Generation Interconnection Request
System Impact Study Report
For
PJM Generation Interconnection Request
Queue Position AE1-205

McLean 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 solar generating facility located in Livingston County, Illinois. The installed facilities will have a total capability of 200 MW with 84 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is December 31, 2022. This study does not imply a TO commitment to this in-service date.

Point of Interconnection

Queue Position AE1-205 proposes to interconnect with the ComEd transmission system at TSS 92 McLean by utilizing the same attachment facilities as AB2-047 Blooming Grove Wind Farm, as shown in the one-line diagram.

Cost Summary

The AE1-205 project will be responsible for the following costs.

Description	Cost Estimate
Total Physical Interconnection Costs	$400,000
Allocation towards System Network Upgrade Costs (PJM Identified - Summer Peak)*	$1,231,760
Allocation towards System Network Upgrade Costs (PJM Identified - Light Load)*	$0
Allocation towards System Network Upgrade Costs (TO Identified)*	$ 0
Total Costs	$ 1,631,760

*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	$400,000
Direct Connection Network Upgrades	$0
Non-Direct Connection Network Upgrades	$0
Total Physical Interconnection Costs	$400,000

Attachment Facilities
The addition of a 200 MW solar facility behind the meter will require review and possible upgrade of SCADA, Communication, relays and metering. The estimated cost is $400,000.

Direct Connection Network Upgrades
None.

Non-Direct Connection Network Upgrades
None.

Schedule:

ComEd would take approximately 18-months to review and possibly upgrade SCADA, Communication, relays and metering after the ISA / ICSA are signed.

Revenue Metering and SCADA Requirements

PJM Requirements

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

Meteorological Data Reporting Requirements

The 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 AE1-205 was evaluated as a 200.0 MW (Capacity 84.0 MW) injection at the McLean 345 kV substation which taps the Pontiac – Brokaw 345kV line in the ComEd area. Project AE1-205 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AE1-205 was studied with a commercial probability of 100%. Potential network impacts were as follows:

Summer Peak Analysis - 2022

Generator Deliverability

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

Overload	Contingency		Affected		Bus			Power	Loading %		Rating		MW	Flowgate
Number	Type	Name	Area	Facility Description	From	To	Circuit	Flow	Initial	Final	Type	MVA	Contribution	Appendix
1	N-1	COMED_P1-2_345-L8014___-S-B	CE - CE	LORETTO ; B-AE1-172 TAP 345 kV line	270704	939400	1	AC	99.72	102.45	ER	1528	42.26	1
2	N-1	COMED_P1-2_345-L8002___-S	CE - CE	Z2-087 TAP-PONTIAC ; R 345 kV line	917500	270853	1	AC	98.75	102.3	ER	1528	57.77	2

Notes:
Violation 1: ComEd SSTE rating is 2107 MVA (Not a violation)
Violation 2: ComEd SSTE rating is 1837 MVA (Not a violation)

Multiple Facility Contingency

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

None

Contribution to Previously Identified Overloads

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

Overload	Contingency		Affected		Bus			Power	Loading %		Rating		MW	Flowgate
Number	Type	Name	Area	Facility Description	From	To	Circuit	Flow	Initial	Final	Type	MVA	Contribution	Appendix
3	LFFB	AEP_P4_#2978_05DUMONT 765_B	MISO NIPS - CE	17GREEN_ACRE-GREENACRE; T 345 kV line	255104	270771	1	AC	100.54	100.61	ER	1091	13.79	3
4	LFFB	AEP_P4_#2978_05DUMONT 765_B	MISO NIPS - AEP	17STILLWELL-05DUMONT 345 kV line	255113	243219	1	AC	127.81	128.3	ER	1409	24.58	4
5	LFFB	ADD AD1-100 5	CE - CE	BRAIDWOOD; B-BRAIDWOOD; R 345 kV line	270670	270671	1	AC	125.19	127.7	LDR	1341	33.55	5
6	LFFB	AEP_P4_#2978_05DUMONT 765_B	CE - AEP	GREENACRE; T-05OLIVE 345 kV line	270771	243229	1	AC	112.96	113.05	ER	971	13.79	6
7	LFFB	COMED_P4_112-65-BT5-6__	CE - CE	WILTON ; B-WILTON ;3M 345 kV line	270926	275232	1	AC	114.33	116.24	LDR	1379	29.77	7
8	LFFB	COMED_P4_112-65-BT2-3__	CE - CE	WILTON ; R-WILTON ;4M 345 kV line	270927	275233	1	AC	116.71	118.65	LDR	1379	30.38	8
9	LFFB	COMED_P4_112-65-BT5-6__	CE - CE	WILTON ; 765/345 kV transformer	275232	270644	1	AC	114.05	115.96	LDR	1379	29.77	9
10	LFFB	COMED_P4_112-65-BT2-3__	CE - CE	WILTON ; 765/345 kV transformer	275233	270644	1	AC	116.42	118.37	LDR	1379	30.38	10
11	LFFB	AEP_P4_#3128_05EUGENE 345_A2	MISO AMIL - AEP	7CASEY-05SULLIVAN 345 kV line	346809	247712	1	AC	113.62	114.92	ER	1466	19.97	11
12	LFFB	ADD AD1-100 5	CE - CE	AD1-100 TAP-BRAIDWOOD; B 345 kV line	934730	270670	1	AC	127.62	131.23	LDR	1528	56.97	12
13	DCTL	COMED_P7_345-L2001__B-S_+_345-L2003__R-S	CE - CE	AD1-100 TAP-WILTON ; B 345 kV line	934720	270926	1	DC	117.8	119.76	LDR	1846	36.21	13
14	DCTL	COMED_P7_345-L0101__B-S_+_345-L0102__R-S	CE - CE	AD1-100 TAP-WILTON ; B 345 kV line	937030	270926	1	AC	109.25	111.1	LDR	1846	34.05	
15	N-1	COMED_P1-2_345-L8014___-S-B	CE - CE	AE1-172 TAP-AD1-100 TAP 345 kV line	939400	934720	1	AC	101.07	103.74	ER	1528	42.26	14

Notes:

Violation 3: ComEd SSTE rating is 1134 MVA (Not a violation), MISO-end ratings are 1195/1195 MVA SN/SE (Not a violation)

Violation 4: AEP SE rating is 1409 MVA (Violation Valid), MISO ratings are 1409/1779 MVA (Not a violation)
Violation 5: ComEd SSTE rating is 1837 MVA (Not a violation)
Violation 6: ComEd SSTE rating is 1134 MVA (Not a violation), AEP SE rating is 971 MVA (Violation Valid)
Violation 7: ComEd SSTE rating is 1469 MVA (Violation Valid)
Violation 8: ComEd SSTE rating is 1469 MVA (Violation Valid)
Violation 9: ComEd SSTE rating is 1469 MVA (Violation Valid)
Violation 10: ComEd SSTE rating is 1469 MVA (Violation Valid)
Violation 11:AEP ratings are 1443/1685 MVA (SN/SE) (Not a violation), MISO ratings are 1332/1466 MVA SN/SE (Violation Valid)
Violation 12: ComEd SSTE rating is 1837 MVA (Violation Valid)
Violation 13: ComEd ALDR rating is 2554 MVA (Not a violation)
Violation 14: ComEd ALDR rating is 2554 MVA (Not a violation)
Violation 15: ComEd SSTE rating is 2107 MVA (Not a violation)

Steady-State Voltage Requirements

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

None

Delivery of Energy Portion of Interconnection Request

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

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

Overload Number	Type	Contingency Name	Affected Area	Facility Description	Bus From	Bus To	Circuit	Power Flow	Loading % Initial	Loading % Final	Rating Type	Rating MVA	MW Contribution
16	N-1	AEP_P1-2_#695A	MISO NIPS - AEP	17STILLWELL-05DUMONT 345 kV line	255113	243219	1	AC	124.7	125.2	NR	1409	24.84
17	N-1	COMED_P1-2_345-L8001___-S_NO_FSA-A	CE - CE	BLUEMOUND; B-PONTIAC ; B 345 kV line	270668	270852	1	AC	120.76	123	ER	1528	33.47
18	N-1	COMED_P1-2_345-L8014___-S-B	CE - CE	LORETTO ; B-AE1-172 TAP 345 kV line	270704	939400	1	AC	163.26	169.81	ER	1528	100.63
19	Non	Non	CE - CE	LORETTO ; B-AE1-172 TAP 345 kV line	270704	939400	1	AC	119.59	124.48	NR	1364	68.44
20	N-1	COMED_P1-2_345-L8001___-S_NO_FSA-A	CE - CE	LATHAM ; T-W4-005 TAP 345 kV line	270804	905080	1	DC	103.57	106.09	ER	1334	33.6
21	N-1	COMED_P1-2_345-L8014___-S-B	CE - CE	PONTIAC ; B-LORETTO ; B 345 kV line	270852	270704	1	DC	152.64	159.23	ER	1528	100.69
22	Non	Non	CE - CE	PONTIAC ; B-LORETTO ; B 345 kV line	270852	270704	1	DC	108.37	113.4	NR	1364	68.5
23	N-1	COMED_P1-2_345-L11212_B-S-C-A	CE - CE	PONTIAC ; R-AD1-133 TAP 345 kV line	270853	935000	1	AC	149.35	155.45	ER	1528	92.98
24	Non	Non	CE - CE	PONTIAC ; R-AD1-133 TAP 345 kV line	270853	935000	1	AC	101.27	105.3	NR	1334	56.28
25	N-1	AEP_P1-2_#286	MISO AMIL - AEP	7CASEY-05SULLIVAN 345 kV line	346809	247712	1	AC	107.1	108.49	NR	1466	20.02
26	N-1	COMED_P1-2_345-L8001___-S_NO_FSA-A	CE - CE	W4-005 TAP-BLUEMOUND; B 345 kV line	905080	270668	1	AC	119.36	121.89	ER	1334	33.55
27	N-1	COMED_P1-2_345-L8002___-S	CE - CE	Z2-087 TAP-PONTIAC ; R 345 kV line	917500	270853	1	AC	148.17	156.78	ER	1528	137.55
28	Non	Non	CE - CE	Z2-087 TAP-PONTIAC ; R 345 kV line	917500	270853	1	DC	122.82	134.23	NR	1334	152.21
29	N-1	COMED_P1-2_345-L11212_B-S-C-A	CE - CE	AD1-133 TAP-DRESDEN ; R 345 kV line	935000	270717	1	AC	161.92	168.04	ER	1528	92.98
30	Non	Non	CE - CE	AD1-133 TAP-DRESDEN ; R 345 kV line	935000	270717	1	AC	111.19	115.27	NR	1334	56.28

31	N-1	COMED_P1-2_345-L8014___-S-B	CE - CE	AD1-100 TAP-WILTON ; B 345 kV line	934720	270926	1	AC	127.63	130.61	ER	1528	46.5
32	Non	Non	CE - CE	AD1-100 TAP-WILTON ; B 345 kV line	934720	270926	1	AC	114.65	117.01	NR	1364	32.78
33	N-1	COMED_P1-2_345-L8014___-S-B	CE - CE	AE1-172 TAP-AD1-100 TAP 345 kV line	939400	934720	1	AC	172.52	178.91	ER	1528	100.63
34	Non	Non	CE - CE	AE1-172 TAP-AD1-100 TAP 345 kV line	939400	934720	1	AC	128.65	133.45	NR	1364	68.44

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 by MISO during the Facilities Study phase.

Stability and Reactive Power Requirement

(Results of the dynamic studies should be inserted here)

To be determined during the Facilities Study.

Light Load Analysis – 2022

Light load analysis 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
17STILLWELL-05DUMONT 345 kV line (from bus 255113 to bus 243219 ckt 1)	**AEP** AEP SE rating is 1409 MVA. AEP Reinforcement: **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 wavetrap. **Type**: FAC **Cost:** $1,613,000 **Time Estimate**: 6-12 Months **Ratings**: 1718 MVA SE **Notes:** 1. Since the cost of the upgrade is less than $5M, based on PJM cost allocation criteria, AE1-205 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.) AE1-205 could receive cost allocation. 3. Although Queue Project AE1-205 may not presently have cost responsibility for this upgrade, Queue Project AE1-205 may need this upgrade in-service to be deliverable to the PJM system.	$1,613,000 + $200,000 + $600,000 + $1,500,000	$0 + $0 + $181,760 + $450,000	N4058 N4790 N5769.1

4. If Queue Project AE1-205 comes into service prior to completion of the upgrade, Queue Project AE1-205 will need an interim study.

AEP Reinforcement:
Project ID: n4790
Description: Upgrade Dumont 2500A wavetrap at a cost of $200K. New AEP-end ratings to be 1409/1790 MVA (SN/SE).
Type: FAC
Cost: $200,000
Time Estimate: N/A
Ratings: 1409/1790 MVA SN/SE

Notes:
1. Since the cost of the upgrade is less than $5M, based on PJM cost allocation criteria, AE1-205 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.) AE1-205 could receive cost allocation.
3. Although Queue Project AE1-205 may not presently have cost responsibility for this upgrade, Queue Project AE1-205 may need this upgrade in-service to be deliverable to the PJM system.
4. If Queue Project AE1-205 comes into service prior to completion of the upgrade, Queue Project AE1-205 will need an interim study.

AEP Reinforcement:
Project ID: N5769.1
Description: An Engineering study will need to be conducted to determine if the Dumont CT Thermal Limit settings can be adjusted to mitigate the overload. Estimated Cost: $25,000. New relay package will be required if the settings cannot be adjusted, Estimated Cost: $600,000. New AEP ratings: 1409/1868 MVA SN/SE.
Type: FAC
Cost: $25,000
Time Estimate: N/A Months
Ratings: 1409/1868 MVA SN/SE

The cost allocation is as follows:

Queue	MW contribution	Percentage of cost	$ cost ($600,000)
AE1-198	56.56	69.71%	$418,240
AE1-205	24.58	30.29%	$181,760

MISO
MISO Rating 1409/1779 MVA (SN/SE).

