD2-038 C O1	1.83
936292	AD2-038 E O1	12.23
936371	AD2-047 C O1	3.15
936372	AD2-047 E O1	15.37
936972	AD2-131 E	2.82
937001	AD2-134 C	2.06
937002	AD2-134 E	8.23
937211	AD2-159 C	2.01
937212	AD2-159 E	9.4
938851	AE1-113 C O1	7.17
938852	AE1-113 E O1	22.54
938861	AE1-114 C O1	2.86
938862	AE1-114 E O1	10.94
939321	AE1-163 C O1	4.59
939322	AE1-163 E O1	28.21
939401	AE1-172 C	4.03
939402	AE1-172 E	18.92
939631	AE1-193 C	25.67
939632	AE1-193 E	171.81
939641	AE1-194 C	25.67
939642	AE1-194 E	171.81
939651	AE1-195 C	25.67
939652	AE1-195 E	171.81
274857	BIG SKY ;U1	1.1
274858	BIG SKY ;U2	1.1

274877	BISHOP HL;1U	0.84
274878	BISHOP HL;2U	0.84
294401	BSHIL;1U E	3.35
294410	BSHIL;2U E	3.35
274848	CAMPGROVE;RU	1.22
274890	CAYUG;1U E	5.2
274891	CAYUG;2U E	5.2
274863	CAYUGA RI;1U	1.3
274864	CAYUGA RI;2U	1.3
274849	CRESCENT ;1U	0.41
274859	EASYR;U1 E	4.39
274860	EASYR;U2 E	4.39
274856	ECOGROVE ;U1	0.94
950751	G858	1.93
274871	GR RIDGE ;2U	2.
274847	GR RIDGE ;BU	1.58
274855	GSG-6 ;RU	1.05
290051	GSG-6; E	4.18
950591	H008	1.96
950761	H071	2.03
950671	J112	0.28
950141	J395	6.8
950221	J416	7.61
950491	J443	2.23
950501	J449	10.79
952021	J614	3.56
953201	J715	6.89
954701	J844	8.88
953921	J855	5.3
954091	J873	10.4
954301	J898	5.41
954511	J926	5.81
954741	J928	5.89
275149	KEMPTON ;1E	6.51
990901	L-005 E	4.89
274872	LEE DEKAL;1U	2.33
290108	LEEDK;1U E	9.73
274850	MENDOTA H;RU	0.29
274879	MINONK ;1U	1.99
293061	N-015 E	6.31
293513	O-009 C1	0.9
293514	O-009 C2	0.46
293515	O-009 C3	0.5
293516	O-009 E1	3.6
293517	O-009 E2	1.83

293518	O-009 E3	2.01
293712	O-029 C	0.96
293713	O-029 C	0.53
293714	O-029 C	0.49
293715	O-029 E	3.85
293716	O-029 E	2.11
293717	O-029 E	1.94
293771	O-035 E	2.51
293644	O22 E1	4.76
293645	O22 E2	9.24
290021	O50 E	7.96
294392	P-010 E	8.01
294763	P-046 E	3.76
274888	PILOT HIL;1E	6.51
274887	PILOT HIL;1U	1.63
274881	PLEAS RDG;2U	1.63
274851	PROVIDENC;RU	0.63
295110	SUBLETTE C	0.15
295111	SUBLETTE E	1.09
274861	TOP CROP ;1U	1.19
274862	TOP CROP ;2U	2.31
295108	WESTBROOK C	0.34
295109	WESTBROOK E	2.22
909052	X2-022 E	10.28
916211	Z1-072 E	1.9
916221	Z1-073 E	2.16
917501	Z2-087 C	2.06
917502	Z2-087 E	13.78
918051	AA1-018 C	1.84
918052	AA1-018 E	12.31
920272	AA2-123 E	2.45
924041	AB2-047 C O1	2.54
924042	AB2-047 E O1	17.01
924261	AB2-070 C O1	1.47
924262	AB2-070 E O1	9.82
925301	AB2-191 C	0.6
925302	AB2-191 E	0.83
925581	AC1-033 C	1.09
925582	AC1-033 E	7.32
925771	AC1-053 C	1.45
925772	AC1-053 E	9.73
926821	AC1-168 C O1	0.91
926822	AC1-168 E O1	6.08
926841	AC1-171 C O1	0.75
926842	AC1-171 E O1	4.98

