

Feasibility Study Report

For

***PJM Generation Interconnection Request
Queue Position AD2-153***

Brokaw-Pontiac Midpoint

June 7, 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 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 item 5.iv. of Schedule H to the Interconnection Service Agreement.

An Interconnection Customer entering the New Services Queue on or after October 1, 2012 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.

PJM utilizes manufacturer models to ensure the performance of turbines is properly captured during the simulations performed for stability verification. Turbine manufacturers provide such models to their customers. The list of manufacturer models PJM has already validated is contained in Attachment B-2 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 2.2.2. of Manual 14A 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

Queue **AD2-153** project is a proposal to connect a **150 MW Energy, 26.4 MW Capacity, wind** facility to be located in Woodford and McLean Counties, IL (POI is in McLean County, IL). It is proposed in the Interconnection Request (Attachment N) that the primary point of interconnection to be studied is **a new interconnecting substation on the Brokaw (Ameren) (PSSe bus nos. 348847) to McLean (to be built by Z2-087) 345kV Line (PSSe bus nos. 917500)**, 9.5 miles from Brokaw and 10.5 miles from McLean. A secondary POI has been selected as the Davis Creek blue (PSSE Bus No. 270710) to Bloom (PSSE Bus No. 270662) 345kV 17909 Line. This project will have a dedicated 12 mile attachment line (not shared with any other facility). **AD2-153** is proposing to connect (60) GE 2.5 WTGs and (6) 2.3 WTGs, (60) 2.5 MVA and (6) 2.3 MVA, 690 V/34.5 kV pad mount transformers, (3) collection feeders of up to 23 WTGs each, and a step up transformer.

Also stated in the Attachment N is the potential for a storage facility, but that will not be part of this queue position's analysis.

The IC has proposed a service date for this project of December 31, 2020.

Impacts on the MISO member transmission systems are not included in this analysis, but will be included 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) AD2-153 proposes to interconnect 150 MW windfarm to ComEd transmission system by looping in the 'Brokaw – McClean TSS 92 (to be built by Z2-087)' 345kV line 9203, approximately 10 miles from Brokaw.

Attachment Facilities

The IC AD2-153 generator lead will interconnect to a new 345kV Interconnection Substation. This interconnection would require one 345kV line MOD, a dead-end structure and revenue metering as shown in the one-line diagram.

The estimated cost for the attachment facilities is given below.

Scope of Work	Cost Estimate
Installation of one 345kV line MOD, one dead-end structure and one set of revenue metering (see notes below on cost estimate)	\$1.0M

Direct Connection Network Upgrades

To accommodate interconnection of AD2-153, a new 345kV Interconnection Substation would be built looping in the 345kV line 9203 between Brokaw and McClean TSS 92, to interconnect developer’s generator lead.

The scope of work includes installation of three 345kV circuit breakers in “breaker-and-a-half” bus configuration and tie in the Interconnection Substation to the 345kV line 9203 between Brokaw and McClean TSS 92, as shown in the one-line diagram below.

The Interconnection Customer is responsible for constructing all the facilities on the Interconnection Customer side of the point of interconnection outside of the Interconnection Substation. It will be the Interconnection Customer’s responsibility to obtain the site for the Interconnection Substation and right-of-way between the Interconnection Substation and the 345kV transmission line 9203.

In the event, the IC exercises the option to build the Interconnection Substation, the IC will be required to construct all interconnection facilities that will be turned over to ComEd in accordance with ComEd published standards. The IC will be responsible for the ComEd oversight costs (i.e. costs incurred by the Transmission Owner when engaging in oversight activities to satisfy itself that the Interconnection Customer is complying with the Transmission Owner’s standards and specifications for the construction of facilities).

ComEd would design, engineer and construct the tie in of the Interconnection Substation to 345kV line 9203. The estimated cost for Direct Connection Network Upgrade is given below.

For Option to Build Direct Connection cost estimates:

Scope of Work	Cost Estimate
Installation of a new 345kV substation as described above	N/A
Transmission line tie in work (foundations, structures, conductors)	\$3,000,000
ComEd oversight and testing	\$1,500,000
Total Cost Estimate (see notes below on cost estimate)	\$4,500,000

For ComEd building the interconnecting substation cost estimates:

Scope of Work	Cost Estimate
Installation of a new 345kV substation as described above	\$20,000,000
Transmission line tie in work (foundations, structures, conductors)	\$3,000,000

Total Cost Estimate (see notes below on cost estimate)	\$23,000,000
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Normally, it takes about 24-months to engineer, design, procure material and construct 345kV facilities after ISA/ICSA are signed.

Non-Direct Connection Cost Estimate

The estimate cost for Non-Direct Connection work is given below:

Scope of Work	Cost Estimate
Relay/communications/SCADA upgrades at McClean TSS 92	\$1,000,000
Total Cost Estimate (see notes below on cost estimate)	\$1,000,000

Notes on Cost Estimate:

- 1) These estimates are Order-of-Magnitude estimates of the costs that ComEd would bill to the customer for this interconnection. These estimates are based on a one-line electrical diagram of the project and the information provided by the Interconnection Customer.
- 2) These cost estimates do not include cost of acquiring right-of-way for the transmission line and purchasing any additional land, if needed, for the line terminations. The need and cost of acquiring property and associated legal costs will be investigated during Facilities Study for this project.
- 3) 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.
- 4) These estimates are not a guarantee of the maximum amount payable by the Interconnection Customer and the actual costs of ComEd's work may differ significantly from these estimates. Per the PJM Tariff, Interconnection Customer will be responsible for paying all actual costs of ComEd's work.
- 5) The Interconnection Customer is responsible for all engineering, procurement, testing and construction of all equipment on the Interconnection Customer's side of the Point of Interconnection (POI).

Network Impacts

The Queue Project AD2-153 was evaluated as a 150.0 MW (Capacity 26.4 MW) injection tapping the AB2-047 TAP to Brokaw 345kV line in the ComEd area. Project AD2-153 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AD2-153 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. (MISO AMIL - AEP) The 7CASEY-05SULLIVAN 345 kV line (from bus 346809 to bus 247712 ckt 1) loads from 133.69% to 134.94% (**DC power flow**) of its emergency rating (1466 MVA) for the line fault with failed breaker contingency outage of 'AEP_P4_#3128_05EUGENE 345'. This project contributes approximately 18.38 MW to the thermal violation.

```
CONTINGENCY 'AEP_P4_#3128_05EUGENE 345'  
OPEN BRANCH FROM BUS 243221 TO BUS 249504 CKT 1 / 243221 05EUGENE 345 249504 08CAYSUB 345 1  
OPEN BRANCH FROM BUS 243221 TO BUS 348885 CKT 1 / 243221 05EUGENE 345 348885 7BUNSONVILLE 345 1  
END
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Please refer to Appendix 1 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)

None

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. (CE - CE) The BLUEMOUND; B-PONTIAC ; B 345 kV line (from bus 270668 to bus 270852 ckt 1) loads from 135.87% to 137.52% (**DC power flow**) of its emergency rating (1528 MVA) for the single line contingency outage of 'COMED_P1-2_345-L8001___-S-A'. This project contributes approximately 25.27 MW to the thermal violation.

```
CONTINGENCY 'COMED_P1-2_345-L8001___-S-A'  
TRIP BRANCH FROM BUS 270853 TO BUS 917500 CKT 1 / PONTI; R 345 Z2-087 TAP 345  
END
```

2. (CE - CE) The LORETTO ; B-AD1-100 TAP 345 kV line (from bus 270704 to bus 934720 ckt 1) loads from 200.13% to 203.95% (**DC power flow**) of its emergency rating (1528 MVA) for the single line contingency outage of 'COMED_P1-2_345-L8014_T_-S-B'. This project contributes approximately 61.09 MW to the thermal violation.

```
CONTINGENCY 'COMED_P1-2_345-L8014_T_-S-B'  
TRIP BRANCH FROM BUS 935000 TO BUS 270717 CKT 1 / AD1-133 TAP 345 DRESDEN ; R 345  
END
```

3. (CE - CE) The LORETTO ; B-AD1-100 TAP 345 kV line (from bus 270704 to bus 934720 ckt 1) loads from 150.22% to 153.14% (**DC power flow**) of its normal rating (1364 MVA) for non-contingency condition. This project contributes approximately 41.7 MW to the thermal violation.

4. (CE - CE) The DRESDEN ; R-COLLINS ; R 345 kV line (from bus 270717 to bus 270697 ckt 1) loads from 101.06% to 102.25% (**DC power flow**) of its emergency rating (1528 MVA) for the single line contingency outage of 'COMED_P1-2_345-L11212_B-S-B'. This project contributes approximately 18.16 MW to the thermal violation.

```
CONTINGENCY 'COMED_P1-2_345-L11212_B-S-B'  
TRIP BRANCH FROM BUS 934720 TO BUS 270704 CKT 1 / AD1-100 TAP 345 LORET; B 345  
END
```

5. (CE - CE) The DRESDEN ; R-ELWOOD ; R 345 kV line (from bus 270717 to bus 270737 ckt 1) loads from 133.34% to 134.27% (**DC power flow**) of its emergency rating (1479 MVA) for the single line contingency outage of 'COMED_P1-2_345-L1223_TR-S'. This project contributes approximately 15.66 MW to the thermal violation.

```
CONTINGENCY 'COMED_P1-2_345-L1223_TR-S'  
TRIP BRANCH FROM BUS 270717 TO BUS 270731 CKT 1 / DRES; R 345 ELECT;4R 345  
TRIP BRANCH FROM BUS 275180 TO BUS 270717 CKT 1 / DRES;3M 138 DRES; R 345  
TRIP BRANCH FROM BUS 275180 TO BUS 271336 CKT 1 / DRES;3M 138 DRES; B 138  
TRIP BRANCH FROM BUS 275180 TO BUS 275280 CKT 1 / DRES;3M 138 DRES;3C 34.5  
END
```

6. (CE - MISO AMIL) The KINCAID ; B-7AUSTIN 345 kV line (from bus 270796 to bus 347955 ckt 1) loads from 109.38% to 112.16% (**DC power flow**) of its emergency rating (956 MVA) for the single line contingency outage of 'COMED_P1-2_345-L8001___-S-A'. This project contributes approximately 28.25 MW to the thermal violation.

