Generation Interconnection Request
System Impact Study Report
For
PJM Generation Interconnection Request
Queue Position AE1-114

MARYLAND-LANCASTER 138kV

Revision 0: December 2021
Revision 1: February 2022

Preface

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

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

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

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

Revision History

Revision 0: December 2021.
Revision 1: January 2022. This revised report was updated to reflect the results of PJM's retool analysis.

General

The Interconnection Customer (IC) has proposed a Wind generating facility located in Ogle County, Illinois. The installed facilities will have a total capability of 150 MW with 40 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is 12/31/2021, Per Attachment N. This study does not imply a TO commitment to this in-service date.

Point of Interconnection

The AE1-114 project will interconnect with the ComEd transmission system via a tap of the Maryland to Titan Tire (ESS B427; 1T) 138 kV line.

Cost Summary

The AE1-114 project will be responsible for the following costs.

Description	Cost Estimate
Total Physical Interconnection Costs	$19,000,000
Allocation towards System Network Upgrade Costs (PJM Identified - Summer Peak)*	$87,080,000
Allocation towards System Network Upgrade Costs (PJM Identified - Light Load)*	$657,109
Allocation towards System Network Upgrade Costs (TO Identified)*	$0
Total Costs	$106,737,109

*As your project progresses through the study process and other projects modify their request or withdraw, then your cost allocation could change.

This cost excludes a Federal Income Tax Gross Up charges. This tax may or may not be charged based on whether this project meets the eligibility requirements of IRS Notice 88-129. If at a future date it is determined that the Federal Income Tax Gross charge is required, the Transmission Owner shall be reimbursed by the Interconnection Customer for such taxes.

Note 1: PJM Open Access Transmission Tariff (OATT) section 217.3A outline cost allocation rules. The rules are further clarified in PJM Manual 14A Attachment B. The allocation of costs for a network upgrade will start with the first Queue project to cause the need for the upgrade. Later queue projects will receive cost allocation contingent on their contribution to the violation and are allocated to the queues that have not closed less than 5 years following the execution of the first Interconnection Service Agreement which identifies the need for this upgrade.

Note 2: For customers with System Reinforcements listed: If your present cost allocation to a System Reinforcement indicates $0, then please be aware that as changes to the interconnection process occur, such as prior queued projects withdrawing from the queue, reducing in size, etc., the cost responsibilities can change and a cost allocation may be assigned to your project. In addition, although your present cost allocation to a System Reinforcement is presently $0, your project may need this system reinforcement completed to be deliverable to the PJM system. If your project comes into service prior to completion of the system reinforcement, an interim deliverability study for your project will be required

Transmission Owner Scope of Work

The total physical interconnection costs is given in the table below:

Description	Cost Estimate
Attachment Facilities	$1,000,000
Direct Connection Network Upgrades	$17,000,000
Non-Direct Connection Network Upgrades	$1,000,000
Total Physical Interconnection Costs	**$19,000,000**

Attachment Facilities

The total preliminary cost estimate for the Attachment work is given in the table below. These costs do not include CIAC Tax Gross-up.

Description	Cost Estimate
Installation of one 345kV line MOD, one dead-end structure and one set of revenue metering (see notes below on cost estimate)	$1,000,000
Total Attachment Facilities Costs	**$1,000,000**

Direct Connection

In order to accommodate interconnection of AE1-114, a new 138kV Interconnection Substation would need to be built close to the Maryland-Lancaster 138kV Line 11902, approximately 8 miles from Maryland. The scope of work includes the installation of three 138kV circuit breakers in a "breaker-and-a-half" bus configuration and cutting in the Interconnection Substation to the Maryland-Lancaster 138kV Line 11902, as shown in the one-line diagram. The Interconnection Customer ("IC") is responsible for constructing all of the facilities on the IC side of the Point of Interconnection ("POI"). It is assumed for the purposes of this report that the IC will obtain the site for the Interconnection Substation and right-of-way between the Interconnection Substation and the 138kV transmission line. In the event that the IC exercises the option to build the interconnecting substation, the IC will be required to construct all interconnection facilities that will be turned over to ComEd in accordance with ComEd published standards and the PJM Tariff. ComEd would design, engineer and construct the tie in of the Interconnection Substation to the Maryland-Lancaster 138kV Line 11902. The preliminary cost estimate for Direct Connection Network Upgrade is given in the following tables.

Description	Cost Estimate
Installation of a new 138kV substation	$15,000,000
Transmission line tie in work (foundations, structures, conductors)	$2,000,000
Total Physical Interconnection Costs	**$17,000,000**

Option to Build Direct Connection cost estimates:

Description	Cost Estimate
Installation of a new 138kV substation	Interconnection Customer Responsibility
Transmission line tie in work (foundations, structures, conductors)	$2,000,000
ComEd oversight and testing	$1,000,000
Total Physical Interconnection Costs	**$3,000,000**

Non-Direct Connection

The integration of the new 138kV Interconnection Substation would require relay/communications/SCADA upgrades at Lancaster TSS 192 and Maryland TSS 124. The ComEd cost is given below:

Description	Cost Estimate
Relay/communications/SCADA upgrades at the Lancaster TSS 192 substation	$500,000
Relay/communications/SCADA upgrades at the Maryland TSS 124 substation	$500,000
Total Physical Interconnection Costs	**$1,000,000**

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 IC.

2) There were no site visits performed for these estimates. There may be costs related to specific site related issues that are not identified in these estimates. The site reviews will be performed during the Facilities Study or during detailed engineering.

3) These estimates are not a guarantee of the maximum amount payable by the IC and the actual costs of ComEd's work may differ significantly from these estimates. The IC will be responsible for paying actual costs of ComEd's work in accordance with Sections 212.1 and 217 of the PJM Open Access Transmission Tariff.

4) The IC is responsible for all engineering, procurement, testing and construction of all equipment on the IC's side of the POI.

5) These cost estimates do not include cost of acquiring right-of-way for the transmission line and purchasing any additional land, if needed, for the line terminations. The need and cost of acquiring property and associated legal costs will be investigated during Facilities Study for this project.

Schedule:

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

Revenue Metering and SCADA Requirements

PJM Requirements

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

Meteorological Data Reporting Requirements

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

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

Interconnected Transmission Owner Requirements

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

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

Network Impacts

The Queue Project AE1-114 was evaluated as a 150 MW (Capacity 34.0 MW) injection tapping the Maryland – ESS B427 line in the ComEd area. Project AE1-114 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AE1-114 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			
Number	Type	Name	Affected Area	Facility Description	From	To	Circuit	Power Flow	Initial	Final	Type	MVA	MW Contribution	Flowgate Appendix
1	LFFB	COMED_P4_006-45-BT3-4__	CE - CE	AE1-114 TAP-ESS B427 ;1T 138 kV line	938860	272598	1	AC	86.76	116.87	LDR	215	66.99	1
2	LFFB	COMED_P4_006-45-BT3-8__	CE - CE	AE1-114 TAP-ESS B427 ;1T 138 kV line	938860	272598	1	AC	70.73	100.79	LDR	215	66.79	

Note:

Overload 1: Maryland – ESS B427 Facility. ComEd: 367 MVA SSTE (Not a violation)

Overload 2: Maryland – ESS B427 Facility. ComEd: 367 MVA SSTE (Not a violation)

Contribution to Previously Identified Overloads

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

Overload Number	Type	Contingency Name	Affected Area	Facility Description	Bus From	Bus To	Circuit	Power Flow	Loading % Initial	Loading % Final	Rating Type	Rating MVA	MW Contribution	Flowgate Appendix
1	LFFB	AEP_P4_#2978_05DUMONT 765_B	MISO NIPS - AEP	17STILLWELL-05DUMONT 345 kV line	255113	243219	1	AC	119.35	119.75	ER	1409	20.1	2
2	LFFB	COMED_P4_144-45-BT6-7__	CE - CE	CHERRY VA; B-GARDEN PR; R 345 kV line	270694	270759	1	AC	101.24	103.24	LDR	1479	26.98	3
3	LFFB	COMED_P4_144-45-BT6-8__	CE - CE	CHERRY VA; B-GARDEN PR; R 345 kV line	270694	270759	1	AC	101.24	103.23	LDR	1479	26.98	
4	LFFB	COMED_P4_144-45-BT6-7__	CE - CE	GARDEN PR; R-SILVER LK; R 345 kV line	270759	270883	1	AC	114.81	117.37	LDR	1479	26.98	4
5	LFFB	COMED_P4_144-45-BT6-8__	CE - CE	GARDEN PR; R-SILVER LK; R 345 kV line	270759	270883	1	AC	114.81	117.37	LDR	1479	26.98	
6	LFFB	AEP_P4_#2978_05DUMONT 765_B	CE - AEP	GREENACRE; T-05OLIVE 345 kV line	270771	243229	1	AC	110.3	110.37	ER	971	11.58	5
7	LFFB	COMED_P4_155-45-BT6-7__	CE - CE	NELSON ; B-ELECT JCT; B 345 kV line	270828	270730	1	AC	110.28	111.62	LDR	1656	20.67	6
8	LFFB	COMED_P4_937-45-BT1-2__	CE - CE	NELSON ; B-ELECT JCT; B 345 kV line	270828	270730	1	AC	107.97	109.39	LDR	1656	22	
9	LFFB	COMED_P4_937-45-BT1-4__	CE - CE	NELSON ; B-ELECT JCT; B 345 kV line	270828	270730	1	AC	106.95	108.38	LDR	1656	22.01	
10	LFFB	COMED_P4_112-65-BT5-6__	CE - CE	WILTON ; B-WILTON ;3M 345 kV line	270926	275232	1	AC	104.65	106.02	LDR	1379	21.36	7
11	LFFB	COMED_P4_112-65-BT2-3__	CE - CE	WILTON ; R-WILTON ;4M 345 kV line	270927	275233	1	AC	106.82	108.22	LDR	1379	21.81	8
12	BUS	COMED_P2-2_119_LN-138___6	CE - CE	HAUMESSER; B-W DEKALB ;3T 138 kV line	271680	272756	1	AC	116.19	119.26	LDR	471	15.5	9
13	DCTL	COMED_P7_138-L11902GB-R_+_138-L17121_R-R-B	CE - CE	W DEKALB ;3T-WATERMAN ;3B 138 kV line	272756	272730	1	AC	109.3	112.56	LDR	471	15.5	10
14	LFFB	COMED_P4_112-65-BT5-6__	CE - CE	WILTON ; 765/345 kV transformer	275232	270644	1	AC	104.37	105.74	LDR	1379	21.36	11
15	LFFB	COMED_P4_112-65-BT2-3__	CE - CE	WILTON ; 765/345 kV transformer	275233	270644	1	AC	106.54	107.94	LDR	1379	21.81	12