<i>927201</i>	<i>AC1-214 C O1</i>	<i>1.6</i>
<i>927202</i>	<i>AC1-214 E O1</i>	<i>5.09</i>

Appendix 8 (LL)

(CE - AREA14) The BRAIDWOOD; B-AD1-100 TAP 345 kV line (from bus 270670 to bus 934730 ckt 1) loads from 103.29% to 104.78% (AC power flow) of its emergency rating (1528 MVA) for the tower line contingency outage of 'COMED_P7_345-L0101__B-S+_345-L0102__R-S'. This project contributes approximately 26.45 MW to the thermal violation.

CONTINGENCY 'COMED_P7_345-L0101__B-S+_345-L0102__R-S'

TRIP BRANCH FROM BUS 270802 TO BUS 270846 CKT 1 / LASCO STA; B
345 PLANO ; B 345

TRIP BRANCH FROM BUS 270846 TO BUS 270847 CKT 1 / PLANO ; B 345
PLANO ; R 345

TRIP BRANCH FROM BUS 270803 TO BUS 270847 CKT 1 / LASCO STA; R
345 PLANO ; R 345

END

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

Appendix 9 (LL)

(CE - CE) The WILTON ; B-WILTON ;3M 345 kV line (from bus 270926 to bus 275232 ckt 1) loads from 117.16% to 119.08% (**DC power flow**) of its load dump rating (1379 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT5-6__'. This project contributes approximately 44.86 MW to the thermal violation.

CONTINGENCY 'COMED_P4_112-65-BT5-6__'

TRIP BRANCH FROM BUS 270644 TO BUS 270607 CKT 1 / WILTO; 765
COLLI; 765

TRIP BRANCH FROM BUS 275233 TO BUS 270644 CKT 1 / WILTO;4M 345
WILTO; 765

TRIP BRANCH FROM BUS 275233 TO BUS 270927 CKT 1 / WILTO;4M 345
WILTO; R 345

TRIP BRANCH FROM BUS 275233 TO BUS 275333 CKT 1 / WILTO;4M 345
WILTO;4C 33

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
934431	AD1-067 C	0.12
934432	AD1-067 E	0.52
934721	AD1-100 C	23.03
934722	AD1-100 E	107.45
935141	AD1-148	3.82
936291	AD2-038 C O1	2.23
936292	AD2-038 E O1	14.91
936371	AD2-047 C O1	4.42
936372	AD2-047 E O1	21.59
936972	AD2-131 E	3.96
937001	AD2-134 C	2.45
937002	AD2-134 E	9.78
937211	AD2-159 C	2.89
937212	AD2-159 E	13.51
938851	AE1-113 C O1	8.31
938852	AE1-113 E O1	26.11
938861	AE1-114 C O1	3.4
938862	AE1-114 E O1	12.99
939321	AE1-163 C O1	5.6
939322	AE1-163 E O1	34.38
939401	AE1-172 C	6.3
939402	AE1-172 E	29.55
939631	AE1-193 C	5.83
939632	AE1-193 E	39.03
939641	AE1-194 C	5.83
939642	AE1-194 E	39.03
939651	AE1-195 C	5.83