```
CONTINGENCY 'COMED_P1-2_345-L8001___-S-A'  
TRIP BRANCH FROM BUS 270853 TO BUS 917500 CKT 1 / PONTI; R 345 Z2-087 TAP 345  
END
```

7. (CE - MISO AMIL) The KINCAID ; B-7AUSTIN 345 kV line (from bus 270796 to bus 347955 ckt 1) loads from 108.49% to 110.66% (**DC power flow**) of its normal rating (797 MVA) for non-contingency condition. This project contributes approximately 17.33 MW to the thermal violation.

8. (CE - CE) The LATHAM ; T-W4-005 TAP 345 kV line (from bus 270804 to bus 905080 ckt 1) loads from 124.94% to 126.58% (**DC power flow**) of its emergency rating (1334 MVA) for the single line contingency outage of 'COMED_P1-2_345-L8001___-S-A'. This project contributes approximately 25.37 MW to the thermal violation.

```
CONTINGENCY 'COMED_P1-2_345-L8001___-S-A'  
TRIP BRANCH FROM BUS 270853 TO BUS 917500 CKT 1 / PONTI; R 345 Z2-087 TAP 345  
END
```

9. (CE - CE) The PONTIAC ; B-LORETTO ; B 345 kV line (from bus 270852 to bus 270704 ckt 1) loads from 187.52% to 191.45% (**DC power flow**) of its emergency rating (1528 MVA) for the single line contingency outage of 'COMED_P1-2_345-L8014_T_-S-B'. This project contributes approximately 61.13 MW to the thermal violation.

```
CONTINGENCY 'COMED_P1-2_345-L8014_T_-S-B'  
TRIP BRANCH FROM BUS 935000 TO BUS 270717 CKT 1 / AD1-133 TAP 345 DRESDEN ; R 345  
END
```

10. (CE - CE) The PONTIAC ; B-LORETTO ; B 345 kV line (from bus 270852 to bus 270704 ckt 1) loads from 138.2% to 140.98% (**DC power flow**) of its normal rating (1364 MVA) for non-contingency condition. This project contributes approximately 41.74 MW to the thermal violation.

11. (CE - CE) The PONTIAC ; R-AD1-133 TAP 345 kV line (from bus 270853 to bus 935000 ckt 1) loads from 175.1% to 178.46% (**DC power flow**) of its emergency rating (1528 MVA) for

the single line contingency outage of 'COMED_P1-2_345-L11212_B-S-B'. This project contributes approximately 56.31 MW to the thermal violation.

CONTINGENCY 'COMED_P1-2_345-L11212_B-S-B'
TRIP BRANCH FROM BUS 934720 TO BUS 270704 CKT 1 / AD1-100 TAP 345 LORET; B 345
END

12. (CE - CE) The PONTIAC ; R-AD1-133 TAP 345 kV line (from bus 270853 to bus 935000 ckt 1) loads from 116.89% to 119.15% (**DC power flow**) of its normal rating (1334 MVA) for non-contingency condition. This project contributes approximately 33.94 MW to the thermal violation.

13. (MISO AMIL - AEP) The 7CASEY-05SULLIVAN 345 kV line (from bus 346809 to bus 247712 ckt 1) loads from 128.3% to 129.45% (**DC power flow**) of its normal rating (1451 MVA) for the single line contingency outage of 'AEP_P1-2_#286'. This project contributes approximately 18.26 MW to the thermal violation.

CONTINGENCY 'AEP_P1-2_#286'
OPEN BRANCH FROM BUS 243221 TO BUS 348885 CKT 1 / 243221 05EUGENE 345 348885 7BUNSONVILLE 345 1
END

14. (CE - CE) The W4-005 TAP-BLUEMOUND; B 345 kV line (from bus 905080 to bus 270668 ckt 1) loads from 137.76% to 139.5% (**DC power flow**) of its emergency rating (1334 MVA) for the single line contingency outage of 'COMED_P1-2_345-L8001___-S-A'. This project contributes approximately 25.33 MW to the thermal violation.

CONTINGENCY 'COMED_P1-2_345-L8001___-S-A'
TRIP BRANCH FROM BUS 270853 TO BUS 917500 CKT 1 / PONTI; R 345 Z2-087 TAP 345
END

15. (CE - CE) The Z2-087 TAP-PONTIAC ; R 345 kV line (from bus 917500 to bus 270853 ckt 1) loads from 171.48% to 176.01% (**DC power flow**) of its emergency rating (1528 MVA) for the single line contingency outage of 'COMED_P1-2_345-L8002___-S'. This project contributes approximately 79.64 MW to the thermal violation.

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

16. (CE - CE) The Z2-087 TAP-PONTIAC ; R 345 kV line (from bus 917500 to bus 270853 ckt 1) loads from 141.21% to 146.25% (**DC power flow**) of its normal rating (1334 MVA) for non-contingency condition. This project contributes approximately 84.21 MW to the thermal violation.

17. (CE - CE) The AB2-047 TAP-Z2-087 TAP 345 kV line (from bus 924040 to bus 917500 ckt 1) loads from 162.92% to 167.32% (**DC power flow**) of its emergency rating (1528 MVA) for the single line contingency outage of 'COMED_P1-2_345-L8002___-S'. This project contributes approximately 79.64 MW to the thermal violation.

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

18. (CE - CE) The AB2-047 TAP-Z2-087 TAP 345 kV line (from bus 924040 to bus 917500 ckt 1) loads from 133.1% to 137.82% (**DC power flow**) of its normal rating (1334 MVA) for non-contingency condition. This project contributes approximately 84.21 MW to the thermal violation.

19. (CE - CE) The AD1-100 TAP-AD2-137 TAP 345 kV line (from bus 934720 to bus 937030 ckt 1) loads from 156.49% to 158.77% (**DC power flow**) of its emergency rating (1528 MVA) for the single line contingency outage of "'934725'". This project contributes approximately 34.83 MW to the thermal violation.

```
CONTINGENCY '934725'                AD1-100 JNT 345 934730 AD1-100 TAP 345 1
OPEN BRANCH FROM BUS 934725 TO BUS 934730 CKT 1
END
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20. (CE - CE) The AD1-100 TAP-AD2-137 TAP 345 kV line (from bus 934720 to bus 937030 ckt 1) loads from 124.06% to 125.49% (**DC power flow**) of its normal rating (1364 MVA) for non-contingency condition. This project contributes approximately 21.18 MW to the thermal violation.

21. (CE - CE) The AD1-133 TAP-DRESDEN ; R 345 kV line (from bus 935000 to bus 270717 ckt 1) loads from 186.86% to 190.38% (**DC power flow**) of its emergency rating (1528 MVA) for the single line contingency outage of 'COMED_P1-2_345-L11212_B-S-B'. This project contributes approximately 56.31 MW to the thermal violation.

```
CONTINGENCY 'COMED_P1-2_345-L11212_B-S-B'
TRIP BRANCH FROM BUS 934720 TO BUS 270704 CKT 1      / AD1-100 TAP 345 LORET; B 345
END
```

22. (CE - CE) The AD1-133 TAP-DRESDEN ; R 345 kV line (from bus 935000 to bus 270717 ckt 1) loads from 128.57% to 130.98% (**DC power flow**) of its normal rating (1334 MVA) for non-contingency condition. This project contributes approximately 33.94 MW to the thermal violation.