MISO Reinforcement:
Project ID:
Description: Upgrade Stillwell substation terminal equipment (upgrade substation conductor to bundled 2-1590 AL and replace wavetrap) at a cost of $1.5M. New expected MISO end SE rating will be 1832 MVA.
Type: FAC

<table>
<tr><td></td><td><u>Cost:</u> $1,500,000
<u>Time Estimate</u>: N/A Months
<u>Ratings</u>: 1832 MVA SE

The cost allocation is as follows:
<table><tr><th>Queue</th><th>MW contribution</th><th>Percentage of cost</th><th>$ cost ($1.5M)</th></tr><tr><td>AE1-198</td><td>56.56</td><td>69.71%</td><td>$1.05</td></tr><tr><td>AE1-205</td><td>24.58</td><td>30.29%</td><td>$0.45</td></tr></table></td><td></td><td></td><td></td></tr>
<tr><td>GREENACRE; T-05OLIVE 345 kV line (from bus 270771 to bus 243229 ckt 1)</td><td><u>AEP</u>
AEP SE ratings is 971 MVA.

<u>AEP Reinforcement:</u>
<u>Project ID</u>: n5913
<u>Description</u>: Upgrade is a sag study will be required for the entire 40.64 miles of ACSR/PE ~ 1414 ~ 62/19 Conductor section 1 to determine if the line can be operated above its emergency rating 971 MVA. Estimated Cost: $162,560. 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.
<u>Type</u>: FAC
<u>Cost:</u> $162,560
<u>Time Estimate</u>: 30 Months

<u>Notes:</u>
1. Since the cost of the upgrade is less than $5M, based on PJM cost allocation criteria, AE1-205 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.) AE1-205 could receive cost allocation.
3. Although Queue Project AE1-205 may not presently have cost responsibility for this upgrade, Queue Project AE1-205 may need this upgrade in-service to be deliverable to the PJM system.
4. If Queue Project AE1-205 comes into service prior to completion of the upgrade, Queue Project AE1-205 will need an interim study.

<u>ComEd</u>
ComEd SSTE rating is 1134 MVA and is sufficient</td><td>$162,560</td><td>$0</td><td>N5913</td></tr>
<tr><td>WILTON ; B-WILTON ;3M 345 kV line (from bus 270926 to bus 275232 ckt 1)</td><td><u>ComEd</u>
ComEd SSTE rating is 1469 MVA.

<u>ComEd Reinforcement:</u>
<u>Project ID</u>: n5145
<u>Description</u>: 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).
<u>Type</u>: CON
<u>Cost:</u> $12,000,000</td><td>$12,000,000</td><td>$600,000</td><td>N5145</td></tr>
</table>

	Time Estimate: 36-40 Months **Ratings**: N/A The cost allocation is as follows: **Queue** / **MW contribution** / **Percentage of Cost** / **$ cost ($ 12 M)** AD1-100 / 116.8 / 19.24% / $ 2.308 AD2-047 / 26.4 / 4.35% / $ 0.522 AD2-066 / 17.7 / 2.92% / $ 0.350 AD2-102 / 29.7 / 4.88% / $ 0.586 AD2-134 / 16.2 / 2.67% / $ 0.320 AD2-159 / 16.6 / 2.73% / $ 0.328 AD2-194 / 19.6 / 3.23% / $ 0.388 AE1-113 / 45.7 / 7.53% / $ 0.903 AE1-114 / 21.8 / 3.59% / $ 0.431 AE1-163 / 53.1 / 8.75% / $ 1.049 AE1-166 / 28.6 / 4.71% / $ 0.566 AE1-172 / 47.1 / 7.76% / $ 0.931 AE1-193 / 45.8 / 7.55% / $ 0.906 AE1-194 / 45.8 / 7.55% / $ 0.906 AE1-195 / 45.8 / 7.55% / $ 0.906 AE1-205 / 30.4 / 5.00% / $ 0.600			
7CASEY-05SULLIVAN 345 kV line (from bus 346809 to bus 247712 ckt 1)	**AEP** AEP ratings are 1443/1685 MVA (SN/SE) and are sufficient. **MISO:** **Description**: Ameren-end: Install splice and dead-end shunts on the Ameren-owned portion of the Casey – Sullivan 345 kV line. Cost estimate is $506K. **Type**: FAC **Cost:** $506,000 **Notes:** 1. Since the cost of the upgrade is less than $5M, based on PJM cost allocation criteria, AE1-205 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.) AE1-205 could receive cost allocation. 3. Although Queue Project AE1-205 may not presently have cost responsibility for this upgrade, Queue Project AE1-205 may need this upgrade in-service to be deliverable to the PJM system. 4. If Queue Project AE1-205 comes into service prior to completion of the upgrade, Queue Project AE1-205 will need an interim study.	$506,000	$0	N/A
AD1-100 TAP-BRAIDWOOD; B 345 kV line (from bus	**ComEd** The applicable SSTE rating for this line segment is 1837 MVA.	$3,000,000	$0	N7206

934730 to bus 270670 ckt 1)	ComEd Reinforcement: **Project ID**: n7206 **Description**: Move and re-terminate the L2002 Davis Creek line into the same breaker bay as the AD1-100 attachment at the AD1-100 interconnection substation. This eliminates the stuck breaker contingency loss of the Wilton Center line and Davis Creek L2002 line. Time estimate is 24 months. Estimated cost is $3M. **Type**: FAC **Cost:** $3,000,000 **Time Estimate**:24 Months **Ratings**: N/A **Notes:** 1. Since the cost of the upgrade is less than $5M, based on PJM cost allocation criteria, AE1-205 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.) AE1-205 could receive cost allocation. 3. Although Queue Project AE1-205 may not presently have cost responsibility for this upgrade, Queue Project AE1-205 may need this upgrade in-service to be deliverable to the PJM system. 4. If Queue Project AE1-205 comes into service prior to completion of the upgrade, Queue Project AE1-205 will need an interim study.			
	Total	$19,581,560	$1,231,760	

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)

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)

None

Short Circuit System Reinforcement

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

None

Contingencies (Summer Peak Analysis)

Contingency Name	Description
ADD AD1-100 5	CONTINGENCY 'ADD AD1-100 5' OPEN BRANCH FROM BUS 934730 TO BUS 270710 CKT 1 / AD1-100 - DAVIS CREEK OPEN BRANCH FROM BUS 934720 TO BUS 937030 CKT 1 / AD1-100 - AD2-137 TAP (WILTON) END
AEP_P1-2_#286	CONTINGENCY 'AEP_P1-2_#286' OPEN BRANCH FROM BUS 243221 TO BUS 348885 CKT 1 / 243221 05EUGENE 345 348885 7BUNSONVILLE 345 1 END
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
AEP_P4_#3128_05EUGENE 345_A2	CONTINGENCY 'AEP_P4_#3128_05EUGENE 345_A2' OPEN BRANCH FROM BUS 243221 TO BUS 249504 CKT 1 / 243221 05EUGENE 345 249504 08CAYSUB 345 1 OPEN BRANCH FROM BUS 243221 TO BUS 348885 CKT 1 / 243221 05EUGENE 345 348885 7BUNSONVILLE 345 1 END
COMED_P1-2_345-L11212_B-S-C-A	CONTINGENCY 'COMED_P1-2_345-L11212_B-S-C-A' TRIP BRANCH FROM BUS 934720 TO BUS 939400 CKT 1 / AD1-100 TAP 345 AE1-172 TAP 345 END
COMED_P1-2_345-L8001___-S_NO_FSA-A	CONTINGENCY 'COMED_P1-2_345-L8001___-S_NO_FSA-A' TRIP BRANCH FROM BUS 270853 TO BUS 917500 CKT 1 / PONTI; R 345 Z2-087 TAP 345 END
COMED_P1-2_345-L8002___-S	CONTINGENCY 'COMED_P1-2_345-L8002___-S' TRIP BRANCH FROM BUS 270852 TO BUS 270668 CKT 1 / PONTI; B 345 BLUEM; B 345 END
COMED_P1-2_345-L8014___-S-B	CONTINGENCY 'COMED_P1-2_345-L8014___-S-B' TRIP BRANCH FROM BUS 935000 TO BUS 270717 CKT 1 / AD1-133 TAP 345 DRESDEN ; R 345 END
COMED_P4_112-65-BT2-3__	CONTINGENCY 'COMED_P4_112-65-BT2-3__' TRIP BRANCH FROM BUS 270644 TO BUS 270607 CKT 1 / WILTO; 765 COLLI; 765 TRIP BRANCH FROM BUS 275232 TO BUS 270644 CKT 1 / WILTO;3M 345 WILTO; 765 TRIP BRANCH FROM BUS 275232 TO BUS 270926 CKT 1 / WILTO;3M 345 WILTO; B 345 TRIP BRANCH FROM BUS 275232 TO BUS 275332 CKT 1 / WILTO;3M 345 WILTO;3C 33 END
COMED_P4_112-65-BT5-6__	CONTINGENCY 'COMED_P4_112-65-BT5-6__' TRIP BRANCH FROM BUS 270644 TO BUS 270607 CKT 1 / WILTO; 765 COLLI; 765 TRIP BRANCH FROM BUS 275233 TO BUS 270644 CKT 1 / WILTO;4M 345 WILTO; 765 TRIP BRANCH FROM BUS 275233 TO BUS 270927 CKT 1 / WILTO;4M 345 WILTO; R 345

	TRIP BRANCH FROM BUS 275233 TO BUS 275333 CKT 1 / WILTO;4M 345 WILTO;4C 33 END
COMED_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
COMED_P7_345-L2001__B-S_+_345-L2003__R-S	CONTINGENCY 'COMED_P7_345-L2001__B-S_+_345-L2003__R-S' TRIP BRANCH FROM BUS 270670 TO BUS 270728 CKT 1 / BRAID; B 345 E FRA; B 345 TRIP BRANCH FROM BUS 270728 TO BUS 270766 CKT 1 / E FRA; B 345 GOODI;3B 345 TRIP BRANCH FROM BUS 270728 TO BUS 274750 CKT 1 / E FRA; B 345 CRETE;BP 345 TRIP BRANCH FROM BUS 270671 TO BUS 270729 CKT 1 / BRAID; R 345 E FRA; R 345 END

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 LORETTO ; B-AE1-172 TAP 345 kV line (from bus 270704 to bus 939400 ckt 1) loads from 99.72% to 102.45% (AC power flow) of its emergency rating (1528 MVA) for the single line contingency outage of 'COMED_P1-2_345-L8014___-S-B'. This project contributes approximately 42.26 MW to the thermal violation.

CONTINGENCY 'COMED_P1-2_345-L8014___-S-B'
TRIP BRANCH FROM BUS 935000 TO BUS 270717 CKT 1 / AD1-133 TAP 345 DRESDEN ; R 345
END

Bus Number	*Bus Name*	*Full Contribution*
933441	*AC2-157 C*	*4.28*
935001	*AD1-133 C O1*	*90.81*
935141	*AD1-148*	*13.5*
LTF	*AD2-098*	*0.21*
936771	*AD2-100 C O1*	*24.31*
936971	*AD2-131 C O1*	*1.6*
937211	*AD2-159 C*	*11.29*
939741	*AE1-205 C O1*	*42.26*
274863	*CAYUGA RI;1U*	*3.23*
274864	*CAYUGA RI;2U*	*3.23*
LTF	*CBM-N*	*0.57*
LTF	*CBM-S1*	*11.04*
LTF	*CBM-S2*	*3.33*
LTF	*CBM-W2*	*130.4*
LTF	*CHILHOWEE /* 35% REVERSE 4476971*	*< 0.01*
LTF	*CIN*	*11.57*
LTF	*CPLE*	*1.16*
LTF	*G-007A*	*1.91*
LTF	*IPL*	*6.25*
950701	*J196 C*	*1.14*
950291	*J291*	*4.24*
951001	*J339*	*12.8*
954761	*J468 C*	*4.05*
951741	*J474 C*	*5.16*
952271	*J644*	*13.57*
952321	*J734*	*10.75*
954721	*J750 C*	*3.62*
952651	*J756 C*	*4.83*
952871	*J757 C*	*5.78*

953401	*J811*	*10.86*
953651	*J815*	*37.42*
953741	*J826 C*	*3.19*
953851	*J845 C*	*3.12*
953881	*J848 C*	*5.41*
954411	*J912*	*14.2*
274650	*KINCAID ;1U*	*19.81*
274651	*KINCAID ;2U*	*19.84*
LTF	*LGEE*	*1.7*
LTF	*MEC*	*9.12*
LTF	*NYISO*	*2.45*
274853	*TWINGROVE;U1*	*2.88*
274854	*TWINGROVE;U2*	*2.88*
LTF	*VFT*	*5.13*
905081	*W4-005 C*	*2.75*
917501	*Z2-087 C*	*2.3*
930461	*AB1-087*	*31.*
930471	*AB1-088*	*31.*
924041	*AB2-047 C O1*	*16.35*
924261	*AB2-070 C O1*	*7.64*
925771	*AC1-053 C*	*7.49*
926841	*AC1-171 C O1*	*0.96*

Appendix 2

(CE - CE) The Z2-087 TAP-PONTIAC ; R 345 kV line (from bus 917500 to bus 270853 ckt 1) loads from 98.75% to 102.3% (AC power flow) of its emergency rating (1528 MVA) for the single line contingency outage of 'COMED_P1-2_345-L8002___-S'. This project contributes approximately 57.77 MW to the thermal violation.