Note:
Overload 1: MISO: 1779 MVA SE. AEP: 1409 MVA SE (Violation valid for AEP)
Overload 2: ComEd: 1568 MVA SSTE. (Not a Violation)
Overload 3: ComEd: 1568 MVA SSTE. (Not a Violation)
Overload 4: ComEd: 1568 MVA SSTE. (Violation valid)
Overload 5: ComEd: 1568 MVA SSTE. (Violation valid)
Overload 6: ComEd: 1134 MVA SSTE. AEP: 971 MVA SSTE (Violation valid for AEP only)
Overload 7: ComEd: 1837 MVA SSTE. (Violation valid)
Overload 8: ComEd: 1837 MVA SSTE. (Not a Violation for this Flow Gate)
Overload 9: ComEd: 1837 MVA SSTE. (Not a Violation for this Flow Gate)
Overload 10: ComEd SSTE rating is 1469 MVA (Not a violation)
Overload 11: ComEd SSTE rating is 1469 MVA (Violation valid)
Overload 12: ComEd ALDR rating is 542 MVA (Violation valid)
Overload 13: ComEd ALDR rating is 542 MVA (Not a violation)
Overload 14: ComEd SSTE rating is 1469 MVA (Not a violation)
Overload 15: ComEd SSTE rating is 1469 MVA (Violation valid)

Steady-State Voltage Requirements

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

To be determined

Short Circuit

(Summary of impacted circuit breakers)

This project has no short circuit 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.

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		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	AEP_P1-2_#695A	MISO NIPS - CE	17STJOHN-ST JOHN ; T 345 kV line	255112	270886	1	DC	75.15	76.17	ER	1091	12.93	
2	N-1	AEP_P1-2_#695A	MISO NIPS - AEP	17STILLWELL-05DUMONT 345 kV line	255113	243219	1	AC	115.89	116.3	NR	1409	20.53	
3	N-1	COMED_P1-2_345-L0626__B-R-B	CE - CE	CHERRY VA; B-GARDEN PR; R 345 kV line	270694	270759	1	AC	100.63	102.46	ER	1479	27.29	
4	N-1	COMED_P1-2_345-L0626__B-R-B	CE - CE	GARDEN PR; R-SILVER LK; R 345 kV line	270759	270883	1	AC	114.24	116.83	ER	1479	27.29	
5	Non	Non	CE - CE	GARDEN PR; R-SILVER LK; R 345 kV line	270759	270883	1	DC	105.93	107.33	NR	1201	20.88	
6	N-1	AEP_P1-2_#695A	CE - AEP	GREENACRE; T-05OLIVE 345 kV line	270771	243229	1	AC	72.11	73.1	NR	971	11.69	
7	N-1	COMED_P1-2_345-L15501_B-R	CE - CE	NELSON ; B-ELECT JCT; B 345 kV line	270828	270730	1	AC	107.03	108.35	ER	1656	22.01	
8	N-1	AEP_P1-2_#695A	CE - MISO NIPS	ST JOHN ; T-17GREEN_ACRE 345 kV line	270886	255104	1	DC	75.14	76.16	ER	1091	12.93	

9	N-1	AEP_P1-2_#695A	CE - MISO NIPS	CRETE EC ;BP-17STJOHN 345 kV line	274750	255112	1	AC	85.73	86.83	ER	1399	18.11	
10	N-1	COMED_P1-2_345-L0627__B-R	CE - CE	AE1-114 TAP-ESS B427 ;1T 138 kV line	938860	272598	1	AC	70.16	100.31	ER	215	66.99	

Stability and Reactive Power Requirement

AE1-114 was assessed for compliance with reactive power capability requirements using the supplied capability curves. Please note this is a new facility.

- Generation shall have the ability to maintain a power factor of at least 0.95 leading to 0.95 lagging at the high side of facility transformer or the result of the System Impact Study indicated that, for the safety and reliably of the Transmission System, no power factor requirement is required.

Generator	MFO	Required pF Range		Maximum (Lagging)	Minimum (Leading)
		Lagging	Leading		
AE1-114	150	0.95	0.95		
Total MVAR Required				49.303	-49.303
MVAR from Generators				Qmax	Qmin
				50	-50
Customer Planned Compensation				0	0
Qloss				-26.794	-46.933
AX+SS				0	0
Total Available MVAR at High Side of Facility Transformer				23.206	-96.933
Deficiency in MVAR				**26.097**	**Meet**

AE1-114 **does not meet** the reactive power requirement at the high side of facility transformer. Reactive power compensation is required for this project. This project needs to have additional reactive power capabilities to fulfill the power factor requirement. The estimated required additional capacitive reactive power is 26.1 MVar.

The MFO of AE1-114 was also assessed and found that the MFO at POI is **lower** than the requested MFO.

	Active Power (MW)
Requested Gross MW	151.5
Requested MFO	150
Aux+SS	0
Losses	5.089
MFO at the POI	146.411
MFO at the POI <= Requested MFO	**Yes**

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 From	Bus To	Circuit	Power Flow	Loading % Initial	Loading % Final	Rating Type	Rating MVA	MW Contribution	Flowgate Appendix
1	N-1	AEP_P1-2_#695A	CE - CE	E FRANKFO; B-CRETE EC ;BP 345 kV line	270728	274750	1	DC	99.75	100.74	ER	1399	13.86	13

Note:

Overload 1: ComEd: 1483 MVA SSTE (Not a violation)

Multiple Facility Contingency

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

Overload Number	Contingency Type	Contingency Name	Affected Area	Facility Description	Bus From	Bus To	Circuit	Power Flow	Loading % Initial	Loading % Final	Rating Type	Rating MVA	MW Contribution	Flowgate Appendix
1	LFFB	COMED_P4_112-65-BT5-6__	CE - CE	WILTON ; 765/345 kV transformer	275232	270644	1	DC	99.04	100.22	LDR	1379	16.38	14

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	Contingency Type	Contingency Name	Affected Area	Facility Description	Bus From	Bus To	Circuit	Power Flow	Loading % Initial	Loading % Final	Rating Type	Rating MVA	MW Contribution	Flowgate Appendix
1	LFFB	COMED_P4_112-65-BT5-6__	CE - CE	WILTON ; B-WILTON ;3M 345 kV line	270926	275232	1	DC	113.22	113.92	LDR	1379	16.38	15
2	LFFB	COMED_P4_112-65-BT2-3__	CE - CE	WILTON ; R-WILTON ;4M 345 kV line	270927	275233	1	DC	115.61	116.33	LDR	1379	16.73	16
3	LFFB	COMED_P4_112-65-BT2-3__	CE - CE	WILTON ; 765/345 kV transformer	275233	270644	1	DC	102.22	103.43	LDR	1379	16.73	17

Note:

Overload 1: See Summer Peak Reinforcement Section

Overload 2: See Summer Peak Reinforcement Section

Overload 3: ComEd SSTE rating is 1469 MVA (Not a violation)