23. (CE - CE) The AD2-137 TAP-WILTON ; B 345 kV line (from bus 937030 to bus 270926 ckt 1) loads from 161.77% to 163.46% (**DC power flow**) of its emergency rating (1528 MVA) for the single line contingency outage of "'934725'". This project contributes approximately 34.83 MW to the thermal violation.

```
CONTINGENCY '934725'                AD1-100 JNT 345 934730 AD1-100 TAP 345 1
OPEN BRANCH FROM BUS 934725 TO BUS 934730 CKT 1
END
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24. (CE - CE) The AD2-137 TAP-WILTON ; B 345 kV line (from bus 937030 to bus 270926 ckt 1) loads from 130.85% to 132.25% (**DC power flow**) of its normal rating (1364 MVA) for non-contingency condition. This project contributes approximately 21.18 MW to the thermal violation.

25. (CE - CE) The AD2-153 TAP-AB2-047 TAP 345 kV line (from bus 937160 to bus 924040 ckt 1) loads from 152.69% to 157.86% (**DC power flow**) of its emergency rating (1528 MVA)

for the single line contingency outage of 'COMED_P1-2_345-L8002___-S'. This project contributes approximately 79.64 MW to the thermal violation.

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

26. (CE - CE) The AD2-153 TAP-AB2-047 TAP 345 kV line (from bus 937160 to bus 924040 ckt 1) loads from 121.25% to 126.98% (**DC power flow**) of its normal rating (1334 MVA) for non-contingency condition. This project contributes approximately 84.21 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

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. (MISO AMIL - AEP) The 7CASEY-05SULLIVAN 345 kV line (from bus 346809 to bus 247712 ckt 1) loads from 133.69% to 134.94% (**DC power flow**) of its emergency rating (1466 MVA) for the line fault with failed breaker contingency outage of 'AEP_P4_#3128_05EUGENE 345'. This project contributes approximately 18.38 MW to the thermal violation.

AEP:

- 1. Rebuild 0.82 mile of the ACAR ~ 1024.5 ~ 30/7 ~ RAIL1 conductor section 5.
Estimated Cost is \$1.64 Million.**
- 2. Rebuild 0.82 mile of the ACAR ~ 1024.5 ~ 30/7 ~ RAIL1 conductor section 6.
Estimated Cost is \$1.64 Million.**
- 3. Rebuild 1.0 mile of the ACSR/PE ~ 1414 ~ 62/19 ~ conductor section 2.
Estimated Cost is \$2 Million.**

An approximate construction time would be 24 to 36 months after signing an interconnection agreement

MISO:

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

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

(MISO AMIL - AEP) The 7CASEY-05SULLIVAN 345 kV line (from bus 346809 to bus 247712 ckt 1) loads from 133.69% to 134.94% (**DC power flow**) of its emergency rating (1466 MVA) for the line fault with failed breaker contingency outage of 'AEP_P4_#3128_05EUGENE 345'. This project contributes approximately 18.38 MW to the thermal violation.

CONTINGENCY 'AEP_P4_#3128_05EUGENE 345'

OPEN BRANCH FROM BUS 243221 TO BUS 249504 CKT 1

/ 243221 05EUGENE 345 249504 08CAYSUB 345 1

OPEN BRANCH FROM BUS 243221 TO BUS 348885 CKT 1

/ 243221 05EUGENE 345 348885 7BUNSONVILLE 345 1

END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
933341	AC2-147 C	0.54
933342	AC2-147 E	0.89
934051	AD1-031 C O1	2.37
934052	AD1-031 E O1	3.87
934421	AD1-066	0.87
LTF	AD1-092	9.6
LTF	AD1-093	16.1
LTF	AD1-094	2.91
934881	AD1-117 C	3.34
934882	AD1-117 E	2.23
935001	AD1-133 C O1	14.35
935002	AD1-133 E O1	9.57
935141	AD1-148	7.48
936771	AD2-100 C	21.17
936772	AD2-100 E	14.11
936972	AD2-131 E	8.4
937161	AD2-153 C O1	3.24
937162	AD2-153 E O1	15.15
937171	AD2-154 C O1	3.24
937172	AD2-154 E O1	15.15
937211	AD2-159 C	4.63
937212	AD2-159 E	21.69
937531	AD2-214 C	3.23
937532	AD2-214 E	1.52
274832	ANNAWAN ; 1U	8.72
LTF	BLUEG	5.63
294401	BSHIL;1U E	7.13
294410	BSHIL;2U E	7.13
LTF	CANNELTON	1.2
LTF	CARR	0.33
274890	CAYUG;1U E	10.29
274891	CAYUG;2U E	10.29
LTF	CBM-S1	9.31

<i>LTF</i>	<i>CBM-S2</i>	2.76
<i>LTF</i>	<i>CBM-W1</i>	56.04
<i>LTF</i>	<i>CBM-W2</i>	138.78
<i>LTF</i>	<i>CLIFTY</i>	18.96
<i>LTF</i>	<i>CPLE</i>	0.38
274849	<i>CRESCENT ;1U</i>	3.95
<i>LTF</i>	<i>DEARBORN</i>	0.59
274859	<i>EASYR;U1 E</i>	6.86
274860	<i>EASYR;U2 E</i>	6.86
<i>LTF</i>	<i>ELMERSMITH</i>	3.21
<i>LTF</i>	<i>G-007</i>	0.83
960018	<i>G997 E</i>	-2.86
<i>LTF</i>	<i>GIBSON</i>	1.43
960026	<i>J196 E</i>	5.39
940291	<i>J291</i>	3.23
983101	<i>J339</i>	6.2
938571	<i>J467 C</i>	3.57
938572	<i>J467 E</i>	14.26
940541	<i>J468 C</i>	7.15
940542	<i>J468 E</i>	28.62
951151	<i>J474 C</i>	2.63
951152	<i>J474 E</i>	10.54
951641	<i>J641 C</i>	8.28
951642	<i>J641 E</i>	2.16
951661	<i>J644</i>	9.66
981031	<i>J734</i>	5.2
939811	<i>J750 C</i>	2.74
939812	<i>J750 E</i>	10.97
981361	<i>J756 C</i>	3.21
981362	<i>J756 E</i>	12.84
981581	<i>J757 C</i>	5.26
981582	<i>J757 E</i>	21.02
938331	<i>J797</i>	18.82
938391	<i>J808</i>	8.79
938411	<i>J811</i>	17.92
939761	<i>J813</i>	43.43
938791	<i>J815</i>	32.44
938811	<i>J817</i>	10.29
938841	<i>J826</i>	10.81
938891	<i>J835 C</i>	3.46
938892	<i>J835 E</i>	13.85
938941	<i>J845 C</i>	2.27
938942	<i>J845 E</i>	9.07
938971	<i>J848 C</i>	6.82
938972	<i>J848 E</i>	27.27

939171	J872 C	5.75
939172	J872 E	22.99
939261	J884	7.9
939481	J912	14.37
939741	J949	39.25
274650	KINCAID ;1U	17.96
274651	KINCAID ;2U	17.89
990901	L-005 E	11.23
LTF	MEC	44.96
293516	O-009 E1	6.44
293517	O-009 E2	3.27
293518	O-009 E3	3.6
293715	O-029 E	6.89
293716	O-029 E	3.78
293717	O-029 E	3.47
293771	O-035 E	5.23
LTF	O-066	5.35
296308	R-030 C1	3.34
296271	R-030 C2	3.34
296125	R-030 C3	3.38
296309	R-030 E1	13.35
296272	R-030 E2	13.35
296128	R-030 E3	13.51
LTF	RENSSELAER	0.26
LTF	ROSETON	1.86
290261	S-027 C	0.91
290265	S-028 C	0.91
LTF	TRIMBLE	1.09
274853	TWINGROVE;U1	19.52
274854	TWINGROVE;U2	19.52
276150	W2-048 E	2.06
903433	W3-046	16.12
905081	W4-005 C	1.19
905082	W4-005 E	42.87
905471	W4-084	0.29
274874	WALNR;2U	1.53
294502	WALNR;2U E	6.11
LTF	WEC	4.2
909052	X2-022 E	28.64
LTF	Z1-043	22.26
917501	Z2-087 C	2.62
917502	Z2-087 E	17.54
919221	AA1-146	11.73
919581	AA2-030	11.73
919621	AA2-039 C	1.74

919622	AA2-039 E	11.64
LTF	AB2-013	13.42
924041	AB2-047 C O1	3.34
924042	AB2-047 E O1	22.37
924261	AB2-070 C O1	3.86
924262	AB2-070 E O1	25.84
925161	AB2-173	2.09
925581	AC1-033 C	1.17
925582	AC1-033 E	7.82
925771	AC1-053 C	3.9
925772	AC1-053 E	26.07
926821	AC1-168 C	0.84
926822	AC1-168 E	5.65
926841	AC1-171 C	1.14
926842	AC1-171 E	7.61
927531	AC1-185 1	0.43
927541	AC1-185 2	0.43
927551	AC1-185 3	0.43
927561	AC1-185 4	0.43
927571	AC1-185 5	0.43
927581	AC1-185 6	0.43
927591	AC1-185 7	0.43
927601	AC1-185 8	0.43
927201	AC1-214 C	1.68
927202	AC1-214 E	4.46

Secondary Point of Interconnection (Option-2)

The Interconnection Customer (IC) AD2-153 proposes to interconnect 150 MW windfarm to ComEd transmission system by looping in the ‘Davis Creek – Bloom’ 345kV line 19707.

Attachment Facilities

The IC AD2-153 generator lead will interconnect to a 345kV Interconnection Substation. This interconnection would require one 345kV line MOD, a dead-end structure and revenue metering as shown in the one-line diagram.

The estimated cost for the attachment facilities is given below.

Scope of Work	Cost Estimate
Installation of one 345kV line MOD, one dead-end structure and one set of revenue metering (see notes below on cost estimate)	\$1.0M

Direct Connection Network Upgrades

Prior to AD2-153 queue position, a new 345kV Interconnection Substation would be built under two earlier queue positions AD2-047 and AD2-101, by looping in the ‘Davis Creek – Bloom’ 345kV line 19707, approximately 16 miles from Davis Creek TSS 86. It is proposed to interconnect developer’s generator lead to the already built Interconnection Substation.

The scope of work includes installation of four 345kV circuit breakers at the Interconnection Substation (to be built by AD2-047 and AD2-101), to create a line position for IC’s generator lead, as shown in the one-line diagram below. It should be noted that if anyone of AD2-047 and AD2-101 projects drops out or does not build the Interconnection Substation, then the interconnection scope of work for AD2-153 project would change.

The Interconnection Customer is responsible for constructing all the facilities on the Interconnection Customer side of the point of interconnection outside of the Interconnection.

The estimated cost for Direct Connection Network Upgrade is given below.

Scope of Work	Cost Estimate
Installation of four 345kV circuit breakers at the Interconnection Substation (built by AD2-047 and AD2-101) and relay/protection work	\$10,000,000
Total Cost Estimate (see notes below on cost estimate)	\$10,000,000

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

Non-Direct Connection Cost Estimate

None

Notes on Cost Estimate:

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

Network Impacts

The Queue Project AD2-153 was evaluated as a 150.0 MW (Capacity 26.4 MW) injection tapping the AD2-047 Tap to Bloom; B 345kV line in the ComEd area. Project AD2-153 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AD2-153 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. (MISO NIPS - CE) The 17STJOHN-ST JOHN ; T 345 kV line (from bus 255112 to bus 270886 ckt 1) loads from 110.23% to 110.29% (**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 13.02 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 1 for a table containing the generators having contribution to this flowgate.

2. (MISO NIPS - CE) The 17STJOHN-ST JOHN ; T 345 kV line (from bus 255112 to bus 270886 ckt 1) loads from 109.45% to 109.52% (**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 13.14 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
```

3. (MISO NIPS - CE) The 17STJOHN-ST JOHN ; T 345 kV line (from bus 255112 to bus 270886 ckt 1) loads from 109.43% to 109.5% (**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 13.14 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
```

4. (MISO NIPS - CE) The 17STJOHN-ST JOHN ; T 345 kV line (from bus 255112 to bus 270886 ckt 1) loads from 109.42% to 109.49% (**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 13.14 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
```

5. (MISO NIPS - AEP) The 17STILLWELL-05DUMONT 345 kV line (from bus 255113 to bus 243219 ckt 1) loads from 165.51% to 165.66% (**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 25.37 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.

6. (CE - MISO NIPS) The BURNHAM ;0R-17MUNSTER 345 kV line (from bus 270677 to bus 255109 ckt 1) loads from 131.02% to 131.15% (**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 18.04 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 3 for a table containing the generators having contribution to this flowgate.