CONTINGENCY 'COMED_P1-2_345-L8002___-S'
TRIP BRANCH FROM BUS 270852 TO BUS 270668 CKT 1 / PONTI; B 345 BLUEM; B 345
END

Bus Number	*Bus Name*	*Full Contribution*
933441	*AC2-157 C*	*4.41*
935141	*AD1-148*	*15.43*
LTF	*AD2-098*	*0.24*
936771	*AD2-100 C O1*	*23.27*
936971	*AD2-131 C O1*	*1.53*
937211	*AD2-159 C*	*7.44*
939741	*AE1-205 C O1*	*57.77*
LTF	*CBM-N*	*0.67*
LTF	*CBM-S1*	*11.01*
LTF	*CBM-S2*	*3.43*
LTF	*CBM-W2*	*128.61*
LTF	*CHILHOWEE /* 35% REVERSE 4476971*	*< 0.01*
LTF	*CIN*	*12.08*
LTF	*CPLE*	*1.22*
LTF	*G-007A*	*2.24*
LTF	*IPL*	*6.54*
950701	*J196 C*	*1.28*
950291	*J291*	*4.04*
951001	*J339*	*15.21*
954761	*J468 C*	*4.32*
951741	*J474 C*	*5.73*
952271	*J644*	*13.05*
952321	*J734*	*12.77*
954721	*J750 C*	*3.57*
952651	*J756 C*	*4.59*
952871	*J757 C*	*5.51*
953401	*J811*	*10.84*
953651	*J815*	*36.62*
953741	*J826 C*	*3.73*

953851	*J845 C*	*3.66*
953881	*J848 C*	*5.31*
954411	*J912*	*13.98*
954681	*J949*	*19.04*
274650	*KINCAID ;1U*	*18.92*
274651	*KINCAID ;2U*	*18.93*
LTF	*LGEE*	*1.8*
LTF	*MEC*	*6.04*
LTF	*NYISO*	*2.91*
LTF	*TATANKA*	*0.01*
274853	*TWINGROVE;U1*	*1.57*
274854	*TWINGROVE;U2*	*1.57*
LTF	*VFT*	*6.01*
905081	*W4-005 C*	*1.81*
917501	*Z2-087 C*	*3.15*
930461	*AB1-087*	*31.93*
930471	*AB1-088*	*31.93*
924041	*AB2-047 C O1*	*22.35*
924261	*AB2-070 C O1*	*8.97*
925771	*AC1-053 C*	*8.72*
926841	*AC1-171 C O1*	*1.02*

Appendix 3

(MISO NIPS - CE) The 17GREEN_ACRE-GREENACRE; T 345 kV line (from bus 255104 to bus 270771 ckt 1) loads from 100.54% to 100.61% (AC power flow) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of 'AEP_P4_#2978_05DUMONT 765_B'. This project contributes approximately 13.79 MW to the thermal violation.

CONTINGENCY 'AEP_P4_#2978_05DUMONT 765_B'
OPEN BRANCH FROM BUS 243206 TO BUS 243207 CKT 1 / 243206 05DUMONT 765 243207 05GRNTWN 765 1
OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1 / 243206 05DUMONT 765 270644 WILTON ; 765 1
END

Bus Number	*Bus Name*	*Full Contribution*
932881	*AC2-115 1*	*1.59*
932891	*AC2-115 2*	*1.59*
932921	*AC2-116*	*0.56*
933411	*AC2-154 C*	*1.69*
933412	*AC2-154 E*	*2.76*
933911	*AD1-013 C*	*1.23*
933912	*AD1-013 E*	*1.96*
933931	*AD1-016 C*	*0.62*
933932	*AD1-016 E*	*1.02*
934051	*AD1-031 C O1*	*1.88*
934052	*AD1-031 E O1*	*3.07*
934101	*AD1-039 1*	*4.69*
934111	*AD1-039 2*	*4.9*
934431	*AD1-067 C*	*0.09*
934432	*AD1-067 E*	*0.37*
934701	*AD1-098 C O1*	*4.6*
934702	*AD1-098 E O1*	*3.35*
934721	*AD1-100 C*	*13.01*
934722	*AD1-100 E*	*60.71*
934871	*AD1-116 C*	*0.62*
934872	*AD1-116 E*	*1.01*
934971	*AD1-129 C*	*0.61*
934972	*AD1-129 E*	*0.4*
935001	*AD1-133 C O1*	*13.81*
935002	*AD1-133 E O1*	*9.21*
936291	*AD2-038 C O1*	*1.55*
936292	*AD2-038 E O1*	*10.38*

936371	*AD2-047 C O1*	*3.03*
936372	*AD2-047 E O1*	*14.78*
936461	*AD2-060*	*1.78*
936511	*AD2-066 C O1*	*5.6*
936512	*AD2-066 E O1*	*3.73*
936791	*AD2-102 C*	*9.47*
936792	*AD2-102 E*	*6.31*
937001	*AD2-134 C*	*1.73*
937002	*AD2-134 E*	*6.9*
937311	*AD2-172 C*	*1.65*
937312	*AD2-172 E*	*2.27*
937401	*AD2-194 1*	*5.27*
937411	*AD2-194 2*	*5.27*
937531	*AD2-214 C*	*2.94*
937532	*AD2-214 E*	*1.96*
938511	*AE1-070 1*	*6.19*
938521	*AE1-070 2*	*5.66*
938851	*AE1-113 C O1*	*5.39*
938852	*AE1-113 E O1*	*19.1*
938861	*AE1-114 C O1*	*2.63*
938862	*AE1-114 E O1*	*8.96*
939051	*AE1-134 1*	*0.91*
939061	*AE1-134 2*	*0.91*
939321	*AE1-163 C O1*	*3.9*
939322	*AE1-163 E O1*	*23.94*
939351	*AE1-166 C O1*	*6.87*
939352	*AE1-166 E O1*	*6.34*
939401	*AE1-172 C O1*	*3.5*
939402	*AE1-172 E O1*	*16.4*
939631	*AE1-193 C O1*	*10.91*
939632	*AE1-193 E O1*	*73.04*
939641	*AE1-194 C*	*10.91*
939642	*AE1-194 E*	*73.04*
939651	*AE1-195 C*	*10.91*
939652	*AE1-195 E*	*73.04*
939681	*AE1-198 C O1*	*32.41*
939682	*AE1-198 E O1*	*27.54*
939741	*AE1-205 C O1*	*5.79*
939742	*AE1-205 E O1*	*8.*
940101	*AE1-252 C O1*	*7.02*
940102	*AE1-252 E O1*	*4.68*
LTF	*BLUEG*	*2.63*
294401	*BSHIL;1U E*	*5.66*
294410	*BSHIL;2U E*	*5.66*
LTF	*CARR*	*0.48*

LTF	*CATAWBA*	*0.15*
274890	*CAYUG;1U E*	*8.97*
274891	*CAYUG;2U E*	*8.97*
LTF	*CBM-S1*	*1.49*
LTF	*CBM-W1*	*20.35*
LTF	*CBM-W2*	*39.71*
LTF	*CHOCTAW /* 35% REVERSE 4566958 4511400*	*< 0.01*
LTF	*CIN*	*0.23*
274751	*CRETE EC ;1U*	*2.22*
274752	*CRETE EC ;2U*	*2.22*
274753	*CRETE EC ;3U*	*2.22*
274754	*CRETE EC ;4U*	*2.22*
274859	*EASYR;U1 E*	*7.34*
274860	*EASYR;U2 E*	*7.34*
LTF	*G-007*	*1.33*
290051	*GSG-6; E*	*6.98*
LTF	*HAMLET*	*0.3*
953871	*J847*	*2.7*
275149	*KEMPTON ;1E*	*12.46*
990901	*L-005 E*	*8.29*
290108	*LEEDK;1U E*	*16.23*
LTF	*MEC*	*25.26*
293061	*N-015 E*	*10.29*
293516	*O-009 E1*	*6.08*
293517	*O-009 E2*	*3.09*
293518	*O-009 E3*	*3.4*
293715	*O-029 E*	*6.5*
293716	*O-029 E*	*3.56*
293717	*O-029 E*	*3.28*
293771	*O-035 E*	*4.23*
LTF	*O-066*	*8.55*
293644	*O22 E1*	*7.28*
293645	*O22 E2*	*14.13*
290021	*O50 E*	*13.06*
294392	*P-010 E*	*13.07*
294763	*P-046 E*	*6.27*
274888	*PILOT HIL;1E*	*12.46*
270859	*PWR VTR EC;R*	*8.1*
LTF	*RENSSELAER*	*0.38*
274722	*S-055 E*	*7.56*
295111	*SUBLETTE E*	*1.82*
LTF	*TRIMBLE*	*0.32*
LTF	*WEC*	*5.35*
295109	*WESTBROOK E*	*3.74*

910542	*X3-005 E*	*0.52*
915011	*Y3-013 1*	*2.52*
915021	*Y3-013 2*	*2.52*
915031	*Y3-013 3*	*2.52*
916211	*Z1-072 E*	*3.2*
916221	*Z1-073 E*	*3.6*
916502	*Z1-106 E1*	*0.85*
916504	*Z1-106 E2*	*0.85*
916512	*Z1-107 E*	*1.72*
916522	*Z1-108 E*	*1.67*
917502	*Z2-087 E*	*11.99*
918052	*AA1-018 E*	*10.68*
919221	*AA1-146*	*11.73*
919581	*AA2-030*	*11.73*
920272	*AA2-123 E*	*1.64*
930481	*AB1-089*	*44.01*
930501	*AB1-091 O1*	*49.4*
930741	*AB1-122 1O1*	*47.85*
930751	*AB1-122 2O1*	*50.02*
924041	*AB2-047 C O1*	*2.24*
924042	*AB2-047 E O1*	*14.99*
924471	*AB2-096*	*28.36*
925302	*AB2-191 E*	*0.92*
925581	*AC1-033 C*	*0.93*
925582	*AC1-033 E*	*6.21*
926311	*AC1-109 1*	*1.28*
926321	*AC1-109 2*	*1.28*
926331	*AC1-110 1*	*1.27*
926341	*AC1-110 2*	*1.27*
926351	*AC1-111 1*	*0.51*
926361	*AC1-111 2*	*0.51*
926371	*AC1-111 3*	*0.51*
926381	*AC1-111 4*	*0.51*
926391	*AC1-111 5*	*0.51*
926401	*AC1-111 6*	*0.51*
927511	*AC1-113 1*	*0.8*
927521	*AC1-113 2*	*0.8*
926431	*AC1-114*	*1.59*
927451	*AC1-142A 1*	*2.85*
927461	*AC1-142A 2*	*2.85*
926821	*AC1-168 C O1*	*0.76*
926822	*AC1-168 E O1*	*5.11*
927091	*AC1-204 1*	*49.02*
927101	*AC1-204 2*	*48.98*
927201	*AC1-214 C O1*	*1.36*

927202	*AC1-214 E O1*	*4.32*

Appendix 4

(MISO NIPS - AEP) The 17STILLWELL-05DUMONT 345 kV line (from bus 255113 to bus 243219 ckt 1) loads from 127.81% to 128.3% (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 24.58 MW to the thermal violation.

CONTINGENCY 'AEP_P4_#2978_05DUMONT 765_B'
OPEN BRANCH FROM BUS 243206 TO BUS 243207 CKT 1 / 243206 05DUMONT 765 243207 05GRNTWN 765 1
OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1 / 243206 05DUMONT 765 270644 WILTON ; 765 1
END

Bus Number	*Bus Name*	*Full Contribution*
932881	*AC2-115 1*	*2.76*
932891	*AC2-115 2*	*2.76*
932921	*AC2-116*	*0.96*
932931	*AC2-117*	*5.85*
933411	*AC2-154 C*	*3.04*
933412	*AC2-154 E*	*4.96*
933911	*AD1-013 C*	*2.13*
933912	*AD1-013 E*	*3.4*
933931	*AD1-016 C*	*1.07*
933932	*AD1-016 E*	*1.75*
934051	*AD1-031 C O1*	*3.3*
934052	*AD1-031 E O1*	*5.39*
934101	*AD1-039 1*	*8.13*
934111	*AD1-039 2*	*8.37*
934431	*AD1-067 C*	*0.15*
934432	*AD1-067 E*	*0.64*
934701	*AD1-098 C O1*	*7.96*
934702	*AD1-098 E O1*	*5.81*
934721	*AD1-100 C*	*22.58*
934722	*AD1-100 E*	*105.36*
934871	*AD1-116 C*	*1.1*
934872	*AD1-116 E*	*1.79*
934971	*AD1-129 C*	*1.05*
934972	*AD1-129 E*	*0.7*
935001	*AD1-133 C O1*	*24.22*
935002	*AD1-133 E O1*	*16.14*
936291	*AD2-038 C O1*	*2.71*