939652	AE1-195 E	39.03
274857	BIG SKY ;U1	1.3
274858	BIG SKY ;U2	1.3
274877	BISHOP HL;1U	1.02
274878	BISHOP HL;2U	1.02
294401	BSHIL;1U E	4.08
294410	BSHIL;2U E	4.08
274848	CAMPGROVE;RU	1.5
274890	CAYUG;1U E	7.92
274891	CAYUG;2U E	7.92
274863	CAYUGA RI;1U	1.98
274864	CAYUGA RI;2U	1.98
274849	CRESCENT ;1U	0.5
274859	EASYR;U1 E	5.22
274860	EASYR;U2 E	5.22
274856	ECOGROVE ;U1	1.11
274871	GR RIDGE ;2U	2.4
274847	GR RIDGE ;BU	1.89
274855	GSG-6 ;RU	1.24
290051	GSG-6; E	4.97
950591	H008	2.1
950671	J112	0.3
950141	J395	7.32
950491	J443	2.39
950501	J449	11.52
952021	J614	3.8
953201	J715	7.81
954701	J844	9.72
953921	J855	5.63
954091	J873	0.37
954301	J898	5.77
954511	J926	6.19
954741	J928	6.32
275149	KEMPTON ;1E	9.15
990901	L-005 E	6.
274872	LEE DEKAL;1U	2.77
290108	LEEDK;1U E	11.55
274850	MENDOTA H;RU	0.34
274879	MINONK ;1U	2.31
293061	N-015 E	7.57
293513	O-009 C1	1.08
293514	O-009 C2	0.55
293515	O-009 C3	0.61
293516	O-009 E1	4.32
293517	O-009 E2	2.19

293518	O-009 E3	2.42
293712	O-029 C	1.15
293713	O-029 C	0.63
293714	O-029 C	0.58
293715	O-029 E	4.62
293716	O-029 E	2.53
293717	O-029 E	2.33
293771	O-035 E	3.06
293644	O22 E1	4.88
293645	O22 E2	9.48
290021	O50 E	9.22
294392	P-010 E	9.61
294763	P-046 E	4.45
274888	PILOT HIL;1E	9.15
274887	PILOT HIL;1U	2.29
274881	PLEAS RDG;2U	2.29
274851	PROVIDENC;RU	0.76
290261	S-027 E	7.9
290265	S-028 E	7.9
295110	SUBLETTE C	0.18
295111	SUBLETTE E	1.29
274861	TOP CROP ;1U	1.22
274862	TOP CROP ;2U	2.37
274853	TWINGROVE;U1	1.97
274854	TWINGROVE;U2	1.97
905081	W4-005 C	2.
905082	W4-005 E	9.48
295108	WESTBROOK C	0.41
295109	WESTBROOK E	2.64
909052	X2-022 E	14.61
916211	Z1-072 E	2.32
916221	Z1-073 E	2.56
917501	Z2-087 C	2.98
917502	Z2-087 E	19.95
918051	AA1-018 C	2.33
918052	AA1-018 E	15.58
920272	AA2-123 E	2.89
924041	AB2-047 C O1	3.68
924042	AB2-047 E O1	24.61
924261	AB2-070 C O1	2.09
924262	AB2-070 E O1	14.01
925301	AB2-191 C	0.71
925302	AB2-191 E	0.98
925581	AC1-033 C	1.33
925582	AC1-033 E	8.91

925771	AC1-053 C	2.07
925772	AC1-053 E	13.87
926821	AC1-168 C O1	1.1
926822	AC1-168 E O1	7.4
926841	AC1-171 C O1	0.94
926842	AC1-171 E O1	6.29
927201	AC1-214 C O1	1.95
927202	AC1-214 E O1	6.21

Appendix 10 (LL)

(CE - CE) The WILTON ; R-WILTON ;4M 345 kV line (from bus 270927 to bus 275233 ckt 1) loads from 119.63% to 121.59% (**DC power flow**) of its load dump rating (1379 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT2-3__'. This project contributes approximately 45.82 MW to the thermal violation.

