

Feasibility Study Report

For

***PJM Generation Interconnection Request
Queue Position AD2-102***

Wempletown 345kV

January 18, 2019

Preface

The intent of the feasibility study is to determine a plan, with ballpark cost and construction time estimates, to connect the subject generation to the PJM network at a location specified by the Interconnection Customer. The Interconnection Customer may request the interconnection of generation as a capacity resource or as an energy-only resource. As a requirement for interconnection, the Interconnection Customer may be responsible for the cost of constructing: (1) Direct Connections, which are new facilities and/or facilities upgrades needed to connect the generator to the PJM network, and (2) Network Upgrades, which are facility additions, or upgrades to existing facilities, that are needed to maintain the reliability of the PJM system.

In some instances a generator interconnection may not be responsible for 100% of the identified network upgrade cost because other transmission network uses, e.g. another generation interconnection, may also contribute to the need for the same network reinforcement. Cost allocation rules for network upgrades can be found in PJM Manual 14A, Attachment B. 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 impact study is performed.

The Interconnection Customer seeking to interconnect a wind 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.

An Interconnection Customer entering the New Services Queue on or after October 1, 2018 (except those regulated by the United States Nuclear Regulatory Commission) shall provide primary frequency response in accordance with Section 4.7.2 of Appendix 2 to the Interconnection Service Agreement. See PJM Manual 14D Section 7.1.1 for more information.

PJM utilizes manufacturer models to ensure the performance of turbines is properly captured during the simulations performed for stability verification and, where applicable, for compliance with low voltage ride through requirements. Turbine manufacturers provide such models to their customers. The list of manufacturer models PJM has already validated is contained in Attachment B of Manual 14G. Manufacturer models may be updated from time to time, for various reasons such as to reflect changes to the control systems or to more accurately represent the capabilities turbines and controls which are currently available in the field. Additionally, as new turbine models are developed, turbine manufacturers provide such new models which must be used in the conduct of these studies. PJM needs adequate time to evaluate the new models in order to reduce delays to the System Impact Study process timeline for the Interconnection Customer as well as other Interconnection Customers in the study group. Therefore, PJM will require that any Interconnection Customer with a new manufacturer model must supply that model to PJM, along with a \$10,000 fully refundable deposit, no later than three (3) months prior to the starting date of the System Impact Study (See Section 4.3 for starting dates) for the Interconnection Request which shall specify the use of the new model. The Interconnection

Customer will be required to submit a completed dynamic model study request form (Attachment B-1 of Manual 14G) in order to document the request for the study.

The Feasibility 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.

General

Impacts on the MISO member transmission systems are not included in this analysis, but will be included in the System Impact Study Phase. Winter peak analysis will be performed in the System Impact Study phase.

This Generation Interconnection Feasibility Study provides analysis results to aid the IC in assessing the practicality and cost of incorporating the facility into the PJM system. This study was limited to load flow analyses of probable contingencies. If the IC elects to pursue a System Impact Study, a more comprehensive analysis will be performed.

Primary Point of Interconnection (Option-1)

The Interconnection Customer (IC) AD2-102, a 200MW solar facility, proposes to interconnect with the ComEd transmission system by connecting to the 345kV bus at the Wempletown TSS 171.

Attachment Facilities

The IC AD2-102 generator lead would interconnect to the 345kV bus at the Wempletown TSS 171. This interconnection would require one 345kV line MOD, a dead-end structure and revenue metering as shown in the one-line diagram.

The cost for the attachment facilities is estimated at \$1M.

Scope of Work	Cost Estimate
Installation of one 345kV line MOD, a dead-end structure and revenue metering (see notes below on cost estimate)	\$1,000,000

Direct Connection Network Upgrades

To accommodate interconnection of AD2-102, 345kV switchgear at TSS 171 Wempletown would be expanded to create a line position for the IC's generator lead.

The scope of work includes installation of one 345kV circuit breaker and bus work, as shown in the one-line diagram below.

The IC is responsible for constructing all the facilities on the IC side of the point of interconnection outside of the Interconnection Substation. The estimated cost of the Direct Connection Upgrade is given below.

Scope of Work	Cost Estimate
Installation of a one 345kV circuit breaker and bus work at TSS 171 Wempletown as described above	\$3,000,000

Total Cost Estimate (see notes below on cost estimate)	\$3,000,000
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ComEd would take approximately 24-months to construct the substation and transmission line work after the ISA / ICSA are signed.

Notes on Cost Estimate:

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

AD2-102



Network Impacts

The Queue Project AD2-102 was evaluated as a 200.0 MW (Capacity 120.0 MW) injection at the Wempletown 345kV substation in the ComEd area. Project AD2-102 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AD2-102 was studied with a commercial probability of 53%. Potential network impacts were as follows:

Summer Peak Analysis - 2021

Generator Deliverability

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

None

Multiple Facility Contingency

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

None

Contribution to Previously Identified Overloads

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

1. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line (from bus 247610 to bus 243219 ckt 2) loads from 114.17% to 114.27% (**DC power flow**) of its emergency rating (1409 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT4-5__'. This project contributes approximately 14.98 MW to the thermal violation.

CONTINGENCY 'COMED_P4_112-65-BT4-5__'

TRIP BRANCH FROM BUS 270644 TO BUS 243206 CKT 1	/ WILTO; 765 05DUMONT 765
TRIP BRANCH FROM BUS 275233 TO BUS 270644 CKT 1	/ WILTO;4M 345 WILTO; 765
TRIP BRANCH FROM BUS 275233 TO BUS 270927 CKT 1	/ WILTO;4M 345 WILTO; R 345
TRIP BRANCH FROM BUS 275233 TO BUS 275333 CKT 1	/ WILTO;4M 345 WILTO;4C 33
END	

Please refer to Appendix 1 for a table containing the generators having contribution to this flowgate.

2. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line (from bus 247610 to bus 243219 ckt 2) loads from 114.17% to 114.27% (**DC power flow**) of its emergency rating (1409 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT3-4__'. This project contributes approximately 14.98 MW to the thermal violation.

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

3. (MISO NIPS - CE) The 17STJOHN-ST JOHN ; T 345 kV line (from bus 255112 to bus 270886 ckt 1) loads from 109.53% to 109.62% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of 'AEP_P4_#2978_05DUMONT 765'. This project contributes approximately 17.6 MW to the thermal violation.

CONTINGENCY 'AEP_P4_#2978_05DUMONT 765'
OPEN BRANCH FROM BUS 243206 TO BUS 907040 CKT 1 / 243206 05DUMONT 765 X1-020
OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1 / 243206 05DUMONT 765 270644 WILTON ; 765 1
END

Please refer to Appendix 2 for a table containing the generators having contribution to this flowgate.

4. (MISO NIPS - CE) The 17STJOHN-ST JOHN ; T 345 kV line (from bus 255112 to bus 270886 ckt 1) loads from 108.74% to 108.84% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_023-65-BT2-3__'. This project contributes approximately 17.76 MW to the thermal violation.

CONTINGENCY 'COMED_P4_023-65-BT2-3__'
TRIP BRANCH FROM BUS 270644 TO BUS 243206 CKT 1 / WILTO; 765 05DUMONT 765
TRIP BRANCH FROM BUS 270607 TO BUS 270630 CKT 1 / COLLI; 765 PLANO; 765
END

5. (MISO NIPS - CE) The 17STJOHN-ST JOHN ; T 345 kV line (from bus 255112 to bus 270886 ckt 1) loads from 108.71% to 108.81% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT4-5__'. This project contributes approximately 17.71 MW to the thermal violation.

CONTINGENCY 'COMED_P4_112-65-BT4-5__'
TRIP BRANCH FROM BUS 270644 TO BUS 243206 CKT 1 / WILTO; 765 05DUMONT 765
TRIP BRANCH FROM BUS 275233 TO BUS 270644 CKT 1 / WILTO;4M 345 WILTO; 765
TRIP BRANCH FROM BUS 275233 TO BUS 270927 CKT 1 / WILTO;4M 345 WILTO; R 345
TRIP BRANCH FROM BUS 275233 TO BUS 275333 CKT 1 / WILTO;4M 345 WILTO;4C 33
END

6. (MISO NIPS - CE) The 17STJOHN-ST JOHN ; T 345 kV line (from bus 255112 to bus 270886 ckt 1) loads from 108.7% to 108.8% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT3-4__'. This project contributes approximately 17.71 MW to the thermal violation.

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

7. (MISO NIPS - AEP) The 17STILLWELL-05DUMONT 345 kV line (from bus 255113 to bus 243219 ckt 1) loads from 164.15% to 164.31% (**DC power flow**) of its emergency rating (1409 MVA) for the line fault with failed breaker contingency outage of

'AEP_P4_#2978_05DUMONT 765'. This project contributes approximately 27.54 MW to the thermal violation.

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CONTINGENCY 'AEP_P4_#2978_05DUMONT 765'  
OPEN BRANCH FROM BUS 243206 TO BUS 907040 CKT 1      / 243206 05DUMONT 765 X1-020  
OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1      / 243206 05DUMONT 765 270644 WILTON ; 765 1  
END
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Please refer to Appendix 3 for a table containing the generators having contribution to this flowgate.

8. (MISO NIPS - AEP) The 17STILLWELL-05DUMONT 345 kV line (from bus 255113 to bus 243219 ckt 1) loads from 117.98% to 118.43% (**DC power flow**) of its normal rating (1409 MVA) for the single line contingency outage of 'COMED_P1-2_695_B2'. This project contributes approximately 14.37 MW to the thermal violation.

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CONTINGENCY 'COMED_P1-2_695_B2'  
OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1      / 243206 05DUMONT 765 270644 WILTO; 765 1  
END
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9. (CE - MISO NIPS) The BURNHAM ;0R-17MUNSTER 345 kV line (from bus 270677 to bus 255109 ckt 1) loads from 129.76% to 129.95% (**DC power flow**) of its emergency rating (1195 MVA) for the line fault with failed breaker contingency outage of 'AEP_P4_#2978_05DUMONT 765'. This project contributes approximately 22.98 MW to the thermal violation.

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CONTINGENCY 'AEP_P4_#2978_05DUMONT 765'  
OPEN BRANCH FROM BUS 243206 TO BUS 907040 CKT 1      / 243206 05DUMONT 765 X1-020  
OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1      / 243206 05DUMONT 765 270644 WILTON ; 765 1  
END
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Please refer to Appendix 4 for a table containing the generators having contribution to this flowgate.

10. (CE - CE) The E FRANKFO; B-CRETE EC ;BP 345 kV line (from bus 270728 to bus 274750 ckt 1) loads from 108.91% to 109.0% (**DC power flow**) of its load dump rating (1399 MVA) for the line fault with failed breaker contingency outage of 'AEP_P4_#2978_05DUMONT 765'. This project contributes approximately 24.98 MW to the thermal violation.

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CONTINGENCY 'AEP_P4_#2978_05DUMONT 765'  
OPEN BRANCH FROM BUS 243206 TO BUS 907040 CKT 1      / 243206 05DUMONT 765 X1-020  
OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1      / 243206 05DUMONT 765 270644 WILTON ; 765 1  
END
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Please refer to Appendix 5 for a table containing the generators having contribution to this flowgate.

11. (CE - CE) The E FRANKFO; B-CRETE EC ;BP 345 kV line (from bus 270728 to bus 274750 ckt 1) loads from 108.41% to 108.5% (**DC power flow**) of its load dump rating (1399

MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_023-65-BT2-3__'. This project contributes approximately 25.22 MW to the thermal violation.

CONTINGENCY 'COMED_P4_023-65-BT2-3__'
TRIP BRANCH FROM BUS 270644 TO BUS 243206 CKT 1 / WILTO; 765 05DUMONT 765
TRIP BRANCH FROM BUS 270607 TO BUS 270630 CKT 1 / COLLI; 765 PLANO; 765
END

12. (CE - CE) The E FRANKFO; B-CRETE EC ;BP 345 kV line (from bus 270728 to bus 274750 ckt 1) loads from 108.36% to 108.46% (**DC power flow**) of its load dump rating (1399 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT4-5__'. This project contributes approximately 25.12 MW to the thermal violation.

CONTINGENCY 'COMED_P4_112-65-BT4-5__'
TRIP BRANCH FROM BUS 270644 TO BUS 243206 CKT 1 / WILTO; 765 05DUMONT 765
TRIP BRANCH FROM BUS 275233 TO BUS 270644 CKT 1 / WILTO;4M 345 WILTO; 765
TRIP BRANCH FROM BUS 275233 TO BUS 270927 CKT 1 / WILTO;4M 345 WILTO; R 345
TRIP BRANCH FROM BUS 275233 TO BUS 275333 CKT 1 / WILTO;4M 345 WILTO;4C 33
END

13. (CE - CE) The E FRANKFO; B-CRETE EC ;BP 345 kV line (from bus 270728 to bus 274750 ckt 1) loads from 108.35% to 108.44% (**DC power flow**) of its load dump rating (1399 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT3-4__'. This project contributes approximately 25.11 MW to the thermal violation.

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

14. (CE - CE) The GARDEN PR; R-SILVER LK; R 345 kV line (from bus 270759 to bus 270883 ckt 1) loads from 121.87% to 123.3% (**DC power flow**) of its load dump rating (1479 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_144-45-BT6-8__'. This project contributes approximately 47.04 MW to the thermal violation.

CONTINGENCY 'COMED_P4_144-45-BT6-8__'
TRIP BRANCH FROM BUS 934400 TO BUS 270916 CKT 1 / AD1-064 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

Please refer to Appendix 6 for a table containing the generators having contribution to this flowgate.

15. (CE - CE) The GARDEN PR; R-SILVER LK; R 345 kV line (from bus 270759 to bus 270883 ckt 1) loads from 109.05% to 109.79% (**DC power flow**) of its emergency rating (1479 MVA) for the single line contingency outage of 'COMED_P1-2_345-L0626__B-R-B-B'. This project contributes approximately 24.46 MW to the thermal violation.

CONTINGENCY 'COMED_P1-2_345-L0626__B-R-B-B'
TRIP BRANCH FROM BUS 934400 TO BUS 270916 CKT 1 / AD1-064 TAP 345 WAYNE ; B 345
END

16. (CE - CE) The GARDEN PR; R-SILVER LK; R 345 kV line (from bus 270759 to bus 270883 ckt 1) loads from 108.88% to 109.62% (**DC power flow**) of its emergency rating (1479 MVA) for the single line contingency outage of 'COMED_P1-2_345-L0626__B-R-B-A'. This project contributes approximately 24.46 MW to the thermal violation.

CONTINGENCY 'COMED_P1-2_345-L0626__B-R-B-A'
TRIP BRANCH FROM BUS 930480 TO BUS 934400 CKT 1 / AB1-089 TAP 345 AD1-064 TAP 345
END

17. (CE - AEP) The GREENACRE; T-05OLIVE 345 kV line (from bus 270771 to bus 243229 ckt 1) loads from 112.15% to 112.29% (**DC power flow**) of its emergency rating (971 MVA) for the line fault with failed breaker contingency outage of 'AEP_P4_#2978_05DUMONT 765'. This project contributes approximately 15.88 MW to the thermal violation.

CONTINGENCY 'AEP_P4_#2978_05DUMONT 765'
OPEN BRANCH FROM BUS 243206 TO BUS 907040 CKT 1 / 243206 05DUMONT 765 X1-020
OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1 / 243206 05DUMONT 765 270644 WILTON ; 765 1
END

Please refer to Appendix 7 for a table containing the generators having contribution to this flowgate.

18. (CE - AEP) The GREENACRE; T-05OLIVE 345 kV line (from bus 270771 to bus 243229 ckt 1) loads from 110.8% to 110.95% (**DC power flow**) of its emergency rating (971 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_023-65-BT2-3__'. This project contributes approximately 16.03 MW to the thermal violation.

CONTINGENCY 'COMED_P4_023-65-BT2-3__'
TRIP BRANCH FROM BUS 270644 TO BUS 243206 CKT 1 / WILTO; 765 05DUMONT 765
TRIP BRANCH FROM BUS 270607 TO BUS 270630 CKT 1 / COLLI; 765 PLANO; 765
END

19. (CE - MISO NIPS) The ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 109.52% to 109.61% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of 'AEP_P4_#2978_05DUMONT 765'. This project contributes approximately 17.6 MW to the thermal violation.

CONTINGENCY 'AEP_P4_#2978_05DUMONT 765'
OPEN BRANCH FROM BUS 243206 TO BUS 907040 CKT 1 / 243206 05DUMONT 765 X1-020
OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1 / 243206 05DUMONT 765 270644 WILTON ; 765 1
END

Please refer to Appendix 8 for a table containing the generators having contribution to this flowgate.

20. (CE - MISO NIPS) The ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 108.74% to 108.84% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_023-65-BT2-3__'. This project contributes approximately 17.76 MW to the thermal violation.

CONTINGENCY 'COMED_P4_023-65-BT2-3__'

TRIP BRANCH FROM BUS 270644 TO BUS 243206 CKT 1	/ WILTO; 765 05DUMONT 765
TRIP BRANCH FROM BUS 270607 TO BUS 270630 CKT 1	/ COLLI; 765 PLANO; 765
END	

21. (CE - MISO NIPS) The ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 108.71% to 108.81% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT4-5__'. This project contributes approximately 17.71 MW to the thermal violation.

CONTINGENCY 'COMED_P4_112-65-BT4-5__'	
TRIP BRANCH FROM BUS 270644 TO BUS 243206 CKT 1	/ WILTO; 765 05DUMONT 765
TRIP BRANCH FROM BUS 275233 TO BUS 270644 CKT 1	/ WILTO;4M 345 WILTO; 765
TRIP BRANCH FROM BUS 275233 TO BUS 270927 CKT 1	/ WILTO;4M 345 WILTO; R 345
TRIP BRANCH FROM BUS 275233 TO BUS 275333 CKT 1	/ WILTO;4M 345 WILTO;4C 33
END	

22. (CE - MISO NIPS) The ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 108.7% to 108.8% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT3-4__'. This project contributes approximately 17.71 MW to the thermal violation.

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	

23. (CE - CE) The WILTON ; B-WILTON ;3M 345 kV line (from bus 270926 to bus 275232 ckt 1) loads from 145.73% to 146.08% (**DC power flow**) of its load dump rating (1379 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT5-6__'. This project contributes approximately 28.88 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	

Please refer to Appendix 9 for a table containing the generators having contribution to this flowgate.

24. (CE - CE) The WILTON ; R-WILTON ;4M 345 kV line (from bus 270927 to bus 275233 ckt 1) loads from 148.62% to 148.92% (**DC power flow**) of its load dump rating (1379 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT2-3__'. This project contributes approximately 29.5 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	

Please refer to Appendix 10 for a table containing the generators having contribution to this flowgate.

25. (CE - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line (from bus 274750 to bus 255112 ckt 1) loads from 126.47% to 126.57% (**DC power flow**) of its emergency rating (1399 MVA) for the line fault with failed breaker contingency outage of 'AEP_P4_#2978_05DUMONT 765'. This project contributes approximately 24.67 MW to the thermal violation.

CONTINGENCY 'AEP_P4_#2978_05DUMONT 765'
OPEN BRANCH FROM BUS 243206 TO BUS 907040 CKT 1 / 243206 05DUMONT 765 X1-020
OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1 / 243206 05DUMONT 765 270644 WILTON ; 765 1
END

Please refer to Appendix 11 for a table containing the generators having contribution to this flowgate.

26. (CE - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line (from bus 274750 to bus 255112 ckt 1) loads from 125.99% to 126.08% (**DC power flow**) of its emergency rating (1399 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_023-65-BT2-3__'. This project contributes approximately 24.9 MW to the thermal violation.

CONTINGENCY 'COMED_P4_023-65-BT2-3__'
TRIP BRANCH FROM BUS 270644 TO BUS 243206 CKT 1 / WILTO; 765 05DUMONT 765
TRIP BRANCH FROM BUS 270607 TO BUS 270630 CKT 1 / COLLI; 765 PLANO; 765
END

27. (CE - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line (from bus 274750 to bus 255112 ckt 1) loads from 125.94% to 126.04% (**DC power flow**) of its emergency rating (1399 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT4-5__'. This project contributes approximately 24.8 MW to the thermal violation.

CONTINGENCY 'COMED_P4_112-65-BT4-5__'
TRIP BRANCH FROM BUS 270644 TO BUS 243206 CKT 1 / WILTO; 765 05DUMONT 765
TRIP BRANCH FROM BUS 275233 TO BUS 270644 CKT 1 / WILTO;4M 345 WILTO; 765
TRIP BRANCH FROM BUS 275233 TO BUS 270927 CKT 1 / WILTO;4M 345 WILTO; R 345
TRIP BRANCH FROM BUS 275233 TO BUS 275333 CKT 1 / WILTO;4M 345 WILTO;4C 33
END

28. (CE - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line (from bus 274750 to bus 255112 ckt 1) loads from 125.93% to 126.03% (**DC power flow**) of its emergency rating (1399 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT3-4__'. This project contributes approximately 24.8 MW to the thermal violation.

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

29. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 133.32% to 133.47% (**DC power flow**) of its emergency rating (971 MVA) for the

line fault with failed breaker contingency outage of 'AEP_P4_#2978_05DUMONT 765'. This project contributes approximately 19.23 MW to the thermal violation.