936292	*AD2-038 E O1*	*18.14*
936371	*AD2-047 C O1*	*5.44*
936372	*AD2-047 E O1*	*26.58*
936461	*AD2-060*	*3.2*
936511	*AD2-066 C O1*	*9.74*
936512	*AD2-066 E O1*	*6.49*
936791	*AD2-102 C*	*16.39*
936792	*AD2-102 E*	*10.93*
937001	*AD2-134 C*	*3.*
937002	*AD2-134 E*	*11.96*
937311	*AD2-172 C*	*2.85*
937312	*AD2-172 E*	*3.94*
937401	*AD2-194 1*	*9.*
937411	*AD2-194 2*	*9.*
937531	*AD2-214 C*	*5.12*
937532	*AD2-214 E*	*3.42*
938511	*AE1-070 1*	*10.58*
938521	*AE1-070 2*	*9.68*
938851	*AE1-113 C O1*	*9.26*
938852	*AE1-113 E O1*	*32.83*
938861	*AE1-114 C O1*	*4.56*
938862	*AE1-114 E O1*	*15.54*
939051	*AE1-134 1*	*1.59*
939061	*AE1-134 2*	*1.59*
939321	*AE1-163 C O1*	*6.81*
939322	*AE1-163 E O1*	*41.83*
939351	*AE1-166 C O1*	*11.86*
939352	*AE1-166 E O1*	*10.95*
939401	*AE1-172 C O1*	*6.16*
939402	*AE1-172 E O1*	*28.85*
939631	*AE1-193 C O1*	*10.3*
939632	*AE1-193 E O1*	*68.91*
939641	*AE1-194 C*	*10.3*
939642	*AE1-194 E*	*68.91*
939651	*AE1-195 C*	*10.3*
939652	*AE1-195 E*	*68.91*
939681	*AE1-198 C O1*	*30.58*
939682	*AE1-198 E O1*	*25.98*
939741	*AE1-205 C O1*	*10.32*
939742	*AE1-205 E O1*	*14.25*
940101	*AE1-252 C O1*	*12.36*
940102	*AE1-252 E O1*	*8.24*
LTF	*BLUEG*	*0.64*
294401	*BSHIL;1U E*	*9.93*
294410	*BSHIL;2U E*	*9.93*

LTF	*CARR*	*0.87*
LTF	*CATAWBA*	*0.19*
274890	*CAYUG;1U E*	*15.86*
274891	*CAYUG;2U E*	*15.86*
LTF	*CBM-S1*	*4.21*
LTF	*CBM-W1*	*36.52*
LTF	*CBM-W2*	*84.42*
LTF	*CHOCTAW /* 35% REVERSE 4566958 4511400*	*< 0.01*
LTF	*CIN*	*3.51*
274859	*EASYR;U1 E*	*12.75*
274860	*EASYR;U2 E*	*12.75*
LTF	*G-007*	*2.42*
290051	*GSG-6; E*	*12.09*
LTF	*HAMLET*	*0.43*
LTF	*IPL*	*1.25*
954751	*J351*	*165.42*
275149	*KEMPTON ;1E*	*22.42*
990901	*L-005 E*	*14.6*
290108	*LEEDK;1U E*	*28.09*
LTF	*MEC*	*45.08*
293061	*N-015 E*	*17.64*
293516	*O-009 E1*	*10.59*
293517	*O-009 E2*	*5.38*
293518	*O-009 E3*	*5.92*
293715	*O-029 E*	*11.32*
293716	*O-029 E*	*6.21*
293717	*O-029 E*	*5.71*
293771	*O-035 E*	*7.42*
LTF	*O-066*	*15.53*
293644	*O22 E1*	*12.02*
293645	*O22 E2*	*23.33*
290021	*O50 E*	*22.45*
294392	*P-010 E*	*22.4*
294763	*P-046 E*	*10.86*
274888	*PILOT HIL;1E*	*22.42*
270859	*PWR VTR EC;R*	*14.01*
LTF	*RENSSELAER*	*0.69*
274724	*RIVER EC ;11*	*5.49*
274722	*S-055 E*	*13.02*
274795	*SE CHICAG;2U*	*1.29*
274788	*SE CHICAG;5U*	*1.31*
274789	*SE CHICAG;6U*	*1.31*
274790	*SE CHICAG;7U*	*1.31*
274791	*SE CHICAG;8U*	*1.31*

295111	*SUBLETTE E*	*3.15*
LTF	*TRIMBLE*	*0.12*
LTF	*WEC*	*9.25*
295109	*WESTBROOK E*	*6.48*
910542	*X3-005 E*	*1.*
915011	*Y3-013 1*	*4.34*
915021	*Y3-013 2*	*4.34*
915031	*Y3-013 3*	*4.34*
916211	*Z1-072 E*	*5.61*
916221	*Z1-073 E*	*6.24*
916502	*Z1-106 E1*	*1.46*
916504	*Z1-106 E2*	*1.46*
916512	*Z1-107 E*	*3.05*
916522	*Z1-108 E*	*2.88*
917502	*Z2-087 E*	*21.38*
918052	*AA1-018 E*	*18.85*
919221	*AA1-146*	*20.41*
919581	*AA2-030*	*20.41*
920272	*AA2-123 E*	*2.83*
930481	*AB1-089*	*76.13*
930501	*AB1-091 O1*	*88.69*
930741	*AB1-122 1O1*	*82.91*
930751	*AB1-122 2O1*	*85.44*
924041	*AB2-047 C O1*	*3.99*
924042	*AB2-047 E O1*	*26.73*
924471	*AB2-096*	*49.02*
925302	*AB2-191 E*	*1.6*
925581	*AC1-033 C*	*1.63*
925582	*AC1-033 E*	*10.89*
926311	*AC1-109 1*	*2.2*
926321	*AC1-109 2*	*2.2*
926331	*AC1-110 1*	*2.19*
926341	*AC1-110 2*	*2.19*
926351	*AC1-111 1*	*0.88*
926361	*AC1-111 2*	*0.88*
926371	*AC1-111 3*	*0.88*
926381	*AC1-111 4*	*0.88*
926391	*AC1-111 5*	*0.88*
926401	*AC1-111 6*	*0.88*
927511	*AC1-113 1*	*1.38*
927521	*AC1-113 2*	*1.38*
926431	*AC1-114*	*2.76*
927451	*AC1-142A 1*	*4.86*
927461	*AC1-142A 2*	*4.86*
926821	*AC1-168 C O1*	*1.33*

926822	*AC1-168 E O1*	*8.91*
927091	*AC1-204 1*	*83.73*
927101	*AC1-204 2*	*83.7*
927201	*AC1-214 C O1*	*2.38*
927202	*AC1-214 E O1*	*7.57*

Appendix 5

(CE - CE) The BRAIDWOOD; B-BRAIDWOOD; R 345 kV line (from bus 270670 to bus 270671 ckt 1) loads from 125.19% to 127.7% (AC power flow) of its load dump rating (1341 MVA) for the line fault with failed breaker contingency outage of 'ADD AD1-100 5'. This project contributes approximately 33.55 MW to the thermal violation.

CONTINGENCY 'ADD AD1-100 5'
OPEN BRANCH FROM BUS 934730 TO BUS 270710 CKT 1 / AD1-100 - DAVIS CREEK
OPEN BRANCH FROM BUS 934720 TO BUS 937030 CKT 1 / AD1-100 - AD2-137 TAP (WILTON)
END

Bus Number	*Bus Name*	*Full Contribution*
934721	*AD1-100 C*	*62.25*
934722	*AD1-100 E*	*290.51*
935001	*AD1-133 C O1*	*15.08*
935002	*AD1-133 E O1*	*10.06*
935141	*AD1-148*	*4.56*
937211	*AD2-159 C*	*3.8*
937212	*AD2-159 E*	*17.79*
939351	*AE1-166 C O1*	*34.51*
939352	*AE1-166 E O1*	*31.86*
939401	*AE1-172 C O1*	*12.99*
939402	*AE1-172 E O1*	*60.79*
939741	*AE1-205 C O1*	*14.09*
939742	*AE1-205 E O1*	*19.46*
940101	*AE1-252 C O1*	*26.04*
940102	*AE1-252 E O1*	*17.36*
274654	*BRAIDWOOD;1U*	*104.01*
274890	*CAYUG;1U E*	*29.51*
274891	*CAYUG;2U E*	*29.51*
274863	*CAYUGA RI;1U*	*1.3*
274864	*CAYUGA RI;2U*	*1.3*
LTF	*CBM-N*	*0.11*
LTF	*CBM-S1*	*3.67*
LTF	*CBM-S2*	*1.02*
LTF	*CBM-W2*	*45.27*
LTF	*CIN*	*3.71*
LTF	*CPLE*	*0.34*
LTF	*G-007A*	*0.38*
LTF	*IPL*	*1.98*
951741	*J474 C*	*1.72*

951742	*J474 E*	*9.29*
953741	*J826 C*	*1.05*
953742	*J826 E*	*5.69*
LTF	*LGEE*	*0.51*
LTF	*MEC*	*4.89*
LTF	*NYISO*	*0.46*
290261	*S-027 E*	*21.92*
290265	*S-028 E*	*21.92*
274853	*TWINGROVE;U1*	*0.97*
274854	*TWINGROVE;U2*	*0.97*
LTF	*VFT*	*1.02*
276150	*W2-048 E*	*1.26*
905081	*W4-005 C*	*0.93*
905082	*W4-005 E*	*29.99*
909052	*X2-022 E*	*17.44*
917501	*Z2-087 C*	*0.77*
917502	*Z2-087 E*	*29.19*
924041	*AB2-047 C O1*	*5.45*
924042	*AB2-047 E O1*	*36.49*
924261	*AB2-070 C O1*	*2.57*
924262	*AB2-070 E O1*	*17.23*
925771	*AC1-053 C*	*2.52*
925772	*AC1-053 E*	*16.9*

Appendix 6

(CE - AEP) The GREENACRE; T-05OLIVE 345 kV line (from bus 270771 to bus 243229 ckt 1) loads from 112.96% to 113.05% (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 13.79 MW to the thermal violation.

CONTINGENCY 'AEP_P4_#2978_05DUMONT 765_B'
OPEN BRANCH FROM BUS 243206 TO BUS 243207 CKT 1 / 243206 05DUMONT 765 243207 05GRNTWN 765 1
OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1 / 243206 05DUMONT 765 270644 WILTON ; 765 1
END

Bus Number	*Bus Name*	*Full Contribution*
932881	*AC2-115 1*	*1.59*
932891	*AC2-115 2*	*1.59*
932921	*AC2-116*	*0.56*
933411	*AC2-154 C*	*1.69*
933412	*AC2-154 E*	*2.76*
933911	*AD1-013 C*	*1.23*
933912	*AD1-013 E*	*1.96*
933931	*AD1-016 C*	*0.62*
933932	*AD1-016 E*	*1.02*
934051	*AD1-031 C O1*	*1.88*
934052	*AD1-031 E O1*	*3.07*
934101	*AD1-039 1*	*4.69*
934111	*AD1-039 2*	*4.9*
934431	*AD1-067 C*	*0.09*
934432	*AD1-067 E*	*0.37*
934701	*AD1-098 C O1*	*4.6*
934702	*AD1-098 E O1*	*3.35*
934721	*AD1-100 C*	*13.01*
934722	*AD1-100 E*	*60.71*
934871	*AD1-116 C*	*0.62*
934872	*AD1-116 E*	*1.01*
934971	*AD1-129 C*	*0.61*
934972	*AD1-129 E*	*0.4*
935001	*AD1-133 C O1*	*13.81*
935002	*AD1-133 E O1*	*9.21*
936291	*AD2-038 C O1*	*1.55*
936292	*AD2-038 E O1*	*10.38*
936371	*AD2-047 C O1*	*3.03*

936372	*AD2-047 E O1*	*14.78*
936461	*AD2-060*	*1.78*
936511	*AD2-066 C O1*	*5.6*
936512	*AD2-066 E O1*	*3.73*
936791	*AD2-102 C*	*9.47*
936792	*AD2-102 E*	*6.31*
937001	*AD2-134 C*	*1.73*
937002	*AD2-134 E*	*6.9*
937311	*AD2-172 C*	*1.65*
937312	*AD2-172 E*	*2.27*
937401	*AD2-194 1*	*5.27*
937411	*AD2-194 2*	*5.27*
937531	*AD2-214 C*	*2.94*
937532	*AD2-214 E*	*1.96*
938511	*AE1-070 1*	*6.19*
938521	*AE1-070 2*	*5.66*
938851	*AE1-113 C O1*	*5.39*
938852	*AE1-113 E O1*	*19.1*
938861	*AE1-114 C O1*	*2.63*
938862	*AE1-114 E O1*	*8.96*
939051	*AE1-134 1*	*0.91*
939061	*AE1-134 2*	*0.91*
939321	*AE1-163 C O1*	*3.9*
939322	*AE1-163 E O1*	*23.94*
939351	*AE1-166 C O1*	*6.87*
939352	*AE1-166 E O1*	*6.34*
939401	*AE1-172 C O1*	*3.5*
939402	*AE1-172 E O1*	*16.4*
939631	*AE1-193 C O1*	*10.91*
939632	*AE1-193 E O1*	*73.04*
939641	*AE1-194 C*	*10.91*
939642	*AE1-194 E*	*73.04*
939651	*AE1-195 C*	*10.91*
939652	*AE1-195 E*	*73.04*
939681	*AE1-198 C O1*	*32.41*
939682	*AE1-198 E O1*	*27.54*
939741	*AE1-205 C O1*	*5.79*
939742	*AE1-205 E O1*	*8.*
940101	*AE1-252 C O1*	*7.02*
940102	*AE1-252 E O1*	*4.68*
LTF	*BLUEG*	*2.63*
294401	*BSHIL;1U E*	*5.66*
294410	*BSHIL;2U E*	*5.66*
LTF	*CARR*	*0.48*
LTF	*CATAWBA*	*0.15*