System Reinforcements

Summer Peak Load Flow Analysis Reinforcement

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

New System Reinforcements

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

<table>
<tr><th>Facility</th><th>Upgrade Description</th><th>Cost</th><th>Cost Allocation</th><th>Upgrade Number</th></tr>
<tr><td>NELSON ; B-ELECT JCT; B 345 kV Ckt 1</td><td>
<u>Project ID</u>: n6639
<u>Description</u>: ComEd 345kV L15502 SSTE rating is 1837 MVA. The upgrade will be to re-conductor the line, station conductor work and upgrade 2-disconnnect switches. A preliminary estimate for the upgrade is $36.2 M with a estimated construction timeline of 30 months. Upon completion the ratings will be 2293/2293/2293/2436 MVA (SN/SLTE/SSTE/SLD).
<u>Type</u>: FAC
<u>Cost:</u> $36,200,000
<u>Time Estimate</u>: 30 Months
<u>Ratings</u>: 2293/2293/2293/2436 MVA (SN/SLTE/SSTE/SLD).
<table>
<tr><th>Queue</th><th>MW Contribution</th><th>Cost %</th><th>Cost $ (36.2M)</th></tr>
<tr><td>AE1-114</td><td>20.7</td><td>100%</td><td>$36,200,000</td></tr>
</table>
<u>Project ID</u>: n6639.1
<u>Description</u>: Replace station conductor at TSS111 EJ, replace MOD. Relay upgrades, re-conductor part of the line. New ratings will be 1683/2068/2172/2308 (SN/SLTE/SSTE/SLD). 36 months, $22.3M
<u>Type</u>: FAC
<u>Cost:</u> $22,300,000
<u>Time Estimate</u>: 36 Months
<u>Ratings</u>: 683/2068/2172/2308 (SN/SLTE/SSTE/SLD).
<table>
<tr><th>Queue</th><th>MW Contribution</th><th>Cost %</th><th>Cost $ (22.3M)</th></tr>
<tr><td>AE1-114</td><td>20.7</td><td>100%</td><td>$22,300,000</td></tr>
</table>
<u>Project ID</u>: n6639.2
<u>Description</u>: ComEd 345kV L15502 SSTE rating is 1837 MVA. The upgrade is to perform sag mitigation on a portion of the line section along with Reconductoring on a different section, upgrade station conductor at both line terminals, replace both line motor operated disconnect witches and line current transformers, upgrade line relay schemes at both terminals as well. A preliminary estimate for the upgrade is $10.5M with an estimated construction timeline of 36 months. Upon completion of the upgrades the ratings will be 1683/2068/2367/2564 MVA (SN/SLTE/SSTE/SLD)
<u>Type</u>: FAC
<u>Cost:</u> $10,500,000
<u>Time Estimate</u>: 36 Months
<u>Ratings</u>: 683/2068/2367/2564 MVA (SN/SLTE/SSTE/SLD)
<table>
<tr><th>Queue</th><th>MW Contribution</th><th>Cost %</th><th>Cost $ (10.5M)</th></tr>
<tr><td>AE1-114</td><td>20.7</td><td>100%</td><td>$10,500,000</td></tr>
</table>
</td><td>$69,000,000</td><td>$69,000,000</td><td>N6639
N6639.1
N6639.2</td></tr>
<tr><td></td><td>Total Cost</td><td>$69,000,000</td><td>$69,000,000</td><td></td></tr>
</table>

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, AE1-114 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.) AE1-114 could receive cost allocation. 3. Although Queue Project AE1-114 may not presently have cost responsibility for this upgrade, Queue Project AE1-114 may need this upgrade in-service to be deliverable to the PJM system. 4. If Queue Project AE1-114 comes into service prior to completion of the upgrade, Queue Project AE1-114 will need an interim study.	$1,613,000	$0	N4058
HAUMESSER; B-W DEKALB ;3T Ckt 1	**Project ID**: n5792 **Description**: The upgrade will be to Reconductor the line at a cost of $2.3M (potential tower replacements to be determined during the Facilities Study). New expected ratings to be 487/534/612/722/830 MVA (SN/SLTE/SSTE/SLD/ALDR). PJM Network Upgrade N5792. **Type**: FAC **Cost:** $2,300,000 **Time Estimate**: N/A **Ratings**: 487/534/612/722/830 MVA (SN/SLTE/SSTE/SLD/ALDR). **Notes**: 1. Since the cost of the upgrade is less than $5M, based on PJM cost allocation criteria, AE1-114 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.) AE1-114 could receive cost allocation. 3. Although Queue Project AE1-114 may not presently have cost responsibility for this upgrade, Queue Project AE1-114 may need this upgrade in-service to be deliverable to the PJM system. 4. If Queue Project AE1-114 comes into service prior to completion of the upgrade, Queue Project AE1-114 will need an interim study.	$2,300,000	$0	N5792

<table>
<tr>
<td>GARDEN PR; R-SILVER LK; R 345 kV Ckt 1</td>
<td>
<u>Project ID</u>: n5318.1
<u>Description</u>: ComEd 345kV L15616 SN rating is 1201 MVA. The post contingency flow for this event exceeds the rating therefore an upgrade is required. The upgrade will be to re-conductor the line and station bus work. A preliminary estimate for this upgrade is $45.7M with an estimated construction timeline of 30 months. Upon completion of the upgrade the ratings will be: 1248/1441/1667/1982 MVA SN/SLTE/SSTE/SLD.
<u>Type</u>: CON
<u>Cost:</u> $45,700,000
<u>Time Estimate</u>: 30 Months
<u>Ratings</u>: 1248/1441/1667/1982 MVA SN/SLTE/SSTE/SLD

The cost allocation is as follows:
<table>
<tr><th>Queue</th><th>MW Contribution</th><th>Cost %</th><th>Cost $ (45.7M)</th></tr>
<tr><td>J850</td><td>25.3</td><td>21.7%</td><td>$9,920,000</td></tr>
<tr><td>J870</td><td>17.2</td><td>14.8%</td><td>$6,740,000</td></tr>
<tr><td>AD2-102</td><td>47.1</td><td>40.4%</td><td>$18,460,000</td></tr>
<tr><td>AE1-114</td><td>27</td><td>23.2%</td><td>$10,580,000</td></tr>
</table>

<u>Project ID</u>: n5318.2
<u>Description</u>: L15616 SSTE rating is 1568 MVA. The post contingency flow for this event exceeds the rating therefore upgrades are required. Reconductor 26.7 miles of 2338 kcmil. Mitigate sag limits. Upgrade relay package. Replace station conductor at both line terminals. Replace 2-345 kV breakers at TSS 138 Silver Lake. A preliminary estimate for the upgrades is $32.4M with an estimated construction timeline of 36 months. Upon completion of all upgrades the new ratings will be 1461/1656/1909/1912 MVA (SN/SLTE/SSTE/SLD).
<u>Type</u>: FAC
<u>Cost:</u> $32,400,000
<u>Time Estimate</u>: 36 Months
<u>Ratings</u>: 1461/1656/1909/1912 MVA SN/SLTE/SSTE/SLD

The cost allocation is as follows:
<table>
<tr><th>Queue</th><th>MW Contribution</th><th>Cost %</th><th>Cost $ (32.4M)</th></tr>
<tr><td>J850</td><td>25.3</td><td>21.7%</td><td>$7,030,000</td></tr>
<tr><td>J870</td><td>17.2</td><td>14.8%</td><td>$4,780,000</td></tr>
<tr><td>AD2-102</td><td>47.1</td><td>40.4%</td><td>$13,090,000</td></tr>
<tr><td>AE1-114</td><td>27</td><td>23.2%</td><td>$7,500,000</td></tr>
</table>
</td>
<td>$78,100,000</td>
<td>$18,080,000</td>
<td>N5318.1
N5318.2</td>
</tr>
<tr>
<td>GREENACRE; T-05OLIVE 345 kV Ckt. 1</td>
<td>
<u>Project ID</u>: n5913
<u>Description</u>: Upgrade is a sag study will be required for the entire 40.64 miles of ACSR/PE ~ 1414 ~ 62/19 Conductor section 1 to determine if the line can be operated above its emergency rating 971 MVA. Estimated Cost: $162,560.
If deemed necessary to rebuild the entire 40.64 miles of the section of the line, Estimated Cost: $81,280,000.
New expected SE rating is 1318 MVA.
PJM NUN N5913.
<u>Type</u>: FAC
<u>Cost:</u> $162,560
<u>Time Estimate</u>: N/A
<u>Ratings</u>: Existing Ratings are as follows:
AEP SE: 971 MVA
ComEd SE: 1134 MVA
<u>Notes</u>:
</td>
<td>$162,560</td>
<td>$0</td>
<td>N5913</td>
</tr>
</table>

	1. Since the cost of the upgrade is less than $5M, based on PJM cost allocation criteria, AE1-114 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.) AE1-114 could receive cost allocation. 3. Although Queue Project AE1-114 may not presently have cost responsibility for this upgrade, Queue Project AE1-114 may need this upgrade in-service to be deliverable to the PJM system. 4. If Queue Project AE1-114 comes into service prior to completion of the upgrade, Queue Project AE1-114 will need an interim study.			
	Total Cost	**$82,175,560**	**$18,080,000**	

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

Light Load - Load Flow Analysis Reinforcements

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)

<table>
<tr><th>Facility</th><th>Upgrade Description</th><th>Cost</th><th>Cost Allocation</th><th>Upgrade Number</th></tr>
<tr><td>WILTON ; B-WILTON ;3M 345 kV line Ckt 1 (from bus 270926 to bus 275232)