7. (CE - CE) The DAVIS CRK; B 345/138 kV transformer (from bus 270710 to bus 275174 ckt 1) loads from 123.1% to 131.39% (**DC power flow**) of its load dump rating (480 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_179-45-BT3-4__'. This project contributes approximately 39.75 MW to the thermal violation.

```
CONTINGENCY 'COMED_P4_179-45-BT3-4__'  
TRIP BRANCH FROM BUS 270662 TO BUS 270674 CKT 1 / BLOOM ; B 345 BURNHAM ; B 345  
TRIP BRANCH FROM BUS 275163 TO BUS 270674 CKT 1 / BURNHAM ;1M 138 BURNHAM ; B 345  
TRIP BRANCH FROM BUS 275163 TO BUS 271122 CKT 1 / BURNHAM ;1M 138 BURNHAM ; B 138  
TRIP BRANCH FROM BUS 275163 TO BUS 275263 CKT 1 / BURNHAM ;1M 138 BURNHAM ;1C 36.2  
TRIP BRANCH FROM BUS 270662 TO BUS 937160 CKT 1 / BLOOM ; B 345 AD2-153 TAP 345  
TRIP BRANCH FROM BUS 270662 TO BUS 271098 TO BUS 275258 CKT 1 / BLOOM ; B 345 BLOOM ; B 138 BLOOM ;4C 34.5  
END
```

Please refer to Appendix 4 for a table containing the generators having contribution to this flowgate.

8. (CE - CE) The DAVIS CRK; B 345/138 kV transformer (from bus 270710 to bus 275174 ckt 1) loads from 119.88% to 123.76% (**DC power flow**) of its load dump rating (530 MVA) for the tower line contingency outage of 'COMED_P7_345-L2002_TB-S+_345-L2004__R-S-A'. This project contributes approximately 20.55 MW to the thermal violation.

```
CONTINGENCY 'COMED_P7_345-L2002_TB-S+_345-L2004__R-S-A'  
TRIP BRANCH FROM BUS 270670 TO BUS 270671 CKT 1 / BRAID; B 345 BRAID; R 345  
TRIP BRANCH FROM BUS 270670 TO BUS 934730 CKT 1 / BRAID; B 345 AD1-100 TAP 345  
TRIP BRANCH FROM BUS 270671 TO BUS 270711 CKT 1 / BRAID; R 345 DAVIS; R 345  
END
```

9. (CE - AEP) The GREENACRE; T-05OLIVE 345 kV line (from bus 270771 to bus 243229 ckt 1) loads from 113.24% to 113.36% (**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 13.53 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 5 for a table containing the generators having contribution to this flowgate.

10. (CE - AEP) The GREENACRE; T-05OLIVE 345 kV line (from bus 270771 to bus 243229 ckt 1) loads from 111.94% to 112.06% (**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 13.72 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
```

11. (CE - MISO NIPS) The ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 110.22% to 110.28% (**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 13.02 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 6 for a table containing the generators having contribution to this flowgate.

12. (CE - MISO NIPS) The ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 109.45% to 109.52% (**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 13.14 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
```

13. (CE - MISO NIPS) The ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 109.43% to 109.5% (**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 13.14 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
```

14. (CE - MISO NIPS) The ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 109.42% to 109.49% (**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 13.14 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
```

15. (CE - CE) The WILTON ; B-WILTON ;3M 345 kV line (from bus 270926 to bus 275232 ckt 1) loads from 149.31% to 149.56% (**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 25.74 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 7 for a table containing the generators having contribution to this flowgate.

16. (CE - CE) The WILTON ; R-WILTON ;4M 345 kV line (from bus 270927 to bus 275233 ckt 1) loads from 151.65% to 151.89% (**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 26.27 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 8 for a table containing the generators having contribution to this flowgate.

17. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 134.42% to 134.53% (**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 14.82 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 9 for a table containing the generators having contribution to this flowgate.

18. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 133.32% to 133.43% (**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 14.97 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

19. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 133.31% to 133.43% (**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 14.97 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

20. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 133.31% to 133.43% (**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 14.97 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

21. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 133.29% to 133.4% (**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 14.97 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

22. (CE - CE) The DAVIS CRK;3M-DAVIS CRK; B 138 kV line (from bus 275174 to bus 271294 ckt 1) loads from 123.06% to 131.34% (**DC power flow**) of its load dump rating (480 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_179-45-BT3-4__'. This project contributes approximately 39.75 MW to the thermal violation.

CONTINGENCY 'COMED_P4_179-45-BT3-4__'
 TRIP BRANCH FROM BUS 270662 TO BUS 270674 CKT 1 / BLOOM ; B 345 BURNHAM ; B 345
 TRIP BRANCH FROM BUS 275163 TO BUS 270674 CKT 1 / BURNHAM ;1M 138 BURNHAM ; B 345
 TRIP BRANCH FROM BUS 275163 TO BUS 271122 CKT 1 / BURNHAM ;1M 138 BURNHAM ; B 138
 TRIP BRANCH FROM BUS 275163 TO BUS 275263 CKT 1 / BURNHAM ;1M 138 BURNHAM ;1C 36.2
 TRIP BRANCH FROM BUS 270662 TO BUS 937160 CKT 1 / BLOOM ; B 345 AD2-153 TAP 345
 TRIP BRANCH FROM BUS 270662 TO BUS 271098 TO BUS 275258 CKT 1 / BLOOM ; B 345 BLOOM ; B 138 BLOOM ;4C 34.5
 END

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

23. (CE - CE) The DAVIS CRK;3M-DAVIS CRK; B 138 kV line (from bus 275174 to bus 271294 ckt 1) loads from 119.86% to 123.74% (**DC power flow**) of its load dump rating (530 MVA) for the tower line contingency outage of 'COMED_P7_345-L2002_TB-S+_345-L2004__R-S-A'. This project contributes approximately 20.55 MW to the thermal violation.

CONTINGENCY 'COMED_P7_345-L2002_TB-S+_345-L2004__R-S-A'
 TRIP BRANCH FROM BUS 270670 TO BUS 270671 CKT 1 / BRAID; B 345 BRAID; R 345
 TRIP BRANCH FROM BUS 270670 TO BUS 934730 CKT 1 / BRAID; B 345 AD1-100 TAP 345
 TRIP BRANCH FROM BUS 270671 TO BUS 270711 CKT 1 / BRAID; R 345 DAVIS; R 345
 END

24. (CE - CE) The WILTON ; 765/345 kV transformer (from bus 275232 to bus 270644 ckt 1) loads from 149.31% to 149.56% (**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 25.74 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 11 for a table containing the generators having contribution to this flowgate.

25. (CE - CE) The WILTON ; 765/345 kV transformer (from bus 275233 to bus 270644 ckt 1) loads from 151.65% to 151.89% (**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 26.27 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 12 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)

None

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. (MISO NIPS - CE) The 17STJOHN-ST JOHN ; T 345 kV line (from bus 255112 to bus 270886 ckt 1) loads from 109.39% to 109.46% (**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 13.15 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 - AEP) The 17STILLWELL-05DUMONT 345 kV line (from bus 255113 to bus 243219 ckt 1) loads from 162.29% to 162.46% (**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 26.15 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 104.25% to 104.4% (**DC power flow**) of its normal rating (1409 MVA) for non-contingency condition. This project contributes approximately 16.83 MW to the thermal violation.

4. (CE - CE) The BLOOM ; B 345/1 kV transformer (from bus 270662 to bus 999050 ckt 1) loads from 97.76% to 106.73% (**DC power flow**) of its emergency rating (480 MVA) for the single line contingency outage of 'COMED_P1-2_345-L17908TB-S'. This project contributes approximately 43.06 MW to the thermal violation.

```
CONTINGENCY 'COMED_P1-2_345-L17908TB-S'  
TRIP BRANCH FROM BUS 270662 TO BUS 270674 CKT 1 / BLOOM; B 345 BURNH; B 345  
TRIP BRANCH FROM BUS 275163 TO BUS 270674 CKT 1 / BURNH;1M 138 BURNH; B 345  
TRIP BRANCH FROM BUS 275163 TO BUS 271122 CKT 1 / BURNH;1M 138 BURNH; B 138  
TRIP BRANCH FROM BUS 275163 TO BUS 275263 CKT 1 / BURNH;1M 138 BURNH;1C 36.2  
END
```

5. (CE - MISO NIPS) The BURNHAM ;0R-17MUNSTER 345 kV line (from bus 270677 to bus 255109 ckt 1) loads from 130.1% to 130.23% (**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 18.2 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 DAVIS CRK; B 345/138 kV transformer (from bus 270710 to bus 275174 ckt 1) loads from 122.71% to 131.0% (**DC power flow**) of its emergency rating (480 MVA) for the single line contingency outage of 'COMED_P1-2_345-L17907TB-S_A'. This project contributes approximately 39.76 MW to the thermal violation.

```
CONTINGENCY 'COMED_P1-2_345-L17907TB-S_A'  
TRIP BRANCH FROM BUS 270662 TO BUS 937160 CKT 1 / BLOOM ; B 345 AD2-153 TAP 345  
TRIP BRANCH FROM BUS 270662 TO BUS 271098 TO BUS 275258 CKT 1 / BLOOM ; B 345 BLOOM ; B 138 BLOOM ;4C 34.5  
END
```

7. (CE - AEP) The GREENACRE; T-05OLIVE 345 kV line (from bus 270771 to bus 243229 ckt 1) loads from 111.94% to 112.06% (**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 13.72 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
```

8. (CE - MISO NIPS) The ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 109.39% to 109.46% (**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 13.15 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 - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 133.27% to 133.39% (**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 14.98 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
```

10. (CE - CE) The DAVIS CRK;3M-DAVIS CRK; B 138 kV line (from bus 275174 to bus 271294 ckt 1) loads from 122.69% to 130.98% (**DC power flow**) of its emergency rating (480 MVA) for the single line contingency outage of 'COMED_P1-2_345-L17907TB-S_A'. This project contributes approximately 39.76 MW to the thermal violation.

```
CONTINGENCY 'COMED_P1-2_345-L17907TB-S_A'  
TRIP BRANCH FROM BUS 270662 TO BUS 937160 CKT 1 / BLOOM ; B 345 AD2-153 TAP 345  
TRIP BRANCH FROM BUS 270662 TO BUS 271098 TO BUS 275258 CKT 1 / BLOOM ; B 345 BLOOM ; B 138 BLOOM ;4C 34.5  
END
```

11. (CE - CE) The AC1-067 TAP-BURNHAM ;1R 345 kV line (from bus 925880 to bus 270675 ckt 1) loads from 104.65% to 105.11% (**DC power flow**) of its emergency rating (1383 MVA) for the single line contingency outage of 'COMED_P2-1_086-CB_34__A'. This project contributes approximately 14.2 MW to the thermal violation.