CONTINGENCY 'COMED_P4_112-65-BT2-3__'

TRIP BRANCH FROM BUS 270644 TO BUS 270607 CKT 1 / WILTO; 765
COLLI; 765

TRIP BRANCH FROM BUS 275232 TO BUS 270644 CKT 1 / WILTO;3M 345
WILTO; 765

TRIP BRANCH FROM BUS 275232 TO BUS 270926 CKT 1 / WILTO;3M 345
WILTO; B 345

TRIP BRANCH FROM BUS 275232 TO BUS 275332 CKT 1 / WILTO;3M 345
WILTO;3C 33

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
934431	AD1-067 C	0.13
934432	AD1-067 E	0.53
934721	AD1-100 C	23.48
934722	AD1-100 E	109.58
935141	AD1-148	3.9
936291	AD2-038 C O1	2.28
936292	AD2-038 E O1	15.23
936371	AD2-047 C O1	4.51
936372	AD2-047 E O1	22.04
936972	AD2-131 E	4.04
937001	AD2-134 C	2.5
937002	AD2-134 E	9.98
937211	AD2-159 C	2.94
937212	AD2-159 E	13.78
938851	AE1-113 C O1	8.48
938852	AE1-113 E O1	26.67
938861	AE1-114 C O1	3.47
938862	AE1-114 E O1	13.26
939321	AE1-163 C O1	5.72
939322	AE1-163 E O1	35.12
939401	AE1-172 C	6.42
939402	AE1-172 E	30.13
939631	AE1-193 C	5.96
939632	AE1-193 E	39.86
939641	AE1-194 C	5.96
939642	AE1-194 E	39.86
939651	AE1-195 C	5.96

939652	AE1-195 E	39.86
274857	BIG SKY ;U1	1.33
274858	BIG SKY ;U2	1.33
274877	BISHOP HL;1U	1.04
274878	BISHOP HL;2U	1.04
294401	BSHIL;1U E	4.17
294410	BSHIL;2U E	4.17
274848	CAMPGROVE;RU	1.53
274890	CAYUG;1U E	8.08
274891	CAYUG;2U E	8.08
274863	CAYUGA RI;1U	2.02
274864	CAYUGA RI;2U	2.02
274849	CRESCENT ;1U	0.51
274859	EASYR;U1 E	5.33
274860	EASYR;U2 E	5.33
274856	ECOGROVE ;U1	1.14
274871	GR RIDGE ;2U	2.45
274847	GR RIDGE ;BU	1.93
274855	GSG-6 ;RU	1.27
290051	GSG-6; E	5.07
950591	H008	2.14
950671	J112	0.3
950141	J395	7.48
950491	J443	2.45
950501	J449	11.76
952021	J614	3.88
953201	J715	7.97
954701	J844	9.92
953921	J855	4.75
954301	J898	5.89
954511	J926	6.33
954741	J928	6.46
275149	KEMPTON ;1E	9.34
990901	L-005 E	6.12
274872	LEE DEKAL;1U	2.83
290108	LEEDK;1U E	11.79
274850	MENDOTA H;RU	0.35
274879	MINONK ;1U	2.35
293061	N-015 E	7.73
293513	O-009 C1	1.1
293514	O-009 C2	0.56
293515	O-009 C3	0.62
293516	O-009 E1	4.41
293517	O-009 E2	2.24
293518	O-009 E3	2.47