274890	*CAYUG;1U E*	*8.97*
274891	*CAYUG;2U E*	*8.97*
LTF	*CBM-S1*	*1.49*
LTF	*CBM-W1*	*20.35*
LTF	*CBM-W2*	*39.71*
LTF	*CHOCTAW /* 35% REVERSE 4566958 4511400*	*< 0.01*
LTF	*CIN*	*0.23*
274751	*CRETE EC ;1U*	*2.22*
274752	*CRETE EC ;2U*	*2.22*
274753	*CRETE EC ;3U*	*2.22*
274754	*CRETE EC ;4U*	*2.22*
274859	*EASYR;U1 E*	*7.34*
274860	*EASYR;U2 E*	*7.34*
LTF	*G-007*	*1.33*
290051	*GSG-6; E*	*6.98*
LTF	*HAMLET*	*0.3*
953871	*J847*	*2.7*
275149	*KEMPTON ;1E*	*12.46*
990901	*L-005 E*	*8.29*
290108	*LEEDK;1U E*	*16.23*
LTF	*MEC*	*25.26*
293061	*N-015 E*	*10.29*
293516	*O-009 E1*	*6.08*
293517	*O-009 E2*	*3.09*
293518	*O-009 E3*	*3.4*
293715	*O-029 E*	*6.5*
293716	*O-029 E*	*3.56*
293717	*O-029 E*	*3.28*
293771	*O-035 E*	*4.23*
LTF	*O-066*	*8.55*
293644	*O22 E1*	*7.28*
293645	*O22 E2*	*14.13*
290021	*O50 E*	*13.06*
294392	*P-010 E*	*13.07*
294763	*P-046 E*	*6.27*
274888	*PILOT HIL;1E*	*12.46*
270859	*PWR VTR EC;R*	*8.1*
LTF	*RENSSELAER*	*0.38*
274722	*S-055 E*	*7.56*
295111	*SUBLETTE E*	*1.82*
LTF	*TRIMBLE*	*0.32*
LTF	*WEC*	*5.35*
295109	*WESTBROOK E*	*3.74*
910542	*X3-005 E*	*0.52*

915011	*Y3-013 1*	*2.52*
915021	*Y3-013 2*	*2.52*
915031	*Y3-013 3*	*2.52*
916211	*Z1-072 E*	*3.2*
916221	*Z1-073 E*	*3.6*
916502	*Z1-106 E1*	*0.85*
916504	*Z1-106 E2*	*0.85*
916512	*Z1-107 E*	*1.72*
916522	*Z1-108 E*	*1.67*
917502	*Z2-087 E*	*11.99*
918052	*AA1-018 E*	*10.68*
919221	*AA1-146*	*11.73*
919581	*AA2-030*	*11.73*
920272	*AA2-123 E*	*1.64*
930481	*AB1-089*	*44.01*
930501	*AB1-091 O1*	*49.4*
930741	*AB1-122 1O1*	*47.85*
930751	*AB1-122 2O1*	*50.02*
924041	*AB2-047 C O1*	*2.24*
924042	*AB2-047 E O1*	*14.99*
924471	*AB2-096*	*28.36*
925302	*AB2-191 E*	*0.92*
925581	*AC1-033 C*	*0.93*
925582	*AC1-033 E*	*6.21*
926311	*AC1-109 1*	*1.28*
926321	*AC1-109 2*	*1.28*
926331	*AC1-110 1*	*1.27*
926341	*AC1-110 2*	*1.27*
926351	*AC1-111 1*	*0.51*
926361	*AC1-111 2*	*0.51*
926371	*AC1-111 3*	*0.51*
926381	*AC1-111 4*	*0.51*
926391	*AC1-111 5*	*0.51*
926401	*AC1-111 6*	*0.51*
927511	*AC1-113 1*	*0.8*
927521	*AC1-113 2*	*0.8*
926431	*AC1-114*	*1.59*
927451	*AC1-142A 1*	*2.85*
927461	*AC1-142A 2*	*2.85*
926821	*AC1-168 C O1*	*0.76*
926822	*AC1-168 E O1*	*5.11*
927091	*AC1-204 1*	*49.02*
927101	*AC1-204 2*	*48.98*
927201	*AC1-214 C O1*	*1.36*
927202	*AC1-214 E O1*	*4.32*

Appendix 7

(CE - CE) The WILTON ; B-WILTON ;3M 345 kV line (from bus 270926 to bus 275232 ckt 1) loads from 114.33% to 116.24% (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 29.77 MW to the thermal violation.

CONTINGENCY 'COMED_P4_112-65-BT5-6__'
TRIP BRANCH FROM BUS 270644 TO BUS 270607 CKT 1 / WILTO; 765 COLLI; 765
TRIP BRANCH FROM BUS 275233 TO BUS 270644 CKT 1 / WILTO;4M 345 WILTO; 765
TRIP BRANCH FROM BUS 275233 TO BUS 270927 CKT 1 / WILTO;4M 345 WILTO; R 345
TRIP BRANCH FROM BUS 275233 TO BUS 275333 CKT 1 / WILTO;4M 345 WILTO;4C 33
END

Bus Number	*Bus Name*	*Full Contribution*
932881	*AC2-115 1*	*2.93*
932891	*AC2-115 2*	*2.93*
932921	*AC2-116*	*1.03*
932931	*AC2-117*	*6.56*
933411	*AC2-154 C*	*3.22*
933412	*AC2-154 E*	*5.25*
933911	*AD1-013 C*	*2.27*
933912	*AD1-013 E*	*3.62*
933931	*AD1-016 C*	*1.14*
933932	*AD1-016 E*	*1.86*
934051	*AD1-031 C O1*	*3.54*
934052	*AD1-031 E O1*	*5.77*
934101	*AD1-039 1*	*8.8*
934111	*AD1-039 2*	*8.9*
934431	*AD1-067 C*	*0.16*
934432	*AD1-067 E*	*0.68*
934701	*AD1-098 C O1*	*8.47*
934702	*AD1-098 E O1*	*6.18*
934721	*AD1-100 C*	*29.56*
934722	*AD1-100 E*	*137.94*
934871	*AD1-116 C*	*1.18*
934872	*AD1-116 E*	*1.92*
934971	*AD1-129 C*	*1.11*
934972	*AD1-129 E*	*0.74*

935001	*AD1-133 C O1*	*27.56*
935002	*AD1-133 E O1*	*18.38*
936291	*AD2-038 C O1*	*2.9*
936292	*AD2-038 E O1*	*19.39*
936371	*AD2-047 C O1*	*5.76*
936372	*AD2-047 E O1*	*28.14*
936461	*AD2-060*	*3.39*
936511	*AD2-066 C O1*	*10.42*
936512	*AD2-066 E O1*	*6.95*
936791	*AD2-102 C*	*17.41*
936792	*AD2-102 E*	*11.6*
937001	*AD2-134 C*	*3.19*
937002	*AD2-134 E*	*12.73*
937311	*AD2-172 C*	*3.03*
937312	*AD2-172 E*	*4.18*
937401	*AD2-194 1*	*9.61*
937411	*AD2-194 2*	*9.61*
937531	*AD2-214 C*	*5.44*
937532	*AD2-214 E*	*3.63*
938511	*AE1-070 1*	*11.29*
938521	*AE1-070 2*	*10.33*
938851	*AE1-113 C O1*	*9.85*
938852	*AE1-113 E O1*	*34.92*
938861	*AE1-114 C O1*	*4.84*
938862	*AE1-114 E O1*	*16.51*
939051	*AE1-134 1*	*1.68*
939061	*AE1-134 2*	*1.68*
939321	*AE1-163 C O1*	*7.28*
939322	*AE1-163 E O1*	*44.73*
939351	*AE1-166 C O1*	*14.59*
939352	*AE1-166 E O1*	*13.47*
939401	*AE1-172 C O1*	*8.13*
939402	*AE1-172 E O1*	*38.05*
939741	*AE1-205 C O1*	*12.5*
939742	*AE1-205 E O1*	*17.27*
940101	*AE1-252 C O1*	*16.3*
940102	*AE1-252 E O1*	*10.87*
LTF	*BLUEG*	*7.45*
294401	*BSHIL;1U E*	*10.64*
294410	*BSHIL;2U E*	*10.64*
LTF	*CALDERWOOD*	*0.05*
LTF	*CANNELTON*	*0.06*
LTF	*CARR*	*0.93*
LTF	*CATAWBA*	*0.36*
274890	*CAYUG;1U E*	*20.35*

274891	*CAYUG;2U E*	*20.35*
LTF	*CBM-S1*	*2.09*
LTF	*CBM-W1*	*37.96*
LTF	*CBM-W2*	*73.38*
LTF	*CHEOAH*	*0.06*
LTF	*CHOCTAW /* 35% REVERSE 4566958 4511400*	*< 0.01*
LTF	*CIN*	*0.17*
274859	*EASYR;U1 E*	*13.54*
274860	*EASYR;U2 E*	*13.54*
LTF	*G-007*	*2.61*
290051	*GSG-6; E*	*12.87*
LTF	*HAMLET*	*0.68*
275149	*KEMPTON ;1E*	*23.73*
990901	*L-005 E*	*15.65*
290108	*LEEDK;1U E*	*29.9*
274772	*LINCOLN ;3U*	*3.87*
274773	*LINCOLN ;4U*	*3.87*
274774	*LINCOLN ;5U*	*3.87*
274775	*LINCOLN ;6U*	*3.87*
274776	*LINCOLN ;7U*	*3.87*
274777	*LINCOLN ;8U*	*3.87*
LTF	*MEC*	*46.95*
293061	*N-015 E*	*19.54*
293516	*O-009 E1*	*11.26*
293517	*O-009 E2*	*5.72*
293518	*O-009 E3*	*6.3*
293715	*O-029 E*	*12.04*
293716	*O-029 E*	*6.6*
293717	*O-029 E*	*6.07*
293771	*O-035 E*	*7.97*
LTF	*O-066*	*16.73*
293644	*O22 E1*	*12.62*
293645	*O22 E2*	*24.5*
290021	*O50 E*	*23.88*
294392	*P-010 E*	*24.82*
294763	*P-046 E*	*11.54*
274888	*PILOT HIL;1E*	*23.73*
270859	*PWR VTR EC;R*	*14.89*
LTF	*RENSSELAER*	*0.73*
290261	*S-027 E*	*20.54*
290265	*S-028 E*	*20.54*
274722	*S-055 E*	*13.83*
295111	*SUBLETTE E*	*3.35*
LTF	*TRIMBLE*	*0.89*

LTF	WEC	9.8
295109	WESTBROOK E	6.89
910542	X3-005 E	0.9
915011	Y3-013 1	4.61
915021	Y3-013 2	4.61
915031	Y3-013 3	4.61
916211	Z1-072 E	6.03
916221	Z1-073 E	6.64
916502	Z1-106 E1	1.56
916504	Z1-106 E2	1.56
916512	Z1-107 E	3.18
916522	Z1-108 E	3.06
917502	Z2-087 E	25.9
918052	AA1-018 E	20.24
919221	AA1-146	21.67
919581	AA2-030	21.67
920272	AA2-123 E	3.01
930481	AB1-089	80.94
930501	AB1-091 O1	94.42
930741	AB1-122 1O1	89.83
930751	AB1-122 2O1	90.78
924041	AB2-047 C O1	4.84
924042	AB2-047 E O1	32.38
924471	AB2-096	52.12
925302	AB2-191 E	1.7
925581	AC1-033 C	1.74
925582	AC1-033 E	11.67
926311	AC1-109 1	2.35
926321	AC1-109 2	2.35
926331	AC1-110 1	2.34
926341	AC1-110 2	2.34
926351	AC1-111 1	0.94
926361	AC1-111 2	0.94
926371	AC1-111 3	0.94
926381	AC1-111 4	0.94
926391	AC1-111 5	0.94
926401	AC1-111 6	0.94
927511	AC1-113 1	1.46
927521	AC1-113 2	1.46
926431	AC1-114	2.93
927451	AC1-142A 1	5.15
927461	AC1-142A 2	5.15
926821	AC1-168 C O1	1.44
926822	AC1-168 E O1	9.65
927091	AC1-204 1	89.38

927101	*AC1-204 2*	*89.38*
927201	*AC1-214 C O1*	*2.56*
927202	*AC1-214 E O1*	*8.13*

Appendix 8

(CE - CE) The WILTON ; R-WILTON ;4M 345 kV line (from bus 270927 to bus 275233 ckt 1) loads from 116.71% to 118.65% (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 30.38 MW to the thermal violation.