&

WILTON ; R-WILTON ;4M 345 kV line Ckt 1 (from bus 270927 to bus 275233)

&

WILTON ; 765/345 kV transformer Ckt 1 (from bus 275233 to bus 270644)</td><td>ComEd Reinforcement:
Project ID: n5145
Description: Build out the Wilton 765kV bus thereby allowing for 765kV L11216 (currently on Bus 6) to be relocated to Bus 8. Along with this line relocation, installation of 2-765kV BT CB’s (6-8 & 8-2).
Type: CON
Cost: $12,000,000
Time Estimate: 36-40 Months
Ratings: N/A
The cost allocation is as follows:
<table>
<tr><th>Queue</th><th>MW Contribution</th><th>Cost %</th><th>Cost $ (12M)</th></tr>
<tr><td>AD1-100</td><td>116.8</td><td>38.23%</td><td>$4,587,588</td></tr>
<tr><td>AD2-047</td><td>26.4</td><td>8.64%</td><td>$1,036,921</td></tr>
<tr><td>AD2-066</td><td>17.7</td><td>5.80%</td><td>$695,944</td></tr>
<tr><td>AD2-102</td><td>29.7</td><td>9.7%</td><td>$1,164,572</td></tr>
<tr><td>AD2-134</td><td>16.2</td><td>5.34%</td><td>$640,220</td></tr>
<tr><td>AD2-159</td><td>16.6</td><td>5.43%</td><td>$652,003</td></tr>
<tr><td>AD2-194</td><td>19.6</td><td>6.42%</td><td>$770,621</td></tr>
<tr><td>AE1-113</td><td>44.5</td><td>14.96%</td><td>$1,794,973</td></tr>
<tr><td>AE1-114</td><td>16.73</td><td>5.48%</td><td>$657,109</td></tr>
</table></td><td>$12,000,000</td><td>$657,109</td><td>N5145</td></tr>
<tr><td></td><td>Total</td><td>$12,000,000</td><td>$657,109</td><td></td></tr>
</table>

Short Circuit System Reinforcement

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

This project has no short circuit 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-L0626__B-R-B	CONTINGENCY 'COMED_P1-2_345-L0626__B-R-B' TRIP BRANCH FROM BUS 930480 TO BUS 270916 CKT 1 / AB1-089 TAP 345 WAYNE ; B 345 END
COMED_P1-2_345-L0627__B-R	CONTINGENCY 'COMED_P1-2_345-L0627__B-R' TRIP BRANCH FROM BUS 274768 TO BUS 270678 CKT 1 / LEECO;BP 345 BYRON; B 345 END
COMED_P1-2_345-L15501_B-R	CONTINGENCY 'COMED_P1-2_345-L15501_B-R' TRIP BRANCH FROM BUS 270828 TO BUS 274768 CKT 1 / NELSO; B 345 LEECO;BP 345 END
COMED_P2-2_119_LN-138___6	CONTINGENCY 'COMED_P2-2_119_LN-138___6' TRIP BRANCH FROM BUS 271897 TO BUS 271499 CKT 1 / LANCASTER; R 138 FREEPORT ;5T 138 TRIP BRANCH FROM BUS 271897 TO BUS 271898 CKT 1 / LANCASTER; R 138 LANCASTER;BT 138 END
COMED_P4_006-45-BT3-4__	CONTINGENCY 'COMED_P4_006-45-BT3-4__' TRIP BRANCH FROM BUS 274768 TO BUS 270678 CKT 1 / LEECO;BP 345 BYRON; B 345 REMOVE UNIT 1 FROM BUS 274656 / BYRON;1U 25 END
COMED_P4_006-45-BT3-8__	CONTINGENCY 'COMED_P4_006-45-BT3-8__' TRIP BRANCH FROM BUS 274768 TO BUS 270678 CKT 1 / LEE CO EC;BP 345 BYRON ; B 345 TRIP BRANCH FROM BUS 270678 TO BUS 270679 CKT 1 / BYRON ; B 345 BYRON ; R 345 END
COMED_P4_023-65-BT2-3__	CONTINGENCY 'COMED_P4_023-65-BT2-3__' TRIP BRANCH FROM BUS 270644 TO BUS 243206 CKT 1 / WILTO; 765 05DUMONT 765 TRIP BRANCH FROM BUS 270607 TO BUS 270630 CKT 1 / COLLI; 765 PLANO; 765

	END
COMED_P4_112-65-BT2-3__	CONTINGENCY 'COMED_P4_112-65-BT2-3__' TRIP BRANCH FROM BUS 270644 TO BUS 270607 CKT 1 / WILTO; 765 COLLI; 765 TRIP BRANCH FROM BUS 275232 TO BUS 270644 CKT 1 / WILTO;3M 345 WILTO; 765 TRIP BRANCH FROM BUS 275232 TO BUS 270926 CKT 1 / WILTO;3M 345 WILTO; B 345 TRIP BRANCH FROM BUS 275232 TO BUS 275332 CKT 1 / WILTO;3M 345 WILTO;3C 33 END
COMED_P4_112-65-BT3-4__	CONTINGENCY 'COMED_P4_112-65-BT3-4__' TRIP BRANCH FROM BUS 270644 TO BUS 243206 CKT 1 / WILTO; 765 05DUMONT 765 TRIP BRANCH FROM BUS 275232 TO BUS 270644 CKT 1 / WILTO;3M 345 WILTO; 765 TRIP BRANCH FROM BUS 275232 TO BUS 270926 CKT 1 / WILTO;3M 345 WILTO; B 345 TRIP BRANCH FROM BUS 275232 TO BUS 275332 CKT 1 / WILTO;3M 345 WILTO;3C 33 END
COMED_P4_112-65-BT4-5__	CONTINGENCY 'COMED_P4_112-65-BT4-5__' TRIP BRANCH FROM BUS 270644 TO BUS 243206 CKT 1 / WILTO; 765 05DUMONT 765 TRIP BRANCH FROM BUS 275233 TO BUS 270644 CKT 1 / WILTO;4M 345 WILTO; 765 TRIP BRANCH FROM BUS 275233 TO BUS 270927 CKT 1 / WILTO;4M 345 WILTO; R 345 TRIP BRANCH FROM BUS 275233 TO BUS 275333 CKT 1 / WILTO;4M 345 WILTO;4C 33 END
COMED_P4_112-65-BT5-6__	CONTINGENCY 'COMED_P4_112-65-BT5-6__' TRIP BRANCH FROM BUS 270644 TO BUS 270607 CKT 1 / WILTO; 765 COLLI; 765 TRIP BRANCH FROM BUS 275233 TO BUS 270644 CKT 1 / WILTO;4M 345 WILTO; 765 TRIP BRANCH FROM BUS 275233 TO BUS 270927 CKT 1

	/ WILTO;4M 345 WILTO; R 345 TRIP BRANCH FROM BUS 275233 TO BUS 275333 CKT 1 / WILTO;4M 345 WILTO;4C 33 END
COMED_P4_144-45-BT6-7__	CONTINGENCY 'COMED_P4_144-45-BT6-7__' TRIP BRANCH FROM BUS 270730 TO BUS 270916 CKT 1 / ELEC JUNC; B 345 WAYNE ; B 345 TRIP BRANCH FROM BUS 270916 TO BUS 270917 CKT 1 / WAYNE ; B 345 WAYNE ; R 345 TRIP BRANCH FROM BUS 270916 TO BUS 270900 CKT 1 / WAYNE ; B 345 TOLLWAY ; B 345 DISCONNECT BUS 275228 / WAYNE ;1M 138 END
COMED_P4_144-45-BT6-8__	CONTINGENCY 'COMED_P4_144-45-BT6-8__' TRIP BRANCH FROM BUS 930480 TO BUS 270916 CKT 1 / AB1-089 TAP 345 WAYNE ; B 345 TRIP BRANCH FROM BUS 270730 TO BUS 270916 CKT 1 / ELEC JUNC; B 345 WAYNE ; B 345 TRIP BRANCH FROM BUS 270916 TO BUS 270917 CKT 1 / WAYNE ; B 345 WAYNE ; R 345 END
COMED_P4_155-45-BT6-7__	CONTINGENCY 'COMED_P4_155-45-BT6-7__' TRIP BRANCH FROM BUS 275204 TO BUS 270828 CKT 1 / NELSO;4M 138 NELSO; B 345 TRIP BRANCH FROM BUS 275204 TO BUS 272094 CKT 1 / NELSO;4M 138 NELSO; B 138 TRIP BRANCH FROM BUS 275204 TO BUS 275304 CKT 1 / NELSO;4M 138 NELSO;4C 34.5 TRIP BRANCH FROM BUS 270828 TO BUS 274768 CKT 1 / NELSO; B 345 LEECO;BP 345 END
COMED_P4_937-45-BT1-2__	CONTINGENCY 'COMED_P4_937-45-BT1-2__' TRIP BRANCH FROM BUS 270828 TO BUS 274768 CKT 1 / NELSO; B 345 LEECO;BP 345 TRIP BRANCH FROM BUS 274768 TO BUS 270678 CKT 1 / LEECO;BP 345 BYRON; B 345