CONTINGENCY 'AEP_P4_#2978_05DUMONT 765'
 OPEN BRANCH FROM BUS 243206 TO BUS 907040 CKT 1 / 243206 05DUMONT 765 X1-020
 OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1 / 243206 05DUMONT 765 270644 WILTON ; 765 1
 END

Please refer to Appendix 12 for a table containing the generators having contribution to this flowgate.

30. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 132.18% to 132.33% (**DC power flow**) of its emergency rating (971 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_023-65-BT4-5__'. This project contributes approximately 19.36 MW to the thermal violation.

CONTINGENCY 'COMED_P4_023-65-BT4-5__'
 TRIP BRANCH FROM BUS 275168 TO BUS 270607 CKT 1 / COLLI;2M 345 COLLI; 765
 TRIP BRANCH FROM BUS 275168 TO BUS 270697 CKT 1 / COLLI;2M 345 COLLI; R 345
 TRIP BRANCH FROM BUS 275168 TO BUS 275268 CKT 1 / COLLI;2M 345 COLLI;2C 33
 TRIP BRANCH FROM BUS 270644 TO BUS 243206 CKT 1 / WILTO; 765 05DUMONT 765
 END

31. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 132.18% to 132.34% (**DC power flow**) of its emergency rating (971 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT4-5__'. This project contributes approximately 19.37 MW to the thermal violation.

CONTINGENCY 'COMED_P4_112-65-BT4-5__'
 TRIP BRANCH FROM BUS 270644 TO BUS 243206 CKT 1 / WILTO; 765 05DUMONT 765
 TRIP BRANCH FROM BUS 275233 TO BUS 270644 CKT 1 / WILTO;4M 345 WILTO; 765
 TRIP BRANCH FROM BUS 275233 TO BUS 270927 CKT 1 / WILTO;4M 345 WILTO; R 345
 TRIP BRANCH FROM BUS 275233 TO BUS 275333 CKT 1 / WILTO;4M 345 WILTO;4C 33
 END

32. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 132.18% to 132.33% (**DC power flow**) of its emergency rating (971 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT3-4__'. This project contributes approximately 19.37 MW to the thermal violation.

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

33. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 132.16% to 132.32% (**DC power flow**) of its emergency rating (971 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_023-65-BT2-3__'. This project contributes approximately 19.4 MW to the thermal violation.

CONTINGENCY 'COMED_P4_023-65-BT2-3__'
 TRIP BRANCH FROM BUS 270644 TO BUS 243206 CKT 1 / WILTO; 765 05DUMONT 765
 TRIP BRANCH FROM BUS 270607 TO BUS 270630 CKT 1 / COLLI; 765 PLANO; 765

END

34. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 108.06% to 108.51% (**DC power flow**) of its normal rating (971 MVA) for the single line contingency outage of 'COMED_P1-2_695_B2'. This project contributes approximately 9.87 MW to the thermal violation.

CONTINGENCY 'COMED_P1-2_695_B2'
OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1 / 243206 05DUMONT 765 270644 WILTO; 765 1
END

35. (CE - CE) The WILTON ; 765/345 kV transformer (from bus 275232 to bus 270644 ckt 1) loads from 145.73% to 146.08% (**DC power flow**) of its load dump rating (1379 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT5-6__'. This project contributes approximately 28.88 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

Please refer to Appendix 13 for a table containing the generators having contribution to this flowgate.

36. (CE - CE) The WILTON ; 765/345 kV transformer (from bus 275233 to bus 270644 ckt 1) loads from 148.62% to 148.91% (**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 29.5 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

Please refer to Appendix 14 for a table containing the generators having contribution to this flowgate.

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)

To be determined

Affected System Analysis & Mitigation

MISO Impacts:

MISO Impacts to be determined during later study phases (as applicable).

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.

1. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line (from bus 247610 to bus 243219 ckt 2) loads from 114.16% to 114.26% (**DC power flow**) of its normal rating (1409 MVA) for the single line contingency outage of 'COMED_P1-2_695_B2'. This project contributes approximately 14.97 MW to the thermal violation.

CONTINGENCY 'COMED_P1-2_695_B2'
OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1 / 243206 05DUMONT 765 270644 WILTO; 765 1
END

2. (MISO NIPS - CE) The 17STJOHN-ST JOHN ; T 345 kV line (from bus 255112 to bus 270886 ckt 1) loads from 108.67% to 108.77% (**DC power flow**) of its emergency rating (1091 MVA) for the single line contingency outage of 'COMED_P1-2_695_B2'. This project contributes approximately 17.7 MW to the thermal violation.

CONTINGENCY 'COMED_P1-2_695_B2'
OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1 / 243206 05DUMONT 765 270644 WILTO; 765 1
END

3. (MISO NIPS - AEP) The 17STILLWELL-05DUMONT 345 kV line (from bus 255113 to bus 243219 ckt 1) loads from 160.8% to 160.99% (**DC power flow**) of its normal rating (1409 MVA) for the single line contingency outage of 'COMED_P1-2_695_B2'. This project contributes approximately 28.17 MW to the thermal violation.

CONTINGENCY 'COMED_P1-2_695_B2'
OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1 / 243206 05DUMONT 765 270644 WILTO; 765 1
END

4. (MISO NIPS - AEP) The 17STILLWELL-05DUMONT 345 kV line (from bus 255113 to bus 243219 ckt 1) loads from 103.1% to 103.25% (**DC power flow**) of its normal rating (1409 MVA) for non-contingency condition. This project contributes approximately 15.44 MW to the thermal violation.

5. (CE - MISO NIPS) The BURNHAM ;0R-17MUNSTER 345 kV line (from bus 270677 to bus 255109 ckt 1) loads from 128.81% to 129.0% (**DC power flow**) of its emergency rating (1195

MVA) for the single line contingency outage of 'COMED_P1-2_695_B2'. This project contributes approximately 23.12 MW to the thermal violation.

CONTINGENCY 'COMED_P1-2_695_B2'
OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1 / 243206 05DUMONT 765 270644 WILTO; 765 1
END

6. (CE - CE) The CHERRY VA; B-GARDEN PR; R 345 kV line (from bus 270694 to bus 270759 ckt 1) loads from 119.99% to 121.48% (**DC power flow**) of its emergency rating (1479 MVA) for the single line contingency outage of 'COMED_P1-2_345-L0626__B-R-B-B'. This project contributes approximately 47.97 MW to the thermal violation.

CONTINGENCY 'COMED_P1-2_345-L0626__B-R-B-B'
TRIP BRANCH FROM BUS 934400 TO BUS 270916 CKT 1 / AD1-064 TAP 345 WAYNE ; B 345
END

7. (CE - CE) The COLLINS ; R-COLLINS ;2M 345 kV line (from bus 270697 to bus 275168 ckt 1) loads from 113.3% to 113.95% (**DC power flow**) of its emergency rating (1379 MVA) for the single line contingency outage of 'COMED_P1-2_765-L2315____-S'. This project contributes approximately 19.53 MW to the thermal violation.

CONTINGENCY 'COMED_P1-2_765-L2315____-S'
TRIP BRANCH FROM BUS 270607 TO BUS 270630 CKT 1 / COLLI; 765 PLANO; 765
END

8. (CE - CE) The E FRANKFO; B-CRETE EC ;BP 345 kV line (from bus 270728 to bus 274750 ckt 1) loads from 108.26% to 108.35% (**DC power flow**) of its emergency rating (1399 MVA) for the single line contingency outage of 'COMED_P1-2_695_B2'. This project contributes approximately 25.08 MW to the thermal violation.

CONTINGENCY 'COMED_P1-2_695_B2'
OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1 / 243206 05DUMONT 765 270644 WILTO; 765 1
END

9. (CE - CE) The GARDEN PR; R-SILVER LK; R 345 kV line (from bus 270759 to bus 270883 ckt 1) loads from 121.53% to 122.99% (**DC power flow**) of its emergency rating (1479 MVA) for the single line contingency outage of 'COMED_P1-2_345-L0626__B-R-B-B'. This project contributes approximately 47.97 MW to the thermal violation.

CONTINGENCY 'COMED_P1-2_345-L0626__B-R-B-B'
TRIP BRANCH FROM BUS 934400 TO BUS 270916 CKT 1 / AD1-064 TAP 345 WAYNE ; B 345
END

10. (CE - CE) The GARDEN PR; R-SILVER LK; R 345 kV line (from bus 270759 to bus 270883 ckt 1) loads from 109.92% to 111.28% (**DC power flow**) of its normal rating (1201 MVA) for non-contingency condition. This project contributes approximately 36.22 MW to the thermal violation.

11. (CE - CE) The GOODINGS ;4B-GOODINGS ;3B 345 kV line (from bus 270770 to bus 270766 ckt 1) loads from 108.23% to 108.77% (**DC power flow**) of its emergency rating (1802 MVA) for the single line contingency outage of 'COMED_P1-2_345-L11613AB-S'. This project contributes approximately 21.17 MW to the thermal violation.

CONTINGENCY 'COMED_P1-2_345-L11613AB-S'
 TRIP BRANCH FROM BUS 270666 TO BUS 270664 CKT 1 / B ISL;BT 345 B ISL; B 345
 TRIP BRANCH FROM BUS 270666 TO BUS 270926 CKT 1 / B ISL;BT 345 WILTO; B 345
 TRIP BRANCH FROM BUS 270770 TO BUS 270666 CKT 1 / GOODI;4B 345 B ISL;BT 345
 END

12. (CE - AEP) The GREENACRE; T-05OLIVE 345 kV line (from bus 270771 to bus 243229 ckt 1) loads from 110.8% to 110.94% (**DC power flow**) of its normal rating (971 MVA) for the single line contingency outage of 'COMED_P1-2_695_B2'. This project contributes approximately 16.04 MW to the thermal violation.

CONTINGENCY 'COMED_P1-2_695_B2'
 OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1 / 243206 05DUMONT 765 270644 WILTO; 765 1
 END

13. (CE - MISO NIPS) The ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 108.66% to 108.76% (**DC power flow**) of its emergency rating (1091 MVA) for the single line contingency outage of 'COMED_P1-2_695_B2'. This project contributes approximately 17.7 MW to the thermal violation.

CONTINGENCY 'COMED_P1-2_695_B2'
 OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1 / 243206 05DUMONT 765 270644 WILTO; 765 1
 END

14. (CE - CE) The WALTO; B-ELECT JCT; B 345 kV line (from bus 270932 to bus 270730 ckt 1) loads from 99.77% to 100.41% (**DC power flow**) of its emergency rating (1528 MVA) for the single line contingency outage of 'COMED_P1-2_345-L0626__B-R-B-B'. This project contributes approximately 21.3 MW to the thermal violation.

CONTINGENCY 'COMED_P1-2_345-L0626__B-R-B-B'
 TRIP BRANCH FROM BUS 934400 TO BUS 270916 CKT 1 / AD1-064 TAP 345 WAYNE ; B 345
 END

15. (CE - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line (from bus 274750 to bus 255112 ckt 1) loads from 125.84% to 125.94% (**DC power flow**) of its emergency rating (1399 MVA) for the single line contingency outage of 'COMED_P1-2_695_B2'. This project contributes approximately 24.77 MW to the thermal violation.

CONTINGENCY 'COMED_P1-2_695_B2'
 OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1 / 243206 05DUMONT 765 270644 WILTO; 765 1
 END

16. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 132.14% to 132.3% (**DC power flow**) of its normal rating (971 MVA) for the single line contingency outage of 'COMED_P1-2_695_B2'. This project contributes approximately 19.36 MW to the thermal violation.

CONTINGENCY 'COMED_P1-2_695_B2'
 OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1 / 243206 05DUMONT 765 270644 WILTO; 765 1
 END

17. (CE - CE) The AB1-089 TAP-AD1-064 TAP 345 kV line (from bus 930480 to bus 934400 ckt 1) loads from 100.56% to 101.64% (**DC power flow**) of its emergency rating (2058 MVA)

for the single line contingency outage of 'COMED_P1-2_345-L97116__-R'. This project contributes approximately 48.16 MW to the thermal violation.

CONTINGENCY 'COMED_P1-2_345-L97116__-R'
TRIP BRANCH FROM BUS 270759 TO BUS 270883 CKT 1 / U3-021 SILVE; R 345
END

18. (CE - CE) The AB1-089 TAP-AD1-064 TAP 345 kV line (from bus 930480 to bus 934400 ckt 1) loads from 98.76% to 100.99% (**DC power flow**) of its normal rating (1679 MVA) for non-contingency condition. This project contributes approximately 36.96 MW to the thermal violation.

19. (CE - CE) The AD1-064 TAP-WAYNE ; B 345 kV line (from bus 934400 to bus 270916 ckt 1) loads from 104.53% to 105.61% (**DC power flow**) of its emergency rating (2058 MVA) for the single line contingency outage of 'COMED_P1-2_345-L97116__-R'. This project contributes approximately 48.16 MW to the thermal violation.

CONTINGENCY 'COMED_P1-2_345-L97116__-R'
TRIP BRANCH FROM BUS 270759 TO BUS 270883 CKT 1 / U3-021 SILVE; R 345
END

20. (CE - CE) The AD1-064 TAP-WAYNE ; B 345 kV line (from bus 934400 to bus 270916 ckt 1) loads from 103.38% to 105.61% (**DC power flow**) of its normal rating (1679 MVA) for non-contingency condition. This project contributes approximately 36.96 MW to the thermal violation.

Light Load Analysis - 2021

Light Load Studies to be conducted during later study phases (as required by PJM Manual 14B).

System Reinforcements

Short Circuit

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

None identified

Stability and Reactive Power Requirement

(Results of the dynamic studies should be inserted here)

To be determined

Summer Peak Load Flow Analysis Reinforcements

New System Reinforcements

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

None

Contribution to Previously Identified System Reinforcements

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

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

1. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line (from bus 247610 to bus 243219 ckt 2) loads from 114.17% to 114.27% (**DC power flow**) of its emergency rating (1409 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT4-5__'. This project contributes approximately 14.98 MW to the thermal violation.

AEP:

The upgrade is to perform a sag study which shows remediation work will include the replacement of tower 20 with a custom steel pole and the removal of swing angle brackets on 2 structures (PJM Network Upgrade N4512). Cost estimate is \$1.0775M. The sag study will raise the SE rating to 1868 MVA which is not sufficient. The line conductor sections 1 and 2 will have to be reconducted/rebuilt. Estimated Cost: \$28.6 Million

(A) Sag study: 6 to 12 months.

(B) Rebuild. The standard time required for construction differs from state to state. An Approximate construction would be 36 to 48 months after signing an interconnection agreement.

2. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line (from bus 247610 to bus 243219 ckt 2) loads from 114.17% to 114.27% (**DC power flow**) of its emergency rating (1409 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT3-4__'. This project contributes approximately 14.98 MW to the thermal violation.

Same as Contribution to Previously Identified #1

3. (MISO NIPS - CE) The 17STJOHN-ST JOHN ; T 345 kV line (from bus 255112 to bus 270886 ckt 1) loads from 109.53% to 109.62% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of 'AEP_P4_#2978_05DUMONT 765'. This project contributes approximately 17.6 MW to the thermal violation.

COMED:

SSTE rating is 1134 MVA. The post contingency load exceeds the SSTE rating therefore an upgrade is required. The upgrade will be to mitigate the sag on the line. A preliminary estimate for the upgrade is \$2.8 million with a construction estimated timeline of 30 months. Upon completion of this work the new line ratings will be 1091/1399/1483/1674 MVA (SN/SLTE/SSTE/SLD).

MISO:

The external (i.e. Non-PJM) Transmission Owner, MISO, will not evaluate this violation until the impact study phase.

4. (MISO NIPS - CE) The 17STJOHN-ST JOHN ; T 345 kV line (from bus 255112 to bus 270886 ckt 1) loads from 108.74% to 108.84% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_023-65-BT2-3__'. This project contributes approximately 17.76 MW to the thermal violation.

Same as Contribution to Previously Identified #3

5. (MISO NIPS - CE) The 17STJOHN-ST JOHN ; T 345 kV line (from bus 255112 to bus 270886 ckt 1) loads from 108.71% to 108.81% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT4-5__'. This project contributes approximately 17.71 MW to the thermal violation.

Same as Contribution to Previously Identified #3

6. (MISO NIPS - CE) The 17STJOHN-ST JOHN ; T 345 kV line (from bus 255112 to bus 270886 ckt 1) loads from 108.7% to 108.8% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT3-4__'. This project contributes approximately 17.71 MW to the thermal violation.

Same as Contribution to Previously Identified #3

7. (MISO NIPS - AEP) The 17STILLWELL-05DUMONT 345 kV line (from bus 255113 to bus 243219 ckt 1) loads from 164.15% to 164.31% (**DC power flow**) of its emergency rating (1409 MVA) for the line fault with failed breaker contingency outage of 'AEP_P4_#2978_05DUMONT 765'. This project contributes approximately 27.54 MW to the thermal violation.

AEP / MISO:

- 1) (N4058) Sag study results: Stillwell - Dumont 345 kV line 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 \$1.613 million. New SE rating will be 1718 MVA limited by a Dumont wavetrap and possibly the conductor. This upgrade is driven by a prior queue. Per PJM cost allocation rules, AC1-002 LTF presently does not receive cost allocation for this upgrade. Note: as changes to the interconnection process occur, such as prior queued projects withdrawing from the queue, AC1-002 LTF could receive cost allocation.
- 2) Additional AEP-end upgrade: Rebuild 8.6 miles of the AEP owned line and upgrade necessary Dumont terminal equipment (wavetrap) at a cost of \$20 million.

PJM Network Upgrade N4790. New AEP-end ratings to be 1409/2045 MVA (SN/SE). Limited by Dumont risers.

- 3) Additional AEP-end upgrade: In addition to upgrading the Dumont risers, a different conductor (compared to the prior upgrade) will need to be selected to achieve the desired rating. The new conductor would be 1272 dual ACSR conductor. The additional cost for this work scope is \$2 million. The new AEP-end ratings to be 1690/2278 MVA SN/SE (limited by the conductor). PJM Network Upgrade N5064.**
- 4) Additional AEP-end upgrade: AEP said it would cost \$4.8 million to string a second Stillwell- Dumont 345 kV line on the existing tower. The \$4.8 million is for 8.5 miles of the AEP portion. Would need a NIPSCO portion (2.87 miles) cost estimate.**
- 5) MISO end – ratings are 1409/1779 MVA. MISO end upgrade: Rebuild NIPSCO portion of line (2.87 miles) at a cost of \$6.5 million and upgrade Stillwell substation equipment at a cost of \$1.5 million. Total cost is \$8.0 million. New expected MISO end ratings will be 1582/1898 MVA SN/SE.**
- 6) Additional MISO-end upgrade: Reconductor 2.87 miles of transmission conductor to bundled 954 ACSS, replace substation conductor to bundled 2500 AL, and replace wavetrap. \$12 million. New MISO-end ratings to be 2550/2923 MVA SN/SE.**

8. (MISO NIPS - AEP) The 17STILLWELL-05DUMONT 345 kV line (from bus 255113 to bus 243219 ckt 1) loads from 117.98% to 118.43% (**DC power flow**) of its normal rating (1409 MVA) for the single line contingency outage of 'COMED_P1-2_695_B2'. This project contributes approximately 14.37 MW to the thermal violation.

Same as Contribution to Previously Identified #7

9. (CE - MISO NIPS) The BURNHAM ;0R-17MUNSTER 345 kV line (from bus 270677 to bus 255109 ckt 1) loads from 129.76% to 129.95% (**DC power flow**) of its emergency rating (1195 MVA) for the line fault with failed breaker contingency outage of 'AEP_P4_#2978_05DUMONT 765'. This project contributes approximately 22.98 MW to the thermal violation.

COMED:

ComEd L17703 SSTE rating is 1251 MVA. The post contingency flow exceeds the rating therefore an upgrade is required. Upgrades include line reconductoring and station conductor work at Burnham. A preliminary estimate for the upgrades is \$8.1 million with a preliminary construction timeline of 30 months. Upon completion the new ratings will be 1248/1441/1667/1982 MVA (SN/SLTE/SSTE/SLD)

MISO:

The external (i.e. Non-PJM) Transmission Owner, MISO, will not evaluate this violation until the impact study phase.

10. (CE - CE) The E FRANKFO; B-CRETE EC ;BP 345 kV line (from bus 270728 to bus 274750 ckt 1) loads from 108.91% to 109.0% (**DC power flow**) of its load dump rating (1399 MVA) for the line fault with failed breaker contingency outage of 'AEP_P4_#2978_05DUMONT 765'. This project contributes approximately 24.98 MW to the thermal violation.

COMED:

ComEd 345kV L6607 SSTE rating is 1483 MVA. The post contingency flow for this event exceeds the rating therefore an upgrade is required. The upgrade will be to reconductor the line. A preliminary estimate for this upgrade is \$11.2 million with a preliminary construction timeline of 30-36 months. Upon completion of this upgrade the new ratings will be 1334/1726/1837/2084 MVA (SN/SLTE/SSTE/SLD)

11. (CE - CE) The E FRANKFO; B-CRETE EC ;BP 345 kV line (from bus 270728 to bus 274750 ckt 1) loads from 108.41% to 108.5% (**DC power flow**) of its load dump rating (1399 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_023-65-BT2-3__'. This project contributes approximately 25.22 MW to the thermal violation.