CONTINGENCY 'COMED_P4_112-65-BT2-3__'
TRIP BRANCH FROM BUS 270644 TO BUS 270607 CKT 1 / WILTO; 765 COLLI; 765
TRIP BRANCH FROM BUS 275232 TO BUS 270644 CKT 1 / WILTO;3M 345 WILTO; 765
TRIP BRANCH FROM BUS 275232 TO BUS 270926 CKT 1 / WILTO;3M 345 WILTO; B 345
TRIP BRANCH FROM BUS 275232 TO BUS 275332 CKT 1 / WILTO;3M 345 WILTO;3C 33
END

Bus Number	*Bus Name*	*Full Contribution*
932881	*AC2-115 1*	*2.99*
932891	*AC2-115 2*	*2.99*
932921	*AC2-116*	*1.05*
932931	*AC2-117*	*6.7*
933411	*AC2-154 C*	*3.29*
933412	*AC2-154 E*	*5.36*
933911	*AD1-013 C*	*2.31*
933912	*AD1-013 E*	*3.7*
933931	*AD1-016 C*	*1.17*
933932	*AD1-016 E*	*1.9*
934051	*AD1-031 C O1*	*3.61*
934052	*AD1-031 E O1*	*5.9*
934101	*AD1-039 1*	*8.99*
934111	*AD1-039 2*	*9.09*
934431	*AD1-067 C*	*0.17*
934432	*AD1-067 E*	*0.69*
934701	*AD1-098 C O1*	*8.65*
934702	*AD1-098 E O1*	*6.32*
934721	*AD1-100 C*	*30.14*
934722	*AD1-100 E*	*140.67*
934871	*AD1-116 C*	*1.2*
934872	*AD1-116 E*	*1.96*
934971	*AD1-129 C*	*1.14*
934972	*AD1-129 E*	*0.76*

935001	*AD1-133 C O1*	*28.14*
935002	*AD1-133 E O1*	*18.76*
936291	*AD2-038 C O1*	*2.96*
936292	*AD2-038 E O1*	*19.81*
936371	*AD2-047 C O1*	*5.88*
936372	*AD2-047 E O1*	*28.72*
936461	*AD2-060*	*3.46*
936511	*AD2-066 C O1*	*10.64*
936512	*AD2-066 E O1*	*7.09*
936791	*AD2-102 C*	*17.78*
936792	*AD2-102 E*	*11.85*
937001	*AD2-134 C*	*3.26*
937002	*AD2-134 E*	*13.*
937311	*AD2-172 C*	*3.09*
937312	*AD2-172 E*	*4.27*
937401	*AD2-194 1*	*9.82*
937411	*AD2-194 2*	*9.82*
937531	*AD2-214 C*	*5.55*
937532	*AD2-214 E*	*3.7*
938511	*AE1-070 1*	*11.54*
938521	*AE1-070 2*	*10.55*
938851	*AE1-113 C O1*	*10.06*
938852	*AE1-113 E O1*	*35.67*
938861	*AE1-114 C O1*	*4.94*
938862	*AE1-114 E O1*	*16.87*
939051	*AE1-134 1*	*1.72*
939061	*AE1-134 2*	*1.72*
939321	*AE1-163 C O1*	*7.44*
939322	*AE1-163 E O1*	*45.7*
939351	*AE1-166 C O1*	*14.88*
939352	*AE1-166 E O1*	*13.74*
939401	*AE1-172 C O1*	*8.29*
939402	*AE1-172 E O1*	*38.81*
939741	*AE1-205 C O1*	*12.76*
939742	*AE1-205 E O1*	*17.62*
940101	*AE1-252 C O1*	*16.62*
940102	*AE1-252 E O1*	*11.08*
LTF	*BLUEG*	*7.61*
294401	*BSHIL;1U E*	*10.87*
294410	*BSHIL;2U E*	*10.87*
LTF	*CALDERWOOD*	*0.05*
LTF	*CANNELTON*	*0.06*
LTF	*CARR*	*0.95*
LTF	*CATAWBA*	*0.36*
274890	*CAYUG;1U E*	*20.76*

274891	CAYUG;2U E	20.76
LTF	CBM-S1	2.13
LTF	CBM-W1	38.77
LTF	CBM-W2	74.91
LTF	CHEOAH	0.06
LTF	CHOCTAW /* 35% REVERSE 4566958 4511400	< 0.01
LTF	CIN	0.17
274859	EASYR;U1 E	13.83
274860	EASYR;U2 E	13.83
LTF	G-007	2.66
290051	GSG-6; E	13.15
LTF	HAMLET	0.69
275149	KEMPTON ;1E	24.23
990901	L-005 E	15.98
290108	LEEDK;1U E	30.54
274772	LINCOLN ;3U	3.98
274773	LINCOLN ;4U	3.98
274774	LINCOLN ;5U	3.98
274775	LINCOLN ;6U	3.98
274776	LINCOLN ;7U	3.98
274777	LINCOLN ;8U	3.98
LTF	MEC	47.95
293061	N-015 E	19.95
293516	O-009 E1	11.5
293517	O-009 E2	5.84
293518	O-009 E3	6.43
293715	O-029 E	12.29
293716	O-029 E	6.74
293717	O-029 E	6.2
293771	O-035 E	8.13
LTF	O-066	17.09
293644	O22 E1	12.89
293645	O22 E2	25.02
290021	O50 E	24.39
294392	P-010 E	25.34
294763	P-046 E	11.79
274888	PILOT HIL;1E	24.23
270859	PWR VTR EC;R	15.21
LTF	RENSSELAER	0.75
290261	S-027 E	20.95
290265	S-028 E	20.95
274722	S-055 E	14.12
295111	SUBLETTE E	3.42
LTF	TRIMBLE	0.91

LTF	WEC	10.01
295109	WESTBROOK E	7.04
910542	X3-005 E	0.92
915011	Y3-013 1	4.71
915021	Y3-013 2	4.71
915031	Y3-013 3	4.71
916211	Z1-072 E	6.16
916221	Z1-073 E	6.78
916502	Z1-106 E1	1.59
916504	Z1-106 E2	1.59
916512	Z1-107 E	3.25
916522	Z1-108 E	3.13
917502	Z2-087 E	26.43
918052	AA1-018 E	20.68
919221	AA1-146	22.13
919581	AA2-030	22.13
920272	AA2-123 E	3.07
930481	AB1-089	82.66
930501	AB1-091 O1	96.38
930741	AB1-122 1O1	91.73
930751	AB1-122 2O1	92.72
924041	AB2-047 C O1	4.94
924042	AB2-047 E O1	33.03
924471	AB2-096	53.23
925302	AB2-191 E	1.74
925581	AC1-033 C	1.78
925582	AC1-033 E	11.91
926311	AC1-109 1	2.4
926321	AC1-109 2	2.4
926331	AC1-110 1	2.39
926341	AC1-110 2	2.39
926351	AC1-111 1	0.96
926361	AC1-111 2	0.96
926371	AC1-111 3	0.96
926381	AC1-111 4	0.96
926391	AC1-111 5	0.96
926401	AC1-111 6	0.96
927511	AC1-113 1	1.5
927521	AC1-113 2	1.5
926431	AC1-114	2.99
927451	AC1-142A 1	5.26
927461	AC1-142A 2	5.26
926821	AC1-168 C O1	1.47
926822	AC1-168 E O1	9.85
927091	AC1-204 1	91.3

927101	*AC1-204 2*	*91.3*
927201	*AC1-214 C O1*	*2.61*
927202	*AC1-214 E O1*	*8.3*

Appendix 9

(CE - CE) The WILTON ; 765/345 kV transformer (from bus 275232 to bus 270644 ckt 1) loads from 114.05% to 115.96% (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 29.77 MW to the thermal violation.

CONTINGENCY 'COMED_P4_112-65-BT5-6__'
TRIP BRANCH FROM BUS 270644 TO BUS 270607 CKT 1 / WILTO; 765 COLLI; 765
TRIP BRANCH FROM BUS 275233 TO BUS 270644 CKT 1 / WILTO;4M 345 WILTO; 765
TRIP BRANCH FROM BUS 275233 TO BUS 270927 CKT 1 / WILTO;4M 345 WILTO; R 345
TRIP BRANCH FROM BUS 275233 TO BUS 275333 CKT 1 / WILTO;4M 345 WILTO;4C 33
END

Bus Number	*Bus Name*	*Full Contribution*
932881	*AC2-115 1*	*2.93*
932891	*AC2-115 2*	*2.93*
932921	*AC2-116*	*1.03*
932931	*AC2-117*	*6.56*
933411	*AC2-154 C*	*3.22*
933412	*AC2-154 E*	*5.25*
933911	*AD1-013 C*	*2.27*
933912	*AD1-013 E*	*3.62*
933931	*AD1-016 C*	*1.14*
933932	*AD1-016 E*	*1.86*
934051	*AD1-031 C O1*	*3.54*
934052	*AD1-031 E O1*	*5.77*
934101	*AD1-039 1*	*8.8*
934111	*AD1-039 2*	*8.9*
934431	*AD1-067 C*	*0.16*
934432	*AD1-067 E*	*0.68*
934701	*AD1-098 C O1*	*8.47*
934702	*AD1-098 E O1*	*6.18*
934721	*AD1-100 C*	*29.56*
934722	*AD1-100 E*	*137.94*
934871	*AD1-116 C*	*1.18*
934872	*AD1-116 E*	*1.92*
934971	*AD1-129 C*	*1.11*
934972	*AD1-129 E*	*0.74*

935001	*AD1-133 C O1*	*27.56*
935002	*AD1-133 E O1*	*18.38*
936291	*AD2-038 C O1*	*2.9*
936292	*AD2-038 E O1*	*19.39*
936371	*AD2-047 C O1*	*5.76*
936372	*AD2-047 E O1*	*28.14*
936461	*AD2-060*	*3.39*
936511	*AD2-066 C O1*	*10.42*
936512	*AD2-066 E O1*	*6.95*
936791	*AD2-102 C*	*17.41*
936792	*AD2-102 E*	*11.6*
937001	*AD2-134 C*	*3.19*
937002	*AD2-134 E*	*12.73*
937311	*AD2-172 C*	*3.03*
937312	*AD2-172 E*	*4.18*
937401	*AD2-194 1*	*9.61*
937411	*AD2-194 2*	*9.61*
937531	*AD2-214 C*	*5.44*
937532	*AD2-214 E*	*3.63*
938511	*AE1-070 1*	*11.29*
938521	*AE1-070 2*	*10.33*
938851	*AE1-113 C O1*	*9.85*
938852	*AE1-113 E O1*	*34.92*
938861	*AE1-114 C O1*	*4.84*
938862	*AE1-114 E O1*	*16.51*
939051	*AE1-134 1*	*1.68*
939061	*AE1-134 2*	*1.68*
939321	*AE1-163 C O1*	*7.28*
939322	*AE1-163 E O1*	*44.73*
939351	*AE1-166 C O1*	*14.59*
939352	*AE1-166 E O1*	*13.47*
939401	*AE1-172 C O1*	*8.13*
939402	*AE1-172 E O1*	*38.05*
939741	*AE1-205 C O1*	*12.5*
939742	*AE1-205 E O1*	*17.27*
940101	*AE1-252 C O1*	*16.3*
940102	*AE1-252 E O1*	*10.87*
LTF	*BLUEG*	*7.45*
294401	*BSHIL;1U E*	*10.64*
294410	*BSHIL;2U E*	*10.64*
LTF	*CALDERWOOD*	*0.05*
LTF	*CANNELTON*	*0.06*
LTF	*CARR*	*0.93*
LTF	*CATAWBA*	*0.36*
274890	*CAYUG;1U E*	*20.35*

274891	*CAYUG;2U E*	*20.35*
LTF	*CBM-S1*	*2.09*
LTF	*CBM-W1*	*37.96*
LTF	*CBM-W2*	*73.38*
LTF	*CHEOAH*	*0.06*
LTF	*CHOCTAW /* 35% REVERSE 4566958 4511400*	*< 0.01*
LTF	*CIN*	*0.17*
274859	*EASYR;U1 E*	*13.54*
274860	*EASYR;U2 E*	*13.54*
LTF	*G-007*	*2.61*
290051	*GSG-6; E*	*12.87*
LTF	*HAMLET*	*0.68*
275149	*KEMPTON ;1E*	*23.73*
990901	*L-005 E*	*15.65*
290108	*LEEDK;1U E*	*29.9*
274772	*LINCOLN ;3U*	*3.87*
274773	*LINCOLN ;4U*	*3.87*
274774	*LINCOLN ;5U*	*3.87*
274775	*LINCOLN ;6U*	*3.87*
274776	*LINCOLN ;7U*	*3.87*
274777	*LINCOLN ;8U*	*3.87*
LTF	*MEC*	*46.95*
293061	*N-015 E*	*19.54*
293516	*O-009 E1*	*11.26*
293517	*O-009 E2*	*5.72*
293518	*O-009 E3*	*6.3*
293715	*O-029 E*	*12.04*
293716	*O-029 E*	*6.6*
293717	*O-029 E*	*6.07*
293771	*O-035 E*	*7.97*
LTF	*O-066*	*16.73*
293644	*O22 E1*	*12.62*
293645	*O22 E2*	*24.5*
290021	*O50 E*	*23.88*
294392	*P-010 E*	*24.82*
294763	*P-046 E*	*11.54*
274888	*PILOT HIL;1E*	*23.73*
270859	*PWR VTR EC;R*	*14.89*
LTF	*RENSSELAER*	*0.73*
290261	*S-027 E*	*20.54*
290265	*S-028 E*	*20.54*
274722	*S-055 E*	*13.83*
295111	*SUBLETTE E*	*3.35*
LTF	*TRIMBLE*	*0.89*

LTF	WEC	9.8
295109	WESTBROOK E	6.89
910542	X3-005 E	0.9
915011	Y3-013 1	4.61
915021	Y3-013 2	4.61
915031	Y3-013 3	4.61
916211	Z1-072 E	6.03
916221	Z1-073 E	6.64
916502	Z1-106 E1	1.56
916504	Z1-106 E2	1.56
916512	Z1-107 E	3.18
916522	Z1-108 E	3.06
917502	Z2-087 E	25.9
918052	AA1-018 E	20.24
919221	AA1-146	21.67
919581	AA2-030	21.67
920272	AA2-123 E	3.01
930481	AB1-089	80.94
930501	AB1-091 O1	94.42
930741	AB1-122 1O1	89.83
930751	AB1-122 2O1	90.78
924041	AB2-047 C O1	4.84
924042	AB2-047 E O1	32.38
924471	AB2-096	52.12
925302	AB2-191 E	1.7
925581	AC1-033 C	1.74
925582	AC1-033 E	11.67
926311	AC1-109 1	2.35
926321	AC1-109 2	2.35
926331	AC1-110 1	2.34
926341	AC1-110 2	2.34
926351	AC1-111 1	0.94
926361	AC1-111 2	0.94
926371	AC1-111 3	0.94
926381	AC1-111 4	0.94
926391	AC1-111 5	0.94
926401	AC1-111 6	0.94
927511	AC1-113 1	1.46
927521	AC1-113 2	1.46
926431	AC1-114	2.93
927451	AC1-142A 1	5.15
927461	AC1-142A 2	5.15
926821	AC1-168 C O1	1.44
926822	AC1-168 E O1	9.65
927091	AC1-204 1	89.38

927101	*AC1-204 2*	*89.38*
927201	*AC1-214 C O1*	*2.56*
927202	*AC1-214 E O1*	*8.13*

Appendix 10

(CE - CE) The WILTON ; 765/345 kV transformer (from bus 275233 to bus 270644 ckt 1) loads from 116.42% to 118.37% (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 30.38 MW to the thermal violation.