293712	O-029 C	1.18
293713	O-029 C	0.65
293714	O-029 C	0.6
293715	O-029 E	4.71
293716	O-029 E	2.58
293717	O-029 E	2.38
293771	O-035 E	3.12
293644	O22 E1	4.99
293645	O22 E2	9.68
290021	O50 E	9.42
294392	P-010 E	9.81
294763	P-046 E	4.55
274888	PILOT HIL;1E	9.34
274887	PILOT HIL;1U	2.34
274881	PLEAS RDG;2U	2.34
274851	PROVIDENC;RU	0.78
290261	S-027 E	8.06
290265	S-028 E	8.06
295110	SUBLETTE C	0.18
295111	SUBLETTE E	1.32
274861	TOP CROP ;1U	1.25
274862	TOP CROP ;2U	2.42
274853	TWINGROVE;U1	2.01
274854	TWINGROVE;U2	2.01
905081	W4-005 C	2.04
905082	W4-005 E	9.67
295108	WESTBROOK C	0.42
295109	WESTBROOK E	2.7
909052	X2-022 E	14.91
916211	Z1-072 E	2.36
916221	Z1-073 E	2.62
917501	Z2-087 C	3.04
917502	Z2-087 E	20.36
918051	AA1-018 C	2.38
918052	AA1-018 E	15.92
920272	AA2-123 E	2.95
924041	AB2-047 C O1	3.75
924042	AB2-047 E O1	25.11
924261	AB2-070 C O1	2.14
924262	AB2-070 E O1	14.3
925301	AB2-191 C	0.73
925302	AB2-191 E	1.
925581	AC1-033 C	1.36
925582	AC1-033 E	9.1
925771	AC1-053 C	2.11

925772	AC1-053 E	14.15
926821	AC1-168 C O1	1.13
926822	AC1-168 E O1	7.55
926841	AC1-171 C O1	0.96
926842	AC1-171 E O1	6.42
927201	AC1-214 C O1	2.
927202	AC1-214 E O1	6.34

Appendix 11 (LL)

(CE - CE) The WILTON ; 765/345 kV transformer (from bus 275232 to bus 270644 ckt 1) loads from 105.72% to 108.98% (**DC power flow**) of its load dump rating (1379 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT5-6__'. This project contributes approximately 44.86 MW to the thermal violation.

CONTINGENCY 'COMED_P4_112-65-BT5-6__'

TRIP BRANCH FROM BUS 270644 TO BUS 270607 CKT 1 / WILTO; 765
COLLI; 765

TRIP BRANCH FROM BUS 275233 TO BUS 270644 CKT 1 / WILTO;4M 345
WILTO; 765

TRIP BRANCH FROM BUS 275233 TO BUS 270927 CKT 1 / WILTO;4M 345
WILTO; R 345

TRIP BRANCH FROM BUS 275233 TO BUS 275333 CKT 1 / WILTO;4M 345
WILTO;4C 33

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
934431	AD1-067 C	0.12
934432	AD1-067 E	0.52
934721	AD1-100 C	23.03
934722	AD1-100 E	107.45
936291	AD2-038 C O1	2.23
936292	AD2-038 E O1	14.91
936371	AD2-047 C O1	4.42
936372	AD2-047 E O1	21.59
937001	AD2-134 C	2.45
937002	AD2-134 E	9.78
937211	AD2-159 C	2.89
937212	AD2-159 E	13.51
938851	AE1-113 C O1	8.31
938852	AE1-113 E O1	26.11
938861	AE1-114 C O1	3.4
938862	AE1-114 E O1	12.99
939321	AE1-163 C O1	5.6
939322	AE1-163 E O1	34.38
939401	AE1-172 C	6.3
939402	AE1-172 E	29.55
939631	AE1-193 C	5.83
939632	AE1-193 E	39.03
939641	AE1-194 C	5.83
939642	AE1-194 E	39.03
939651	AE1-195 C	5.83
939652	AE1-195 E	39.03
274857	BIG SKY ;U1	1.3