CONTINGENCY 'COMED_P2-1_086-CB_34___A'
TRIP BRANCH FROM BUS 270662 TO BUS 937160 CKT 1 / BLOOM; B 345
AD2-153 TAP 345
END

12. (CE - CE) The AD1-100 TAP-AD2-140 TAP 345 kV line (from bus 934720 to bus 937050 ckt 1) loads from 149.5% to 150.32% (**DC power flow**) of its emergency rating (1528 MVA) for the single line contingency outage of 'COMED_P1-2_345-L8014_T_-S-B'. This project contributes approximately 16.57 MW to the thermal violation.

CONTINGENCY 'COMED_P1-2_345-L8014_T_-S-B'
TRIP BRANCH FROM BUS 935000 TO BUS 270717 CKT 1 / AD1-133 TAP 345 DRESDEN ; R 345
END

13. (CE - CE) The AD1-100 TAP-AD2-140 TAP 345 kV line (from bus 934720 to bus 937050 ckt 1) loads from 130.94% to 132.08% (**DC power flow**) of its normal rating (1364 MVA) for non-contingency condition. This project contributes approximately 16.93 MW to the thermal violation.

14. (CE - CE) The AD1-100 TAP-BRAIDWOOD; B 345 kV line (from bus 934730 to bus 270670 ckt 1) loads from 101.08% to 103.05% (**DC power flow**) of its emergency rating (1341 MVA) for the single line contingency outage of 'COMED_P1-2_345-L11212_B-S-A_A'. This project contributes approximately 31.1 MW to the thermal violation.

CONTINGENCY 'COMED_P1-2_345-L11212_B-S-A_A'
TRIP BRANCH FROM BUS 270926 TO BUS 937050 CKT 1 / WILTO; B 345 AD2-140 TAP 345
END

15. (CE - CE) The AD2-140 TAP-WILTON ; B 345 kV line (from bus 937050 to bus 270926 ckt 1) loads from 167.54% to 168.42% (**DC power flow**) of its emergency rating (1528 MVA) for the single line contingency outage of 'COMED_P1-2_345-L8014_T_-S-B'. This project contributes approximately 16.57 MW to the thermal violation.

CONTINGENCY 'COMED_P1-2_345-L8014_T_-S-B'
TRIP BRANCH FROM BUS 935000 TO BUS 270717 CKT 1 / AD1-133 TAP 345 DRESDEN ; R 345
END

16. (CE - CE) The AD2-140 TAP-WILTON ; B 345 kV line (from bus 937050 to bus 270926 ckt 1) loads from 151.87% to 153.0% (**DC power flow**) of its normal rating (1364 MVA) for non-contingency condition. This project contributes approximately 16.93 MW to the thermal violation.

17. (CE - CE) The BLOOM ; B 138/1 kV transformer (from bus 999050 to bus 271098 ckt 1) loads from 97.74% to 106.71% (**DC power flow**) of its emergency rating (480 MVA) for the single line contingency outage of 'COMED_P1-2_345-L17908TB-S'. This project contributes approximately 43.06 MW to the thermal violation.

CONTINGENCY 'COMED_P1-2_345-L17908TB-S'
TRIP BRANCH FROM BUS 270662 TO BUS 270674 CKT 1 / BLOOM; B 345 BURNH; B 345
TRIP BRANCH FROM BUS 275163 TO BUS 270674 CKT 1 / BURNH;1M 138 BURNH; B 345
TRIP BRANCH FROM BUS 275163 TO BUS 271122 CKT 1 / BURNH;1M 138 BURNH; B 138

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 gauge 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

(MISO NIPS - CE) The 17STJOHN-ST JOHN ; T 345 kV line (from bus 255112 to bus 270886 ckt 1) loads from 110.23% to 110.29% (**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 13.02 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 O2	0.69
936182	AD2-024 E O2	1.13
936291	AD2-038 C O2	1.7
936292	AD2-038 E O2	11.4
936371	AD2-047 C O2	1.48
936372	AD2-047 E O2	15.96
936461	AD2-060	1.83
936511	AD2-066 C O2	6.72
936512	AD2-066 E O2	4.48
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 O2	2.43
937032	AD2-137 E O2	11.39
937051	AD2-140 C O2	2.43
937052	AD2-140 E O2	11.36
937061	AD2-141 C O2	2.4
937062	AD2-141 E O2	11.33
937071	AD2-142 C O2	4.85
937072	AD2-142 E O2	22.73
937121	AD2-148 C O2	2.35
937122	AD2-148 E O2	11.01
937131	AD2-149 C O2	2.35
937132	AD2-149 E O2	11.01
937141	AD2-150 C O2	2.35
937142	AD2-150 E O2	11.01

937161	AD2-153 C O2	2.29
937162	AD2-153 E O2	10.73
937181	AD2-155 C O2	2.45
937182	AD2-155 E O2	11.49
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 O2	5.43
937332	AD2-176 E O2	3.62
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	2.99
293716	O-029 E	1.64
293717	O-029 E	1.51
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

<i>927591</i>	<i>ACI-185 7</i>	<i>0.51</i>
<i>927601</i>	<i>ACI-185 8</i>	<i>0.51</i>
<i>927091</i>	<i>ACI-204 1</i>	<i>55.28</i>
<i>927101</i>	<i>ACI-204 2</i>	<i>55.2</i>

Appendix 2

(MISO NIPS - AEP) The 17STILLWELL-05DUMONT 345 kV line (from bus 255113 to bus 243219 ckt 1) loads from 165.51% to 165.66% (**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 25.37 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	0.98
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
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 O2	1.08
936182	AD2-024 E O2	1.77
936291	AD2-038 C O2	2.68
936292	AD2-038 E O2	17.91
936371	AD2-047 C O2	2.86
936372	AD2-047 E O2	30.8
936461	AD2-060	3.21
936511	AD2-066 C O2	10.34
936512	AD2-066 E O2	6.89
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 O2	4.17
937032	AD2-137 E O2	19.51
937051	AD2-140 C O2	4.13
937052	AD2-140 E O2	19.34
937061	AD2-141 C O2	4.19
937062	AD2-141 E O2	19.78
937071	AD2-142 C O2	8.26
937072	AD2-142 E O2	38.69
937121	AD2-148 C O2	3.88
937122	AD2-148 E O2	18.16
937131	AD2-149 C O2	3.88
937132	AD2-149 E O2	18.16
937141	AD2-150 C O2	3.88

937142	AD2-150 E O2	18.16
937161	AD2-153 C O2	4.47
937162	AD2-153 E O2	20.91
937181	AD2-155 C O2	4.13
937182	AD2-155 E O2	19.34
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 O2	8.47
937332	AD2-176 E O2	5.65
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	8.26
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

<i>927591</i>	<i>ACI-185 7</i>	<i>0.8</i>
<i>927601</i>	<i>ACI-185 8</i>	<i>0.8</i>
<i>927091</i>	<i>ACI-204 1</i>	<i>84.36</i>
<i>927101</i>	<i>ACI-204 2</i>	<i>84.34</i>

Appendix 3

(CE - MISO NIPS) The BURNHAM ;0R-17MUNSTER 345 kV line (from bus 270677 to bus 255109 ckt 1) loads from 131.02% to 131.15% (**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 18.04 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 O2	0.91
936182	AD2-024 E O2	1.48
936291	AD2-038 C O2	2.22
936292	AD2-038 E O2	14.88
936371	AD2-047 C O2	2.06
936372	AD2-047 E O2	22.16
936461	AD2-060	3.04
936511	AD2-066 C O2	8.71
936512	AD2-066 E O2	5.81
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 O2	3.72
937032	AD2-137 E O2	17.41
937051	AD2-140 C O2	3.66
937052	AD2-140 E O2	17.12
937061	AD2-141 C O2	3.41
937062	AD2-141 E O2	16.08
937071	AD2-142 C O2	7.31
937072	AD2-142 E O2	34.24
937121	AD2-148 C O2	3.28
937122	AD2-148 E O2	15.36
937131	AD2-149 C O2	3.28
937132	AD2-149 E O2	15.36
937141	AD2-150 C O2	3.28

937142	AD2-150 E O2	15.36
937161	AD2-153 C O2	3.17
937162	AD2-153 E O2	14.86
937181	AD2-155 C O2	3.75
937182	AD2-155 E O2	17.56
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 O2	7.1
937332	AD2-176 E O2	4.73
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
293715	O-029 E	6.15
293716	O-029 E	3.37
293717	O-029 E	3.1