CONTINGENCY 'COMED_P4_112-65-BT2-3__'
TRIP BRANCH FROM BUS 270644 TO BUS 270607 CKT 1 / WILTO; 765 COLLI; 765
TRIP BRANCH FROM BUS 275232 TO BUS 270644 CKT 1 / WILTO;3M 345 WILTO; 765
TRIP BRANCH FROM BUS 275232 TO BUS 270926 CKT 1 / WILTO;3M 345 WILTO; B 345
TRIP BRANCH FROM BUS 275232 TO BUS 275332 CKT 1 / WILTO;3M 345 WILTO;3C 33
END

Bus Number	*Bus Name*	*Full Contribution*
932881	*AC2-115 1*	*2.99*
932891	*AC2-115 2*	*2.99*
932921	*AC2-116*	*1.05*
932931	*AC2-117*	*6.7*
933411	*AC2-154 C*	*3.29*
933412	*AC2-154 E*	*5.36*
933911	*AD1-013 C*	*2.31*
933912	*AD1-013 E*	*3.7*
933931	*AD1-016 C*	*1.17*
933932	*AD1-016 E*	*1.9*
934051	*AD1-031 C O1*	*3.61*
934052	*AD1-031 E O1*	*5.9*
934101	*AD1-039 1*	*8.99*
934111	*AD1-039 2*	*9.09*
934431	*AD1-067 C*	*0.17*
934432	*AD1-067 E*	*0.69*
934701	*AD1-098 C O1*	*8.65*
934702	*AD1-098 E O1*	*6.32*
934721	*AD1-100 C*	*30.14*
934722	*AD1-100 E*	*140.67*
934871	*AD1-116 C*	*1.2*
934872	*AD1-116 E*	*1.96*
934971	*AD1-129 C*	*1.14*
934972	*AD1-129 E*	*0.76*

935001	*AD1-133 C O1*	*28.14*
935002	*AD1-133 E O1*	*18.76*
936291	*AD2-038 C O1*	*2.96*
936292	*AD2-038 E O1*	*19.81*
936371	*AD2-047 C O1*	*5.88*
936372	*AD2-047 E O1*	*28.72*
936461	*AD2-060*	*3.46*
936511	*AD2-066 C O1*	*10.64*
936512	*AD2-066 E O1*	*7.09*
936791	*AD2-102 C*	*17.78*
936792	*AD2-102 E*	*11.85*
937001	*AD2-134 C*	*3.26*
937002	*AD2-134 E*	*13.*
937311	*AD2-172 C*	*3.09*
937312	*AD2-172 E*	*4.27*
937401	*AD2-194 1*	*9.82*
937411	*AD2-194 2*	*9.82*
937531	*AD2-214 C*	*5.55*
937532	*AD2-214 E*	*3.7*
938511	*AE1-070 1*	*11.54*
938521	*AE1-070 2*	*10.55*
938851	*AE1-113 C O1*	*10.06*
938852	*AE1-113 E O1*	*35.67*
938861	*AE1-114 C O1*	*4.94*
938862	*AE1-114 E O1*	*16.87*
939051	*AE1-134 1*	*1.72*
939061	*AE1-134 2*	*1.72*
939321	*AE1-163 C O1*	*7.44*
939322	*AE1-163 E O1*	*45.7*
939351	*AE1-166 C O1*	*14.88*
939352	*AE1-166 E O1*	*13.74*
939401	*AE1-172 C O1*	*8.29*
939402	*AE1-172 E O1*	*38.81*
939741	*AE1-205 C O1*	*12.76*
939742	*AE1-205 E O1*	*17.62*
940101	*AE1-252 C O1*	*16.62*
940102	*AE1-252 E O1*	*11.08*
LTF	*BLUEG*	*7.61*
294401	*BSHIL;1U E*	*10.87*
294410	*BSHIL;2U E*	*10.87*
LTF	*CALDERWOOD*	*0.05*
LTF	*CANNELTON*	*0.06*
LTF	*CARR*	*0.95*
LTF	*CATAWBA*	*0.36*
274890	*CAYUG;1U E*	*20.76*

274891	*CAYUG;2U E*	*20.76*
LTF	*CBM-S1*	*2.13*
LTF	*CBM-W1*	*38.77*
LTF	*CBM-W2*	*74.91*
LTF	*CHEOAH*	*0.06*
LTF	*CHOCTAW /* 35% REVERSE 4566958 4511400*	*< 0.01*
LTF	*CIN*	*0.17*
274859	*EASYR;U1 E*	*13.83*
274860	*EASYR;U2 E*	*13.83*
LTF	*G-007*	*2.66*
290051	*GSG-6; E*	*13.15*
LTF	*HAMLET*	*0.69*
275149	*KEMPTON ;1E*	*24.23*
990901	*L-005 E*	*15.98*
290108	*LEEDK;1U E*	*30.54*
274772	*LINCOLN ;3U*	*3.98*
274773	*LINCOLN ;4U*	*3.98*
274774	*LINCOLN ;5U*	*3.98*
274775	*LINCOLN ;6U*	*3.98*
274776	*LINCOLN ;7U*	*3.98*
274777	*LINCOLN ;8U*	*3.98*
LTF	*MEC*	*47.95*
293061	*N-015 E*	*19.95*
293516	*O-009 E1*	*11.5*
293517	*O-009 E2*	*5.84*
293518	*O-009 E3*	*6.43*
293715	*O-029 E*	*12.29*
293716	*O-029 E*	*6.74*
293717	*O-029 E*	*6.2*
293771	*O-035 E*	*8.13*
LTF	*O-066*	*17.09*
293644	*O22 E1*	*12.89*
293645	*O22 E2*	*25.02*
290021	*O50 E*	*24.39*
294392	*P-010 E*	*25.34*
294763	*P-046 E*	*11.79*
274888	*PILOT HIL;1E*	*24.23*
270859	*PWR VTR EC;R*	*15.21*
LTF	*RENSSELAER*	*0.75*
290261	*S-027 E*	*20.95*
290265	*S-028 E*	*20.95*
274722	*S-055 E*	*14.12*
295111	*SUBLETTE E*	*3.42*
LTF	*TRIMBLE*	*0.91*

LTF	WEC	10.01
295109	WESTBROOK E	7.04
910542	X3-005 E	0.92
915011	Y3-013 1	4.71
915021	Y3-013 2	4.71
915031	Y3-013 3	4.71
916211	Z1-072 E	6.16
916221	Z1-073 E	6.78
916502	Z1-106 E1	1.59
916504	Z1-106 E2	1.59
916512	Z1-107 E	3.25
916522	Z1-108 E	3.13
917502	Z2-087 E	26.43
918052	AA1-018 E	20.68
919221	AA1-146	22.13
919581	AA2-030	22.13
920272	AA2-123 E	3.07
930481	AB1-089	82.66
930501	AB1-091 O1	96.38
930741	AB1-122 1O1	91.73
930751	AB1-122 2O1	92.72
924041	AB2-047 C O1	4.94
924042	AB2-047 E O1	33.03
924471	AB2-096	53.23
925302	AB2-191 E	1.74
925581	AC1-033 C	1.78
925582	AC1-033 E	11.91
926311	AC1-109 1	2.4
926321	AC1-109 2	2.4
926331	AC1-110 1	2.39
926341	AC1-110 2	2.39
926351	AC1-111 1	0.96
926361	AC1-111 2	0.96
926371	AC1-111 3	0.96
926381	AC1-111 4	0.96
926391	AC1-111 5	0.96
926401	AC1-111 6	0.96
927511	AC1-113 1	1.5
927521	AC1-113 2	1.5
926431	AC1-114	2.99
927451	AC1-142A 1	5.26
927461	AC1-142A 2	5.26
926821	AC1-168 C O1	1.47
926822	AC1-168 E O1	9.85
927091	AC1-204 1	91.3

927101	*AC1-204 2*	*91.3*
927201	*AC1-214 C O1*	*2.61*
927202	*AC1-214 E O1*	*8.3*

Appendix 11

(MISO AMIL - AEP) The 7CASEY-05SULLIVAN 345 kV line (from bus 346809 to bus 247712 ckt 1) loads from 113.62% to 114.92% (AC power flow) of its emergency rating (1466 MVA) for the line fault with failed breaker contingency outage of 'AEP_P4_#3128_05EUGENE 345_A2'. This project contributes approximately 19.97 MW to the thermal violation.

CONTINGENCY 'AEP_P4_#3128_05EUGENE 345_A2'
OPEN BRANCH FROM BUS 243221 TO BUS 249504 CKT 1 / 243221 05EUGENE 345 249504 08CAYSUB 345 1
OPEN BRANCH FROM BUS 243221 TO BUS 348885 CKT 1 / 243221 05EUGENE 345 348885 7BUNSONVILLE 345 1
END

Bus Number	*Bus Name*	*Full Contribution*
932881	*AC2-115 1*	*1.3*
932891	*AC2-115 2*	*1.3*
932921	*AC2-116*	*0.46*
933911	*AD1-013 C*	*1.*
933912	*AD1-013 E*	*1.6*
933931	*AD1-016 C*	*0.47*
933932	*AD1-016 E*	*0.76*
934051	*AD1-031 C O1*	*2.35*
934052	*AD1-031 E O1*	*3.84*
934101	*AD1-039 1*	*3.44*
934431	*AD1-067 C*	*0.07*
934432	*AD1-067 E*	*0.3*
934701	*AD1-098 C O1*	*3.79*
934702	*AD1-098 E O1*	*2.77*
934871	*AD1-116 C*	*0.46*
934872	*AD1-116 E*	*0.76*
934971	*AD1-129 C*	*0.47*
934972	*AD1-129 E*	*0.32*
935001	*AD1-133 C O1*	*14.17*
935002	*AD1-133 E O1*	*9.45*
935141	*AD1-148*	*7.46*
936291	*AD2-038 C O1*	*1.35*
936292	*AD2-038 E O1*	*9.02*
936511	*AD2-066 C O1*	*4.77*
936512	*AD2-066 E O1*	*3.18*
936771	*AD2-100 C O1*	*22.67*
936772	*AD2-100 E O1*	*15.11*
936791	*AD2-102 C*	*7.95*

936792	AD2-102 E	5.3
936971	AD2-131 C O1	1.49
936972	AD2-131 E O1	7.5
937001	AD2-134 C	1.42
937002	AD2-134 E	5.65
937211	AD2-159 C	4.61
937212	AD2-159 E	21.61
937311	AD2-172 C	1.42
937312	AD2-172 E	1.96
937531	AD2-214 C	3.26
937532	AD2-214 E	2.18
938851	AE1-113 C O1	4.46
938852	AE1-113 E O1	15.83
938861	AE1-114 C O1	2.38
938862	AE1-114 E O1	8.12
939051	AE1-134 1	0.91
939061	AE1-134 2	0.91
939321	AE1-163 C O1	3.39
939322	AE1-163 E O1	20.81
939401	AE1-172 C O1	3.43
939402	AE1-172 E O1	16.06
939741	AE1-205 C O1	8.39
939742	AE1-205 E O1	11.58
940101	AE1-252 C O1	6.88
940102	AE1-252 E O1	4.58
LTF	BLUEG	10.23
294401	BSHIL;1U E	7.08
294410	BSHIL;2U E	7.08
LTF	CARR	0.28
274890	CAYUG;1U E	10.17
274891	CAYUG;2U E	10.17
LTF	CBM-S1	13.22
LTF	CBM-S2	2.4
LTF	CBM-W1	28.5
LTF	CBM-W2	201.49
LTF	CHOCTAW /* 35% REVERSE 4566958 4511400	< 0.01
LTF	CIN	3.92
LTF	CPLE	0.58
274859	EASYR;U1 E	6.84
274860	EASYR;U2 E	6.84
LTF	G-007	0.76
LTF	GIBSON	0.01
290051	GSG-6; E	5.71
950701	J196 C	1.32

950702	*J196 E*	*5.29*
950291	*J291*	*3.19*
951001	*J339*	*6.02*
954761	*J468 C*	*7.07*
954762	*J468 E*	*28.29*
951741	*J474 C*	*2.02*
951742	*J474 E*	*10.93*
952251	*J641*	*10.33*
952271	*J644*	*9.55*
952321	*J734*	*5.05*
954721	*J750 C*	*2.1*
954722	*J750 E*	*11.37*
952651	*J756 C*	*2.46*
952652	*J756 E*	*13.29*
952871	*J757 C*	*4.05*
952872	*J757 E*	*21.93*
953371	*J808*	*9.04*
953401	*J811*	*17.74*
953641	*J813*	*43.76*
953651	*J815*	*32.06*
953671	*J817*	*10.65*
953741	*J826 C*	*1.65*
953742	*J826 E*	*8.92*
953851	*J845 C*	*1.72*
953852	*J845 E*	*9.3*
953881	*J848 C*	*4.95*
953882	*J848 E*	*27.3*
953431	*J853*	*11.08*
953951	*J859*	*9.76*
954411	*J912*	*14.22*
954681	*J949*	*38.88*
274650	*KINCAID ;1U*	*16.93*
274651	*KINCAID ;2U*	*16.96*
990901	*L-005 E*	*11.18*
290108	*LEEDK;1U E*	*12.47*
LTF	*MEC*	*45.76*
293516	*O-009 E1*	*6.3*
293517	*O-009 E2*	*3.2*
293518	*O-009 E3*	*3.52*
293715	*O-029 E*	*6.74*
293716	*O-029 E*	*3.69*
293717	*O-029 E*	*3.4*
293771	*O-035 E*	*5.19*
LTF	*O-066*	*4.92*
293644	*O22 E1*	*4.92*