Same as Contribution to Previously Identified #10

12. (CE - CE) The E FRANKFO; B-CRETE EC ;BP 345 kV line (from bus 270728 to bus 274750 ckt 1) loads from 108.36% to 108.46% (**DC power flow**) of its load dump rating (1399 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT4-5__'. This project contributes approximately 25.12 MW to the thermal violation.

Same as Contribution to Previously Identified #10

13. (CE - CE) The E FRANKFO; B-CRETE EC ;BP 345 kV line (from bus 270728 to bus 274750 ckt 1) loads from 108.35% to 108.44% (**DC power flow**) of its load dump rating (1399 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT3-4__'. This project contributes approximately 25.11 MW to the thermal violation.

Same as Contribution to Previously Identified #10

14. (CE - CE) The GARDEN PR; R-SILVER LK; R 345 kV line (from bus 270759 to bus 270883 ckt 1) loads from 121.87% to 123.3% (**DC power flow**) of its load dump rating (1479 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_144-45-BT6-8__'. This project contributes approximately 47.04 MW to the thermal violation.

COMED:

ComEd 345kV L15616 SSTE rating is 1568 MVA. The post contingency flow for this event exceeds the SSTE rating therefore an upgrade is required. Reconductor

the line will result in a new SSTE rating of 1837 MVA. A preliminary estimate for this upgrade is \$40.2M with an estimated construction timeline of 24-30 months.

15. (CE - CE) The GARDEN PR; R-SILVER LK; R 345 kV line (from bus 270759 to bus 270883 ckt 1) loads from 109.05% to 109.79% (**DC power flow**) of its emergency rating (1479 MVA) for the single line contingency outage of 'COMED_P1-2_345-L0626__B-R-B-B'. This project contributes approximately 24.46 MW to the thermal violation.

Same as Contribution to Previously Identified #14

16. (CE - CE) The GARDEN PR; R-SILVER LK; R 345 kV line (from bus 270759 to bus 270883 ckt 1) loads from 108.88% to 109.62% (**DC power flow**) of its emergency rating (1479 MVA) for the single line contingency outage of 'COMED_P1-2_345-L0626__B-R-B-A'. This project contributes approximately 24.46 MW to the thermal violation.

Same as Contribution to Previously Identified #14

17. (CE - AEP) The GREENACRE; T-05OLIVE 345 kV line (from bus 270771 to bus 243229 ckt 1) loads from 112.15% to 112.29% (**DC power flow**) of its emergency rating (971 MVA) for the line fault with failed breaker contingency outage of 'AEP_P4_#2978_05DUMONT 765'. This project contributes approximately 15.88 MW to the thermal violation.

AEP:

1. A sag study will be required on the 40.64 mile section line to mitigate the overload. Depending on the sag study results, cost for the upgrade is expected to be between \$1,62,560 (no remediations required just sag study) and \$81.28 million (complete line reconductor/rebuild required).

(A) Sag study: 6 to 12 months.

(B) Rebuild. The standard time required for construction differs from state to state. An Approximate construction would be 36 to 48 months after signing an interconnection agreement.

COMED:

ComEd SSTE is 1134 MVA. No upgrade is required.

18. (CE - AEP) The GREENACRE; T-05OLIVE 345 kV line (from bus 270771 to bus 243229 ckt 1) loads from 110.8% to 110.95% (**DC power flow**) of its emergency rating (971 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_023-65-BT2-3__'. This project contributes approximately 16.03 MW to the thermal violation.

Same as Contribution to Previously Identified #17

19. (CE - MISO NIPS) The ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 109.52% to 109.61% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of

'AEP_P4_#2978_05DUMONT 765'. This project contributes approximately 17.6 MW to the thermal violation.

Same as Contribution to Previously Identified #3

20. (CE - MISO NIPS) The ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 108.74% to 108.84% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_023-65-BT2-3__'. This project contributes approximately 17.76 MW to the thermal violation.

Same as Contribution to Previously Identified #3

21. (CE - MISO NIPS) The ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 108.71% to 108.81% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT4-5__'. This project contributes approximately 17.71 MW to the thermal violation.

Same as Contribution to Previously Identified #3

22. (CE - MISO NIPS) The ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 108.7% to 108.8% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT3-4__'. This project contributes approximately 17.71 MW to the thermal violation.

Same as Contribution to Previously Identified #3

23. (CE - CE) The WILTON ; B-WILTON ;3M 345 kV line (from bus 270926 to bus 275232 ckt 1) loads from 145.73% to 146.08% (**DC power flow**) of its load dump rating (1379 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT5-6__'. This project contributes approximately 28.88 MW to the thermal violation.

COMED:

ComEd post contingency facility overloaded by this event is Tr. 93 @ Station 112 Wilton Center. The upgrade will be to build out the 765kV ring bus at Wilton Center, installation of two 765 kV Bus Tie Circuit Breakers (BT 6-8 & 8-2) along with a relocation of 765kV L11216 from bus 6 to bus 8. Preliminary estimate for upgrade is \$12 million with an estimated construction time line of 30 months. Note, the rating for Tr. 93 at Wilton Center will remain current however with this upgrade the 112-65-BT5-6 contingency file will no longer include the Wilton Center Tr. 94 and will allow both transformers to remain in service eliminating the overload.

24. (CE - CE) The WILTON ; R-WILTON ;4M 345 kV line (from bus 270927 to bus 275233 ckt 1) loads from 148.62% to 148.92% (**DC power flow**) of its load dump rating (1379 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT2-3__'. This project contributes approximately 29.5 MW to the thermal violation.

Same as Contribution to Previously Identified #23

25. (CE - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line (from bus 274750 to bus 255112 ckt 1) loads from 126.47% to 126.57% (**DC power flow**) of its emergency rating (1399 MVA) for the line fault with failed breaker contingency outage of 'AEP_P4_#2978_05DUMONT 765'. This project contributes approximately 24.67 MW to the thermal violation.

Same as Contribution to Previously Identified #10

26. (CE - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line (from bus 274750 to bus 255112 ckt 1) loads from 125.99% to 126.08% (**DC power flow**) of its emergency rating (1399 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_023-65-BT2-3__'. This project contributes approximately 24.9 MW to the thermal violation.

Same as Contribution to Previously Identified #10

27. (CE - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line (from bus 274750 to bus 255112 ckt 1) loads from 125.94% to 126.04% (**DC power flow**) of its emergency rating (1399 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT4-5__'. This project contributes approximately 24.8 MW to the thermal violation.

Same as Contribution to Previously Identified #10

28. (CE - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line (from bus 274750 to bus 255112 ckt 1) loads from 125.93% to 126.03% (**DC power flow**) of its emergency rating (1399 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT3-4__'. This project contributes approximately 24.8 MW to the thermal violation.

Same as Contribution to Previously Identified #10

29. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 133.32% to 133.47% (**DC power flow**) of its emergency rating (971 MVA) for the line fault with failed breaker contingency outage of 'AEP_P4_#2978_05DUMONT 765'. This project contributes approximately 19.23 MW to the thermal violation.

AEP:

A sag study will be required on the 40.64 mile section line to mitigate the overload. Depending on the sag study results, cost for the upgrade is expected to be between \$1,62,560 (no remediations required just sag study) and \$81.28 million (complete line reconductor/rebuild required).

(A) Sag study: 6 to 12 months.

(B) Rebuild. The standard time required for construction differs from state to state. An Approximate construction would be 36 to 48 months after signing an interconnection agreement.

COMED:

ComEd 345kV L97008 SSTE rating is 1134 MVA. The post contingency flow exceeds the rating therefore an upgrade is required. The upgrade will be to mitigate the sag on the line. A preliminary estimate for this upgrade is \$ 22.6 million with a construction timeline of 30 months. Upon completion of the upgrade the ratings will be 1334/1334/1391/1523 MVA (SN/SLTE/SSTE/SLD).

30. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 132.18% to 132.33% (**DC power flow**) of its emergency rating (971 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_023-65-BT4-5__'. This project contributes approximately 19.36 MW to the thermal violation.

Same as Contribution to Previously Identified #29

31. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 132.18% to 132.34% (**DC power flow**) of its emergency rating (971 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT4-5__'. This project contributes approximately 19.37 MW to the thermal violation.

Same as Contribution to Previously Identified #29

32. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 132.18% to 132.33% (**DC power flow**) of its emergency rating (971 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT3-4__'. This project contributes approximately 19.37 MW to the thermal violation.

Same as Contribution to Previously Identified #29

33. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 132.16% to 132.32% (**DC power flow**) of its emergency rating (971 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_023-65-BT2-3__'. This project contributes approximately 19.4 MW to the thermal violation.

Same as Contribution to Previously Identified #29

34. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 108.06% to 108.51% (**DC power flow**) of its normal rating (971 MVA) for the single line contingency outage of 'COMED_P1-2_695_B2'. This project contributes approximately 9.87 MW to the thermal violation.

Same as Contribution to Previously Identified #29

35. (CE - CE) The WILTON ; 765/345 kV transformer (from bus 275232 to bus 270644 ckt 1) loads from 145.73% to 146.08% (**DC power flow**) of its load dump rating (1379 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT5-6__'. This project contributes approximately 28.88 MW to the thermal violation.

Same as Contribution to Previously Identified #23

36. (CE - CE) The WILTON ; 765/345 kV transformer (from bus 275233 to bus 270644 ckt 1) loads from 148.62% to 148.91% (**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 29.5 MW to the thermal violation.

Same as Contribution to Previously Identified #23

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

(AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line (from bus 247610 to bus 243219 ckt 2) loads from 114.17% to 114.27% (**DC power flow**) of its emergency rating (1409 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT4-5__'. This project contributes approximately 14.98 MW to the thermal violation.

CONTINGENCY 'COMED_P4_112-65-BT4-5__'

TRIP BRANCH FROM BUS 270644 TO BUS 243206 CKT 1	/ WILTO; 765 05DUMONT 765
TRIP BRANCH FROM BUS 275233 TO BUS 270644 CKT 1	/ WILTO;4M 345 WILTO; 765
TRIP BRANCH FROM BUS 275233 TO BUS 270927 CKT 1	/ WILTO;4M 345 WILTO; R 345
TRIP BRANCH FROM BUS 275233 TO BUS 275333 CKT 1	/ WILTO;4M 345 WILTO;4C 33

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
247906	05MDL-1G E	11.98
247907	05MDL-2G E	5.94
247912	05MDL-3G E	6.21
247913	05MDL-4G E	5.93
932011	AC2-007 C	0.53
932012	AC2-007 E	0.99
932601	AC2-080 C	3.32
932602	AC2-080 E	22.22
932881	AC2-115 1	1.51
932891	AC2-115 2	1.51
932921	AC2-116	0.53
932931	AC2-117	5.63
933361	AC2-149 C	0.59
933362	AC2-149 E	0.96
933381	AC2-151 C	0.62
933382	AC2-151 E	1.
933411	AC2-154 C	1.56
933412	AC2-154 E	2.54
933431	AC2-156 C	0.6
933432	AC2-156 E	0.98
933511	AC2-166 C	1.47
933512	AC2-166 E	1.63
933911	AD1-013 C O1	1.17
933912	AD1-013 E O1	1.86
933931	AD1-016 C	0.59
933932	AD1-016 E	0.96
934101	AD1-039 1	4.9
934111	AD1-039 2	5.06
934401	AD1-064 C O1	2.03
934402	AD1-064 E O1	9.5
934431	AD1-067 C	0.08

934432	AD1-067 E	0.35
LTF	AD1-092	7.27
LTF	AD1-093	12.55
LTF	AD1-094	2.42
934651	AD1-096 C	0.57
934652	AD1-096 E	0.92
934701	AD1-098 C O1	4.36
934702	AD1-098 E O1	3.18
934721	AD1-100 C	14.03
934722	AD1-100 E	65.67
934871	AD1-116 C	0.62
934872	AD1-116 E	1.01
934941	AD1-126 C	3.7
934942	AD1-126 E	2.46
934971	AD1-129 C	0.57
934972	AD1-129 E	0.38
935001	AD1-133 C O1	13.36
935002	AD1-133 E O1	8.9
936181	AD2-024 C O1	0.59
936182	AD2-024 E O1	0.96
936291	AD2-038 C O1	1.52
936292	AD2-038 E O1	10.15
936371	AD2-047 C O1	1.39
936372	AD2-047 E O1	14.99
936461	AD2-060	1.64
936511	AD2-066 C O1	5.36
936512	AD2-066 E O1	3.58
936781	AD2-101 C	2.75
936782	AD2-101 E	12.87
936791	AD2-102 C	7.64
936792	AD2-102 E	7.34
936961	AD2-130 C	0.99
936962	AD2-130 E	0.13
936981	AD2-132 C	4.5
936982	AD2-132 E	21.05
937001	AD2-134 C	1.73
937002	AD2-134 E	7.15
937031	AD2-137 C O1	2.1
937032	AD2-137 E O1	9.83
937041	AD2-138 C	4.5
937042	AD2-138 E	21.05
937051	AD2-140 C O1	2.1
937052	AD2-140 E O1	9.85
937061	AD2-141 C O1	2.09
937062	AD2-141 E O1	9.86

937071	AD2-142 C O1	4.21
937072	AD2-142 E O1	19.7
937121	AD2-148 C O1	2.11
937122	AD2-148 E O1	9.89
937131	AD2-149 C O1	2.11
937132	AD2-149 E O1	9.89
937141	AD2-150 C O1	2.11
937142	AD2-150 E O1	9.89
937181	AD2-155 C O1	2.11
937182	AD2-155 E O1	9.89
937311	AD2-172 C	1.56
937312	AD2-172 E	2.16
937321	AD2-175 C	9.84
937322	AD2-175 E	6.56
937331	AD2-176 C O1	4.64
937332	AD2-176 E O1	3.09
937401	AD2-194 C1	2.46
937411	AD2-194 C2	2.46
937402	AD2-194 E1	2.46
937412	AD2-194 E2	2.46
LTF	BLUEG	0.82
LTF	CALDERWOOD	0.01
LTF	CARR	0.62
LTF	CATAWBA	0.23
LTF	CBM-S1	1.65
LTF	CBM-W1	46.26
LTF	CBM-W2	36.17
LTF	CELEVELAND	0.64
LTF	CHEOAH	0.02
LTF	CHILHOWEE	< 0.01
LTF	CIN	2.75
LTF	CLIFTY	8.6
LTF	DEARBORN	0.65
LTF	G-007	1.72
290051	GSG-6; E	6.62
LTF	HAMLET	0.89
LTF	IPL	1.05
275149	KEMPTON ;1E	11.46
290108	LEEDK;1U E	15.35
LTF	MEC	25.19
274850	MENDOTA H;RU	3.42
293061	N-015 E	9.8
LTF	O-066	11.04
293644	O22 E1	6.44
293645	O22 E2	12.51

290021	O50 E	12.33
294392	P-010 E	12.44
294763	P-046 E	5.96
274888	PILOT HIL;1E	11.46
274830	PWR VTREC;1U	3.86
274831	PWR VTREC;2U	3.86
LTF	RENSSELAER	0.49
LTF	ROSETON	3.55
LTF	ROWAN	0.54
LTF	SANTEETLA	< 0.01
295111	SUBLETTE E	1.72
247943	T-127 E	6.08
LTF	TRIMBLE	0.18
299993	U3-031C	3.19
291984	U4-033	0.82
274814	UNIV PK N;0U	0.64
274808	UNIV PK N;4U	0.64
274809	UNIV PK N;5U	0.64
274810	UNIV PK N;6U	0.64
274811	UNIV PK N;7U	0.64
274812	UNIV PK N;8U	0.64
274813	UNIV PK N;9U	0.64
274815	UNIV PK N;XU	0.64
274816	UNIV PK N;YU	0.64
903433	W3-046	10.3
LTF	WEC	5.07
295109	WESTBROOK E	3.55
274687	WILL CNTY;4U	41.85
247611	X2-052	73.34
910542	X3-005 E	0.42
914641	Y2-103	28.47
915011	Y3-013 1	2.37
915021	Y3-013 2	2.37
915031	Y3-013 3	2.37
LTF	Z1-043	18.52
916502	Z1-106 E1	0.8
916504	Z1-106 E2	0.8
916512	Z1-107 E	1.66
916522	Z1-108 E	1.57
917711	Z2-114 C	0.08
917712	Z2-114 E	0.45
918051	AA1-018 C	1.59
918052	AA1-018 E	10.66
918972	AA1-116 E	1.64
918982	AA1-117 E	1.64

919591	AA2-035	82.03
920112	AA2-107 E	1.55
920272	AA2-123 E	1.55
930041	AB1-006 C	1.95
930042	AB1-006 E	13.05
930391	AB1-080	4.35
930481	AB1-089	41.7
930491	AB1-090	41.7
930501	AB1-091	44.95
930761	AB1-122 1	45.11
930771	AB1-122 2	46.56
931221	AB1-172	0.51
LTF	AB2-013	10.46
924471	AB2-096	26.83
925301	AB2-191 C	0.8
925302	AB2-191 E	0.71
925881	AC1-067	81.51
926311	AC1-109 1	1.2
926321	AC1-109 2	1.2
926331	AC1-110 1	1.2
926341	AC1-110 2	1.2
926351	AC1-111 1	0.48
926361	AC1-111 2	0.48
926371	AC1-111 3	0.48
926381	AC1-111 4	0.48
926391	AC1-111 5	0.48
926401	AC1-111 6	0.48
927511	AC1-113 1	0.76
927522	AC1-113 2	0.76
926431	AC1-114	1.51
927451	AC1-142A 1	2.66
927461	AC1-142A 2	2.66
926701	AC1-153 C1	49.04
926711	AC1-153 C2	50.61
926702	AC1-153 E1	1.96
926712	AC1-153 E2	2.02
927091	AC1-204 1	45.84
927101	AC1-204 2	45.84

Appendix 2

(MISO NIPS - CE) The 17STJOHN-ST JOHN ; T 345 kV line (from bus 255112 to bus 270886 ckt 1) loads from 109.53% to 109.62% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of 'AEP_P4_#2978_05DUMONT 765'. This project contributes approximately 17.6 MW to the thermal violation.