	END
COMED_P4_937-45-BT1-4__	CONTINGENCY 'COMED_P4_937-45-BT1-4__' TRIP BRANCH FROM BUS 270828 TO BUS 274768 CKT 1 / NELSO; B 345 LEECO;BP 345 TRIP BRANCH FROM BUS 271421 TO BUS 274450 CKT 1 / EASYR; B 138 EASYR;1 34.5 TRIP BRANCH FROM BUS 271421 TO BUS 274451 CKT 1 / EASYR; B 138 EASYR;2 34.5 TRIP BRANCH FROM BUS 272528 TO BUS 271421 CKT 1 / S DIX; B 138 EASYR; B 138 TRIP BRANCH FROM BUS 274420 TO BUS 274857 CKT 1 / EASYR;1H 34.5 EASYR;U1 0.69 TRIP BRANCH FROM BUS 274421 TO BUS 274858 CKT 1 / EASYR;2H 34.5 EASYR;U2 0.69 TRIP BRANCH FROM BUS 274450 TO BUS 274420 CKT 1 / EASYR;1 34.5 EASYR;1H 34.5 TRIP BRANCH FROM BUS 274451 TO BUS 274421 CKT 1 / EASYR;2 34.5 EASYR;2H 34.5 TRIP BRANCH FROM BUS 274768 TO BUS 272528 CKT 1 / LEECO;BP 345 S DIX; B 138 REMOVE UNIT W1 FROM BUS 274857 / EASYR;U1 0.69 REMOVE UNIT W2 FROM BUS 274858 / EASYR;U2 0.69 END
COMED_P7_138-L11902GB-R_+_138-L17121_R-R-B	CONTINGENCY 'COMED_P7_138-L11902GB-R_+_138-L17121_R-R-B' TRIP BRANCH FROM BUS 271399 TO BUS 271397 CKT 1 / ELEROY ;RT 138 ELEROY ; R 138 TRIP BRANCH FROM BUS 271399 TO BUS 271915 CKT 1 / ELEROY ;RT 138 LENA ; R 138 TRIP BRANCH FROM BUS 271898 TO BUS 271399 CKT 1 / LANCASTER;BT 138 ELEROY ;RT 138 TRIP BRANCH FROM BUS 271898 TO BUS 271897 CKT 1 / LANCASTER;BT 138 LANCASTER; R 138 TRIP BRANCH FROM BUS 938860 TO BUS 272598 CKT 1 / AE1-114 TAP 138 ESS B427 ;1T 138

	TRIP BRANCH FROM BUS 272598 TO BUS 271898 CKT 1 / ESS B427 ;1T 138 LANCASTER;BT 138 TRIP BRANCH FROM BUS 272598 TO BUS 272596 CKT 1 / ESS B427 ;1T 138 ESS B427 ; B 138 MOVE 100 PERCENT LOAD FROM BUS 271397 TO BUS 271396 / ELEROY ; R 138 ELEROY ; B 138 MOVE 100 PERCENT LOAD FROM BUS 271915 TO BUS 271914 / LENA ; R 138 LENA ; B 138 TRIP BRANCH FROM BUS 272240 TO BUS 271897 CKT 1 / PECAT; B 138 LANCA; R 138 TRIP BRANCH FROM BUS 272747 TO BUS 272240 CKT 1 / WEMPL; R 138 PECAT; B 138 MOVE 100 PERCENT LOAD FROM BUS 272240 TO BUS 272746 / PECAT; B 138 WEMPL; B 138 END

Appendices

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 AE1-114 TAP-ESS B427 ;1T 138 kV line (from bus 938860 to bus 272598 ckt 1) loads from 86.76% to 116.87% (AC power flow) of its load dump rating (215 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_006-45-BT3-4__'. This project contributes approximately 66.99 MW to the thermal violation.

CONTINGENCY 'COMED_P4_006-45-BT3-4__'
 TRIP BRANCH FROM BUS 274768 TO BUS 270678 CKT 1 / LEECO;BP 345 BYRON; B 345
 REMOVE UNIT 1 FROM BUS 274656 / BYRON;1U 25
 END

Bus Number	*Bus Name*	*Full Contribution*
938861	*AE1-114 C O1*	*15.18*
938862	*AE1-114 E O1*	*51.8*
LTF	*CBM-N*	*0.03*
LTF	*CBM-S1*	*0.62*
LTF	*CBM-S2*	*0.19*
LTF	*CBM-W2*	*7.24*
LTF	*CIN*	*0.22*
LTF	*CPLE*	*0.06*
LTF	*G-007A*	*0.09*
LTF	*IPL*	*0.12*
LTF	*LGEE*	*0.05*
LTF	*MEC*	*4.62*
LTF	*NYISO*	*0.11*
293516	*O-009 E1*	*4.42*
293517	*O-009 E2*	*2.25*
293518	*O-009 E3*	*2.47*
293715	*O-029 E*	*4.73*
293716	*O-029 E*	*2.59*
293717	*O-029 E*	*2.38*
LTF	*VFT*	*0.23*

Appendix 2

(MISO NIPS - AEP) The 17STILLWELL-05DUMONT 345 kV line (from bus 255113 to bus 243219 ckt 1) loads from 119.35% to 119.75% (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 20.1 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 3

(CE - CE) The CHERRY VA; B-GARDEN PR; R 345 kV line (from bus 270694 to bus 270759 ckt 1) loads from 101.24% to 103.24% (AC power flow) of its load dump rating (1479 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_144-45-BT6-7__'. This project contributes approximately 26.98 MW to the thermal violation.

CONTINGENCY 'COMED_P4_144-45-BT6-7__'
TRIP BRANCH FROM BUS 270730 TO BUS 270916 CKT 1 / ELEC JUNC; B 345 WAYNE ; B 345
TRIP BRANCH FROM BUS 270916 TO BUS 270917 CKT 1 / WAYNE ; B 345 WAYNE ; R 345
TRIP BRANCH FROM BUS 270916 TO BUS 270900 CKT 1 / WAYNE ; B 345 TOLLWAY ; B 345
DISCONNECT BUS 275228 / WAYNE ;1M 138
END

Bus Number	*Bus Name*	*Full Contribution*
932881	*AC2-115 1*	*4.92*
932891	*AC2-115 2*	*4.92*
932921	*AC2-116*	*1.72*
933911	*AD1-013 C*	*1.53*
933912	*AD1-013 E*	*2.45*
934431	*AD1-067 C*	*0.11*
934432	*AD1-067 E*	*0.47*
934701	*AD1-098 C O1*	*5.92*
934702	*AD1-098 E O1*	*4.32*
934971	*AD1-129 C*	*1.29*
934972	*AD1-129 E*	*0.86*
936791	*AD2-102 C*	*28.23*
936792	*AD2-102 E*	*18.82*
937001	*AD2-134 C*	*2.18*
937002	*AD2-134 E*	*8.71*
937311	*AD2-172 C*	*4.45*
937312	*AD2-172 E*	*6.14*
937531	*AD2-214 C*	*4.46*
937532	*AD2-214 E*	*2.97*
938861	*AE1-114 C O1*	*6.11*
938862	*AE1-114 E O1*	*20.86*
939051	*AE1-134 1*	*1.56*
939061	*AE1-134 2*	*1.56*
LTF	*BLUEG*	*1.71*
274656	*BYRON ;1U*	*53.26*

274657	*BYRON ;2U*	*52.16*
LTF	*CANNELTON*	*0.02*
LTF	*CARR*	*0.17*
LTF	*CBM-S1*	*1.49*
LTF	*CBM-S2*	*0.03*
LTF	*CBM-W1*	*17.76*
LTF	*CBM-W2*	*24.88*
LTF	*CHOCTAW /* 35% REVERSE 4566958 4511400*	*< 0.01*
274859	*EASYR;U1 E*	*17.06*
274860	*EASYR;U2 E*	*17.06*
274856	*ECOGROVE ;U1*	*0.75*
LTF	*G-007*	*0.46*
LTF	*GIBSON*	*0.03*
290051	*GSG-6; E*	*8.81*
LTF	*HAMLET*	*0.03*
950081	*J384*	*2.64*
950101	*J390*	*84.56*
950142	*J395 E*	*9.1*
952431	*J760*	*5.35*
953681	*J818*	*14.28*
953901	*J850*	*21.04*
954001	*J864*	*4.43*
274765	*LEE CO EC;6U*	*2.49*
290108	*LEEDK;1U E*	*17.52*
LTF	*MEC*	*27.48*
293516	*O-009 E1*	*9.59*
293517	*O-009 E2*	*4.87*
293518	*O-009 E3*	*5.37*
293715	*O-029 E*	*10.26*
293716	*O-029 E*	*5.62*
293717	*O-029 E*	*5.17*
LTF	*O-066*	*2.97*
294763	*P-046 E*	*16.95*
290266	*R-018*	*0.28*
LTF	*RENSSELAER*	*0.13*
274822	*ROCKFORD ;11*	*4.76*
274824	*ROCKFORD ;12*	*4.72*
274823	*ROCKFORD ;21*	*4.89*
295111	*SUBLETTE E*	*2.29*
LTF	*TILTON*	*0.11*
LTF	*TRIMBLE*	*0.2*
LTF	*WEC*	*0.44*
295109	*WESTBROOK E*	*4.72*
907361	*X1-087*	*0.57*

916221	*Z1-073 E*	*4.54*
916522	*Z1-108 E*	*2.09*
919221	*AA1-146*	*20.09*
919581	*AA2-030*	*20.09*
930481	*AB1-089*	*139.36*
925302	*AB2-191 E*	*1.17*
927511	*AC1-113 1*	*2.46*
927521	*AC1-113 2*	*2.46*
926431	*AC1-114*	*4.92*

Appendix 4

(CE - CE) The GARDEN PR; R-SILVER LK; R 345 kV line (from bus 270759 to bus 270883 ckt 1) loads from 114.81% to 117.37% (AC power flow) of its load dump rating (1479 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_144-45-BT6-7__'. This project contributes approximately 26.98 MW to the thermal violation.