293645	*O22 E2*	*9.56*
290021	*O50 E*	*10.82*
294763	*P-046 E*	*5.42*
270859	*PWR VTR EC;R*	*6.27*
LTF	*RENSSELAER*	*0.22*
290261	*S-027 E*	*19.41*
290265	*S-028 E*	*19.41*
295111	*SUBLETTE E*	*1.49*
LTF	*TRIMBLE*	*1.29*
274853	*TWINGROVE;U1*	*0.85*
274854	*TWINGROVE;U2*	*0.85*
276150	*W2-048 E*	*2.06*
905081	*W4-005 C*	*1.12*
905082	*W4-005 E*	*36.41*
LTF	*WEC*	*4.15*
295109	*WESTBROOK E*	*3.06*
909052	*X2-022 E*	*28.56*
916211	*Z1-072 E*	*3.92*
916221	*Z1-073 E*	*2.95*
917502	*Z2-087 E*	*17.37*
918052	*AA1-018 E*	*7.95*
919221	*AA1-146*	*11.71*
919581	*AA2-030*	*11.71*
920272	*AA2-123 E*	*1.22*
930481	*AB1-089*	*35.51*
930741	*AB1-122 1O1*	*35.12*
924041	*AB2-047 C O1*	*3.25*
924042	*AB2-047 E O1*	*21.72*
924261	*AB2-070 C O1*	*3.84*
924262	*AB2-070 E O1*	*25.73*
924471	*AB2-096*	*21.95*
925302	*AB2-191 E*	*0.76*
925581	*AC1-033 C*	*1.16*
925582	*AC1-033 E*	*7.76*
925771	*AC1-053 C*	*3.88*
925772	*AC1-053 E*	*25.98*
927511	*AC1-113 1*	*0.65*
927521	*AC1-113 2*	*0.65*
926431	*AC1-114*	*1.3*
926821	*AC1-168 C O1*	*0.83*
926822	*AC1-168 E O1*	*5.55*
926841	*AC1-171 C O1*	*1.14*
926842	*AC1-171 E O1*	*7.62*
927201	*AC1-214 C O1*	*1.66*
927202	*AC1-214 E O1*	*5.29*

Appendix 12

(CE - CE) The AD1-100 TAP-BRAIDWOOD; B 345 kV line (from bus 934730 to bus 270670 ckt 1) loads from 127.62% to 131.23% (AC power flow) of its load dump rating (1528 MVA) for the line fault with failed breaker contingency outage of 'ADD AD1-100 5'. This project contributes approximately 56.97 MW to the thermal violation.

CONTINGENCY 'ADD AD1-100 5'
OPEN BRANCH FROM BUS 934730 TO BUS 270710 CKT 1 / AD1-100 - DAVIS CREEK
OPEN BRANCH FROM BUS 934720 TO BUS 937030 CKT 1 / AD1-100 - AD2-137 TAP (WILTON)
END

Bus Number	*Bus Name*	*Full Contribution*
934721	*AD1-100 C*	*105.32*
934722	*AD1-100 E*	*491.5*
935001	*AD1-133 C O1*	*25.92*
935002	*AD1-133 E O1*	*17.28*
935141	*AD1-148*	*7.74*
936771	*AD2-100 C O1*	*14.1*
936772	*AD2-100 E O1*	*9.4*
936971	*AD2-131 C O1*	*0.93*
936972	*AD2-131 E O1*	*4.67*
937211	*AD2-159 C*	*6.46*
937212	*AD2-159 E*	*30.22*
939351	*AE1-166 C O1*	*58.38*
939352	*AE1-166 E O1*	*53.89*
939401	*AE1-172 C O1*	*21.99*
939402	*AE1-172 E O1*	*102.97*
939741	*AE1-205 C O1*	*23.93*
939742	*AE1-205 E O1*	*33.04*
940101	*AE1-252 C O1*	*44.11*
940102	*AE1-252 E O1*	*29.4*
274890	*CAYUG;1U E*	*50.01*
274891	*CAYUG;2U E*	*50.01*
274863	*CAYUGA RI;1U*	*2.2*
274864	*CAYUGA RI;2U*	*2.2*
LTF	*CBM-N*	*0.42*
LTF	*CBM-S1*	*6.86*
LTF	*CBM-S2*	*2.15*
LTF	*CBM-W2*	*79.3*
LTF	*CIN*	*6.87*
LTF	*CPLE*	*0.76*

LTF	*G-007A*	*1.41*
LTF	*IPL*	*3.75*
951001	*J339*	*7.18*
951741	*J474 C*	*2.91*
951742	*J474 E*	*15.76*
952321	*J734*	*6.03*
954721	*J750 C*	*2.08*
954722	*J750 E*	*11.26*
952651	*J756 C*	*2.79*
952652	*J756 E*	*15.12*
953651	*J815*	*21.29*
953741	*J826 C*	*1.79*
953742	*J826 E*	*9.7*
953851	*J845 C*	*1.74*
953852	*J845 E*	*9.44*
953881	*J848 C*	*3.07*
953882	*J848 E*	*16.95*
274650	*KINCAID ;1U*	*11.48*
274651	*KINCAID ;2U*	*11.5*
LTF	*LGEE*	*1.06*
LTF	*MEC*	*7.03*
LTF	*NYISO*	*1.83*
290261	*S-027 E*	*37.22*
290265	*S-028 E*	*37.22*
274853	*TWINGROVE;U1*	*1.64*
274854	*TWINGROVE;U2*	*1.64*
LTF	*VFT*	*3.78*
276150	*W2-048 E*	*2.13*
905081	*W4-005 C*	*1.57*
905082	*W4-005 E*	*50.94*
909052	*X2-022 E*	*29.6*
917501	*Z2-087 C*	*1.3*
917502	*Z2-087 E*	*49.57*
924041	*AB2-047 C O1*	*9.26*
924042	*AB2-047 E O1*	*61.96*
924261	*AB2-070 C O1*	*4.37*
924262	*AB2-070 E O1*	*29.25*
925771	*AC1-053 C*	*4.29*
925772	*AC1-053 E*	*28.68*

Appendix 13

(CE - CE) The AD1-100 TAP-WILTON ; B 345 kV line (from bus 934720 to bus 270926 ckt 1) loads from 117.8% to 119.76% (**DC power flow**) of its load dump rating (1846 MVA) for the tower line contingency outage of 'COMED_P7_345-L2001__B-S_+_345-L2003__R-S'. This project contributes approximately 36.21 MW to the thermal violation.

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

Bus Number	*Bus Name*	*Full Contribution*
933411	*AC2-154 C*	*2.77*
933412	*AC2-154 E*	*4.52*
934721	*AD1-100 C*	*51.76*
934722	*AD1-100 E*	*241.53*
935001	*AD1-133 C O1*	*18.14*
935002	*AD1-133 E O1*	*12.09*
935141	*AD1-148*	*5.06*
936371	*AD2-047 C O1*	*4.95*
936372	*AD2-047 E O1*	*24.18*
936461	*AD2-060*	*2.91*
936771	*AD2-100 C O1*	*9.35*
936772	*AD2-100 E O1*	*6.23*
936971	*AD2-131 C O1*	*0.62*
936972	*AD2-131 E O1*	*3.09*
937211	*AD2-159 C*	*4.15*
937212	*AD2-159 E*	*19.44*
939351	*AE1-166 C O1*	*22.63*
939352	*AE1-166 E O1*	*20.89*
939401	*AE1-172 C O1*	*13.56*
939402	*AE1-172 E O1*	*63.48*
939741	*AE1-205 C O1*	*15.21*
939742	*AE1-205 E O1*	*21.*
940101	*AE1-252 C O1*	*27.19*
940102	*AE1-252 E O1*	*18.13*
LTF	*BLUEG*	*0.06*

274654	*BRAIDWOOD;1U*	*49.21*
274655	*BRAIDWOOD;2U*	*47.*
LTF	*CARR*	*0.27*
274890	*CAYUG;1U E*	*31.06*
274891	*CAYUG;2U E*	*31.06*
274863	*CAYUGA RI;1U*	*1.37*
274864	*CAYUGA RI;2U*	*1.37*
LTF	*CBM-S1*	*2.65*
LTF	*CBM-S2*	*0.03*
LTF	*CBM-W1*	*4.27*
LTF	*CBM-W2*	*48.29*
LTF	*CIN*	*2.54*
LTF	*G-007*	*0.75*
274871	*GR RIDGE ;2U*	*0.85*
274847	*GR RIDGE ;BU*	*0.67*
LTF	*HAMLET*	*0.04*
LTF	*IPL*	*1.1*
951001	*J339*	*4.12*
951741	*J474 C*	*1.79*
951742	*J474 E*	*9.68*
952321	*J734*	*3.46*
952651	*J756 C*	*1.81*
952652	*J756 E*	*9.81*
953741	*J826 C*	*1.05*
953742	*J826 E*	*5.67*
275149	*KEMPTON ;1E*	*20.4*
274660	*LASCO STA;1U*	*30.93*
274661	*LASCO STA;2U*	*30.99*
LTF	*LGEE*	*0.02*
LTF	*MEC*	*12.6*
293061	*N-015 E*	*15.21*
LTF	*O-066*	*4.81*
294392	*P-010 E*	*19.32*
274888	*PILOT HIL;1E*	*20.4*
274887	*PILOT HIL;1U*	*0.9*
274881	*PLEAS RDG;2U*	*0.9*
LTF	*RENSSELAER*	*0.22*
290261	*S-027 E*	*23.78*
290265	*S-028 E*	*23.78*
LTF	*TRIMBLE*	*0.04*
274853	*TWINGROVE;U1*	*1.05*
274854	*TWINGROVE;U2*	*1.05*
276150	*W2-048 E*	*1.39*
905081	*W4-005 C*	*1.01*
905082	*W4-005 E*	*32.77*

LTF	*WEC*	*0.89*
909052	*X2-022 E*	*19.37*
917501	*Z2-087 C*	*0.83*
917502	*Z2-087 E*	*31.5*
930501	*AB1-091 O1*	*92.66*
924041	*AB2-047 C O1*	*5.88*
924042	*AB2-047 E O1*	*39.38*
924261	*AB2-070 C O1*	*2.85*
924262	*AB2-070 E O1*	*19.07*
925771	*AC1-053 C*	*2.8*
925772	*AC1-053 E*	*18.72*
926821	*AC1-168 C O1*	*0.69*
926822	*AC1-168 E O1*	*4.63*
926841	*AC1-171 C O1*	*0.6*
926842	*AC1-171 E O1*	*4.*

Appendix 14

(CE - CE) The AE1-172 TAP-AD1-100 TAP 345 kV line (from bus 939400 to bus 934720 ckt 1) loads from 101.07% to 103.74% (AC power flow) of its emergency rating (1528 MVA) for the single line contingency outage of 'COMED_P1-2_345-L8014___-S-B'. This project contributes approximately 42.26 MW to the thermal violation.

CONTINGENCY 'COMED_P1-2_345-L8014___-S-B'
TRIP BRANCH FROM BUS 935000 TO BUS 270717 CKT 1 / AD1-133 TAP 345 DRESDEN ; R 345
END

Bus Number	*Bus Name*	*Full Contribution*
933441	*AC2-157 C*	*4.28*
935001	*AD1-133 C O1*	*90.81*
935141	*AD1-148*	*13.5*
LTF	*AD2-098*	*0.21*
936771	*AD2-100 C O1*	*24.31*
936971	*AD2-131 C O1*	*1.6*
937211	*AD2-159 C*	*11.29*
939401	*AE1-172 C O1*	*30.17*
939741	*AE1-205 C O1*	*42.26*
940101	*AE1-252 C O1*	*60.5*
274863	*CAYUGA RI;1U*	*3.23*
274864	*CAYUGA RI;2U*	*3.23*
LTF	*CBM-N*	*0.57*
LTF	*CBM-S1*	*11.04*
LTF	*CBM-S2*	*3.33*
LTF	*CBM-W2*	*130.4*
LTF	*CHILHOWEE /* 35% REVERSE 4476971*	*< 0.01*
LTF	*CIN*	*11.57*
LTF	*CPLE*	*1.16*
LTF	*G-007A*	*1.91*
LTF	*IPL*	*6.25*
950701	*J196 C*	*1.14*
951001	*J339*	*12.8*
951741	*J474 C*	*5.16*
952271	*J644*	*13.57*
952321	*J734*	*10.75*
954721	*J750 C*	*3.62*
952651	*J756 C*	*4.83*
952871	*J757 C*	*5.78*

953401	*J811*	*10.86*
953651	*J815*	*37.42*
953741	*J826 C*	*3.19*
953851	*J845 C*	*3.12*
953881	*J848 C*	*5.41*
954411	*J912*	*14.2*
274650	*KINCAID ;1U*	*19.81*
274651	*KINCAID ;2U*	*19.84*
LTF	*LGEE*	*1.7*
LTF	*MEC*	*9.12*
LTF	*NYISO*	*2.45*
274853	*TWINGROVE;U1*	*2.88*
274854	*TWINGROVE;U2*	*2.88*
LTF	*VFT*	*5.13*
905081	*W4-005 C*	*2.75*
917501	*Z2-087 C*	*2.3*
930461	*AB1-087*	*31.*
930471	*AB1-088*	*31.*
924041	*AB2-047 C O1*	*16.35*
924261	*AB2-070 C O1*	*7.64*
925771	*AC1-053 C*	*7.49*
926841	*AC1-171 C O1*	*0.96*

Attachment 1: Single Line Diagram