<i>LTF</i>	<i>O-066</i>	<i>12.35</i>
<i>293644</i>	<i>O22 E1</i>	<i>9.27</i>
<i>293645</i>	<i>O22 E2</i>	<i>17.99</i>
<i>290021</i>	<i>O50 E</i>	<i>18.68</i>
<i>294392</i>	<i>P-010 E</i>	<i>19.</i>
<i>294763</i>	<i>P-046 E</i>	<i>9.13</i>
<i>274888</i>	<i>PILOT HIL;1E</i>	<i>21.23</i>
<i>274830</i>	<i>PWR VTREC;1U</i>	<i>5.96</i>
<i>274831</i>	<i>PWR VTREC;2U</i>	<i>5.96</i>
<i>LTF</i>	<i>RENSSELAER</i>	<i>0.57</i>
<i>274723</i>	<i>RIVER EC ;12</i>	<i>5.2</i>
<i>LTF</i>	<i>ROSETON</i>	<i>4.13</i>
<i>LTF</i>	<i>ROWAN</i>	<i>0.57</i>
<i>LTF</i>	<i>SANTEETLA</i>	<i>< 0.01</i>
<i>274794</i>	<i>SE CHICAG;1U</i>	<i>1.15</i>
<i>274795</i>	<i>SE CHICAG;2U</i>	<i>1.15</i>
<i>295111</i>	<i>SUBLETTE E</i>	<i>2.65</i>
<i>LTF</i>	<i>TRIMBLE</i>	<i>0.37</i>
<i>299993</i>	<i>U3-031C</i>	<i>5.65</i>
<i>903433</i>	<i>W3-046</i>	<i>22.98</i>
<i>905471</i>	<i>W4-084</i>	<i>0.44</i>
<i>274874</i>	<i>WALNR;2U</i>	<i>2.31</i>
<i>294502</i>	<i>WALNR;2U E</i>	<i>9.25</i>
<i>LTF</i>	<i>WEC</i>	<i>7.81</i>
<i>295109</i>	<i>WESTBROOK E</i>	<i>5.45</i>
<i>274687</i>	<i>WILL CNTY;4U</i>	<i>64.5</i>
<i>910541</i>	<i>X3-005 C</i>	<i>0.1</i>
<i>910542</i>	<i>X3-005 E</i>	<i>0.91</i>
<i>914641</i>	<i>Y2-103</i>	<i>44.12</i>
<i>915011</i>	<i>Y3-013 1</i>	<i>3.68</i>
<i>915021</i>	<i>Y3-013 2</i>	<i>3.68</i>
<i>915031</i>	<i>Y3-013 3</i>	<i>3.68</i>
<i>LTF</i>	<i>Z1-043</i>	<i>27.52</i>
<i>916502</i>	<i>Z1-106 E1</i>	<i>1.24</i>
<i>916504</i>	<i>Z1-106 E2</i>	<i>1.24</i>
<i>916512</i>	<i>Z1-107 E</i>	<i>2.61</i>
<i>916522</i>	<i>Z1-108 E</i>	<i>2.44</i>
<i>918051</i>	<i>AA1-018 C</i>	<i>2.54</i>
<i>918052</i>	<i>AA1-018 E</i>	<i>16.99</i>
<i>918972</i>	<i>AA1-116 E</i>	<i>3.03</i>
<i>918982</i>	<i>AA1-117 E</i>	<i>3.03</i>
<i>919221</i>	<i>AA1-146</i>	<i>17.02</i>
<i>919581</i>	<i>AA2-030</i>	<i>17.02</i>
<i>919591</i>	<i>AA2-035</i>	<i>129.81</i>
<i>920112</i>	<i>AA2-107 E</i>	<i>2.4</i>

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 4

(CE - CE) The DAVIS CRK; B 345/138 kV transformer (from bus 270710 to bus 275174 ckt 1) loads from 123.1% to 131.39% (**DC power flow**) of its load dump rating (480 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_179-45-BT3-4__'. This project contributes approximately 39.75 MW to the thermal violation.

CONTINGENCY 'COMED_P4_179-45-BT3-4__'

TRIP BRANCH FROM BUS 270662 TO BUS 270674 CKT 1 / BLOOM ; B 345 BURNHAM ; B 345
 TRIP BRANCH FROM BUS 275163 TO BUS 270674 CKT 1 / BURNHAM ;1M 138 BURNHAM ; B 345
 TRIP BRANCH FROM BUS 275163 TO BUS 271122 CKT 1 / BURNHAM ;1M 138 BURNHAM ; B 138
 TRIP BRANCH FROM BUS 275163 TO BUS 275263 CKT 1 / BURNHAM ;1M 138 BURNHAM ;1C 36.2
 TRIP BRANCH FROM BUS 270662 TO BUS 937160 CKT 1 / BLOOM ; B 345 AD2-153 TAP 345
 TRIP BRANCH FROM BUS 270662 TO BUS 271098 TO BUS 275258 CKT 1 / BLOOM ; B 345 BLOOM ; B 138 BLOOM ;4C 34.5
 END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
934721	AD1-100 C	15.9
934722	AD1-100 E	74.42
936371	AD2-047 C O2	4.51
936372	AD2-047 E O2	48.5
936781	AD2-101 C	9.33
936782	AD2-101 E	43.67
937061	AD2-141 C O2	6.96
937062	AD2-141 E O2	32.81
937121	AD2-148 C O2	1.81
937122	AD2-148 E O2	8.49
937131	AD2-149 C O2	1.81
937132	AD2-149 E O2	8.49
937141	AD2-150 C O2	1.81
937142	AD2-150 E O2	8.49
937161	AD2-153 C O2	7.
937162	AD2-153 E O2	32.75
937321	AD2-175 C	32.61
937322	AD2-175 E	21.74
LTF	CBM-N	0.02
LTF	CBM-S1	0.6
LTF	CBM-S2	0.37
LTF	CBM-W2	5.24
LTF	CIN	0.67
LTF	CPLE	0.09
LTF	DEARBORN	0.04
LTF	EDWARDS	0.09
LTF	G-007A	0.21
LTF	IPL	0.39
LTF	LGEE	0.09
LTF	NYISO	0.26

<i>LTF</i>	<i>TATANKA</i>	<i>0.12</i>
<i>LTF</i>	<i>VFT</i>	<i>0.57</i>
<i>918972</i>	<i>AAI-116 E</i>	<i>6.08</i>
<i>918982</i>	<i>AAI-117 E</i>	<i>6.08</i>

Appendix 5

(CE - AEP) The GREENACRE; T-05OLIVE 345 kV line (from bus 270771 to bus 243229 ckt 1) loads from 113.24% to 113.36% (**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 13.53 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
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 O2	0.63
936182	AD2-024 E O2	1.02
936291	AD2-038 C O2	1.54
936292	AD2-038 E O2	10.29
936371	AD2-047 C O2	1.53
936372	AD2-047 E O2	16.48
936461	AD2-060	1.79
936511	AD2-066 C O2	6.01
936512	AD2-066 E O2	4.01
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 O2	2.34
937032	AD2-137 E O2	10.96
937051	AD2-140 C O2	2.32
937052	AD2-140 E O2	10.88
937061	AD2-141 C O2	2.33
937062	AD2-141 E O2	10.98
937071	AD2-142 C O2	4.65
937072	AD2-142 E O2	21.76
937121	AD2-148 C O2	2.2
937122	AD2-148 E O2	10.28
937131	AD2-149 C O2	2.2
937132	AD2-149 E O2	10.28
937141	AD2-150 C O2	2.2
937142	AD2-150 E O2	10.28
937161	AD2-153 C O2	2.38

937162	AD2-153 E O2	11.15
937181	AD2-155 C O2	2.33
937182	AD2-155 E O2	10.91
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 O2	4.9
937332	AD2-176 E O2	3.26
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	4.07
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	<i>N-015 E</i>	10.39
293516	<i>O-009 E1</i>	6.1
293517	<i>O-009 E2</i>	3.1
293518	<i>O-009 E3</i>	3.41
293715	<i>O-029 E</i>	6.52
293716	<i>O-029 E</i>	3.58
293717	<i>O-029 E</i>	3.29
<i>LTF</i>	<i>O-066</i>	8.49
293644	<i>O22 E1</i>	7.35
293645	<i>O22 E2</i>	14.27
290021	<i>O50 E</i>	13.15
294392	<i>P-010 E</i>	13.2
294763	<i>P-046 E</i>	6.31
274888	<i>PILOT HIL;1E</i>	12.52
274830	<i>PWR VTREC;1U</i>	4.11
274831	<i>PWR VTREC;2U</i>	4.11
<i>LTF</i>	<i>RENSSELAER</i>	0.4
<i>LTF</i>	<i>ROSETON</i>	2.87
<i>LTF</i>	<i>ROWAN</i>	0.35
295111	<i>SUBLETTE E</i>	1.83
<i>LTF</i>	<i>TRIMBLE</i>	0.19
299993	<i>U3-031C</i>	3.55
903433	<i>W3-046</i>	16.14
905471	<i>W4-084</i>	0.3
274874	<i>WALNR;2U</i>	1.6
294502	<i>WALNR;2U E</i>	6.41
<i>LTF</i>	<i>WEC</i>	5.4
295109	<i>WESTBROOK E</i>	3.76
274687	<i>WILL CNTY;4U</i>	46.97
910542	<i>X3-005 E</i>	0.52
914641	<i>Y2-103</i>	30.46
915011	<i>Y3-013 1</i>	2.54
915021	<i>Y3-013 2</i>	2.54
915031	<i>Y3-013 3</i>	2.54
<i>LTF</i>	<i>Z1-043</i>	19.09
916502	<i>Z1-106 E1</i>	0.85
916504	<i>Z1-106 E2</i>	0.85
916512	<i>Z1-107 E</i>	1.73
916522	<i>Z1-108 E</i>	1.68
918051	<i>AA1-018 C</i>	1.6
918052	<i>AA1-018 E</i>	10.71
918972	<i>AA1-116 E</i>	1.79
918982	<i>AA1-117 E</i>	1.79
919221	<i>AA1-146</i>	11.8
919581	<i>AA2-030</i>	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

<i>927101</i>	<i>ACI-204 2</i>	<i>49.29</i>
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Appendix 6

(CE - MISO NIPS) The ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 110.22% to 110.28% (**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 13.02 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 O2	0.69
936182	AD2-024 E O2	1.13
936291	AD2-038 C O2	1.7
936292	AD2-038 E O2	11.4
936371	AD2-047 C O2	1.48
936372	AD2-047 E O2	15.96
936461	AD2-060	1.83
936511	AD2-066 C O2	6.72
936512	AD2-066 E O2	4.48
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 O2	2.43
937032	AD2-137 E O2	11.39
937051	AD2-140 C O2	2.43
937052	AD2-140 E O2	11.36
937061	AD2-141 C O2	2.4
937062	AD2-141 E O2	11.33
937071	AD2-142 C O2	4.85
937072	AD2-142 E O2	22.73
937121	AD2-148 C O2	2.35
937122	AD2-148 E O2	11.01
937131	AD2-149 C O2	2.35
937132	AD2-149 E O2	11.01
937141	AD2-150 C O2	2.35
937142	AD2-150 E O2	11.01