CONTINGENCY 'COMED_P4_144-45-BT6-7__'
TRIP BRANCH FROM BUS 270730 TO BUS 270916 CKT 1 / ELEC JUNC; B 345 WAYNE ; B 345
TRIP BRANCH FROM BUS 270916 TO BUS 270917 CKT 1 / WAYNE ; B 345 WAYNE ; R 345
TRIP BRANCH FROM BUS 270916 TO BUS 270900 CKT 1 / WAYNE ; B 345 TOLLWAY ; B 345
DISCONNECT BUS 275228 / WAYNE ;1M 138
END

Bus Number	*Bus Name*	*Full Contribution*
932881	*AC2-115 1*	*4.92*
932891	*AC2-115 2*	*4.92*
932921	*AC2-116*	*1.72*
933911	*AD1-013 C*	*1.53*
933912	*AD1-013 E*	*2.45*
934431	*AD1-067 C*	*0.11*
934432	*AD1-067 E*	*0.47*
934701	*AD1-098 C O1*	*5.92*
934702	*AD1-098 E O1*	*4.32*
934971	*AD1-129 C*	*1.29*
934972	*AD1-129 E*	*0.86*
936791	*AD2-102 C*	*28.23*
936792	*AD2-102 E*	*18.82*
937001	*AD2-134 C*	*2.18*
937002	*AD2-134 E*	*8.71*
937311	*AD2-172 C*	*4.45*
937312	*AD2-172 E*	*6.14*
937531	*AD2-214 C*	*4.46*
937532	*AD2-214 E*	*2.97*
938861	*AE1-114 C O1*	*6.11*
938862	*AE1-114 E O1*	*20.86*
939051	*AE1-134 1*	*1.56*
939061	*AE1-134 2*	*1.56*
LTF	*BLUEG*	*1.71*
274656	*BYRON ;1U*	*53.26*

274657	*BYRON ;2U*	*52.16*
LTF	*CANNELTON*	*0.02*
LTF	*CARR*	*0.17*
LTF	*CBM-S1*	*1.49*
LTF	*CBM-S2*	*0.03*
LTF	*CBM-W1*	*17.76*
LTF	*CBM-W2*	*24.88*
LTF	*CHOCTAW /* 35% REVERSE 4566958 4511400*	*< 0.01*
274859	*EASYR;U1 E*	*17.06*
274860	*EASYR;U2 E*	*17.06*
LTF	*G-007*	*0.46*
LTF	*GIBSON*	*0.03*
290051	*GSG-6; E*	*8.81*
LTF	*HAMLET*	*0.03*
950081	*J384*	*2.64*
950101	*J390*	*84.56*
950142	*J395 E*	*9.1*
952431	*J760*	*5.35*
953681	*J818*	*14.28*
953901	*J850*	*21.04*
954001	*J864*	*4.43*
290108	*LEEDK;1U E*	*17.52*
LTF	*MEC*	*27.48*
293516	*O-009 E1*	*9.59*
293517	*O-009 E2*	*4.87*
293518	*O-009 E3*	*5.37*
293715	*O-029 E*	*10.26*
293716	*O-029 E*	*5.62*
293717	*O-029 E*	*5.17*
LTF	*O-066*	*2.97*
294763	*P-046 E*	*16.95*
270859	*PWR VTR EC;R*	*48.93*
290266	*R-018*	*0.28*
LTF	*RENSSELAER*	*0.13*
274822	*ROCKFORD ;11*	*4.76*
274824	*ROCKFORD ;12*	*4.72*
274823	*ROCKFORD ;21*	*4.89*
295111	*SUBLETTE E*	*2.29*
LTF	*TILTON*	*0.11*
LTF	*TRIMBLE*	*0.2*
LTF	*WEC*	*0.44*
295109	*WESTBROOK E*	*4.72*
916221	*Z1-073 E*	*4.54*
916522	*Z1-108 E*	*2.09*

919221	*AA1-146*	*20.09*
919581	*AA2-030*	*20.09*
930481	*AB1-089*	*139.36*
924471	*AB2-096*	*171.24*
925302	*AB2-191 E*	*1.17*
927511	*AC1-113 1*	*2.46*
927521	*AC1-113 2*	*2.46*
926431	*AC1-114*	*4.92*

Appendix 5

(CE - AEP) The GREENACRE; T-05OLIVE 345 kV line (from bus 270771 to bus 243229 ckt 1) loads from 110.3% to 110.37% (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 11.58 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*	*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 6

(CE - CE) The NELSON ; B-ELECT JCT; B 345 kV line (from bus 270828 to bus 270730 ckt 1) loads from 110.28% to 111.62% (AC power flow) of its load dump rating (1656 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_155-45-BT6-7__'. This project contributes approximately 20.67 MW to the thermal violation.

CONTINGENCY 'COMED_P4_155-45-BT6-7__'
TRIP BRANCH FROM BUS 275204 TO BUS 270828 CKT 1 / NELSO;4M 138 NELSO; B 345
TRIP BRANCH FROM BUS 275204 TO BUS 272094 CKT 1 / NELSO;4M 138 NELSO; B 138
TRIP BRANCH FROM BUS 275204 TO BUS 275304 CKT 1 / NELSO;4M 138 NELSO;4C 34.5
TRIP BRANCH FROM BUS 270828 TO BUS 274768 CKT 1 / NELSO; B 345 LEECO;BP 345
END

Bus Number	*Bus Name*	*Full Contribution*
933911	*AD1-013 C*	*1.39*
933912	*AD1-013 E*	*2.22*
934051	*AD1-031 C O1*	*3.26*
934052	*AD1-031 E O1*	*5.32*
934431	*AD1-067 C*	*0.1*
934432	*AD1-067 E*	*0.44*
934701	*AD1-098 C O1*	*5.88*
934702	*AD1-098 E O1*	*4.29*
937001	*AD2-134 C*	*2.05*
937002	*AD2-134 E*	*8.18*
937311	*AD2-172 C*	*1.46*
937312	*AD2-172 E*	*2.01*
937531	*AD2-214 C*	*10.08*
937532	*AD2-214 E*	*6.72*
938861	*AE1-114 C O1*	*4.69*
938862	*AE1-114 E O1*	*15.98*
939051	*AE1-134 1*	*4.25*
939061	*AE1-134 2*	*4.25*
274877	*BISHOP HL;1U*	*0.43*
274878	*BISHOP HL;2U*	*0.43*
294401	*BSHIL;1U E*	*9.87*
294410	*BSHIL;2U E*	*9.87*

274848	CAMPGROVE;RU	0.6
LTF	CARR	0.06
LTF	CBM-S1	5.17
LTF	CBM-S2	1.22
LTF	CBM-W1	20.95
LTF	CBM-W2	65.6
LTF	CHOCTAW /* 35% REVERSE 4566958 4511400	< 0.01
LTF	CIN	0.76
274699	CORDOVA ;1C	7.1
274701	CORDOVA ;1S	7.99
274700	CORDOVA ;2C	7.1
LTF	CPLE	0.35
274849	CRESCENT ;1U	0.17
LTF	G-007	0.14
950541	G798 C	2.64
950542	G798 E	10.57
950571	G870 C	2.87
950572	G870 E	11.48
950581	G947 C	1.78
950582	G947 E	7.12
290051	GSG-6; E	8.27
950591	H008 C	0.73
950592	H008 E	2.92
950601	H009 C	2.88
950602	H009 E	11.5
950611	H021 C	2.58
950612	H021 E	10.32
950631	H096 C	0.76
950632	H096 E	3.06
LTF	IPL	0.33
950401	J041 C	1.67
950402	J041 E	6.7
950821	J274 C	1.46
950822	J274 E	5.82
950911	J289 C	0.29
950912	J289 E	0.87
950961	J329	4.74
951031	J344 C	3.11
951032	J344 E	9.34
950181	J407 C	3.09
950182	J407 E	12.34
950211	J411 C	4.16
950212	J411 E	16.63
950221	J416 C	3.94