274858	BIG SKY ;U2	1.3
274877	BISHOP HL;1U	1.02
274878	BISHOP HL;2U	1.02
294401	BSHIL;1U E	4.08
294410	BSHIL;2U E	4.08
274848	CAMPGROVE;RU	1.5
274890	CAYUG;1U E	7.92
274891	CAYUG;2U E	7.92
274863	CAYUGA RI;1U	1.98
274864	CAYUGA RI;2U	1.98
274849	CRESCENT ;1U	0.5
274859	EASYR;U1 E	5.22
274860	EASYR;U2 E	5.22
274856	ECOGROVE ;U1	1.11
274871	GR RIDGE ;2U	2.4
274847	GR RIDGE ;BU	1.89
274855	GSG-6 ;RU	1.24
290051	GSG-6; E	4.97
275149	KEMPTON ;1E	9.15
990901	L-005 E	6.
274872	LEE DEKAL;1U	2.77
290108	LEEDK;1U E	11.55
274850	MENDOTA H;RU	0.34
274879	MINONK ;1U	2.31
293061	N-015 E	7.57
293513	O-009 C1	1.08
293514	O-009 C2	0.55
293515	O-009 C3	0.61
293516	O-009 E1	4.32
293517	O-009 E2	2.19
293518	O-009 E3	2.42
293712	O-029 C	1.15
293713	O-029 C	0.63
293714	O-029 C	0.58
293715	O-029 E	4.62
293716	O-029 E	2.53
293717	O-029 E	2.33
293771	O-035 E	3.06
293644	O22 E1	4.88
293645	O22 E2	9.48
290021	O50 E	9.22
294392	P-010 E	9.61
294763	P-046 E	4.45
274888	PILOT HIL;1E	9.15
274887	PILOT HIL;1U	2.29

274881	PLEAS RDG;2U	2.29
274851	PROVIDENC;RU	0.76
290261	S-027 E	7.9
290265	S-028 E	7.9
295110	SUBLETTE C	0.18
295111	SUBLETTE E	1.29
274861	TOP CROP ;1U	1.22
274862	TOP CROP ;2U	2.37
274853	TWINGROVE;U1	1.97
274854	TWINGROVE;U2	1.97
905081	W4-005 C	2.
905082	W4-005 E	9.48
295108	WESTBROOK C	0.41
295109	WESTBROOK E	2.64
916211	Z1-072 E	2.32
916221	Z1-073 E	2.56
917501	Z2-087 C	2.98
917502	Z2-087 E	19.95
918051	AA1-018 C	2.33
918052	AA1-018 E	15.58
920272	AA2-123 E	2.89
924041	AB2-047 C O1	3.68
924042	AB2-047 E O1	24.61
924261	AB2-070 C O1	2.09
924262	AB2-070 E O1	14.01
925301	AB2-191 C	0.71
925302	AB2-191 E	0.98
925581	AC1-033 C	1.33
925582	AC1-033 E	8.91
926821	AC1-168 C O1	1.1
926822	AC1-168 E O1	7.4
926841	AC1-171 C O1	0.94
926842	AC1-171 E O1	6.29
927201	AC1-214 C O1	1.95
927202	AC1-214 E O1	6.21

Appendix 12 (LL)

(CE - CE) The WILTON ; 765/345 kV transformer (from bus 275233 to bus 270644 ckt 1) loads from 109.04% to 112.36% (**DC power flow**) of its load dump rating (1379 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT2-3__'. This project contributes approximately 45.82 MW to the thermal violation.

CONTINGENCY 'COMED_P4_112-65-BT2-3__'