CONTINGENCY 'AEP_P4_#2978_05DUMONT 765'

OPEN BRANCH FROM BUS 243206 TO BUS 907040 CKT 1

/ 243206 05DUMONT 765 X1-020

OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1

/ 243206 05DUMONT 765 270644 WILTON ; 765 1

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932011	AC2-007 C	0.63
932012	AC2-007 E	1.17
932881	AC2-115 1	1.78
932891	AC2-115 2	1.78
932921	AC2-116	0.62
933341	AC2-147 C	0.65
933342	AC2-147 E	1.06
933361	AC2-149 C	0.69
933362	AC2-149 E	1.13
933381	AC2-151 C	0.72
933382	AC2-151 E	1.18
933411	AC2-154 C	1.74
933412	AC2-154 E	2.84
933431	AC2-156 C	0.71
933432	AC2-156 E	1.16
933511	AC2-166 C	1.74
933512	AC2-166 E	1.92
933911	AD1-013 C O1	1.37
933912	AD1-013 E O1	2.19
933931	AD1-016 C	0.69
933932	AD1-016 E	1.13
934101	AD1-039 1	5.73
934111	AD1-039 2	6.14
934401	AD1-064 C O1	2.39
934402	AD1-064 E O1	11.21
934431	AD1-067 C	0.1
934432	AD1-067 E	0.41
LTF	AD1-092	8.28
LTF	AD1-093	14.36
LTF	AD1-094	2.76
934651	AD1-096 C	0.66
934652	AD1-096 E	1.08
934701	AD1-098 C O1	5.12

934702	AD1-098 E O1	3.73
934721	AD1-100 C	16.33
934722	AD1-100 E	76.48
934871	AD1-116 C	0.67
934872	AD1-116 E	1.1
934881	AD1-117 C	3.99
934882	AD1-117 E	2.66
934941	AD1-126 C	4.35
934942	AD1-126 E	2.9
934971	AD1-129 C	0.67
934972	AD1-129 E	0.45
935001	AD1-133 C O1	15.16
935002	AD1-133 E O1	10.11
936181	AD2-024 C O1	0.69
936182	AD2-024 E O1	1.13
936291	AD2-038 C O1	1.71
936292	AD2-038 E O1	11.45
936371	AD2-047 C O1	1.55
936372	AD2-047 E O1	16.74
936461	AD2-060	1.83
936511	AD2-066 C O1	6.21
936512	AD2-066 E O1	4.14
936781	AD2-101 C	3.08
936782	AD2-101 E	14.41
936791	AD2-102 C	8.97
936792	AD2-102 E	8.62
936961	AD2-130 C	1.19
936962	AD2-130 E	0.16
937001	AD2-134 C	2.03
937002	AD2-134 E	8.39
937031	AD2-137 C O1	2.43
937032	AD2-137 E O1	11.36
937051	AD2-140 C O1	2.43
937052	AD2-140 E O1	11.39
937061	AD2-141 C O1	2.42
937062	AD2-141 E O1	11.4
937071	AD2-142 C O1	4.87
937072	AD2-142 E O1	22.78
937121	AD2-148 C O1	2.42
937122	AD2-148 E O1	11.31
937131	AD2-149 C O1	2.42
937132	AD2-149 E O1	11.31
937141	AD2-150 C O1	2.42
937142	AD2-150 E O1	11.31
937181	AD2-155 C O1	2.42

937182	AD2-155 E O1	11.31
937311	AD2-172 C	1.83
937312	AD2-172 E	2.53
937321	AD2-175 C	11.26
937322	AD2-175 E	7.5
937331	AD2-176 C O1	5.48
937332	AD2-176 E O1	3.65
937401	AD2-194 C1	2.97
937411	AD2-194 C2	2.97
937402	AD2-194 E1	2.97
937412	AD2-194 E2	2.97
LTF	BLUEG	1.4
274654	BRAIDWOOD;1U	23.01
274655	BRAIDWOOD;2U	22.39
LTF	CALDERWOOD	0.02
LTF	CANNELTON	0.08
LTF	CARR	0.56
LTF	CATAWBA	0.19
LTF	CBM-S1	1.13
LTF	CBM-W1	39.86
LTF	CBM-W2	29.04
LTF	CELEVELAND	0.53
LTF	CHEOAH	0.03
LTF	CHILHOWEE	< 0.01
LTF	CLIFTY	8.44
274751	CRETE EC ;1U	4.08
274752	CRETE EC ;2U	4.08
274753	CRETE EC ;3U	4.08
274754	CRETE EC ;4U	4.08
LTF	DEARBORN	2.3
274859	EASYR;U1 E	8.18
274860	EASYR;U2 E	8.18
LTF	ELMERSMITH	0.15
LTF	G-007	1.5
LTF	GIBSON	0.08
290051	GSG-6; E	7.77
LTF	HAMLET	0.74
275149	KEMPTON ;1E	12.81
274704	KENDALL ;1C	3.42
274705	KENDALL ;1S	2.28
274706	KENDALL ;2C	3.42
274707	KENDALL ;2S	2.28
274660	LASCO STA;1U	21.43
274661	LASCO STA;2U	21.47
290108	LEEDK;1U E	18.07

<i>LTF</i>	<i>MEC</i>	27.9
274850	<i>MENDOTA H;RU</i>	4.01
293061	<i>N-015 E</i>	11.68
293715	<i>O-029 E</i>	6.17
293716	<i>O-029 E</i>	3.38
293717	<i>O-029 E</i>	3.11
<i>LTF</i>	<i>O-066</i>	9.6
293644	<i>O22 E1</i>	8.57
293645	<i>O22 E2</i>	16.64
290021	<i>O50 E</i>	14.7
294392	<i>P-010 E</i>	14.84
294763	<i>P-046 E</i>	6.99
274888	<i>PILOT HIL;1E</i>	12.81
274830	<i>PWR VTREC;1U</i>	4.56
274831	<i>PWR VTREC;2U</i>	4.56
<i>LTF</i>	<i>RENSSELAER</i>	0.44
<i>LTF</i>	<i>ROSETON</i>	3.21
<i>LTF</i>	<i>ROWAN</i>	0.45
<i>LTF</i>	<i>SANTEETLA</i>	< 0.01
295111	<i>SUBLETTE E</i>	2.02
274861	<i>TOP CROP ;1U</i>	0.4
274862	<i>TOP CROP ;2U</i>	0.77
<i>LTF</i>	<i>TRIMBLE</i>	0.28
299993	<i>U3-031C</i>	3.68
903433	<i>W3-046</i>	18.
905471	<i>W4-084</i>	0.33
274874	<i>WALNR;2U</i>	1.77
294502	<i>WALNR;2U E</i>	7.1
<i>LTF</i>	<i>WEC</i>	5.99
295109	<i>WESTBROOK E</i>	4.16
274687	<i>WILL CNTY;4U</i>	52.58
914641	<i>Y2-103</i>	33.82
915011	<i>Y3-013 1</i>	2.82
915021	<i>Y3-013 2</i>	2.82
915031	<i>Y3-013 3</i>	2.82
<i>LTF</i>	<i>Z1-043</i>	21.13
916502	<i>Z1-106 E1</i>	0.94
916504	<i>Z1-106 E2</i>	0.94
916512	<i>Z1-107 E</i>	1.85
916522	<i>Z1-108 E</i>	1.86
918051	<i>AA1-018 C</i>	1.73
918052	<i>AA1-018 E</i>	11.59
918972	<i>AA1-116 E</i>	1.83
918982	<i>AA1-117 E</i>	1.83
919221	<i>AA1-146</i>	13.05

919581	AA2-030	13.05
919591	AA2-035	95.09
920112	AA2-107 E	1.83
920272	AA2-123 E	1.83
930481	AB1-089	49.08
930491	AB1-090	49.08
930501	AB1-091	50.78
930761	AB1-122 1	52.68
930771	AB1-122 2	56.45
931221	AB1-172	0.57
LTF	AB2-013	11.97
924471	AB2-096	31.64
925161	AB2-173	2.33
925301	AB2-191 C	0.94
925302	AB2-191 E	0.83
926311	AC1-109 1	1.42
926321	AC1-109 2	1.42
926331	AC1-110 1	1.42
926341	AC1-110 2	1.42
926351	AC1-111 1	0.57
926361	AC1-111 2	0.57
926371	AC1-111 3	0.57
926381	AC1-111 4	0.57
926391	AC1-111 5	0.57
926401	AC1-111 6	0.57
927511	AC1-113 1	0.89
927522	AC1-113 2	0.89
926431	AC1-114	1.78
927451	AC1-142A 1	3.2
927461	AC1-142A 2	3.2
926701	AC1-153 C1	57.26
926711	AC1-153 C2	61.36
926702	AC1-153 E1	2.29
926712	AC1-153 E2	2.45
926821	AC1-168 C	0.86
926822	AC1-168 E	5.76
927531	AC1-185 1	0.51
927541	AC1-185 2	0.51
927551	AC1-185 3	0.51
927561	AC1-185 4	0.51
927571	AC1-185 5	0.51
927581	AC1-185 6	0.51
927591	AC1-185 7	0.51
927601	AC1-185 8	0.51
927091	AC1-204 1	55.28

927101	AC1-204 2	55.2
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Appendix 3

(MISO NIPS - AEP) The 17STILLWELL-05DUMONT 345 kV line (from bus 255113 to bus 243219 ckt 1) loads from 164.15% to 164.31% (**DC power flow**) of its emergency rating (1409 MVA) for the line fault with failed breaker contingency outage of 'AEP_P4_#2978_05DUMONT 765'. This project contributes approximately 27.54 MW to the thermal violation.

CONTINGENCY 'AEP_P4_#2978_05DUMONT 765'

OPEN BRANCH FROM BUS 243206 TO BUS 907040 CKT 1

OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1

END

/ 243206 05DUMONT 765 X1-020

/ 243206 05DUMONT 765 270644 WILTON ; 765 1

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932011	AC2-007 C	0.98
932012	AC2-007 E	1.82
932881	AC2-115 1	2.78
932891	AC2-115 2	2.78
932921	AC2-116	0.97
932931	AC2-117	5.89
933341	AC2-147 C	1.02
933342	AC2-147 E	1.66
933361	AC2-149 C	1.08
933362	AC2-149 E	1.77
933381	AC2-151 C	1.13
933382	AC2-151 E	1.84
933411	AC2-154 C	3.05
933412	AC2-154 E	4.98
933431	AC2-156 C	1.11
933432	AC2-156 E	1.81
933511	AC2-166 C	2.72
933512	AC2-166 E	3.
933911	AD1-013 C O1	2.14
933912	AD1-013 E O1	3.43
933931	AD1-016 C	1.08
933932	AD1-016 E	1.77
934101	AD1-039 1	9.01
934111	AD1-039 2	9.36
934401	AD1-064 C O1	3.74
934402	AD1-064 E O1	17.49
934421	AD1-066	1.25
934431	AD1-067 C	0.15
934432	AD1-067 E	0.64
LTF	AD1-092	13.13
LTF	AD1-093	22.7
LTF	AD1-094	4.38

934651	AD1-096 C	1.04
934652	AD1-096 E	1.7
934701	AD1-098 C O1	8.02
934702	AD1-098 E O1	5.85
934721	AD1-100 C	26.69
934722	AD1-100 E	124.96
934871	AD1-116 C	1.1
934872	AD1-116 E	1.8
934881	AD1-117 C	6.27
934882	AD1-117 E	4.18
934941	AD1-126 C	6.81
934942	AD1-126 E	4.54
934971	AD1-129 C	1.05
934972	AD1-129 E	0.7
935001	AD1-133 C O1	24.44
935002	AD1-133 E O1	16.29
936181	AD2-024 C O1	1.08
936182	AD2-024 E O1	1.77
936291	AD2-038 C O1	2.73
936292	AD2-038 E O1	18.27
936371	AD2-047 C O1	2.73
936372	AD2-047 E O1	29.38
936461	AD2-060	3.21
936511	AD2-066 C O1	9.81
936512	AD2-066 E O1	6.54
936781	AD2-101 C	5.91
936782	AD2-101 E	27.66
936791	AD2-102 C	14.04
936792	AD2-102 E	13.49
936961	AD2-130 C	1.86
936962	AD2-130 E	0.25
937001	AD2-134 C	3.18
937002	AD2-134 E	13.16
937031	AD2-137 C O1	4.13
937032	AD2-137 E O1	19.34
937051	AD2-140 C O1	4.17
937052	AD2-140 E O1	19.51
937061	AD2-141 C O1	4.14
937062	AD2-141 E O1	19.54
937071	AD2-142 C O1	8.34
937072	AD2-142 E O1	39.03
937121	AD2-148 C O1	4.22
937122	AD2-148 E O1	19.75
937131	AD2-149 C O1	4.22
937132	AD2-149 E O1	19.75

937141	AD2-150 C O1	4.22
937142	AD2-150 E O1	19.75
937181	AD2-155 C O1	4.22
937182	AD2-155 E O1	19.75
937311	AD2-172 C	2.87
937312	AD2-172 E	3.97
937321	AD2-175 C	19.66
937322	AD2-175 E	13.1
937331	AD2-176 C O1	8.54
937332	AD2-176 E O1	5.69
937401	AD2-194 C1	4.54
937411	AD2-194 C2	4.53
937402	AD2-194 E1	4.54
937412	AD2-194 E2	4.53
937531	AD2-214 C	5.17
937532	AD2-214 E	2.43
274832	ANNAWAN ; 1U	12.73
LTF	BLUEG	0.15
LTF	CARR	0.91
LTF	CATAWBA	0.17
274890	CAYUG;1U E	16.05
274891	CAYUG;2U E	16.05
LTF	CBM-S1	4.13
LTF	CBM-W1	73.22
LTF	CBM-W2	62.78
LTF	CELEVELAND	0.46
LTF	CIN	3.09
LTF	CLIFTY	8.01
LTF	DEARBORN	3.83
274859	EASYR;U1 E	12.84
274860	EASYR;U2 E	12.84
LTF	G-007	2.36
290051	GSG-6; E	12.18
LTF	HAMLET	0.79
LTF	IPL	1.33
940531	J351	434.36
951131	J643	25.84
981291	J740 C	5.51
981292	J740 E	22.06
938961	J847	13.15
275149	KEMPTON ;1E	22.48
290108	LEEDK;1U E	28.29
LTF	MEC	45.53
274850	MENDOTA H;RU	6.29
293061	N-015 E	17.78

293516	O-009 E1	10.65
293517	O-009 E2	5.41
293518	O-009 E3	5.96
293715	O-029 E	11.38
293716	O-029 E	6.24
293717	O-029 E	5.74
LTF	O-066	15.17
293644	O22 E1	12.12
293645	O22 E2	23.53
290021	O50 E	22.63
294392	P-010 E	22.58
294763	P-046 E	10.95
274888	PILOT HIL;1E	22.48
274830	PWR VTREC;1U	7.11
274831	PWR VTREC;2U	7.11
LTF	RENSSELAER	0.71
LTF	ROSETON	5.17
LTF	ROWAN	0.47
274789	SE CHICAG;6U	1.39
274790	SE CHICAG;7U	1.39
274791	SE CHICAG;8U	1.39
295111	SUBLETTE E	3.17
LTF	TRIMBLE	0.06
299993	U3-031C	6.32
903433	W3-046	27.95
905471	W4-084	0.52
274874	WALNR;2U	2.79
294502	WALNR;2U E	11.15
LTF	WEC	9.34
295109	WESTBROOK E	6.52
274687	WILL CNTY;4U	79.77
910542	X3-005 E	1.01
914641	Y2-103	52.52
915011	Y3-013 1	4.38
915021	Y3-013 2	4.38
915031	Y3-013 3	4.38
LTF	Z1-043	33.46
916502	Z1-106 E1	1.47
916504	Z1-106 E2	1.47
916512	Z1-107 E	3.06
916522	Z1-108 E	2.9
918051	AA1-018 C	2.83
918052	AA1-018 E	18.97
918972	AA1-116 E	3.21
918982	AA1-117 E	3.21

919221	AA1-146	20.55
919581	AA2-030	20.55
919591	AA2-035	151.52
920112	AA2-107 E	2.86
920272	AA2-123 E	2.85
930481	AB1-089	76.71
930491	AB1-090	76.71
930501	AB1-091	89.49
930761	AB1-122 1	82.91
930771	AB1-122 2	86.1
931221	AB1-172	0.95
LTF	AB2-013	18.91
924471	AB2-096	49.4
925161	AB2-173	3.67
925301	AB2-191 C	1.47
925302	AB2-191 E	1.31
925881	AC1-067	200.82
926311	AC1-109 1	2.22
926321	AC1-109 2	2.22
926331	AC1-110 1	2.21
926341	AC1-110 2	2.21
926351	AC1-111 1	0.89
926361	AC1-111 2	0.89
926371	AC1-111 3	0.89
926381	AC1-111 4	0.89
926391	AC1-111 5	0.89
926401	AC1-111 6	0.89
927511	AC1-113 1	1.39
927522	AC1-113 2	1.39
926431	AC1-114	2.78
927451	AC1-142A 1	4.9
927461	AC1-142A 2	4.9
926701	AC1-153 C1	90.12
926711	AC1-153 C2	93.59
926702	AC1-153 E1	3.61
926712	AC1-153 E2	3.74
926821	AC1-168 C	1.35
926822	AC1-168 E	9.07
927531	AC1-185 1	0.8
927541	AC1-185 2	0.8
927551	AC1-185 3	0.8
927561	AC1-185 4	0.8
927571	AC1-185 5	0.8
927581	AC1-185 6	0.8
927591	AC1-185 7	0.8

<i>927601</i>	<i>AC1-185 8</i>	<i>0.8</i>
<i>927091</i>	<i>AC1-204 1</i>	<i>84.36</i>
<i>927101</i>	<i>AC1-204 2</i>	<i>84.34</i>
<i>927201</i>	<i>AC1-214 C</i>	<i>1.34</i>
<i>927202</i>	<i>AC1-214 E</i>	<i>3.57</i>

Appendix 4

(CE - MISO NIPS) The BURNHAM ;0R-17MUNSTER 345 kV line (from bus 270677 to bus 255109 ckt 1) loads from 129.76% to 129.95% (**DC power flow**) of its emergency rating (1195 MVA) for the line fault with failed breaker contingency outage of 'AEP_P4_#2978_05DUMONT 765'. This project contributes approximately 22.98 MW to the thermal violation.

CONTINGENCY 'AEP_P4_#2978_05DUMONT 765'

OPEN BRANCH FROM BUS 243206 TO BUS 907040 CKT 1

/ 243206 05DUMONT 765 X1-020

OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1

/ 243206 05DUMONT 765 270644 WILTON ; 765 1

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932011	AC2-007 C	0.82
932012	AC2-007 E	1.52
932881	AC2-115 1	2.32
932891	AC2-115 2	2.32
932921	AC2-116	0.81
932931	AC2-117	5.38
933341	AC2-147 C	0.85
933342	AC2-147 E	1.38
933361	AC2-149 C	0.91
933362	AC2-149 E	1.48
933381	AC2-151 C	0.95
933382	AC2-151 E	1.55
933411	AC2-154 C	2.88
933412	AC2-154 E	4.7
933431	AC2-156 C	0.94
933432	AC2-156 E	1.53
933511	AC2-166 C	2.28
933512	AC2-166 E	2.52
933911	AD1-013 C O1	1.79
933912	AD1-013 E O1	2.86
933931	AD1-016 C	0.91
933932	AD1-016 E	1.48
934101	AD1-039 1	7.58
934111	AD1-039 2	7.76
934401	AD1-064 C O1	3.13
934402	AD1-064 E O1	14.65
934431	AD1-067 C	0.13
934432	AD1-067 E	0.54
LTF	AD1-092	10.71
LTF	AD1-093	18.55
LTF	AD1-094	3.6
934651	AD1-096 C	0.87

934652	AD1-096 E	1.42
934701	AD1-098 C O1	6.7
934702	AD1-098 E O1	4.89
934721	AD1-100 C	22.49
934722	AD1-100 E	105.29
934871	AD1-116 C	0.99
934872	AD1-116 E	1.61
934881	AD1-117 C	5.21
934882	AD1-117 E	3.48
934941	AD1-126 C	5.71
934942	AD1-126 E	3.81
934971	AD1-129 C	0.88
934972	AD1-129 E	0.59
935001	AD1-133 C O1	20.35
935002	AD1-133 E O1	13.57
936181	AD2-024 C O1	0.91
936182	AD2-024 E O1	1.48
936291	AD2-038 C O1	2.35
936292	AD2-038 E O1	15.72
936371	AD2-047 C O1	2.58
936372	AD2-047 E O1	27.77
936461	AD2-060	3.04
936511	AD2-066 C O1	8.21
936512	AD2-066 E O1	5.47
936781	AD2-101 C	4.28
936782	AD2-101 E	20.04
936791	AD2-102 C	11.72
936792	AD2-102 E	11.26
936961	AD2-130 C	1.57
936962	AD2-130 E	0.21
937001	AD2-134 C	2.66
937002	AD2-134 E	11.
937031	AD2-137 C O1	3.66
937032	AD2-137 E O1	17.12
937051	AD2-140 C O1	3.72
937052	AD2-140 E O1	17.41
937061	AD2-141 C O1	3.7
937062	AD2-141 E O1	17.43
937071	AD2-142 C O1	7.44
937072	AD2-142 E O1	34.83
937121	AD2-148 C O1	3.43
937122	AD2-148 E O1	16.06
937131	AD2-149 C O1	3.43
937132	AD2-149 E O1	16.06
937141	AD2-150 C O1	3.43

937142	AD2-150 E O1	16.06
937181	AD2-155 C O1	3.43
937182	AD2-155 E O1	16.06
937311	AD2-172 C	2.4
937312	AD2-172 E	3.31
937321	AD2-175 C	15.98
937322	AD2-175 E	10.65
937331	AD2-176 C O1	7.16
937332	AD2-176 E O1	4.77
937401	AD2-194 C1	3.79
937411	AD2-194 C2	3.79
937402	AD2-194 E1	3.79
937412	AD2-194 E2	3.79
LTF	BLUEG	1.8
LTF	CALDERWOOD	0.02
LTF	CANNELTON	0.09
LTF	CARR	0.72
LTF	CATAWBA	0.24
274890	CAYUG;1U E	13.34
274891	CAYUG;2U E	13.34
LTF	CBM-S1	1.55
LTF	CBM-W1	48.42
LTF	CBM-W2	38.56
LTF	CELEVELAND	0.67
LTF	CHEOAH	0.03
LTF	CHILHOWEE	< 0.01
LTF	CLIFTY	10.94
LTF	DEARBORN	2.84
274859	EASYR;U1 E	10.67
274860	EASYR;U2 E	10.67
LTF	ELMERSMITH	0.17
LTF	G-007	1.92
LTF	GIBSON	0.09
290051	GSG-6; E	10.18
LTF	HAMLET	0.94
275149	KEMPTON ;1E	21.23
290108	LEEDK;1U E	23.7
LTF	MEC	36.43
274850	MENDOTA H;RU	5.25
293061	N-015 E	14.96
293516	O-009 E1	0.89
293517	O-009 E2	0.45
293518	O-009 E3	0.5
293715	O-029 E	9.41
293716	O-029 E	5.16

293717	O-029 E	4.74
LTF	O-066	12.35
293644	O22 E1	9.27
293645	O22 E2	17.99
290021	O50 E	18.68
294392	P-010 E	19.
294763	P-046 E	9.13
274888	PILOT HIL;1E	21.23
274830	PWR VTREC;1U	5.96
274831	PWR VTREC;2U	5.96
LTF	RENSSELAER	0.57
274723	RIVER EC ;12	5.2
LTF	ROSETON	4.13
LTF	ROWAN	0.57
LTF	SANTEETLA	< 0.01
274794	SE CHICAG;1U	1.15
274795	SE CHICAG;2U	1.15
295111	SUBLETTE E	2.65
LTF	TRIMBLE	0.37
299993	U3-031C	5.65
903433	W3-046	22.98
905471	W4-084	0.44
274874	WALNR;2U	2.31
294502	WALNR;2U E	9.25
LTF	WEC	7.81
295109	WESTBROOK E	5.45
274687	WILL CNTY;4U	64.5
910541	X3-005 C	0.1
910542	X3-005 E	0.91
914641	Y2-103	44.12
915011	Y3-013 1	3.68
915021	Y3-013 2	3.68
915031	Y3-013 3	3.68
LTF	Z1-043	27.52
916502	Z1-106 E1	1.24
916504	Z1-106 E2	1.24
916512	Z1-107 E	2.61
916522	Z1-108 E	2.44
918051	AA1-018 C	2.54
918052	AA1-018 E	16.99
918972	AA1-116 E	3.03
918982	AA1-117 E	3.03
919221	AA1-146	17.02
919581	AA2-030	17.02
919591	AA2-035	129.81

920112	AA2-107 E	2.4
920272	AA2-123 E	2.39
930481	AB1-089	64.13
930491	AB1-090	64.13
930501	AB1-091	93.52
930761	AB1-122 1	69.73
930771	AB1-122 2	71.42
931221	AB1-172	0.81
LTF	AB2-013	15.45
924471	AB2-096	41.37
925161	AB2-173	3.04
925301	AB2-191 C	1.23
925302	AB2-191 E	1.09
925881	AC1-067	307.8
926311	AC1-109 1	1.88
926321	AC1-109 2	1.88
926331	AC1-110 1	1.86
926341	AC1-110 2	1.86
926351	AC1-111 1	0.75
926361	AC1-111 2	0.75
926371	AC1-111 3	0.75
926381	AC1-111 4	0.75
926391	AC1-111 5	0.75
926401	AC1-111 6	0.75
927511	AC1-113 1	1.16
927522	AC1-113 2	1.16
926431	AC1-114	2.32
927451	AC1-142A 1	4.12
927461	AC1-142A 2	4.12
926701	AC1-153 C1	75.79
926711	AC1-153 C2	77.63
926702	AC1-153 E1	3.03
926712	AC1-153 E2	3.1
926821	AC1-168 C	1.12
926822	AC1-168 E	7.48
927531	AC1-185 1	0.67
927541	AC1-185 2	0.67
927551	AC1-185 3	0.67
927561	AC1-185 4	0.67
927571	AC1-185 5	0.67
927581	AC1-185 6	0.67
927591	AC1-185 7	0.67
927601	AC1-185 8	0.67
927091	AC1-204 1	70.49
927101	AC1-204 2	70.54

Appendix 5

(CE - CE) The E FRANKFO; B-CRETE EC ;BP 345 kV line (from bus 270728 to bus 274750 ckt 1) loads from 108.91% to 109.0% (**DC power flow**) of its load dump rating (1399 MVA) for the line fault with failed breaker contingency outage of 'AEP_P4_#2978_05DUMONT 765'. This project contributes approximately 24.98 MW to the thermal violation.

