

Feasibility Study Report

For

***PJM Generation Interconnection Request
Queue Position AD1-133***

Pontiac Midpoint—Dresden

June 1, 2018

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.

For Local and Network Upgrades which are required due to overloads associated with the System Impact Studies of an individual New Services Queue, and have a cost less than \$5,000,000, the cost of the Local and Network Upgrades will be shared by all proposed projects which have been assigned a Queue Position in the New Services Queue in which the need for the Local and Network Upgrades was identified. The Load Flow Cost Allocation methods discussed in this manual, including cutoffs, still apply to the individual projects.

For Local and Network Upgrades which are required due to the overloads associated with the System Impact Studies of an individual New Services Queue, and have a cost of \$5,000,000 or greater, the cost of the Local and Network Upgrades will be allocated according to the order of the New Service Requests in the New Services Queue and the MW contribution of each individual Interconnection Request for those projects which cause or contribute to the need for the Local or Network Upgrades. The Load Flow Cost Allocation methods discussed in this manual, including cutoffs, still apply to the individual projects.

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 G-2 of Manual 14A. 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 G-1 of Manual 14A) 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 AD1-133 Pontiac Midpoint—Dresden project is a proposal to connect a 300 Energy (180 MW Capacity) solar PV facility to be located in Grundy County, IL. The IC has proposed a service date for this project of December 31, 2019.

It is proposed in the AD1-133 Interconnection Request (Attachment N) that the customer is selecting the primary POI on the 345kV Pontiac Midpoint-Dresden 8014 Line. They are selecting a secondary POI as the 345kV Loretto-Wilton Center 11212 Line.

Impacts on the MISO member transmission systems are not included in this analysis, but will be included in the 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) AD1-133, a 300MW solar facility, proposes to interconnect with the ComEd transmission system by tying into the Pontiac-Dresden 345kV Line 8014.

Attachment Facilities

The IC AD1-133 generator lead would 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 cost for the attachment facilities is estimated at \$1.0M.

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)	\$ 1,000,000

Direct Connection Network Upgrades

In order to accommodate interconnection of AD1-133, a new 345kV Interconnection Substation would need to be built close to the Pontiac-Dresden 345kV Line 8014 approximately 23 miles from the Pontiac substation.

The scope of work includes the installation of three 345kV circuit breakers in a “breaker-and-a-half” bus configuration and cutting in the Interconnection Substation to the Pontiac-Dresden 345kV Line 8014, as shown in the one line diagram below.

The IC is responsible for constructing all of the facilities on the IC side of the point of interconnection outside of the substation. It is assumed for the purposes of this report that the IC

will obtain the site for the Interconnection Substation and right-of-way between the Interconnection Substation and the 345kV transmission line.

In the event that the IC exercises the option to build the interconnecting substation, the IC will be required to construct all interconnection facilities that will be turned over to ComEd in accordance with ComEd published standards and the PJM Tariff.

ComEd would design, engineer and construct the tie in of the Interconnection Substation to the Pontiac-Dresden 345kV Line 8014.

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

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

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

Non-Direct Connection Network Upgrades

The integration of the new 345kV Interconnection Substation would require relay/communications/SCADA upgrades at Dresden Station 12 and TSS 80 Pontiac.

The ComEd cost is given below:

Scope of Work	Cost Estimate
Relay/communications/SCADA upgrades at Dresden Station 12	\$ 1,000,000
Relay/communications/SCADA upgrades at Pontiac TSS 80	\$ 1,000,000
Total Cost Estimate (see notes below on cost estimate)	\$ 2,000,000

Notes on Cost Estimate:

- 1) These estimates are Order-of-Magnitude estimates of the costs that ComEd would bill to the customer for this interconnection. These estimates are based on a one-line electrical diagram of the project and the information provided by the IC.
- 2) There were no site visits performed for these estimates. There may be costs related to specific site related issues that are not identified in these estimates. The site reviews will be performed during the Facilities Study or during detailed engineering.