950222	*J416 E*	*15.76*
950471	*J438 C*	*3.44*
950472	*J438 E*	*13.82*
950491	*J443 C*	*0.97*
950492	*J443 E*	*3.9*
950501	*J449 C*	*3.28*
950502	*J449 E*	*13.11*
950522	*J455 E*	*22.29*
951221	*J475 C*	*3.8*
951222	*J475 E*	*15.22*
951301	*J495 C*	*3.61*
951302	*J495 E*	*10.82*
951331	*J498 C*	*5.11*
951332	*J498 E*	*20.43*
951341	*J499 C*	*4.99*
951342	*J499 E*	*19.96*
951351	*J500 C*	*6.93*
951352	*J500 E*	*27.7*
951381	*J504*	*5.87*
951421	*J514*	*3.51*
951441	*J523 C*	*2.24*
951442	*J523 E*	*1.49*
951451	*J524 C*	*4.62*
951452	*J524 E*	*3.08*
951501	*J529 C*	*3.55*
951502	*J529 E*	*14.22*
951511	*J530 C*	*5.61*
951512	*J530 E*	*22.44*
951541	*J534 C*	*3.69*
951542	*J534 E*	*14.78*
951551	*J535 C*	*3.11*
951552	*J535 E*	*12.45*
951821	*J541 C*	*4.57*
951822	*J541 E*	*24.74*
951841	*J555 C*	*2.08*
951842	*J555 E*	*11.24*
952191	*J583 C*	*2.2*
952192	*J583 E*	*11.93*
952211	*J590 C*	*1.04*
952212	*J590 E*	*5.64*
952021	*J614 C*	*0.76*
952022	*J614 E*	*4.12*
953082	*J836 E*	*14.98*
954702	*J844 E*	*29.63*
954131	*J877*	*18.57*

954301	*J898 C*	*1.14*
954302	*J898 E*	*6.17*
990901	*L-005 E*	*13.61*
LTF	*LGEE*	*0.11*
LTF	*MEC*	*53.97*
274715	*NELSON EC;1C*	*7.74*
274716	*NELSON EC;1S*	*10.69*
274717	*NELSON EC;2C*	*7.74*
274718	*NELSON EC;2S*	*10.69*
293513	*O-009 C1*	*0.93*
293514	*O-009 C2*	*0.47*
293515	*O-009 C3*	*0.52*
293516	*O-009 E1*	*21.2*
293517	*O-009 E2*	*10.77*
293518	*O-009 E3*	*11.86*
293712	*O-029 C*	*1.*
293713	*O-029 C*	*0.55*
293714	*O-029 C*	*0.51*
293715	*O-029 E*	*22.67*
293716	*O-029 E*	*12.43*
293717	*O-029 E*	*11.43*
293771	*O-035 E*	*6.02*
LTF	*O-066*	*0.9*
294763	*P-046 E*	*5.55*
274851	*PROVIDENC;RU*	*0.27*
274662	*QUAD CITI;1U*	*40.52*
274663	*QUAD CITI;2U*	*41.56*
950721	*R420 C*	*3.7*
950722	*R420 E*	*14.82*
950731	*R490 C*	*0.18*
950732	*R490 E*	*0.71*
LTF	*RENSSELAER*	*0.05*
295111	*SUBLETTE E*	*2.15*
905471	*W4-084*	*0.15*
295109	*WESTBROOK E*	*4.43*
916211	*Z1-072 E*	*4.56*
916221	*Z1-073 E*	*4.27*
919221	*AA1-146*	*54.74*
919581	*AA2-030*	*54.74*
925302	*AB2-191 E*	*1.09*
925581	*AC1-033 C*	*1.62*
925582	*AC1-033 E*	*10.82*
926841	*AC1-171 C O1*	*0.78*
926842	*AC1-171 E O1*	*5.22*
927201	*AC1-214 C O1*	*1.93*

927202	*AC1-214 E O1*	*6.15*

Appendix 7

(CE - CE) The WILTON ; B-WILTON ;3M 345 kV line (from bus 270926 to bus 275232 ckt 1) loads from 104.65% to 106.02% (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 21.36 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 106.82% to 108.22% (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 21.81 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 HAUMESSER; B-W DEKALB ;3T 138 kV line (from bus 271680 to bus 272756 ckt 1) loads from 116.19% to 119.26% (AC power flow) of its load dump rating (471 MVA) for the bus fault outage of 'COMED_P2-2_119_LN-138___6'. This project contributes approximately 15.5 MW to the thermal violation.

CONTINGENCY 'COMED_P2-2_119_LN-138___6'
TRIP BRANCH FROM BUS 271897 TO BUS 271499 CKT 1 / LANCASTER; R 138 FREEPORT ;5T 138
TRIP BRANCH FROM BUS 271897 TO BUS 271898 CKT 1 / LANCASTER; R 138 LANCASTER;BT 138
END

Bus Number	*Bus Name*	*Full Contribution*
933911	*AD1-013 C*	*8.58*
933912	*AD1-013 E*	*13.71*
934431	*AD1-067 C*	*0.6*
934432	*AD1-067 E*	*2.52*
934701	*AD1-098 C O1*	*30.09*
934702	*AD1-098 E O1*	*21.97*
937001	*AD2-134 C*	*11.81*
937002	*AD2-134 E*	*47.13*
938861	*AE1-114 C O1*	*3.51*
938862	*AE1-114 E O1*	*11.99*
LTF	*BLUEG*	*0.2*
LTF	*CARR*	*0.03*
LTF	*CBM-S1*	*0.42*
LTF	*CBM-S2*	*0.05*
LTF	*CBM-W1*	*2.32*
LTF	*CBM-W2*	*6.32*
LTF	*CPLE*	*< 0.01*
272363	*ESS H440 ; R*	*2.15*
LTF	*G-007*	*0.07*
274855	*GSG-6 ;RU*	*2.1*
290051	*GSG-6; E*	*47.66*
274872	*LEE DEKAL;1U*	*5.95*
290108	*LEEDK;1U E*	*140.84*
LTF	*MEC*	*5.66*
274850	*MENDOTA H;RU*	*0.5*
LTF	*O-066*	*0.46*
LTF	*RENSSELAER*	*0.02*
295110	*SUBLETTE C*	*0.33*
295111	*SUBLETTE E*	*12.41*

LTF	*TRIMBLE*	*0.03*
905471	*W4-084*	*0.08*
295108	*WESTBROOK C*	*0.73*
295109	*WESTBROOK E*	*25.52*
916221	*Z1-073 E*	*24.59*
925301	*AB2-191 C*	*0.81*
925302	*AB2-191 E*	*6.31*

Appendix 10

(CE - CE) The W DEKALB ;3T-WATERMAN ;3B 138 kV line (from bus 272756 to bus 272730 ckt 1) loads from 109.3% to 112.56% (AC power flow) of its load dump rating (471 MVA) for the tower line contingency outage of 'COMED_P7_138-L11902GB-R_+_138-L17121_R-R-B'. This project contributes approximately 15.5 MW to the thermal violation.

CONTINGENCY 'COMED_P7_138-L11902GB-R_+_138-L17121_R-R-B'
TRIP BRANCH FROM BUS 271399 TO BUS 271397 CKT 1 / ELEROY ;RT 138 ELEROY ; R 138
TRIP BRANCH FROM BUS 271399 TO BUS 271915 CKT 1 / ELEROY ;RT 138 LENA ; R 138
TRIP BRANCH FROM BUS 271898 TO BUS 271399 CKT 1 / LANCASTER;BT 138 ELEROY ;RT 138
TRIP BRANCH FROM BUS 271898 TO BUS 271897 CKT 1 / LANCASTER;BT 138 LANCASTER; R 138
TRIP BRANCH FROM BUS 938860 TO BUS 272598 CKT 1 / AE1-114 TAP 138 ESS B427 ;1T 138
TRIP BRANCH FROM BUS 272598 TO BUS 271898 CKT 1 / ESS B427 ;1T 138 LANCASTER;BT 138
TRIP BRANCH FROM BUS 272598 TO BUS 272596 CKT 1 / ESS B427 ;1T 138 ESS B427 ; B 138
MOVE 100 PERCENT LOAD FROM BUS 271397 TO BUS 271396 / ELEROY ; R 138 ELEROY ; B 138
MOVE 100 PERCENT LOAD FROM BUS 271915 TO BUS 271914 / LENA ; R 138 LENA ; B 138
TRIP BRANCH FROM BUS 272240 TO BUS 271897 CKT 1 / PECAT; B 138 LANCA; R 138
TRIP BRANCH FROM BUS 272747 TO BUS 272240 CKT 1 / WEMPL; R 138 PECAT; B 138
MOVE 100 PERCENT LOAD FROM BUS 272240 TO BUS 272746 / PECAT; B 138 WEMPL; B 138
END

Bus Number	*Bus Name*	*Full Contribution*
933911	*AD1-013 C*	*8.58*
933912	*AD1-013 E*	*13.71*
934431	*AD1-067 C*	*0.6*
934432	*AD1-067 E*	*2.52*
934701	*AD1-098 C O1*	*30.09*
934702	*AD1-098 E O1*	*21.97*
937001	*AD2-134 C*	*11.81*