CONTINGENCY 'AEP_P4_#2978_05DUMONT 765'

OPEN BRANCH FROM BUS 243206 TO BUS 907040 CKT 1

/ 243206 05DUMONT 765 X1-020

OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1

/ 243206 05DUMONT 765 270644 WILTON ; 765 1

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932011	AC2-007 C	0.89
932012	AC2-007 E	1.66
932881	AC2-115 1	2.52
932891	AC2-115 2	2.52
932921	AC2-116	0.88
933341	AC2-147 C	0.92
933342	AC2-147 E	1.5
933361	AC2-149 C	0.98
933362	AC2-149 E	1.6
933381	AC2-151 C	1.03
933382	AC2-151 E	1.67
933411	AC2-154 C	2.34
933412	AC2-154 E	3.82
933431	AC2-156 C	1.01
933432	AC2-156 E	1.64
933511	AC2-166 C	2.46
933512	AC2-166 E	2.72
933911	AD1-013 C O1	1.94
933912	AD1-013 E O1	3.1
933931	AD1-016 C	0.98
933932	AD1-016 E	1.61
934101	AD1-039 1	8.1
934111	AD1-039 2	8.76
934401	AD1-064 C O1	3.4
934402	AD1-064 E O1	15.91
934431	AD1-067 C	0.14
934432	AD1-067 E	0.58
LTF	AD1-092	11.78
LTF	AD1-093	20.42
LTF	AD1-094	3.92
934651	AD1-096 C	0.94
934652	AD1-096 E	1.54
934701	AD1-098 C O1	7.26

934702	AD1-098 E O1	5.3
934721	AD1-100 C	22.76
934722	AD1-100 E	106.57
934871	AD1-116 C	0.94
934872	AD1-116 E	1.54
934881	AD1-117 C	5.67
934882	AD1-117 E	3.78
934941	AD1-126 C	6.17
934942	AD1-126 E	4.12
934971	AD1-129 C	0.96
934972	AD1-129 E	0.64
935001	AD1-133 C O1	21.36
935002	AD1-133 E O1	14.24
936181	AD2-024 C O1	0.98
936182	AD2-024 E O1	1.61
936291	AD2-038 C O1	2.41
936292	AD2-038 E O1	16.16
936371	AD2-047 C O1	2.09
936372	AD2-047 E O1	22.53
936461	AD2-060	2.46
936511	AD2-066 C O1	8.79
936512	AD2-066 E O1	5.86
936791	AD2-102 C	12.74
936792	AD2-102 E	12.24
936961	AD2-130 C	1.68
936962	AD2-130 E	0.22
937001	AD2-134 C	2.88
937002	AD2-134 E	11.91
937031	AD2-137 C O1	3.32
937032	AD2-137 E O1	15.53
937051	AD2-140 C O1	3.31
937052	AD2-140 E O1	15.51
937061	AD2-141 C O1	3.29
937062	AD2-141 E O1	15.53
937071	AD2-142 C O1	6.63
937072	AD2-142 E O1	31.02
937121	AD2-148 C O1	3.28
937122	AD2-148 E O1	15.36
937131	AD2-149 C O1	3.28
937132	AD2-149 E O1	15.36
937141	AD2-150 C O1	3.28
937142	AD2-150 E O1	15.36
937181	AD2-155 C O1	3.28
937182	AD2-155 E O1	15.36
937311	AD2-172 C	2.6

937312	AD2-172 E	3.6
937321	AD2-175 C	15.28
937322	AD2-175 E	10.19
937331	AD2-176 C O1	7.77
937332	AD2-176 E O1	5.18
937401	AD2-194 C1	4.24
937411	AD2-194 C2	4.23
937402	AD2-194 E1	4.24
937412	AD2-194 E2	4.23
LTF	BLUEG	1.96
274654	BRAIDWOOD;1U	33.28
274655	BRAIDWOOD;2U	32.37
LTF	CANNELTON	0.11
LTF	CARR	0.74
LTF	CATAWBA	0.24
LTF	CBM-S1	1.73
LTF	CBM-W1	53.69
LTF	CBM-W2	41.3
LTF	CELEVELAND	0.66
LTF	CHEOAH	< 0.01
LTF	CLIFTY	11.49
LTF	DEARBORN	2.95
274859	EASYR;U1 E	11.61
274860	EASYR;U2 E	11.61
LTF	ELMERSMITH	0.21
LTF	G-007	1.96
LTF	GIBSON	0.13
290051	GSG-6; E	11.03
LTF	HAMLET	0.93
274676	JOLIET 29;8U	13.75
275149	KEMPTON ;1E	17.24
274704	KENDALL ;1C	4.9
274705	KENDALL ;1S	3.27
274706	KENDALL ;2C	4.9
274707	KENDALL ;2S	3.27
274660	LASCO STA;1U	30.75
274661	LASCO STA;2U	30.8
290108	LEEDK;1U E	25.63
LTF	MEC	39.61
274850	MENDOTA H;RU	5.69
293061	N-015 E	16.7
293516	O-009 E1	0.57
293517	O-009 E2	0.29
293518	O-009 E3	0.32
293715	O-029 E	10.24

293716	O-029 E	5.61
293717	O-029 E	5.16
LTF	O-066	12.55
293644	O22 E1	12.52
293645	O22 E2	24.31
290021	O50 E	20.97
294392	P-010 E	21.21
294763	P-046 E	9.92
274888	PILOT HIL;1E	17.24
274830	PWR VTREC;1U	6.47
274831	PWR VTREC;2U	6.47
LTF	RENSSELAER	0.58
LTF	ROSETON	4.2
LTF	ROWAN	0.56
LTF	SANTEETLA	< 0.01
295111	SUBLETTE E	2.87
274861	TOP CROP ;1U	0.58
274862	TOP CROP ;2U	1.13
LTF	TRIMBLE	0.4
299993	U3-031C	5.01
903433	W3-046	25.68
905471	W4-084	0.47
274874	WALNR;2U	2.52
294502	WALNR;2U E	10.08
LTF	WEC	8.51
295109	WESTBROOK E	5.9
274687	WILL CNTY;4U	75.03
914641	Y2-103	48.04
915011	Y3-013 1	4.
915021	Y3-013 2	4.
915031	Y3-013 3	4.
LTF	Z1-043	30.
916502	Z1-106 E1	1.34
916504	Z1-106 E2	1.34
916512	Z1-107 E	2.57
916522	Z1-108 E	2.64
918051	AA1-018 C	2.42
918052	AA1-018 E	16.19
918972	AA1-116 E	2.46
918982	AA1-117 E	2.46
919221	AA1-146	18.54
919581	AA2-030	18.54
919591	AA2-035	133.8
920112	AA2-107 E	2.59
920272	AA2-123 E	2.59

930481	AB1-089	69.67
930491	AB1-090	69.67
930501	AB1-091	67.74
930761	AB1-122 1	74.55
930771	AB1-122 2	80.59
931221	AB1-172	0.8
LTF	AB2-013	17.02
924471	AB2-096	44.92
925161	AB2-173	3.31
925301	AB2-191 C	1.33
925302	AB2-191 E	1.18
926311	AC1-109 1	2.01
926321	AC1-109 2	2.01
926331	AC1-110 1	2.02
926341	AC1-110 2	2.02
926351	AC1-111 1	0.8
926361	AC1-111 2	0.8
926371	AC1-111 3	0.8
926381	AC1-111 4	0.8
926391	AC1-111 5	0.8
926401	AC1-111 6	0.8
927511	AC1-113 1	1.26
927522	AC1-113 2	1.26
926431	AC1-114	2.52
927451	AC1-142A 1	4.57
927461	AC1-142A 2	4.57
926701	AC1-153 C1	81.04
926711	AC1-153 C2	87.6
926702	AC1-153 E1	3.24
926712	AC1-153 E2	3.5
926821	AC1-168 C	1.22
926822	AC1-168 E	8.19
927531	AC1-185 1	0.73
927541	AC1-185 2	0.73
927551	AC1-185 3	0.73
927561	AC1-185 4	0.73
927571	AC1-185 5	0.73
927581	AC1-185 6	0.73
927591	AC1-185 7	0.73
927601	AC1-185 8	0.73
927091	AC1-204 1	78.89
927101	AC1-204 2	78.75

Appendix 6

(CE - CE) The GARDEN PR; R-SILVER LK; R 345 kV line (from bus 270759 to bus 270883 ckt 1) loads from 121.87% to 123.3% (**DC power flow**) of its load dump rating (1479 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_144-45-BT6-8__'. This project contributes approximately 47.04 MW to the thermal violation.

CONTINGENCY 'COMED_P4_144-45-BT6-8__'

TRIP BRANCH FROM BUS 934400 TO BUS 270916 CKT 1

/ AD1-064 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

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932011	AC2-007 C	1.29
932012	AC2-007 E	2.39
932881	AC2-115 1	4.93
932891	AC2-115 2	4.93
932921	AC2-116	1.73
933341	AC2-147 C	1.24
933342	AC2-147 E	2.03
933361	AC2-149 C	0.78
933362	AC2-149 E	1.27
933511	AC2-166 C	1.55
933512	AC2-166 E	1.71
933911	AD1-013 C O1	1.56
933912	AD1-013 E O1	2.49
934401	AD1-064 C O1	6.73
934402	AD1-064 E O1	31.49
934431	AD1-067 C	0.11
934432	AD1-067 E	0.47
934651	AD1-096 C	1.63
934652	AD1-096 E	2.66
934701	AD1-098 C O1	6.02
934702	AD1-098 E O1	4.39
934881	AD1-117 C	7.66
934882	AD1-117 E	5.1
934941	AD1-126 C	4.18
934942	AD1-126 E	2.79
934971	AD1-129 C	1.35
934972	AD1-129 E	0.9
936791	AD2-102 C	23.99
936792	AD2-102 E	23.05
937001	AD2-134 C	2.34
937002	AD2-134 E	9.68
937311	AD2-172 C	4.42

937312	AD2-172 E	6.1
937531	AD2-214 C	4.76
937532	AD2-214 E	2.24
LTF	BLUEG	0.65
LTF	CANNELTON	0.04
LTF	CARR	0.18
LTF	CATAWBA	< 0.01
LTF	CBM-S1	1.36
LTF	CBM-S2	0.02
LTF	CBM-W1	36.27
LTF	CBM-W2	18.51
LTF	CLIFTY	3.41
LTF	DEARBORN	0.74
274859	EASYR;U1 E	17.3
274860	EASYR;U2 E	17.3
LTF	ELMERSMITH	0.07
LTF	G-007	0.47
LTF	GIBSON	0.12
290051	GSG-6; E	8.96
LTF	HAMLET	0.06
940081	J384	2.63
940101	J390	84.17
940142	J395 E	9.11
981221	J584 C	1.36
981222	J584 E	5.46
951671	J652	9.01
981141	J760	5.32
938151	J807 C	0.77
938152	J807 E	3.08
938421	J818	14.18
938161	J819 C	1.93
938162	J819 E	7.7
938181	J825 C	2.19
938182	J825 E	8.75
938991	J850	20.88
939091	J864	4.43
290108	LEEDK;1U E	17.92
LTF	MEC	28.
274850	MENDOTA H;RU	4.63
293516	O-009 E1	8.88
293517	O-009 E2	4.51
293518	O-009 E3	4.97
293715	O-029 E	9.5
293716	O-029 E	5.21
293717	O-029 E	4.79

<i>LTF</i>	<i>O-066</i>	<i>3.03</i>
<i>294763</i>	<i>P-046 E</i>	<i>16.83</i>
<i>274830</i>	<i>PWR VTREC;1U</i>	<i>24.72</i>
<i>274831</i>	<i>PWR VTREC;2U</i>	<i>24.72</i>
<i>LTF</i>	<i>RENSSELAER</i>	<i>0.14</i>
<i>LTF</i>	<i>ROSETON</i>	<i>1.04</i>
<i>LTF</i>	<i>ROWAN</i>	<i>0.04</i>
<i>295111</i>	<i>SUBLETTE E</i>	<i>2.33</i>
<i>LTF</i>	<i>TILTON</i>	<i>0.12</i>
<i>LTF</i>	<i>TRIMBLE</i>	<i>0.13</i>
<i>905471</i>	<i>W4-084</i>	<i>0.54</i>
<i>274874</i>	<i>WALNR;2U</i>	<i>2.43</i>
<i>294502</i>	<i>WALNR;2U E</i>	<i>9.72</i>
<i>LTF</i>	<i>WEC</i>	<i>0.61</i>
<i>295109</i>	<i>WESTBROOK E</i>	<i>4.8</i>
<i>916522</i>	<i>Z1-108 E</i>	<i>2.07</i>
<i>919221</i>	<i>AA1-146</i>	<i>20.58</i>
<i>919581</i>	<i>AA2-030</i>	<i>20.58</i>
<i>920112</i>	<i>AA2-107 E</i>	<i>1.63</i>
<i>930481</i>	<i>AB1-089</i>	<i>140.16</i>
<i>930491</i>	<i>AB1-090</i>	<i>140.16</i>
<i>924471</i>	<i>AB2-096</i>	<i>171.68</i>
<i>925161</i>	<i>AB2-173</i>	<i>3.67</i>
<i>925301</i>	<i>AB2-191 C</i>	<i>1.08</i>
<i>925302</i>	<i>AB2-191 E</i>	<i>0.96</i>
<i>927511</i>	<i>AC1-113 1</i>	<i>2.46</i>
<i>927522</i>	<i>AC1-113 2</i>	<i>2.46</i>
<i>926431</i>	<i>AC1-114</i>	<i>4.93</i>
<i>927531</i>	<i>AC1-185 1</i>	<i>1.08</i>
<i>927541</i>	<i>AC1-185 2</i>	<i>1.08</i>
<i>927551</i>	<i>AC1-185 3</i>	<i>1.08</i>
<i>927561</i>	<i>AC1-185 4</i>	<i>1.08</i>
<i>927571</i>	<i>AC1-185 5</i>	<i>1.08</i>
<i>927581</i>	<i>AC1-185 6</i>	<i>1.08</i>
<i>927591</i>	<i>AC1-185 7</i>	<i>1.08</i>
<i>927601</i>	<i>AC1-185 8</i>	<i>1.08</i>

Appendix 7

(CE - AEP) The GREENACRE; T-05OLIVE 345 kV line (from bus 270771 to bus 243229 ckt 1) loads from 112.15% to 112.29% (**DC power flow**) of its emergency rating (971 MVA) for the line fault with failed breaker contingency outage of 'AEP_P4_#2978_05DUMONT 765'. This project contributes approximately 15.88 MW to the thermal violation.

CONTINGENCY 'AEP_P4_#2978_05DUMONT 765'

OPEN BRANCH FROM BUS 243206 TO BUS 907040 CKT 1

/ 243206 05DUMONT 765 X1-020

OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1

/ 243206 05DUMONT 765 270644 WILTON ; 765 1

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932011	AC2-007 C	0.57
932012	AC2-007 E	1.05
932881	AC2-115 1	1.6
932891	AC2-115 2	1.6
932921	AC2-116	0.56
933341	AC2-147 C	0.59
933342	AC2-147 E	0.96
933361	AC2-149 C	0.63
933362	AC2-149 E	1.02
933381	AC2-151 C	0.65
933382	AC2-151 E	1.06
933411	AC2-154 C	1.7
933412	AC2-154 E	2.77
933431	AC2-156 C	0.64
933432	AC2-156 E	1.05
933511	AC2-166 C	1.57
933512	AC2-166 E	1.73
933911	AD1-013 C O1	1.24
933912	AD1-013 E O1	1.98
933931	AD1-016 C	0.63
933932	AD1-016 E	1.02
934101	AD1-039 1	5.19
934111	AD1-039 2	5.48
934401	AD1-064 C O1	2.16
934402	AD1-064 E O1	10.11
934421	AD1-066	0.71
934431	AD1-067 C	0.09
934432	AD1-067 E	0.37
LTF	AD1-092	7.48
LTF	AD1-093	12.96
LTF	AD1-094	2.5
934651	AD1-096 C	0.6
934652	AD1-096 E	0.98

934701	AD1-098 C O1	4.62
934702	AD1-098 E O1	3.37
934721	AD1-100 C	15.19
934722	AD1-100 E	71.09
934871	AD1-116 C	0.62
934872	AD1-116 E	1.02
934881	AD1-117 C	3.61
934882	AD1-117 E	2.4
934941	AD1-126 C	3.93
934942	AD1-126 E	2.62
934971	AD1-129 C	0.61
934972	AD1-129 E	0.41
935001	AD1-133 C O1	13.88
935002	AD1-133 E O1	9.25
936181	AD2-024 C O1	0.63
936182	AD2-024 E O1	1.02
936291	AD2-038 C O1	1.56
936292	AD2-038 E O1	10.42
936371	AD2-047 C O1	1.52
936372	AD2-047 E O1	16.36
936461	AD2-060	1.79
936511	AD2-066 C O1	5.63
936512	AD2-066 E O1	3.75
936781	AD2-101 C	3.17
936782	AD2-101 E	14.83
936791	AD2-102 C	8.1
936792	AD2-102 E	7.78
936961	AD2-130 C	1.08
936962	AD2-130 E	0.14
937001	AD2-134 C	1.84
937002	AD2-134 E	7.58
937031	AD2-137 C O1	2.32
937032	AD2-137 E O1	10.88
937051	AD2-140 C O1	2.34
937052	AD2-140 E O1	10.96
937061	AD2-141 C O1	2.33
937062	AD2-141 E O1	10.97
937071	AD2-142 C O1	4.68
937072	AD2-142 E O1	21.92
937121	AD2-148 C O1	2.34
937122	AD2-148 E O1	10.97
937131	AD2-149 C O1	2.34
937132	AD2-149 E O1	10.97
937141	AD2-150 C O1	2.34
937142	AD2-150 E O1	10.97

937181	AD2-155 C O1	2.34
937182	AD2-155 E O1	10.97
937311	AD2-172 C	1.66
937312	AD2-172 E	2.29
937321	AD2-175 C	10.92
937322	AD2-175 E	7.28
937331	AD2-176 C O1	4.94
937332	AD2-176 E O1	3.29
937401	AD2-194 C1	2.65
937411	AD2-194 C2	2.65
937402	AD2-194 E1	2.65
937412	AD2-194 E2	2.65
937531	AD2-214 C	2.96
937532	AD2-214 E	1.39
274832	ANNAWAN ; 1U	7.25
LTF	BLUEG	0.94
LTF	CANNELTON	< 0.01
LTF	CARR	0.5
LTF	CATAWBA	0.15
274890	CAYUG;1U E	9.
274891	CAYUG;2U E	9.
LTF	CBM-S1	1.4
LTF	CBM-W1	40.64
LTF	CBM-W2	28.81
LTF	CELEVELAND	0.4
LTF	CLIFTY	6.69
274751	CRETE EC ;1U	2.36
274752	CRETE EC ;2U	2.36
274753	CRETE EC ;3U	2.36
274754	CRETE EC ;4U	2.36
LTF	DEARBORN	2.24
274859	EASYR;U1 E	7.38
274860	EASYR;U2 E	7.38
LTF	G-007	1.32
290051	GSG-6; E	7.02
LTF	HAMLET	0.59
951131	J643	15.61
981291	J740 C	4.38
981292	J740 E	17.51
938961	J847	8.43
275149	KEMPTON ;1E	12.52
290108	LEEDK;1U E	16.33
LTF	MEC	25.44
274850	MENDOTA H;RU	3.62
293061	N-015 E	10.39