937161	AD2-153 C O2	2.29
937162	AD2-153 E O2	10.73
937181	AD2-155 C O2	2.45
937182	AD2-155 E O2	11.49
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 O2	5.43
937332	AD2-176 E O2	3.62
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	2.99
293716	O-029 E	1.64
293717	O-029 E	1.51
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

<i>927591</i>	<i>ACI-185 7</i>	<i>0.51</i>
<i>927601</i>	<i>ACI-185 8</i>	<i>0.51</i>
<i>927091</i>	<i>ACI-204 1</i>	<i>55.28</i>
<i>927101</i>	<i>ACI-204 2</i>	<i>55.2</i>

Appendix 7

(CE - CE) The WILTON ; B-WILTON ;3M 345 kV line (from bus 270926 to bus 275232 ckt 1) loads from 149.31% to 149.56% (**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 25.74 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
932931	AC2-117	6.51
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	18.37
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
934881	AD1-117 C	0.61
934882	AD1-117 E	0.4
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 O2	1.14
936182	AD2-024 E O2	1.85
936291	AD2-038 C O2	2.85
936292	AD2-038 E O2	19.06
936371	AD2-047 C O2	2.93
936372	AD2-047 E O2	31.55
936461	AD2-060	3.38
936511	AD2-066 C O2	11.11
936512	AD2-066 E O2	7.41
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 O2	7.63
937032	AD2-137 E O2	35.73
937051	AD2-140 C O2	7.27
937052	AD2-140 E O2	34.02
937061	AD2-141 C O2	4.74
937062	AD2-141 E O2	22.37
937071	AD2-142 C O2	14.53
937072	AD2-142 E O2	68.03
937121	AD2-148 C O2	5.34
937122	AD2-148 E O2	24.98
937131	AD2-149 C O2	5.34
937132	AD2-149 E O2	24.98
937141	AD2-150 C O2	5.34
937142	AD2-150 E O2	24.98
937161	AD2-153 C O2	4.53

937162	AD2-153 E O2	21.21
937171	AD2-154 C O2	3.97
937172	AD2-154 E O2	18.59
937181	AD2-155 C O2	4.34
937182	AD2-155 E O2	20.33
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 O2	8.9
937332	AD2-176 E O2	5.93
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	<i>MENDOTA H;RU</i>	6.6
293061	<i>N-015 E</i>	19.2
<i>LTF</i>	<i>O-066</i>	16.29
293644	<i>O22 E1</i>	12.6
293645	<i>O22 E2</i>	24.46
290021	<i>O50 E</i>	23.83
294392	<i>P-010 E</i>	24.38
294763	<i>P-046 E</i>	11.49
274888	<i>PILOT HIL;1E</i>	23.64
274830	<i>PWR VTREC;1U</i>	7.47
274831	<i>PWR VTREC;2U</i>	7.47
296308	<i>R-030 C1</i>	5.
296271	<i>R-030 C2</i>	5.
296125	<i>R-030 C3</i>	5.06
296309	<i>R-030 E1</i>	20.01
296272	<i>R-030 E2</i>	20.01
296128	<i>R-030 E3</i>	20.26
<i>LTF</i>	<i>RENSSELAER</i>	0.74
<i>LTF</i>	<i>ROSETON</i>	5.35
<i>LTF</i>	<i>ROWAN</i>	0.8
<i>LTF</i>	<i>SANTEETLA</i>	0.02
295111	<i>SUBLETTE E</i>	3.33
<i>LTF</i>	<i>TRIMBLE</i>	0.53
299993	<i>U3-031C</i>	11.53
903433	<i>W3-046</i>	29.48
<i>LTF</i>	<i>WEC</i>	9.78
295109	<i>WESTBROOK E</i>	6.85
274687	<i>WILL CNTY;4U</i>	82.07
910542	<i>X3-005 E</i>	0.9
914641	<i>Y2-103</i>	55.09
915011	<i>Y3-013 1</i>	4.59
915021	<i>Y3-013 2</i>	4.59
915031	<i>Y3-013 3</i>	4.59
<i>LTF</i>	<i>Z1-043</i>	35.61
916502	<i>Z1-106 E1</i>	1.55
916504	<i>Z1-106 E2</i>	1.55
916512	<i>Z1-107 E</i>	3.17
916522	<i>Z1-108 E</i>	3.05
917501	<i>Z2-087 C</i>	3.91
917502	<i>Z2-087 E</i>	26.18
918051	<i>AA1-018 C</i>	3.02
918052	<i>AA1-018 E</i>	20.2
918972	<i>AA1-116 E</i>	3.38
918982	<i>AA1-117 E</i>	3.38
919591	<i>AA2-035</i>	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 8

(CE - CE) The WILTON ; R-WILTON ;4M 345 kV line (from bus 270927 to bus 275233 ckt 1) loads from 151.65% to 151.89% (**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 26.27 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 O2	1.16
936182	AD2-024 E O2	1.89
936291	AD2-038 C O2	2.91
936292	AD2-038 E O2	19.46
936371	AD2-047 C O2	2.99
936372	AD2-047 E O2	32.2
936461	AD2-060	3.45
936511	AD2-066 C O2	11.34
936512	AD2-066 E O2	7.56
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 O2	7.77
937032	AD2-137 E O2	36.39
937051	AD2-140 C O2	7.4
937052	AD2-140 E O2	34.65
937061	AD2-141 C O2	4.84
937062	AD2-141 E O2	22.82
937071	AD2-142 C O2	14.8
937072	AD2-142 E O2	69.29
937121	AD2-148 C O2	5.44
937122	AD2-148 E O2	25.47
937131	AD2-149 C O2	5.44
937132	AD2-149 E O2	25.47
937141	AD2-150 C O2	5.44

937142	AD2-150 E O2	25.47
937161	AD2-153 C O2	4.62
937162	AD2-153 E O2	21.64
937171	AD2-154 C O2	4.05
937172	AD2-154 E O2	18.97
937181	AD2-155 C O2	4.43
937182	AD2-155 E O2	20.75
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 O2	9.09
937332	AD2-176 E O2	6.06
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
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	0.71
927541	AC1-185 2	0.71
927551	AC1-185 3	0.71
927561	AC1-185 4	0.71
927571	AC1-185 5	0.71
927581	AC1-185 6	0.71
927591	AC1-185 7	0.71
927601	AC1-185 8	0.71
927091	AC1-204 1	91.1

<i>927101</i>	<i>ACI-204 2</i>	<i>91.1</i>
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Appendix 9

(CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 134.42% to 134.53% (**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 14.82 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 O2	0.76
936182	AD2-024 E O2	1.24
936291	AD2-038 C O2	1.86
936292	AD2-038 E O2	12.48
936371	AD2-047 C O2	1.69
936372	AD2-047 E O2	18.15
936461	AD2-060	2.16
936511	AD2-066 C O2	7.42
936512	AD2-066 E O2	4.95
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 O2	2.7
937032	AD2-137 E O2	12.66
937051	AD2-140 C O2	2.7
937052	AD2-140 E O2	12.62
937061	AD2-141 C O2	2.71
937062	AD2-141 E O2	12.78
937071	AD2-142 C O2	5.39
937072	AD2-142 E O2	25.24
937121	AD2-148 C O2	2.6
937122	AD2-148 E O2	12.18
937131	AD2-149 C O2	2.6
937132	AD2-149 E O2	12.18
937141	AD2-150 C O2	2.6
937142	AD2-150 E O2	12.18

937161	AD2-153 C O2	2.61
937162	AD2-153 E O2	12.21
937181	AD2-155 C O2	2.83
937182	AD2-155 E O2	13.26
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 O2	5.94
937332	AD2-176 E O2	3.96
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	1.66
937532	AD2-214 E	0.78
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	<i>O-009 E3</i>	4.12
293715	<i>O-029 E</i>	7.88
293716	<i>O-029 E</i>	4.32
293717	<i>O-029 E</i>	3.97
<i>LTF</i>	<i>O-066</i>	10.57
293644	<i>O22 E1</i>	7.91
293645	<i>O22 E2</i>	15.35
290021	<i>O50 E</i>	15.77
294392	<i>P-010 E</i>	16.26
294763	<i>P-046 E</i>	7.64
274888	<i>PILOT HIL;1E</i>	15.08
274830	<i>PWR VTREC;1U</i>	4.98
274831	<i>PWR VTREC;2U</i>	4.98
<i>LTF</i>	<i>RENSSELAER</i>	0.49
<i>LTF</i>	<i>ROSETON</i>	3.54
<i>LTF</i>	<i>ROWAN</i>	0.49
<i>LTF</i>	<i>SANTEETLA</i>	< 0.01
295111	<i>SUBLETTE E</i>	2.21
<i>LTF</i>	<i>TRIMBLE</i>	0.3
299993	<i>U3-031C</i>	4.1
291984	<i>U4-033</i>	1.52
274814	<i>UNIV PK N;0U</i>	1.19
274806	<i>UNIV PK N;2U</i>	1.19
274807	<i>UNIV PK N;3U</i>	1.19
274808	<i>UNIV PK N;4U</i>	1.19
274809	<i>UNIV PK N;5U</i>	1.19
274810	<i>UNIV PK N;6U</i>	1.19
274811	<i>UNIV PK N;7U</i>	1.19
274812	<i>UNIV PK N;8U</i>	1.19
274813	<i>UNIV PK N;9U</i>	1.19
274815	<i>UNIV PK N;XU</i>	1.19
274816	<i>UNIV PK N;YU</i>	1.19
903433	<i>W3-046</i>	19.41
905471	<i>W4-084</i>	0.36
274874	<i>WALNR;2U</i>	1.93
294502	<i>WALNR;2U E</i>	7.74
<i>LTF</i>	<i>WEC</i>	6.54
295109	<i>WESTBROOK E</i>	4.55
274687	<i>WILL CNTY;4U</i>	53.33
910542	<i>X3-005 E</i>	0.52
914641	<i>Y2-103</i>	36.97
915011	<i>Y3-013 1</i>	3.08
915021	<i>Y3-013 2</i>	3.08
915031	<i>Y3-013 3</i>	3.08
<i>LTF</i>	<i>Z1-043</i>	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