937002	*AD2-134 E*	*47.13*
938861	*AE1-114 C O1*	*3.51*
938862	*AE1-114 E O1*	*11.99*
LTF	*BLUEG*	*0.2*
LTF	*CARR*	*0.03*
LTF	*CBM-S1*	*0.42*
LTF	*CBM-S2*	*0.05*
LTF	*CBM-W1*	*2.32*
LTF	*CBM-W2*	*6.32*
LTF	*CPLE*	*< 0.01*
272363	*ESS H440 ; R*	*2.15*
LTF	*G-007*	*0.07*
274855	*GSG-6 ;RU*	*2.1*
290051	*GSG-6; E*	*47.66*
274872	*LEE DEKAL;1U*	*5.95*
290108	*LEEDK;1U E*	*140.84*
LTF	*MEC*	*5.66*
274850	*MENDOTA H;RU*	*0.5*
LTF	*O-066*	*0.46*
LTF	*RENSSELAER*	*0.02*
295110	*SUBLETTE C*	*0.33*
295111	*SUBLETTE E*	*12.41*
LTF	*TRIMBLE*	*0.03*
905471	*W4-084*	*0.08*
295108	*WESTBROOK C*	*0.73*
295109	*WESTBROOK E*	*25.52*
916221	*Z1-073 E*	*24.59*
925301	*AB2-191 C*	*0.81*
925302	*AB2-191 E*	*6.31*

Appendix 11

(CE - CE) The WILTON ; 765/345 kV transformer (from bus 275232 to bus 270644 ckt 1) loads from 104.37% to 105.74% (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 21.36 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 12

(CE - CE) The WILTON ; 765/345 kV transformer (from bus 275233 to bus 270644 ckt 1) loads from 106.54% to 107.94% (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 21.81 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 13

(CE - CE) The E FRANKFO; B-CRETE EC ;BP 345 kV line (from bus 270728 to bus 274750 ckt 1) loads from 99.75% to 100.74% (**DC power flow**) of its emergency rating (1399 MVA) for the single line contingency outage of 'AEP_P1-2_#695A'. This project contributes approximately 13.86 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

Bus Number	*Bus Name*	*Full Contribution*
934431	*AD1-067 C*	*0.1*
934432	*AD1-067 E*	*0.44*
934721	*AD1-100 C*	*15.33*
934722	*AD1-100 E*	*71.56*
935141	*AD1-148*	*2.68*
936291	*AD2-038 C O1*	*1.84*
936292	*AD2-038 E O1*	*12.29*
936371	*AD2-047 C O1*	*3.17*
936372	*AD2-047 E O1*	*15.47*
936972	*AD2-131 E*	*2.79*
937001	*AD2-134 C*	*2.07*
937002	*AD2-134 E*	*8.26*
937211	*AD2-159 C*	*2.*
937212	*AD2-159 E*	*9.38*
938851	*AE1-113 C O1*	*7.2*
938852	*AE1-113 E O1*	*22.64*
938861	*AE1-114 C O1*	*2.87*
938862	*AE1-114 E O1*	*10.98*
939321	*AE1-163 C O1*	*4.61*
939322	*AE1-163 E O1*	*28.34*
939401	*AE1-172 C*	*4.05*
939402	*AE1-172 E*	*18.99*
939682	*AE1-198 E*	*44.97*
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*	*3.36*
294410	*BSHIL;2U E*	*3.36*
274848	*CAMPGROVE;RU*	*1.23*
274890	*CAYUG;1U E*	*5.21*

274891	*CAYUG;2U E*	*5.21*
274863	*CAYUGA RI;1U*	*1.3*
274864	*CAYUGA RI;2U*	*1.3*
274849	*CRESCENT ;1U*	*0.41*
274859	*EASYR;U1 E*	*4.41*
274860	*EASYR;U2 E*	*4.41*
274856	*ECOGROVE ;U1*	*0.94*
950751	*G858*	*1.93*
274871	*GR RIDGE ;2U*	*2.01*
274847	*GR RIDGE ;BU*	*1.58*
274855	*GSG-6 ;RU*	*1.05*
290051	*GSG-6; E*	*4.2*
950591	*H008*	*1.96*
950761	*H071*	*2.03*
950671	*J112*	*0.28*
950141	*J395*	*6.82*
950181	*J407*	*10.02*
950221	*J416*	*10.09*
950491	*J443*	*2.24*
950501	*J449*	*10.8*
952021	*J614*	*3.57*
953201	*J715*	*6.91*
954701	*J844*	*8.89*
953921	*J855*	*5.31*
954091	*J873*	*10.41*
953011	*J885*	*3.21*
954301	*J898*	*5.41*
954511	*J926*	*5.82*
954741	*J928*	*5.92*
275149	*KEMPTON ;1E*	*6.55*
990901	*L-005 E*	*4.9*
274872	*LEE DEKAL;1U*	*2.34*
290108	*LEEDK;1U E*	*9.77*
274850	*MENDOTA H;RU*	*0.29*
274879	*MINONK ;1U*	*2.*
293061	*N-015 E*	*6.34*
293513	*O-009 C1*	*0.9*
293514	*O-009 C2*	*0.46*
293515	*O-009 C3*	*0.51*
293516	*O-009 E1*	*3.61*
293517	*O-009 E2*	*1.83*
293518	*O-009 E3*	*2.02*
293712	*O-029 C*	*0.96*
293713	*O-029 C*	*0.53*
293714	*O-029 C*	*0.49*

293715	*O-029 E*	*3.86*
293716	*O-029 E*	*2.12*
293717	*O-029 E*	*1.95*
293771	*O-035 E*	*2.51*
293644	*O22 E1*	*4.78*
293645	*O22 E2*	*9.28*
290021	*O50 E*	*8.*
294392	*P-010 E*	*8.05*
294763	*P-046 E*	*3.77*
274888	*PILOT HIL;1E*	*6.56*
274887	*PILOT HIL;1U*	*1.64*
274881	*PLEAS RDG;2U*	*1.64*
274851	*PROVIDENC;RU*	*0.63*
290261	*S-027 E*	*5.48*
290265	*S-028 E*	*5.48*
295110	*SUBLETTE C*	*0.15*
274861	*TOP CROP ;1U*	*1.2*
274862	*TOP CROP ;2U*	*2.32*
274853	*TWINGROVE;U1*	*1.37*
274854	*TWINGROVE;U2*	*1.37*
905081	*W4-005 C*	*1.39*
905082	*W4-005 E*	*6.58*
295108	*WESTBROOK C*	*0.34*
909052	*X2-022 E*	*10.24*
916211	*Z1-072 E*	*1.9*
916221	*Z1-073 E*	*2.17*
917501	*Z2-087 C*	*2.06*
917502	*Z2-087 E*	*13.81*
918051	*AA1-018 C*	*1.85*
918052	*AA1-018 E*	*12.38*
920272	*AA2-123 E*	*2.46*
924041	*AB2-047 C O1*	*2.55*
924042	*AB2-047 E O1*	*17.04*
924261	*AB2-070 C O1*	*1.46*
924262	*AB2-070 E O1*	*9.78*
925301	*AB2-191 C*	*0.6*
925302	*AB2-191 E*	*0.83*
925581	*AC1-033 C*	*1.1*
925582	*AC1-033 E*	*7.34*
925771	*AC1-053 C*	*1.45*
925772	*AC1-053 E*	*9.69*
926821	*AC1-168 C O1*	*0.91*
926822	*AC1-168 E O1*	*6.1*
926841	*AC1-171 C O1*	*0.75*
926842	*AC1-171 E O1*	*4.98*

927201	*AC1-214 C O1*	*1.61*
927202	*AC1-214 E O1*	*5.11*

Appendix 14

(CE - CE) The WILTON ; 765/345 kV transformer (from bus 275232 to bus 270644 ckt 1) loads from 99.04% to 100.22% (**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 16.38 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*
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 15

(CE - CE) The WILTON ; B-WILTON ;3M 345 kV line (from bus 270926 to bus 275232 ckt 1) loads from 113.22% to 113.92% (**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 16.38 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*
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 16

(CE - CE) The WILTON ; R-WILTON ;4M 345 kV line (from bus 270927 to bus 275233 ckt 1) loads from 115.61% to 116.33% (**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 16.73 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*
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 17

(CE - CE) The WILTON ; 765/345 kV transformer (from bus 275233 to bus 270644 ckt 1) loads from 102.22% to 103.43% (**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 16.73 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*
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*

Contingencies (Light Load Analysis)

Option 1	
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-L0626__B-R-B	CONTINGENCY 'COMED_P1-2_345-L0626__B-R-B' TRIP BRANCH FROM BUS 930480 TO BUS 270916 CKT 1 / AB1-089 TAP 345 WAYNE ; B 345 END
COMED_P1-2_345-L0627__B-R	CONTINGENCY 'COMED_P1-2_345-L0627__B-R' TRIP BRANCH FROM BUS 274768 TO BUS 270678 CKT 1 / LEECO;BP 345 BYRON; B 345 END
COMED_P1-2_345-L15501_B-R	CONTINGENCY 'COMED_P1-2_345-L15501_B-R' TRIP BRANCH FROM BUS 270828 TO BUS 274768 CKT 1 / NELSO; B 345 LEECO;BP 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

Attachment 1: Single Line Diagram