293516	O-009 E1	6.1
293517	O-009 E2	3.1
293518	O-009 E3	3.41
293715	O-029 E	6.52
293716	O-029 E	3.58
293717	O-029 E	3.29
LTF	O-066	8.49
293644	O22 E1	7.35
293645	O22 E2	14.27
290021	O50 E	13.15
294392	P-010 E	13.2
294763	P-046 E	6.31
274888	PILOT HIL;1E	12.52
274830	PWR VTREC;1U	4.11
274831	PWR VTREC;2U	4.11
LTF	RENSSELAER	0.4
LTF	ROSETON	2.87
LTF	ROWAN	0.35
295111	SUBLETTE E	1.83
LTF	TRIMBLE	0.19
299993	U3-031C	3.55
903433	W3-046	16.14
905471	W4-084	0.3
274874	WALNR;2U	1.6
294502	WALNR;2U E	6.41
LTF	WEC	5.4
295109	WESTBROOK E	3.76
274687	WILL CNTY;4U	46.97
910542	X3-005 E	0.52
914641	Y2-103	30.46
915011	Y3-013 1	2.54
915021	Y3-013 2	2.54
915031	Y3-013 3	2.54
LTF	Z1-043	19.09
916502	Z1-106 E1	0.85
916504	Z1-106 E2	0.85
916512	Z1-107 E	1.73
916522	Z1-108 E	1.68
918051	AA1-018 C	1.6
918052	AA1-018 E	10.71
918972	AA1-116 E	1.79
918982	AA1-117 E	1.79
919221	AA1-146	11.8
919581	AA2-030	11.8
919591	AA2-035	86.93

920112	AA2-107 E	1.65
920272	AA2-123 E	1.65
930481	AB1-089	44.29
930491	AB1-090	44.29
930501	AB1-091	50.09
930761	AB1-122 1	47.74
930771	AB1-122 2	50.37
931221	AB1-172	0.54
LTF	AB2-013	10.8
924471	AB2-096	28.55
925161	AB2-173	2.1
925301	AB2-191 C	0.85
925302	AB2-191 E	0.75
925881	AC1-067	103.88
926311	AC1-109 1	1.28
926321	AC1-109 2	1.28
926331	AC1-110 1	1.28
926341	AC1-110 2	1.28
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
927522	AC1-113 2	0.8
926431	AC1-114	1.6
927451	AC1-142A 1	2.86
927461	AC1-142A 2	2.86
926701	AC1-153 C1	51.89
926711	AC1-153 C2	54.75
926702	AC1-153 E1	2.08
926712	AC1-153 E2	2.19
926821	AC1-168 C	0.77
926822	AC1-168 E	5.19
927531	AC1-185 1	0.46
927541	AC1-185 2	0.46
927551	AC1-185 3	0.46
927561	AC1-185 4	0.46
927571	AC1-185 5	0.46
927581	AC1-185 6	0.46
927591	AC1-185 7	0.46
927601	AC1-185 8	0.46
927091	AC1-204 1	49.33
927101	AC1-204 2	49.29

<i>927201</i>	<i>AC1-214 C</i>	<i>0.59</i>
<i>927202</i>	<i>AC1-214 E</i>	<i>1.57</i>

Appendix 8

(CE - MISO NIPS) The ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 109.52% to 109.61% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of 'AEP_P4_#2978_05DUMONT 765'. This project contributes approximately 17.6 MW to the thermal violation.

CONTINGENCY 'AEP_P4_#2978_05DUMONT 765'

OPEN BRANCH FROM BUS 243206 TO BUS 907040 CKT 1

OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1

END

/ 243206 05DUMONT 765 X1-020

/ 243206 05DUMONT 765 270644 WILTON ; 765 1

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932011	AC2-007 C	0.63
932012	AC2-007 E	1.17
932881	AC2-115 1	1.78
932891	AC2-115 2	1.78
932921	AC2-116	0.62
933341	AC2-147 C	0.65
933342	AC2-147 E	1.06
933361	AC2-149 C	0.69
933362	AC2-149 E	1.13
933381	AC2-151 C	0.72
933382	AC2-151 E	1.18
933411	AC2-154 C	1.74
933412	AC2-154 E	2.84
933431	AC2-156 C	0.71
933432	AC2-156 E	1.16
933511	AC2-166 C	1.74
933512	AC2-166 E	1.92
933911	AD1-013 C O1	1.37
933912	AD1-013 E O1	2.19
933931	AD1-016 C	0.69
933932	AD1-016 E	1.13
934101	AD1-039 1	5.73
934111	AD1-039 2	6.14
934401	AD1-064 C O1	2.39
934402	AD1-064 E O1	11.21
934431	AD1-067 C	0.1
934432	AD1-067 E	0.41
LTF	AD1-092	8.28
LTF	AD1-093	14.36
LTF	AD1-094	2.76
934651	AD1-096 C	0.66
934652	AD1-096 E	1.08

934701	AD1-098 C O1	5.12
934702	AD1-098 E O1	3.73
934721	AD1-100 C	16.33
934722	AD1-100 E	76.48
934871	AD1-116 C	0.67
934872	AD1-116 E	1.1
934881	AD1-117 C	3.99
934882	AD1-117 E	2.66
934941	AD1-126 C	4.35
934942	AD1-126 E	2.9
934971	AD1-129 C	0.67
934972	AD1-129 E	0.45
935001	AD1-133 C O1	15.16
935002	AD1-133 E O1	10.11
936181	AD2-024 C O1	0.69
936182	AD2-024 E O1	1.13
936291	AD2-038 C O1	1.71
936292	AD2-038 E O1	11.45
936371	AD2-047 C O1	1.55
936372	AD2-047 E O1	16.74
936461	AD2-060	1.83
936511	AD2-066 C O1	6.21
936512	AD2-066 E O1	4.14
936781	AD2-101 C	3.08
936782	AD2-101 E	14.41
936791	AD2-102 C	8.97
936792	AD2-102 E	8.62
936961	AD2-130 C	1.19
936962	AD2-130 E	0.16
937001	AD2-134 C	2.03
937002	AD2-134 E	8.39
937031	AD2-137 C O1	2.43
937032	AD2-137 E O1	11.36
937051	AD2-140 C O1	2.43
937052	AD2-140 E O1	11.39
937061	AD2-141 C O1	2.42
937062	AD2-141 E O1	11.4
937071	AD2-142 C O1	4.87
937072	AD2-142 E O1	22.78
937121	AD2-148 C O1	2.42
937122	AD2-148 E O1	11.31
937131	AD2-149 C O1	2.42
937132	AD2-149 E O1	11.31
937141	AD2-150 C O1	2.42
937142	AD2-150 E O1	11.31

937181	AD2-155 C O1	2.42
937182	AD2-155 E O1	11.31
937311	AD2-172 C	1.83
937312	AD2-172 E	2.53
937321	AD2-175 C	11.26
937322	AD2-175 E	7.5
937331	AD2-176 C O1	5.48
937332	AD2-176 E O1	3.65
937401	AD2-194 C1	2.97
937411	AD2-194 C2	2.97
937402	AD2-194 E1	2.97
937412	AD2-194 E2	2.97
LTF	BLUEG	1.4
274654	BRAIDWOOD;1U	23.01
274655	BRAIDWOOD;2U	22.39
LTF	CALDERWOOD	0.02
LTF	CANNELTON	0.08
LTF	CARR	0.56
LTF	CATAWBA	0.19
LTF	CBM-S1	1.13
LTF	CBM-W1	39.86
LTF	CBM-W2	29.04
LTF	CELEVELAND	0.53
LTF	CHEOAH	0.03
LTF	CHILHOWEE	< 0.01
LTF	CLIFTY	8.44
274751	CRETE EC ;1U	4.08
274752	CRETE EC ;2U	4.08
274753	CRETE EC ;3U	4.08
274754	CRETE EC ;4U	4.08
LTF	DEARBORN	2.3
274859	EASYR;U1 E	8.18
274860	EASYR;U2 E	8.18
LTF	ELMERSMITH	0.15
LTF	G-007	1.5
LTF	GIBSON	0.08
290051	GSG-6; E	7.77
LTF	HAMLET	0.74
275149	KEMPTON ;1E	12.81
274704	KENDALL ;1C	3.42
274705	KENDALL ;1S	2.28
274706	KENDALL ;2C	3.42
274707	KENDALL ;2S	2.28
274660	LASCO STA;1U	21.43
274661	LASCO STA;2U	21.47

290108	LEEDK;1U E	18.07
LTF	MEC	27.9
274850	MENDOTA H;RU	4.01
293061	N-015 E	11.68
293715	O-029 E	6.17
293716	O-029 E	3.38
293717	O-029 E	3.11
LTF	O-066	9.6
293644	O22 E1	8.57
293645	O22 E2	16.64
290021	O50 E	14.7
294392	P-010 E	14.84
294763	P-046 E	6.99
274888	PILOT HIL;1E	12.81
274830	PWR VTREC;1U	4.56
274831	PWR VTREC;2U	4.56
LTF	RENSSELAER	0.44
LTF	ROSETON	3.21
LTF	ROWAN	0.45
LTF	SANTEETLA	< 0.01
295111	SUBLETTE E	2.02
274861	TOP CROP ;1U	0.4
274862	TOP CROP ;2U	0.77
LTF	TRIMBLE	0.28
299993	U3-031C	3.68
903433	W3-046	18.
905471	W4-084	0.33
274874	WALNR;2U	1.77
294502	WALNR;2U E	7.1
LTF	WEC	5.99
295109	WESTBROOK E	4.16
274687	WILL CNTY;4U	52.58
914641	Y2-103	33.82
915011	Y3-013 1	2.82
915021	Y3-013 2	2.82
915031	Y3-013 3	2.82
LTF	Z1-043	21.13
916502	Z1-106 E1	0.94
916504	Z1-106 E2	0.94
916512	Z1-107 E	1.85
916522	Z1-108 E	1.86
918051	AA1-018 C	1.73
918052	AA1-018 E	11.59
918972	AA1-116 E	1.83
918982	AA1-117 E	1.83

919221	AA1-146	13.05
919581	AA2-030	13.05
919591	AA2-035	95.09
920112	AA2-107 E	1.83
920272	AA2-123 E	1.83
930481	AB1-089	49.08
930491	AB1-090	49.08
930501	AB1-091	50.78
930761	AB1-122 1	52.68
930771	AB1-122 2	56.45
931221	AB1-172	0.57
LTF	AB2-013	11.97
924471	AB2-096	31.64
925161	AB2-173	2.33
925301	AB2-191 C	0.94
925302	AB2-191 E	0.83
926311	AC1-109 1	1.42
926321	AC1-109 2	1.42
926331	AC1-110 1	1.42
926341	AC1-110 2	1.42
926351	AC1-111 1	0.57
926361	AC1-111 2	0.57
926371	AC1-111 3	0.57
926381	AC1-111 4	0.57
926391	AC1-111 5	0.57
926401	AC1-111 6	0.57
927511	AC1-113 1	0.89
927522	AC1-113 2	0.89
926431	AC1-114	1.78
927451	AC1-142A 1	3.2
927461	AC1-142A 2	3.2
926701	AC1-153 C1	57.26
926711	AC1-153 C2	61.36
926702	AC1-153 E1	2.29
926712	AC1-153 E2	2.45
926821	AC1-168 C	0.86
926822	AC1-168 E	5.76
927531	AC1-185 1	0.51
927541	AC1-185 2	0.51
927551	AC1-185 3	0.51
927561	AC1-185 4	0.51
927571	AC1-185 5	0.51
927581	AC1-185 6	0.51
927591	AC1-185 7	0.51
927601	AC1-185 8	0.51

<i>927091</i>	<i>AC1-204 1</i>	<i>55.28</i>
<i>927101</i>	<i>AC1-204 2</i>	<i>55.2</i>

Appendix 9

(CE - CE) The WILTON ; B-WILTON ;3M 345 kV line (from bus 270926 to bus 275232 ckt 1) loads from 145.73% to 146.08% (**DC power flow**) of its load dump rating (1379 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT5-6__'. This project contributes approximately 28.88 MW to the thermal violation.

CONTINGENCY 'COMED_P4_112-65-BT5-6__'

TRIP BRANCH FROM BUS 270644 TO BUS 270607 CKT 1	/ WILTO; 765 COLLI; 765
TRIP BRANCH FROM BUS 275233 TO BUS 270644 CKT 1	/ WILTO;4M 345 WILTO; 765
TRIP BRANCH FROM BUS 275233 TO BUS 270927 CKT 1	/ WILTO;4M 345 WILTO; R 345
TRIP BRANCH FROM BUS 275233 TO BUS 275333 CKT 1	/ WILTO;4M 345 WILTO;4C 33

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932011	AC2-007 C	1.03
932012	AC2-007 E	1.91
932881	AC2-115 1	2.92
932891	AC2-115 2	2.92
932921	AC2-116	1.02
933361	AC2-149 C	1.14
933362	AC2-149 E	1.86
933381	AC2-151 C	1.21
933382	AC2-151 E	1.97
933411	AC2-154 C	3.21
933412	AC2-154 E	5.23
933431	AC2-156 C	1.17
933432	AC2-156 E	1.91
933511	AC2-166 C	2.85
933512	AC2-166 E	3.15
933911	AD1-013 C O1	2.25
933912	AD1-013 E O1	3.6
933931	AD1-016 C	1.14
933932	AD1-016 E	1.85
934101	AD1-039 1	9.66
934111	AD1-039 2	9.84
934401	AD1-064 C O1	3.92
934402	AD1-064 E O1	18.38
934431	AD1-067 C	0.16
934432	AD1-067 E	0.68
LTF	AD1-092	13.89
LTF	AD1-093	23.99
LTF	AD1-094	4.66
934651	AD1-096 C	1.09
934652	AD1-096 E	1.78
934701	AD1-098 C O1	8.42
934702	AD1-098 E O1	6.15

934721	AD1-100 C	35.21
934722	AD1-100 E	164.82
934871	AD1-116 C	1.18
934872	AD1-116 E	1.92
934941	AD1-126 C	7.16
934942	AD1-126 E	4.77
934971	AD1-129 C	1.1
934972	AD1-129 E	0.74
935001	AD1-133 C O1	27.67
935002	AD1-133 E O1	18.45
936181	AD2-024 C O1	1.14
936182	AD2-024 E O1	1.85
936291	AD2-038 C O1	2.89
936292	AD2-038 E O1	19.36
936371	AD2-047 C O1	2.87
936372	AD2-047 E O1	30.89
936461	AD2-060	3.38
936511	AD2-066 C O1	10.37
936512	AD2-066 E O1	6.92
936781	AD2-101 C	6.09
936782	AD2-101 E	28.49
936791	AD2-102 C	14.73
936792	AD2-102 E	14.15
936961	AD2-130 C	1.93
936962	AD2-130 E	0.26
937001	AD2-134 C	3.34
937002	AD2-134 E	13.82
937031	AD2-137 C O1	7.27
937032	AD2-137 E O1	34.02
937051	AD2-140 C O1	7.63
937052	AD2-140 E O1	35.73
937061	AD2-141 C O1	7.59
937062	AD2-141 E O1	35.77
937071	AD2-142 C O1	15.26
937072	AD2-142 E O1	71.46
937121	AD2-148 C O1	4.77
937122	AD2-148 E O1	22.34
937131	AD2-149 C O1	4.77
937132	AD2-149 E O1	22.34
937141	AD2-150 C O1	4.77
937142	AD2-150 E O1	22.34
937181	AD2-155 C O1	4.77
937182	AD2-155 E O1	22.34
937311	AD2-172 C	3.02
937312	AD2-172 E	4.16

937321	AD2-175 C	22.23
937322	AD2-175 E	14.82
937331	AD2-176 C O1	8.97
937332	AD2-176 E O1	5.98
937401	AD2-194 C1	4.8
937411	AD2-194 C2	4.8
937402	AD2-194 E1	4.8
937412	AD2-194 E2	4.8
LTF	BLUEG	2.6
LTF	CALDERWOOD	0.04
LTF	CANNELTON	0.12
LTF	CARR	0.94
LTF	CATAWBA	0.34
274890	CAYUG;1U E	20.65
274891	CAYUG;2U E	20.65
LTF	CBM-S1	2.
LTF	CBM-W1	74.76
LTF	CBM-W2	53.18
LTF	CELEVELAND	0.94
LTF	CHEOAH	0.05
LTF	CHILHOWEE	0.01
LTF	CLIFTY	15.69
LTF	DEARBORN	2.77
LTF	ELMERSMITH	0.22
LTF	G-007	2.54
290051	GSG-6; E	12.79
LTF	HAMLET	1.31
275149	KEMPTON ;1E	23.64
290108	LEEDK;1U E	29.72
274770	LINCOLN ;1U	4.13
274771	LINCOLN ;2U	4.13
274772	LINCOLN ;3U	4.13
274773	LINCOLN ;4U	4.13
274774	LINCOLN ;5U	4.13
274775	LINCOLN ;6U	4.13
274776	LINCOLN ;7U	4.13
274777	LINCOLN ;8U	4.13
LTF	MEC	46.92
274850	MENDOTA H;RU	6.6
293061	N-015 E	19.2
LTF	O-066	16.29
293644	O22 E1	12.6
293645	O22 E2	24.46
290021	O50 E	23.83
294392	P-010 E	24.38

294763	P-046 E	11.49
274888	PILOT HIL;1E	23.64
274830	PWR VTREC;1U	7.47
274831	PWR VTREC;2U	7.47
296308	R-030 C1	5.
296271	R-030 C2	5.
296125	R-030 C3	5.06
296309	R-030 E1	20.01
296272	R-030 E2	20.01
296128	R-030 E3	20.26
LTF	RENSSELAER	0.74
LTF	ROSETON	5.35
LTF	ROWAN	0.8
LTF	SANTEETLA	0.02
295111	SUBLETTE E	3.33
LTF	TRIMBLE	0.53
299993	U3-031C	11.53
903433	W3-046	17.81
LTF	WEC	9.78
295109	WESTBROOK E	6.85
274687	WILL CNTY;4U	82.07
910542	X3-005 E	0.9
914641	Y2-103	55.09
915011	Y3-013 1	4.59
915021	Y3-013 2	4.59
915031	Y3-013 3	4.59
LTF	Z1-043	35.61
916502	Z1-106 E1	1.55
916504	Z1-106 E2	1.55
916512	Z1-107 E	3.17
916522	Z1-108 E	3.05
917501	Z2-087 C	3.91
917502	Z2-087 E	26.18
918051	AA1-018 C	3.02
918052	AA1-018 E	20.2
918972	AA1-116 E	3.38
918982	AA1-117 E	3.38
919591	AA2-035	160.67
920112	AA2-107 E	3.
920272	AA2-123 E	2.99
930481	AB1-089	80.54
930491	AB1-090	80.54
930501	AB1-091	91.2
930761	AB1-122 1	88.88
930771	AB1-122 2	90.52

931221	AB1-172	0.98
LTF	AB2-013	19.99
924041	AB2-047 C O1	4.83
924042	AB2-047 E O1	32.3
924471	AB2-096	51.86
925301	AB2-191 C	1.55
925302	AB2-191 E	1.37
925881	AC1-067	167.77
926311	AC1-109 1	2.34
926321	AC1-109 2	2.34
926331	AC1-110 1	2.33
926341	AC1-110 2	2.33
926351	AC1-111 1	0.94
926361	AC1-111 2	0.94
926371	AC1-111 3	0.94
926381	AC1-111 4	0.94
926391	AC1-111 5	0.94
926401	AC1-111 6	0.94
927511	AC1-113 1	1.46
927522	AC1-113 2	1.46
926431	AC1-114	2.92
927451	AC1-142A 1	5.14
927461	AC1-142A 2	5.14
926701	AC1-153 C1	96.61
926711	AC1-153 C2	98.39
926702	AC1-153 E1	3.86
926712	AC1-153 E2	3.94
927091	AC1-204 1	89.19
927101	AC1-204 2	89.19

Appendix 10

(CE - CE) The WILTON ; R-WILTON ;4M 345 kV line (from bus 270927 to bus 275233 ckt 1) loads from 148.62% to 148.92% (**DC power flow**) of its load dump rating (1379 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT2-3__'. This project contributes approximately 29.5 MW to the thermal violation.