TRIP BRANCH FROM BUS 270644 TO BUS 270607 CKT 1 / WILTO; 765
COLLI; 765

TRIP BRANCH FROM BUS 275232 TO BUS 270644 CKT 1 / WILTO;3M 345
WILTO; 765

TRIP BRANCH FROM BUS 275232 TO BUS 270926 CKT 1 / WILTO;3M 345
WILTO; B 345

TRIP BRANCH FROM BUS 275232 TO BUS 275332 CKT 1 / WILTO;3M 345
WILTO;3C 33

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
934431	AD1-067 C	0.13
934432	AD1-067 E	0.53
934721	AD1-100 C	23.48
934722	AD1-100 E	109.58
936291	AD2-038 C O1	2.28
936292	AD2-038 E O1	15.23
936371	AD2-047 C O1	4.51
936372	AD2-047 E O1	22.04
937001	AD2-134 C	2.5
937002	AD2-134 E	9.98
937211	AD2-159 C	2.94
937212	AD2-159 E	13.78
938851	AE1-113 C O1	8.48
938852	AE1-113 E O1	26.67
938861	AE1-114 C O1	3.47
938862	AE1-114 E O1	13.26
939321	AE1-163 C O1	5.72
939322	AE1-163 E O1	35.12
939401	AE1-172 C	6.42
939402	AE1-172 E	30.13
939631	AE1-193 C	5.96
939632	AE1-193 E	39.86
939641	AE1-194 C	5.96
939642	AE1-194 E	39.86
939651	AE1-195 C	5.96
939652	AE1-195 E	39.86
274857	BIG SKY ;U1	1.33

274858	BIG SKY ;U2	1.33
274877	BISHOP HL;1U	1.04
274878	BISHOP HL;2U	1.04
294401	BSHIL;1U E	4.17
294410	BSHIL;2U E	4.17
274848	CAMPGROVE;RU	1.53
274890	CAYUG;1U E	8.08
274891	CAYUG;2U E	8.08
274863	CAYUGA RI;1U	2.02
274864	CAYUGA RI;2U	2.02
274849	CRESCENT ;1U	0.51
274859	EASYR;U1 E	5.33
274860	EASYR;U2 E	5.33
274856	ECOGROVE ;U1	1.14
274871	GR RIDGE ;2U	2.45
274847	GR RIDGE ;BU	1.93
274855	GSG-6 ;RU	1.27
290051	GSG-6; E	5.07
275149	KEMPTON ;1E	9.34
990901	L-005 E	6.12
274872	LEE DEKAL;1U	2.83
290108	LEEDK;1U E	11.79
274850	MENDOTA H;RU	0.35
274879	MINONK ;1U	2.35
293061	N-015 E	7.73
293513	O-009 C1	1.1
293514	O-009 C2	0.56
293515	O-009 C3	0.62
293516	O-009 E1	4.41
293517	O-009 E2	2.24
293518	O-009 E3	2.47
293712	O-029 C	1.18
293713	O-029 C	0.65
293714	O-029 C	0.6
293715	O-029 E	4.71
293716	O-029 E	2.58
293717	O-029 E	2.38
293771	O-035 E	3.12
293644	O22 E1	4.99
293645	O22 E2	9.68
290021	O50 E	9.42
294392	P-010 E	9.81
294763	P-046 E	4.55
274888	PILOT HIL;1E	9.34
274887	PILOT HIL;1U	2.34

274881	PLEAS RDG;2U	2.34
274851	PROVIDENC;RU	0.78
290261	S-027 E	8.06
290265	S-028 E	8.06
295110	SUBLETTE C	0.18
295111	SUBLETTE E	1.32
274861	TOP CROP ;1U	1.25
274862	TOP CROP ;2U	2.42
274853	TWINGROVE;U1	2.01
274854	TWINGROVE;U2	2.01
905081	W4-005 C	2.04
905082	W4-005 E	9.67
295108	WESTBROOK C	0.42
295109	WESTBROOK E	2.7
916211	Z1-072 E	2.36
916221	Z1-073 E	2.62
917501	Z2-087 C	3.04
917502	Z2-087 E	20.36
918051	AA1-018 C	2.38
918052	AA1-018 E	15.92
920272	AA2-123 E	2.95
924041	AB2-047 C O1	3.75
924042	AB2-047 E O1	25.11
924261	AB2-070 C O1	2.14
924262	AB2-070 E O1	14.3
925301	AB2-191 C	0.73
925302	AB2-191 E	1.
925581	AC1-033 C	1.36
925582	AC1-033 E	9.1
925771	AC1-053 C	2.11
925772	AC1-053 E	14.15
926821	AC1-168 C O1	1.13
926822	AC1-168 E O1	7.55
926841	AC1-171 C O1	0.96
926842	AC1-171 E O1	6.42
927201	AC1-214 C O1	2.
927202	AC1-214 E O1	6.34

Attachment 1: Single Line Diagram