<i>926822</i>	<i>ACI-168 E</i>	<i>6.31</i>
<i>927531</i>	<i>ACI-185 1</i>	<i>0.56</i>
<i>927541</i>	<i>ACI-185 2</i>	<i>0.56</i>
<i>927551</i>	<i>ACI-185 3</i>	<i>0.56</i>
<i>927561</i>	<i>ACI-185 4</i>	<i>0.56</i>
<i>927571</i>	<i>ACI-185 5</i>	<i>0.56</i>
<i>927581</i>	<i>ACI-185 6</i>	<i>0.56</i>
<i>927591</i>	<i>ACI-185 7</i>	<i>0.56</i>
<i>927601</i>	<i>ACI-185 8</i>	<i>0.56</i>
<i>927091</i>	<i>ACI-204 1</i>	<i>59.71</i>
<i>927101</i>	<i>ACI-204 2</i>	<i>59.76</i>

Appendix 10

(CE - CE) The DAVIS CRK;3M-DAVIS CRK; B 138 kV line (from bus 275174 to bus 271294 ckt 1) loads from 123.06% to 131.34% (**DC power flow**) of its load dump rating (480 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_179-45-BT3-4__'. This project contributes approximately 39.75 MW to the thermal violation.

CONTINGENCY 'COMED_P4_179-45-BT3-4__'

TRIP BRANCH FROM BUS 270662 TO BUS 270674 CKT 1 / BLOOM ; B 345 BURNHAM ; B 345
 TRIP BRANCH FROM BUS 275163 TO BUS 270674 CKT 1 / BURNHAM ;1M 138 BURNHAM ; B 345
 TRIP BRANCH FROM BUS 275163 TO BUS 271122 CKT 1 / BURNHAM ;1M 138 BURNHAM ; B 138
 TRIP BRANCH FROM BUS 275163 TO BUS 275263 CKT 1 / BURNHAM ;1M 138 BURNHAM ;1C 36.2
 TRIP BRANCH FROM BUS 270662 TO BUS 937160 CKT 1 / BLOOM ; B 345 AD2-153 TAP 345
 TRIP BRANCH FROM BUS 270662 TO BUS 271098 TO BUS 275258 CKT 1 / BLOOM ; B 345 BLOOM ; B 138 BLOOM ;4C 34.5
 END

<i>Bus Number</i>	<i>Bus Name</i>	<i>Full Contribution</i>
934721	AD1-100 C	15.9
934722	AD1-100 E	74.42
936371	AD2-047 C O2	4.51
936372	AD2-047 E O2	48.5
936781	AD2-101 C	9.33
936782	AD2-101 E	43.67
937061	AD2-141 C O2	6.96
937062	AD2-141 E O2	32.81
937121	AD2-148 C O2	1.81
937122	AD2-148 E O2	8.49
937131	AD2-149 C O2	1.81
937132	AD2-149 E O2	8.49
937141	AD2-150 C O2	1.81
937142	AD2-150 E O2	8.49
937161	AD2-153 C O2	7.
937162	AD2-153 E O2	32.75
937321	AD2-175 C	32.61
937322	AD2-175 E	21.74
LTF	CBM-N	0.02
LTF	CBM-S1	0.6
LTF	CBM-S2	0.37
LTF	CBM-W2	5.24
LTF	CIN	0.67
LTF	CPLE	0.09
LTF	DEARBORN	0.04
LTF	EDWARDS	0.09
LTF	G-007A	0.21
LTF	IPL	0.39
LTF	LGEE	0.09
LTF	NYISO	0.26

<i>LTF</i>	<i>TATANKA</i>	<i>0.12</i>
<i>LTF</i>	<i>VFT</i>	<i>0.57</i>
<i>918972</i>	<i>AAI-116 E</i>	<i>6.08</i>
<i>918982</i>	<i>AAI-117 E</i>	<i>6.08</i>

Appendix 11

(CE - CE) The WILTON ; 765/345 kV transformer (from bus 275232 to bus 270644 ckt 1) loads from 149.31% to 149.56% (**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 25.74 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
932931	AC2-117	6.51
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	18.37
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
934881	AD1-117 C	0.61
934882	AD1-117 E	0.4
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 O2	1.14
936182	AD2-024 E O2	1.85
936291	AD2-038 C O2	2.85
936292	AD2-038 E O2	19.06
936371	AD2-047 C O2	2.93
936372	AD2-047 E O2	31.55
936461	AD2-060	3.38
936511	AD2-066 C O2	11.11
936512	AD2-066 E O2	7.41
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 O2	7.63
937032	AD2-137 E O2	35.73
937051	AD2-140 C O2	7.27
937052	AD2-140 E O2	34.02
937061	AD2-141 C O2	4.74
937062	AD2-141 E O2	22.37
937071	AD2-142 C O2	14.53
937072	AD2-142 E O2	68.03
937121	AD2-148 C O2	5.34
937122	AD2-148 E O2	24.98
937131	AD2-149 C O2	5.34
937132	AD2-149 E O2	24.98
937141	AD2-150 C O2	5.34
937142	AD2-150 E O2	24.98
937161	AD2-153 C O2	4.53

937162	AD2-153 E O2	21.21
937171	AD2-154 C O2	3.97
937172	AD2-154 E O2	18.59
937181	AD2-155 C O2	4.34
937182	AD2-155 E O2	20.33
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 O2	8.9
937332	AD2-176 E O2	5.93
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	<i>MENDOTA H;RU</i>	6.6
293061	<i>N-015 E</i>	19.2
<i>LTF</i>	<i>O-066</i>	16.29
293644	<i>O22 E1</i>	12.6
293645	<i>O22 E2</i>	24.46
290021	<i>O50 E</i>	23.83
294392	<i>P-010 E</i>	24.38
294763	<i>P-046 E</i>	11.49
274888	<i>PILOT HIL;1E</i>	23.64
274830	<i>PWR VTREC;1U</i>	7.47
274831	<i>PWR VTREC;2U</i>	7.47
296308	<i>R-030 C1</i>	5.
296271	<i>R-030 C2</i>	5.
296125	<i>R-030 C3</i>	5.06
296309	<i>R-030 E1</i>	20.01
296272	<i>R-030 E2</i>	20.01
296128	<i>R-030 E3</i>	20.26
<i>LTF</i>	<i>RENSSELAER</i>	0.74
<i>LTF</i>	<i>ROSETON</i>	5.35
<i>LTF</i>	<i>ROWAN</i>	0.8
<i>LTF</i>	<i>SANTEETLA</i>	0.02
295111	<i>SUBLETTE E</i>	3.33
<i>LTF</i>	<i>TRIMBLE</i>	0.53
299993	<i>U3-031C</i>	11.53
903433	<i>W3-046</i>	29.48
<i>LTF</i>	<i>WEC</i>	9.78
295109	<i>WESTBROOK E</i>	6.85
274687	<i>WILL CNTY;4U</i>	82.07
910542	<i>X3-005 E</i>	0.9
914641	<i>Y2-103</i>	55.09
915011	<i>Y3-013 1</i>	4.59
915021	<i>Y3-013 2</i>	4.59
915031	<i>Y3-013 3</i>	4.59
<i>LTF</i>	<i>Z1-043</i>	35.61
916502	<i>Z1-106 E1</i>	1.55
916504	<i>Z1-106 E2</i>	1.55
916512	<i>Z1-107 E</i>	3.17
916522	<i>Z1-108 E</i>	3.05
917501	<i>Z2-087 C</i>	3.91
917502	<i>Z2-087 E</i>	26.18
918051	<i>AA1-018 C</i>	3.02
918052	<i>AA1-018 E</i>	20.2
918972	<i>AA1-116 E</i>	3.38
918982	<i>AA1-117 E</i>	3.38
919591	<i>AA2-035</i>	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 12

(CE - CE) The WILTON ; 765/345 kV transformer (from bus 275233 to bus 270644 ckt 1) loads from 151.65% to 151.89% (**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 26.27 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 O2	1.16
936182	AD2-024 E O2	1.89
936291	AD2-038 C O2	2.91
936292	AD2-038 E O2	19.46
936371	AD2-047 C O2	2.99
936372	AD2-047 E O2	32.2
936461	AD2-060	3.45
936511	AD2-066 C O2	11.34
936512	AD2-066 E O2	7.56
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 O2	7.77
937032	AD2-137 E O2	36.39
937051	AD2-140 C O2	7.4
937052	AD2-140 E O2	34.65
937061	AD2-141 C O2	4.84
937062	AD2-141 E O2	22.82
937071	AD2-142 C O2	14.8
937072	AD2-142 E O2	69.29
937121	AD2-148 C O2	5.44
937122	AD2-148 E O2	25.47
937131	AD2-149 C O2	5.44
937132	AD2-149 E O2	25.47
937141	AD2-150 C O2	5.44

937142	AD2-150 E O2	25.47
937161	AD2-153 C O2	4.62
937162	AD2-153 E O2	21.64
937171	AD2-154 C O2	4.05
937172	AD2-154 E O2	18.97
937181	AD2-155 C O2	4.43
937182	AD2-155 E O2	20.75
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 O2	9.09
937332	AD2-176 E O2	6.06
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
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	0.71
927541	AC1-185 2	0.71
927551	AC1-185 3	0.71
927561	AC1-185 4	0.71
927571	AC1-185 5	0.71
927581	AC1-185 6	0.71
927591	AC1-185 7	0.71
927601	AC1-185 8	0.71
927091	AC1-204 1	91.1

<i>927101</i>	<i>ACI-204 2</i>	<i>91.1</i>
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