CONTINGENCY 'COMED_P4_112-65-BT2-3__'

TRIP BRANCH FROM BUS 270644 TO BUS 270607 CKT 1	/ WILTO; 765 COLLI; 765
TRIP BRANCH FROM BUS 275232 TO BUS 270644 CKT 1	/ WILTO;3M 345 WILTO; 765
TRIP BRANCH FROM BUS 275232 TO BUS 270926 CKT 1	/ WILTO;3M 345 WILTO; B 345
TRIP BRANCH FROM BUS 275232 TO BUS 275332 CKT 1	/ WILTO;3M 345 WILTO;3C 33

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932011	AC2-007 C	1.05
932012	AC2-007 E	1.95
932881	AC2-115 1	2.98
932891	AC2-115 2	2.98
932921	AC2-116	1.04
932931	AC2-117	6.65
933341	AC2-147 C	1.09
933342	AC2-147 E	1.78
933361	AC2-149 C	1.16
933362	AC2-149 E	1.9
933381	AC2-151 C	1.23
933382	AC2-151 E	2.01
933411	AC2-154 C	3.27
933412	AC2-154 E	5.34
933431	AC2-156 C	1.19
933432	AC2-156 E	1.95
933511	AC2-166 C	2.91
933512	AC2-166 E	3.22
933911	AD1-013 C O1	2.3
933912	AD1-013 E O1	3.67
933931	AD1-016 C	1.16
933932	AD1-016 E	1.89
934101	AD1-039 1	9.87
934111	AD1-039 2	10.05
934401	AD1-064 C O1	4.01
934402	AD1-064 E O1	18.77
934431	AD1-067 C	0.16
934432	AD1-067 E	0.69
LTF	AD1-092	14.18
LTF	AD1-093	24.5
LTF	AD1-094	4.75
934651	AD1-096 C	1.12

934652	AD1-096 E	1.82
934701	AD1-098 C O1	8.6
934702	AD1-098 E O1	6.28
934721	AD1-100 C	35.9
934722	AD1-100 E	168.07
934871	AD1-116 C	1.2
934872	AD1-116 E	1.96
934881	AD1-117 C	6.72
934882	AD1-117 E	4.48
934941	AD1-126 C	7.31
934942	AD1-126 E	4.87
934971	AD1-129 C	1.13
934972	AD1-129 E	0.75
935001	AD1-133 C O1	28.24
935002	AD1-133 E O1	18.83
936181	AD2-024 C O1	1.16
936182	AD2-024 E O1	1.89
936291	AD2-038 C O1	2.96
936292	AD2-038 E O1	19.78
936371	AD2-047 C O1	2.93
936372	AD2-047 E O1	31.53
936461	AD2-060	3.45
936511	AD2-066 C O1	10.59
936512	AD2-066 E O1	7.06
936781	AD2-101 C	6.21
936782	AD2-101 E	29.08
936791	AD2-102 C	15.05
936792	AD2-102 E	14.46
936961	AD2-130 C	1.97
936962	AD2-130 E	0.26
937001	AD2-134 C	3.42
937002	AD2-134 E	14.11
937031	AD2-137 C O1	7.4
937032	AD2-137 E O1	34.65
937051	AD2-140 C O1	7.77
937052	AD2-140 E O1	36.39
937061	AD2-141 C O1	7.73
937062	AD2-141 E O1	36.43
937071	AD2-142 C O1	15.54
937072	AD2-142 E O1	72.77
937121	AD2-148 C O1	4.87
937122	AD2-148 E O1	22.79
937131	AD2-149 C O1	4.87
937132	AD2-149 E O1	22.79
937141	AD2-150 C O1	4.87

937142	AD2-150 E O1	22.79
937181	AD2-155 C O1	4.87
937182	AD2-155 E O1	22.79
937311	AD2-172 C	3.08
937312	AD2-172 E	4.25
937321	AD2-175 C	22.68
937322	AD2-175 E	15.12
937331	AD2-176 C O1	9.16
937332	AD2-176 E O1	6.11
937401	AD2-194 C1	4.9
937411	AD2-194 C2	4.9
937402	AD2-194 E1	4.9
937412	AD2-194 E2	4.9
LTF	BLUEG	2.66
LTF	CALDERWOOD	0.04
LTF	CANNELTON	0.12
LTF	CARR	0.96
LTF	CATAWBA	0.35
274890	CAYUG;1U E	21.06
274891	CAYUG;2U E	21.06
LTF	CBM-S1	2.05
LTF	CBM-W1	76.35
LTF	CBM-W2	54.29
LTF	CELEVELAND	0.96
LTF	CHEOAH	0.05
LTF	CHILHOWEE	0.01
LTF	CLIFTY	16.03
LTF	DEARBORN	2.83
274859	EASYR;U1 E	10.78
274860	EASYR;U2 E	10.78
LTF	ELMERSMITH	0.22
LTF	G-007	2.59
290051	GSG-6; E	13.07
LTF	HAMLET	1.34
275149	KEMPTON ;1E	24.13
290108	LEEDK;1U E	30.35
274770	LINCOLN ;1U	4.24
274771	LINCOLN ;2U	4.24
274772	LINCOLN ;3U	4.24
274773	LINCOLN ;4U	4.24
274774	LINCOLN ;5U	4.24
274775	LINCOLN ;6U	4.24
274776	LINCOLN ;7U	4.24
274777	LINCOLN ;8U	4.24
LTF	MEC	47.91

274850	MENDOTA H;RU	6.74
293061	N-015 E	19.6
LTF	O-066	16.64
293644	O22 E1	12.86
293645	O22 E2	24.97
290021	O50 E	24.34
294392	P-010 E	24.89
294763	P-046 E	11.73
274888	PILOT HIL;1E	24.13
274830	PWR VTREC;1U	7.63
274831	PWR VTREC;2U	7.63
296308	R-030 C1	5.1
296271	R-030 C2	5.1
296125	R-030 C3	5.17
296309	R-030 E1	20.42
296272	R-030 E2	20.42
296128	R-030 E3	20.66
LTF	RENSSELAER	0.76
LTF	ROSETON	5.46
LTF	ROWAN	0.81
LTF	SANTEETLA	0.02
295111	SUBLETTE E	3.4
LTF	TRIMBLE	0.55
299993	U3-031C	11.84
903433	W3-046	30.11
LTF	WEC	9.99
295109	WESTBROOK E	7.
274687	WILL CNTY;4U	83.82
910542	X3-005 E	0.92
914641	Y2-103	56.26
915011	Y3-013 1	4.69
915021	Y3-013 2	4.69
915031	Y3-013 3	4.69
LTF	Z1-043	36.36
916502	Z1-106 E1	1.58
916504	Z1-106 E2	1.58
916512	Z1-107 E	3.24
916522	Z1-108 E	3.11
917501	Z2-087 C	3.99
917502	Z2-087 E	26.7
918051	AA1-018 C	3.08
918052	AA1-018 E	20.64
918972	AA1-116 E	3.45
918982	AA1-117 E	3.45
919591	AA2-035	164.09

920112	AA2-107 E	3.07
920272	AA2-123 E	3.05
930481	AB1-089	82.25
930491	AB1-090	82.25
930501	AB1-091	93.12
930761	AB1-122 1	90.76
930771	AB1-122 2	92.45
931221	AB1-172	1.
LTF	AB2-013	20.42
924041	AB2-047 C O1	4.92
924042	AB2-047 E O1	32.95
924471	AB2-096	52.97
925301	AB2-191 C	1.58
925302	AB2-191 E	1.4
925881	AC1-067	171.5
926311	AC1-109 1	2.39
926321	AC1-109 2	2.39
926331	AC1-110 1	2.37
926341	AC1-110 2	2.37
926351	AC1-111 1	0.95
926361	AC1-111 2	0.95
926371	AC1-111 3	0.95
926381	AC1-111 4	0.95
926391	AC1-111 5	0.95
926401	AC1-111 6	0.95
927511	AC1-113 1	1.49
927522	AC1-113 2	1.49
926431	AC1-114	2.98
927451	AC1-142A 1	5.25
927461	AC1-142A 2	5.25
926701	AC1-153 C1	98.66
926711	AC1-153 C2	100.49
926702	AC1-153 E1	3.95
926712	AC1-153 E2	4.02
927531	AC1-185 1	0.86
927541	AC1-185 2	0.86
927551	AC1-185 3	0.86
927561	AC1-185 4	0.86
927571	AC1-185 5	0.86
927581	AC1-185 6	0.86
927591	AC1-185 7	0.86
927601	AC1-185 8	0.86
927091	AC1-204 1	91.1
927101	AC1-204 2	91.1

Appendix 11

(CE - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line (from bus 274750 to bus 255112 ckt 1) loads from 126.47% to 126.57% (**DC power flow**) of its emergency rating (1399 MVA) for the line fault with failed breaker contingency outage of 'AEP_P4_#2978_05DUMONT 765'. This project contributes approximately 24.67 MW to the thermal violation.

CONTINGENCY 'AEP_P4_#2978_05DUMONT 765'

OPEN BRANCH FROM BUS 243206 TO BUS 907040 CKT 1

OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1

END

/ 243206 05DUMONT 765 X1-020

/ 243206 05DUMONT 765 270644 WILTON ; 765 1

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932011	AC2-007 C	0.88
932012	AC2-007 E	1.64
932881	AC2-115 1	2.49
932891	AC2-115 2	2.49
932921	AC2-116	0.87
933341	AC2-147 C	0.91
933342	AC2-147 E	1.48
933361	AC2-149 C	0.97
933362	AC2-149 E	1.58
933381	AC2-151 C	1.01
933382	AC2-151 E	1.65
933411	AC2-154 C	2.31
933412	AC2-154 E	3.77
933431	AC2-156 C	1.
933432	AC2-156 E	1.62
933511	AC2-166 C	2.43
933512	AC2-166 E	2.69
933911	AD1-013 C O1	1.92
933912	AD1-013 E O1	3.06
933931	AD1-016 C	0.97
933932	AD1-016 E	1.59
934101	AD1-039 1	8.01
934111	AD1-039 2	8.66
934401	AD1-064 C O1	3.36
934402	AD1-064 E O1	15.71
934431	AD1-067 C	0.14
934432	AD1-067 E	0.57
LTF	AD1-092	11.61
LTF	AD1-093	20.14
LTF	AD1-094	3.87
934651	AD1-096 C	0.93
934652	AD1-096 E	1.52

934701	AD1-098 C O1	7.17
934702	AD1-098 E O1	5.23
934721	AD1-100 C	22.49
934722	AD1-100 E	105.27
934871	AD1-116 C	0.93
934872	AD1-116 E	1.52
934881	AD1-117 C	5.6
934882	AD1-117 E	3.73
934941	AD1-126 C	6.1
934942	AD1-126 E	4.06
934971	AD1-129 C	0.94
934972	AD1-129 E	0.63
935001	AD1-133 C O1	21.08
935002	AD1-133 E O1	14.05
936181	AD2-024 C O1	0.97
936182	AD2-024 E O1	1.59
936291	AD2-038 C O1	2.38
936292	AD2-038 E O1	15.95
936371	AD2-047 C O1	2.07
936372	AD2-047 E O1	22.24
936461	AD2-060	2.43
936511	AD2-066 C O1	8.68
936512	AD2-066 E O1	5.79
936791	AD2-102 C	12.58
936792	AD2-102 E	12.09
936961	AD2-130 C	1.66
936962	AD2-130 E	0.22
937001	AD2-134 C	2.85
937002	AD2-134 E	11.76
937031	AD2-137 C O1	3.28
937032	AD2-137 E O1	15.33
937051	AD2-140 C O1	3.27
937052	AD2-140 E O1	15.31
937061	AD2-141 C O1	3.25
937062	AD2-141 E O1	15.33
937071	AD2-142 C O1	6.54
937072	AD2-142 E O1	30.63
937121	AD2-148 C O1	3.24
937122	AD2-148 E O1	15.16
937131	AD2-149 C O1	3.24
937132	AD2-149 E O1	15.16
937141	AD2-150 C O1	3.24
937142	AD2-150 E O1	15.16
937181	AD2-155 C O1	3.24
937182	AD2-155 E O1	15.16

937311	AD2-172 C	2.57
937312	AD2-172 E	3.55
937321	AD2-175 C	15.09
937322	AD2-175 E	10.06
937331	AD2-176 C O1	7.68
937332	AD2-176 E O1	5.12
937401	AD2-194 C1	4.19
937411	AD2-194 C2	4.19
937402	AD2-194 E1	4.19
937412	AD2-194 E2	4.19
LTF	BLUEG	2.23
274654	BRAIDWOOD;1U	32.94
274655	BRAIDWOOD;2U	32.04
LTF	CALDERWOOD	0.08
LTF	CANNELTON	0.16
LTF	CARR	0.79
LTF	CATAWBA	0.29
LTF	CBM-S1	1.25
LTF	CBM-W1	51.91
LTF	CBM-W2	38.47
LTF	CELEVELAND	0.82
LTF	CHEOAH	0.08
LTF	CHILHOWEE	0.02
LTF	CLIFTY	12.63
274751	CRETE EC ;1U	7.
274752	CRETE EC ;2U	7.
274753	CRETE EC ;3U	7.
274754	CRETE EC ;4U	7.
LTF	DEARBORN	3.08
274859	EASYR;U1 E	11.46
274860	EASYR;U2 E	11.46
LTF	ELMERSMITH	0.35
LTF	G-007	2.12
LTF	GIBSON	0.22
290051	GSG-6; E	10.89
LTF	HAMLET	1.11
275149	KEMPTON ;1E	17.01
274704	KENDALL ;1C	4.85
274705	KENDALL ;1S	3.23
274706	KENDALL ;2C	4.85
274707	KENDALL ;2S	3.23
274660	LASCO STA;1U	30.41
274661	LASCO STA;2U	30.46
290108	LEEDK;1U E	25.32
LTF	MEC	38.88

274850	MENDOTA H;RU	5.62
293061	N-015 E	16.51
293516	O-009 E1	4.46
293517	O-009 E2	2.27
293518	O-009 E3	2.49
293715	O-029 E	10.1
293716	O-029 E	5.54
293717	O-029 E	5.09
LTF	O-066	13.61
293644	O22 E1	12.39
293645	O22 E2	24.06
290021	O50 E	20.72
294392	P-010 E	20.97
294763	P-046 E	9.8
274888	PILOT HIL;1E	17.01
274830	PWR VTREC;1U	6.39
274831	PWR VTREC;2U	6.39
LTF	RENSSELAER	0.63
LTF	ROSETON	4.53
LTF	ROWAN	0.68
LTF	SANTEETLA	0.03
295111	SUBLETTE E	2.83
274861	TOP CROP ;1U	0.58
274862	TOP CROP ;2U	1.12
LTF	TRIMBLE	0.45
299993	U3-031C	4.95
903433	W3-046	25.35
905471	W4-084	0.47
274874	WALNR;2U	2.49
294502	WALNR;2U E	9.94
LTF	WEC	8.4
295109	WESTBROOK E	5.83
274687	WILL CNTY;4U	74.22
914641	Y2-103	47.47
915011	Y3-013 1	3.96
915021	Y3-013 2	3.96
915031	Y3-013 3	3.96
LTF	Z1-043	29.59
916502	Z1-106 E1	1.32
916504	Z1-106 E2	1.32
916512	Z1-107 E	2.54
916522	Z1-108 E	2.61
918051	AA1-018 C	2.39
918052	AA1-018 E	15.99
918972	AA1-116 E	2.43

918982	AA1-117 E	2.43
919221	AA1-146	18.29
919581	AA2-030	18.29
919591	AA2-035	132.2
920112	AA2-107 E	2.56
920272	AA2-123 E	2.56
930481	AB1-089	68.8
930491	AB1-090	68.8
930501	AB1-091	66.87
930761	AB1-122 1	73.65
930771	AB1-122 2	79.68
931221	AB1-172	0.79
LTF	AB2-013	16.78
924471	AB2-096	44.37
925161	AB2-173	3.26
925301	AB2-191 C	1.32
925302	AB2-191 E	1.17
926311	AC1-109 1	1.99
926321	AC1-109 2	1.99
926331	AC1-110 1	1.99
926341	AC1-110 2	1.99
926351	AC1-111 1	0.8
926361	AC1-111 2	0.8
926371	AC1-111 3	0.8
926381	AC1-111 4	0.8
926391	AC1-111 5	0.8
926401	AC1-111 6	0.8
927511	AC1-113 1	1.24
927522	AC1-113 2	1.24
926431	AC1-114	2.49
927451	AC1-142A 1	4.52
927461	AC1-142A 2	4.52
926701	AC1-153 C1	80.05
926711	AC1-153 C2	86.61
926702	AC1-153 E1	3.2
926712	AC1-153 E2	3.46
926821	AC1-168 C	1.2
926822	AC1-168 E	8.08
927531	AC1-185 1	0.72
927541	AC1-185 2	0.72
927551	AC1-185 3	0.72
927561	AC1-185 4	0.72
927571	AC1-185 5	0.72
927581	AC1-185 6	0.72
927591	AC1-185 7	0.72

927601	AC1-185 8	0.72
927091	AC1-204 1	78.02
927101	AC1-204 2	77.87

Appendix 12

(CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 133.32% to 133.47% (**DC power flow**) of its emergency rating (971 MVA) for the line fault with failed breaker contingency outage of 'AEP_P4_#2978_05DUMONT 765'. This project contributes approximately 19.23 MW to the thermal violation.

CONTINGENCY 'AEP_P4_#2978_05DUMONT 765'

OPEN BRANCH FROM BUS 243206 TO BUS 907040 CKT 1

/ 243206 05DUMONT 765 X1-020

OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1

/ 243206 05DUMONT 765 270644 WILTON ; 765 1

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932011	AC2-007 C	0.69
932012	AC2-007 E	1.28
932881	AC2-115 1	1.94
932891	AC2-115 2	1.94
932921	AC2-116	0.68
932931	AC2-117	10.47
933341	AC2-147 C	0.71
933342	AC2-147 E	1.16
933361	AC2-149 C	0.76
933362	AC2-149 E	1.24
933381	AC2-151 C	0.81
933382	AC2-151 E	1.31
933411	AC2-154 C	2.05
933412	AC2-154 E	3.34
933431	AC2-156 C	0.78
933432	AC2-156 E	1.28
933511	AC2-166 C	1.9
933512	AC2-166 E	2.1
933911	AD1-013 C O1	1.5
933912	AD1-013 E O1	2.39
933931	AD1-016 C	0.76
933932	AD1-016 E	1.24
934101	AD1-039 1	6.33
934111	AD1-039 2	6.54
934401	AD1-064 C O1	2.62
934402	AD1-064 E O1	12.25
934431	AD1-067 C	0.11
934432	AD1-067 E	0.45
LTF	AD1-092	9.
LTF	AD1-093	15.6
LTF	AD1-094	3.03
934651	AD1-096 C	0.73
934652	AD1-096 E	1.18

934701	AD1-098 C O1	5.6
934702	AD1-098 E O1	4.09
934721	AD1-100 C	18.07
934722	AD1-100 E	84.58
934871	AD1-116 C	0.84
934872	AD1-116 E	1.38
934881	AD1-117 C	4.36
934882	AD1-117 E	2.91
934941	AD1-126 C	4.77
934942	AD1-126 E	3.18
934971	AD1-129 C	0.74
934972	AD1-129 E	0.49
935001	AD1-133 C O1	16.79
935002	AD1-133 E O1	11.19
936181	AD2-024 C O1	0.76
936182	AD2-024 E O1	1.24
936291	AD2-038 C O1	2.
936292	AD2-038 E O1	13.35
936371	AD2-047 C O1	1.83
936372	AD2-047 E O1	19.72
936461	AD2-060	2.16
936511	AD2-066 C O1	6.9
936512	AD2-066 E O1	4.6
936781	AD2-101 C	3.5
936782	AD2-101 E	16.39
936791	AD2-102 C	9.81
936792	AD2-102 E	9.42
936961	AD2-130 C	1.3
936962	AD2-130 E	0.17
937001	AD2-134 C	2.22
937002	AD2-134 E	9.19
937031	AD2-137 C O1	2.7
937032	AD2-137 E O1	12.62
937051	AD2-140 C O1	2.7
937052	AD2-140 E O1	12.66
937061	AD2-141 C O1	2.69
937062	AD2-141 E O1	12.67
937071	AD2-142 C O1	5.41
937072	AD2-142 E O1	25.31
937121	AD2-148 C O1	2.73
937122	AD2-148 E O1	12.77
937131	AD2-149 C O1	2.73
937132	AD2-149 E O1	12.77
937141	AD2-150 C O1	2.73
937142	AD2-150 E O1	12.77

937181	AD2-155 C O1	2.73
937182	AD2-155 E O1	12.77
937311	AD2-172 C	2.01
937312	AD2-172 E	2.77
937321	AD2-175 C	12.7
937322	AD2-175 E	8.47
937331	AD2-176 C O1	5.99
937332	AD2-176 E O1	3.99
937401	AD2-194 C1	3.21
937411	AD2-194 C2	3.21
937402	AD2-194 E1	3.21
937412	AD2-194 E2	3.21
937531	AD2-214 C	3.57
937532	AD2-214 E	1.68
274832	ANNAWAN ; 1U	5.44
LTF	BLUEG	1.48
LTF	CALDERWOOD	0.02
LTF	CANNELTON	0.07
LTF	CARR	0.62
LTF	CATAWBA	0.21
274890	CAYUG;1U E	10.71
274891	CAYUG;2U E	10.71
LTF	CBM-S1	1.28
LTF	CBM-W1	44.45
LTF	CBM-W2	32.09
LTF	CELEVELAND	0.58
LTF	CHEOAH	0.03
LTF	CHILHOWEE	< 0.01
LTF	CLIFTY	9.14
LTF	DEARBORN	2.57
274859	EASYR;U1 E	8.93
274860	EASYR;U2 E	8.93
LTF	ELMERSMITH	0.13
LTF	G-007	1.65
LTF	GIBSON	0.06
290051	GSG-6; E	8.51
LTF	HAMLET	0.81
275149	KEMPTON ;1E	15.08
290108	LEEDK;1U E	19.79
LTF	MEC	30.47
274850	MENDOTA H;RU	4.39
293061	N-015 E	12.8
293516	O-009 E1	7.37
293517	O-009 E2	3.74
293518	O-009 E3	4.12

293715	O-029 E	7.88
293716	O-029 E	4.32
293717	O-029 E	3.97
LTF	O-066	10.57
293644	O22 E1	7.91
293645	O22 E2	15.35
290021	O50 E	15.77
294392	P-010 E	16.26
294763	P-046 E	7.64
274888	PILOT HIL;1E	15.08
274830	PWR VTREC;1U	4.98
274831	PWR VTREC;2U	4.98
LTF	RENSSELAER	0.49
LTF	ROSETON	3.54
LTF	ROWAN	0.49
LTF	SANTEETLA	< 0.01
295111	SUBLETTE E	2.21
LTF	TRIMBLE	0.3
299993	U3-031C	4.1
291984	U4-033	1.52
274814	UNIV PK N;0U	1.19
274806	UNIV PK N;2U	1.19
274807	UNIV PK N;3U	1.19
274808	UNIV PK N;4U	1.19
274809	UNIV PK N;5U	1.19
274810	UNIV PK N;6U	1.19
274811	UNIV PK N;7U	1.19
274812	UNIV PK N;8U	1.19
274813	UNIV PK N;9U	1.19
274815	UNIV PK N;XU	1.19
274816	UNIV PK N;YU	1.19
903433	W3-046	19.41
905471	W4-084	0.36
274874	WALNR;2U	1.93
294502	WALNR;2U E	7.74
LTF	WEC	6.54
295109	WESTBROOK E	4.55
274687	WILL CNTY;4U	53.33
910542	X3-005 E	0.52
914641	Y2-103	36.97
915011	Y3-013 1	3.08
915021	Y3-013 2	3.08
915031	Y3-013 3	3.08
LTF	Z1-043	23.15
916502	Z1-106 E1	1.03

916504	Z1-106 E2	1.04
916512	Z1-107 E	2.23
916522	Z1-108 E	2.04
918051	AA1-018 C	2.17
918052	AA1-018 E	14.5
918972	AA1-116 E	2.15
918982	AA1-117 E	2.15
919221	AA1-146	14.24
919581	AA2-030	14.24
919591	AA2-035	107.19
920112	AA2-107 E	2.
920272	AA2-123 E	2.
930481	AB1-089	53.65
930491	AB1-090	53.65
930501	AB1-091	58.45
930761	AB1-122 1	58.22
930771	AB1-122 2	60.21
931221	AB1-172	0.69
LTF	AB2-013	13.
924471	AB2-096	34.61
925161	AB2-173	2.54
925301	AB2-191 C	1.03
925302	AB2-191 E	0.91
925881	AC1-067	98.97
926311	AC1-109 1	1.57
926321	AC1-109 2	1.57
926331	AC1-110 1	1.55
926341	AC1-110 2	1.55
926351	AC1-111 1	0.63
926361	AC1-111 2	0.63
926371	AC1-111 3	0.63
926381	AC1-111 4	0.63
926391	AC1-111 5	0.63
926401	AC1-111 6	0.63
927511	AC1-113 1	0.97
927522	AC1-113 2	0.97
926431	AC1-114	1.94
927451	AC1-142A 1	3.49
927461	AC1-142A 2	3.48
926701	AC1-153 C1	63.28
926711	AC1-153 C2	65.45
926702	AC1-153 E1	2.53
926712	AC1-153 E2	2.62
926821	AC1-168 C	0.94
926822	AC1-168 E	6.31

927531	AC1-185 1	0.56
927541	AC1-185 2	0.56
927551	AC1-185 3	0.56
927561	AC1-185 4	0.56
927571	AC1-185 5	0.56
927581	AC1-185 6	0.56
927591	AC1-185 7	0.56
927601	AC1-185 8	0.56
927091	AC1-204 1	59.71
927101	AC1-204 2	59.76

Appendix 13

(CE - CE) The WILTON ; 765/345 kV transformer (from bus 275232 to bus 270644 ckt 1) loads from 145.73% to 146.08% (**DC power flow**) of its load dump rating (1379 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT5-6__'. This project contributes approximately 28.88 MW to the thermal violation.

CONTINGENCY 'COMED_P4_112-65-BT5-6__'

TRIP BRANCH FROM BUS 270644 TO BUS 270607 CKT 1	/ WILTO; 765 COLLI; 765
TRIP BRANCH FROM BUS 275233 TO BUS 270644 CKT 1	/ WILTO;4M 345 WILTO; 765
TRIP BRANCH FROM BUS 275233 TO BUS 270927 CKT 1	/ WILTO;4M 345 WILTO; R 345
TRIP BRANCH FROM BUS 275233 TO BUS 275333 CKT 1	/ WILTO;4M 345 WILTO;4C 33

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932011	AC2-007 C	1.03
932012	AC2-007 E	1.91
932881	AC2-115 1	2.92
932891	AC2-115 2	2.92
932921	AC2-116	1.02
933361	AC2-149 C	1.14
933362	AC2-149 E	1.86
933381	AC2-151 C	1.21
933382	AC2-151 E	1.97
933411	AC2-154 C	3.21
933412	AC2-154 E	5.23
933431	AC2-156 C	1.17
933432	AC2-156 E	1.91
933511	AC2-166 C	2.85
933512	AC2-166 E	3.15
933911	AD1-013 C O1	2.25
933912	AD1-013 E O1	3.6
933931	AD1-016 C	1.14
933932	AD1-016 E	1.85
934101	AD1-039 1	9.66
934111	AD1-039 2	9.84
934401	AD1-064 C O1	3.92
934402	AD1-064 E O1	18.38
934431	AD1-067 C	0.16
934432	AD1-067 E	0.68
LTF	AD1-092	13.89
LTF	AD1-093	23.99
LTF	AD1-094	4.66
934651	AD1-096 C	1.09
934652	AD1-096 E	1.78
934701	AD1-098 C O1	8.42
934702	AD1-098 E O1	6.15

934721	AD1-100 C	35.21
934722	AD1-100 E	164.82
934871	AD1-116 C	1.18
934872	AD1-116 E	1.92
934941	AD1-126 C	7.16
934942	AD1-126 E	4.77
934971	AD1-129 C	1.1
934972	AD1-129 E	0.74
935001	AD1-133 C O1	27.67
935002	AD1-133 E O1	18.45
936181	AD2-024 C O1	1.14
936182	AD2-024 E O1	1.85
936291	AD2-038 C O1	2.89
936292	AD2-038 E O1	19.36
936371	AD2-047 C O1	2.87
936372	AD2-047 E O1	30.89
936461	AD2-060	3.38
936511	AD2-066 C O1	10.37
936512	AD2-066 E O1	6.92
936781	AD2-101 C	6.09
936782	AD2-101 E	28.49
936791	AD2-102 C	14.73
936792	AD2-102 E	14.15
936961	AD2-130 C	1.93
936962	AD2-130 E	0.26
937001	AD2-134 C	3.34
937002	AD2-134 E	13.82
937031	AD2-137 C O1	7.27
937032	AD2-137 E O1	34.02
937051	AD2-140 C O1	7.63
937052	AD2-140 E O1	35.73
937061	AD2-141 C O1	7.59
937062	AD2-141 E O1	35.77
937071	AD2-142 C O1	15.26
937072	AD2-142 E O1	71.46
937121	AD2-148 C O1	4.77
937122	AD2-148 E O1	22.34
937131	AD2-149 C O1	4.77
937132	AD2-149 E O1	22.34
937141	AD2-150 C O1	4.77
937142	AD2-150 E O1	22.34
937181	AD2-155 C O1	4.77
937182	AD2-155 E O1	22.34
937311	AD2-172 C	3.02
937312	AD2-172 E	4.16

937321	AD2-175 C	22.23
937322	AD2-175 E	14.82
937331	AD2-176 C O1	8.97
937332	AD2-176 E O1	5.98
937401	AD2-194 C1	4.8
937411	AD2-194 C2	4.8
937402	AD2-194 E1	4.8
937412	AD2-194 E2	4.8
LTF	BLUEG	2.6
LTF	CALDERWOOD	0.04
LTF	CANNELTON	0.12
LTF	CARR	0.94
LTF	CATAWBA	0.34
274890	CAYUG;1U E	20.65
274891	CAYUG;2U E	20.65
LTF	CBM-S1	2.
LTF	CBM-W1	74.76
LTF	CBM-W2	53.18
LTF	CELEVELAND	0.94
LTF	CHEOAH	0.05
LTF	CHILHOWEE	0.01
LTF	CLIFTY	15.69
LTF	DEARBORN	2.77
LTF	ELMERSMITH	0.22
LTF	G-007	2.54
290051	GSG-6; E	12.79
LTF	HAMLET	1.31
275149	KEMPTON ;1E	23.64
290108	LEEDK;1U E	29.72
274770	LINCOLN ;1U	4.13
274771	LINCOLN ;2U	4.13
274772	LINCOLN ;3U	4.13
274773	LINCOLN ;4U	4.13
274774	LINCOLN ;5U	4.13
274775	LINCOLN ;6U	4.13
274776	LINCOLN ;7U	4.13
274777	LINCOLN ;8U	4.13
LTF	MEC	46.92
274850	MENDOTA H;RU	6.6
293061	N-015 E	19.2
LTF	O-066	16.29
293644	O22 E1	12.6
293645	O22 E2	24.46
290021	O50 E	23.83
294392	P-010 E	24.38

294763	P-046 E	11.49
274888	PILOT HIL;1E	23.64
274830	PWR VTREC;1U	7.47
274831	PWR VTREC;2U	7.47
296308	R-030 C1	5.
296271	R-030 C2	5.
296125	R-030 C3	5.06
296309	R-030 E1	20.01
296272	R-030 E2	20.01
296128	R-030 E3	20.26
LTF	RENSSELAER	0.74
LTF	ROSETON	5.35
LTF	ROWAN	0.8
LTF	SANTEETLA	0.02
295111	SUBLETTE E	3.33
LTF	TRIMBLE	0.53
299993	U3-031C	11.53
903433	W3-046	17.81
LTF	WEC	9.78
295109	WESTBROOK E	6.85
274687	WILL CNTY;4U	82.07
910542	X3-005 E	0.9
914641	Y2-103	55.09
915011	Y3-013 1	4.59
915021	Y3-013 2	4.59
915031	Y3-013 3	4.59
LTF	Z1-043	35.61
916502	Z1-106 E1	1.55
916504	Z1-106 E2	1.55
916512	Z1-107 E	3.17
916522	Z1-108 E	3.05
917501	Z2-087 C	3.91
917502	Z2-087 E	26.18
918051	AA1-018 C	3.02
918052	AA1-018 E	20.2
918972	AA1-116 E	3.38
918982	AA1-117 E	3.38
919591	AA2-035	160.67
920112	AA2-107 E	3.
920272	AA2-123 E	2.99
930481	AB1-089	80.54
930491	AB1-090	80.54
930501	AB1-091	91.2
930761	AB1-122 1	88.88
930771	AB1-122 2	90.52

931221	AB1-172	0.98
LTF	AB2-013	19.99
924041	AB2-047 C O1	4.83
924042	AB2-047 E O1	32.3
924471	AB2-096	51.86
925301	AB2-191 C	1.55
925302	AB2-191 E	1.37
925881	AC1-067	167.77
926311	AC1-109 1	2.34
926321	AC1-109 2	2.34
926331	AC1-110 1	2.33
926341	AC1-110 2	2.33
926351	AC1-111 1	0.94
926361	AC1-111 2	0.94
926371	AC1-111 3	0.94
926381	AC1-111 4	0.94
926391	AC1-111 5	0.94
926401	AC1-111 6	0.94
927511	AC1-113 1	1.46
927522	AC1-113 2	1.46
926431	AC1-114	2.92
927451	AC1-142A 1	5.14
927461	AC1-142A 2	5.14
926701	AC1-153 C1	96.61
926711	AC1-153 C2	98.39
926702	AC1-153 E1	3.86
926712	AC1-153 E2	3.94
927091	AC1-204 1	89.19
927101	AC1-204 2	89.19

Appendix 14

(CE - CE) The WILTON ; 765/345 kV transformer (from bus 275233 to bus 270644 ckt 1) loads from 148.62% to 148.91% (**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 29.5 MW to the thermal violation.

CONTINGENCY 'COMED_P4_112-65-BT2-3__'

TRIP BRANCH FROM BUS 270644 TO BUS 270607 CKT 1	/ WILTO; 765 COLLI; 765
TRIP BRANCH FROM BUS 275232 TO BUS 270644 CKT 1	/ WILTO;3M 345 WILTO; 765
TRIP BRANCH FROM BUS 275232 TO BUS 270926 CKT 1	/ WILTO;3M 345 WILTO; B 345
TRIP BRANCH FROM BUS 275232 TO BUS 275332 CKT 1	/ WILTO;3M 345 WILTO;3C 33

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
932011	AC2-007 C	1.05
932012	AC2-007 E	1.95
932881	AC2-115 1	2.98
932891	AC2-115 2	2.98
932921	AC2-116	1.04
932931	AC2-117	6.65
933341	AC2-147 C	1.09
933342	AC2-147 E	1.78
933361	AC2-149 C	1.16
933362	AC2-149 E	1.9
933381	AC2-151 C	1.23
933382	AC2-151 E	2.01
933411	AC2-154 C	3.27
933412	AC2-154 E	5.34
933431	AC2-156 C	1.19
933432	AC2-156 E	1.95
933511	AC2-166 C	2.91
933512	AC2-166 E	3.22
933911	AD1-013 C O1	2.3
933912	AD1-013 E O1	3.67
933931	AD1-016 C	1.16
933932	AD1-016 E	1.89
934101	AD1-039 1	9.87
934111	AD1-039 2	10.05
934401	AD1-064 C O1	4.01
934402	AD1-064 E O1	18.77
934431	AD1-067 C	0.16
934432	AD1-067 E	0.69
LTF	AD1-092	14.18
LTF	AD1-093	24.5
LTF	AD1-094	4.75
934651	AD1-096 C	1.12

934652	AD1-096 E	1.82
934701	AD1-098 C O1	8.6
934702	AD1-098 E O1	6.28
934721	AD1-100 C	35.9
934722	AD1-100 E	168.07
934871	AD1-116 C	1.2
934872	AD1-116 E	1.96
934881	AD1-117 C	6.72
934882	AD1-117 E	4.48
934941	AD1-126 C	7.31
934942	AD1-126 E	4.87
934971	AD1-129 C	1.13
934972	AD1-129 E	0.75
935001	AD1-133 C O1	28.24
935002	AD1-133 E O1	18.83
936181	AD2-024 C O1	1.16
936182	AD2-024 E O1	1.89
936291	AD2-038 C O1	2.96
936292	AD2-038 E O1	19.78
936371	AD2-047 C O1	2.93
936372	AD2-047 E O1	31.53
936461	AD2-060	3.45
936511	AD2-066 C O1	10.59
936512	AD2-066 E O1	7.06
936781	AD2-101 C	6.21
936782	AD2-101 E	29.08
936791	AD2-102 C	15.05
936792	AD2-102 E	14.46
936961	AD2-130 C	1.97
936962	AD2-130 E	0.26
937001	AD2-134 C	3.42
937002	AD2-134 E	14.11
937031	AD2-137 C O1	7.4
937032	AD2-137 E O1	34.65
937051	AD2-140 C O1	7.77
937052	AD2-140 E O1	36.39
937061	AD2-141 C O1	7.73
937062	AD2-141 E O1	36.43
937071	AD2-142 C O1	15.54
937072	AD2-142 E O1	72.77
937121	AD2-148 C O1	4.87
937122	AD2-148 E O1	22.79
937131	AD2-149 C O1	4.87
937132	AD2-149 E O1	22.79
937141	AD2-150 C O1	4.87

937142	AD2-150 E O1	22.79
937181	AD2-155 C O1	4.87
937182	AD2-155 E O1	22.79
937311	AD2-172 C	3.08
937312	AD2-172 E	4.25
937321	AD2-175 C	22.68
937322	AD2-175 E	15.12
937331	AD2-176 C O1	9.16
937332	AD2-176 E O1	6.11
937401	AD2-194 C1	4.9
937411	AD2-194 C2	4.9
937402	AD2-194 E1	4.9
937412	AD2-194 E2	4.9
LTF	BLUEG	2.66
LTF	CALDERWOOD	0.04
LTF	CANNELTON	0.12
LTF	CARR	0.96
LTF	CATAWBA	0.35
274890	CAYUG;1U E	21.06
274891	CAYUG;2U E	21.06
LTF	CBM-S1	2.05
LTF	CBM-W1	76.35
LTF	CBM-W2	54.29
LTF	CELEVELAND	0.96
LTF	CHEOAH	0.05
LTF	CHILHOWEE	0.01
LTF	CLIFTY	16.03
LTF	DEARBORN	2.83
274859	EASYR;U1 E	10.78
274860	EASYR;U2 E	10.78
LTF	ELMERSMITH	0.22
LTF	G-007	2.59
290051	GSG-6; E	13.07
LTF	HAMLET	1.34
275149	KEMPTON ;1E	24.13
290108	LEEDK;1U E	30.35
274770	LINCOLN ;1U	4.24
274771	LINCOLN ;2U	4.24
274772	LINCOLN ;3U	4.24
274773	LINCOLN ;4U	4.24
274774	LINCOLN ;5U	4.24
274775	LINCOLN ;6U	4.24
274776	LINCOLN ;7U	4.24
274777	LINCOLN ;8U	4.24
LTF	MEC	47.91

274850	MENDOTA H;RU	6.74
293061	N-015 E	19.6
LTF	O-066	16.64
293644	O22 E1	12.86
293645	O22 E2	24.97
290021	O50 E	24.34
294392	P-010 E	24.89
294763	P-046 E	11.73
274888	PILOT HIL;1E	24.13
274830	PWR VTREC;1U	7.63
274831	PWR VTREC;2U	7.63
296308	R-030 C1	5.1
296271	R-030 C2	5.1
296125	R-030 C3	5.17
296309	R-030 E1	20.42
296272	R-030 E2	20.42
296128	R-030 E3	20.66
LTF	RENSSELAER	0.76
LTF	ROSETON	5.46
LTF	ROWAN	0.81
LTF	SANTEETLA	0.02
295111	SUBLETTE E	3.4
LTF	TRIMBLE	0.55
299993	U3-031C	11.84
903433	W3-046	30.11
LTF	WEC	9.99
295109	WESTBROOK E	7.
274687	WILL CNTY;4U	83.82
910542	X3-005 E	0.92
914641	Y2-103	56.26
915011	Y3-013 1	4.69
915021	Y3-013 2	4.69
915031	Y3-013 3	4.69
LTF	Z1-043	36.36
916502	Z1-106 E1	1.58
916504	Z1-106 E2	1.58
916512	Z1-107 E	3.24
916522	Z1-108 E	3.11
917501	Z2-087 C	3.99
917502	Z2-087 E	26.7
918051	AA1-018 C	3.08
918052	AA1-018 E	20.64
918972	AA1-116 E	3.45
918982	AA1-117 E	3.45
919591	AA2-035	164.09

920112	AA2-107 E	3.07
920272	AA2-123 E	3.05
930481	AB1-089	82.25
930491	AB1-090	82.25
930501	AB1-091	93.12
930761	AB1-122 1	90.76
930771	AB1-122 2	92.45
931221	AB1-172	1.
LTF	AB2-013	20.42
924041	AB2-047 C O1	4.92
924042	AB2-047 E O1	32.95
924471	AB2-096	52.97
925301	AB2-191 C	1.58
925302	AB2-191 E	1.4
925881	AC1-067	171.5
926311	AC1-109 1	2.39
926321	AC1-109 2	2.39
926331	AC1-110 1	2.37
926341	AC1-110 2	2.37
926351	AC1-111 1	0.95
926361	AC1-111 2	0.95
926371	AC1-111 3	0.95
926381	AC1-111 4	0.95
926391	AC1-111 5	0.95
926401	AC1-111 6	0.95
927511	AC1-113 1	1.49
927522	AC1-113 2	1.49
926431	AC1-114	2.98
927451	AC1-142A 1	5.25
927461	AC1-142A 2	5.25
926701	AC1-153 C1	98.66
926711	AC1-153 C2	100.49
926702	AC1-153 E1	3.95
926712	AC1-153 E2	4.02
927531	AC1-185 1	0.86
927541	AC1-185 2	0.86
927551	AC1-185 3	0.86
927561	AC1-185 4	0.86
927571	AC1-185 5	0.86
927581	AC1-185 6	0.86
927591	AC1-185 7	0.86
927601	AC1-185 8	0.86
927091	AC1-204 1	91.1
927101	AC1-204 2	91.1