- 3) These estimates are not a guarantee of the maximum amount payable by the IC and the actual costs of ComEd's work may differ significantly from these estimates. Per the PJM Tariff, IC will be responsible for paying all actual costs of ComEd's work.
- 4) The IC is responsible for all engineering, procurement, testing and construction of all equipment on the IC's side of the Point of Interconnection (POI).
- 5)

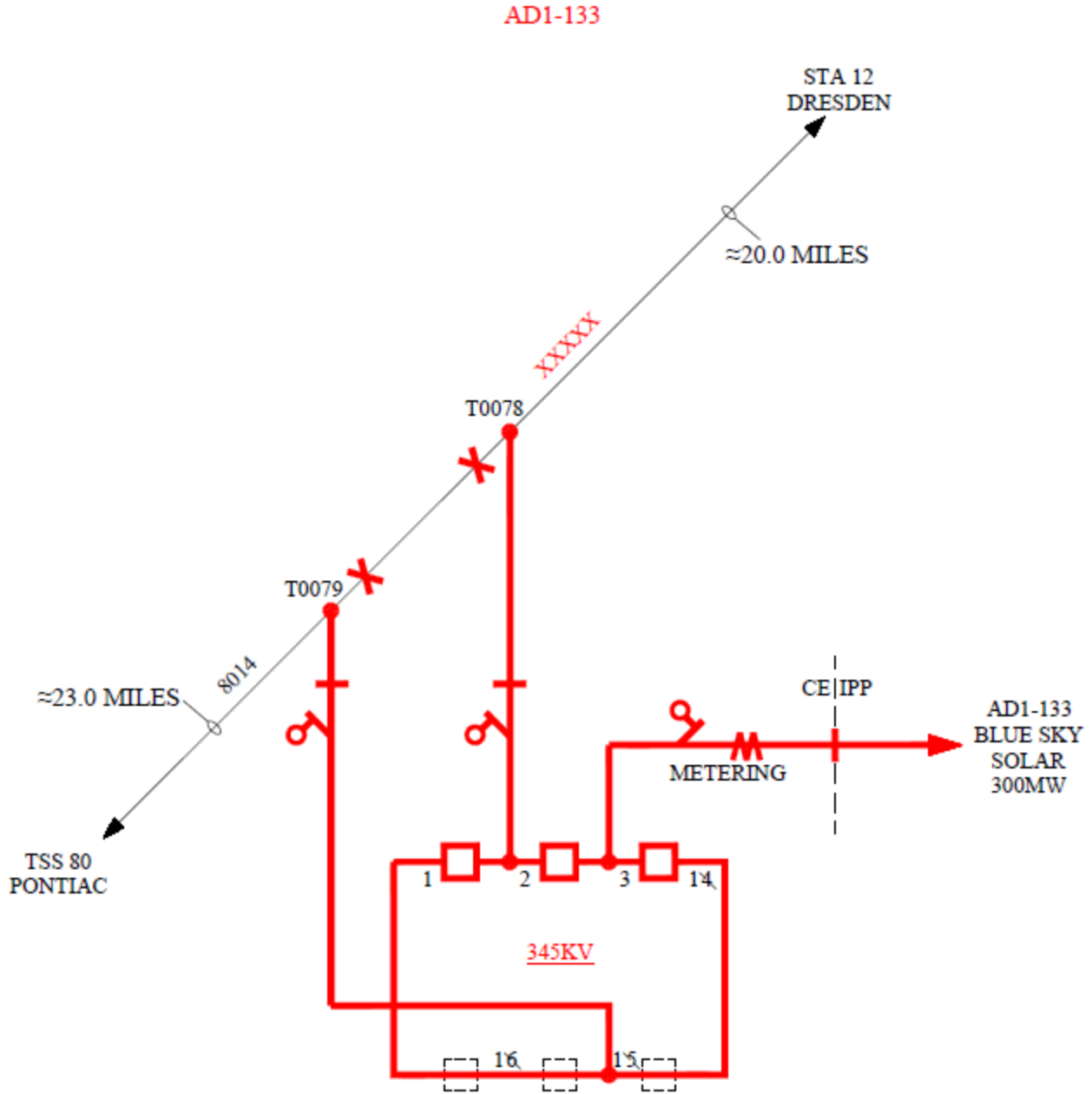


Figure 1. Single Line Diagram for Option 1

Network Impacts for Primary POI

The Queue Project AD1-133 was evaluated as a 300.0 MW (Capacity 180.0 MW) injection tapping the Pontiac (Red) to Dresden (Red) 345kV line in the ComEd area. Project AD1-133 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AD1-133 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)

1. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line (from bus 247610 to bus 243219 ckt 2) loads from 99.77% to 100.23% (**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 13.4 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. (CE - CE) The DRESDEN ; R-ELWOOD ; R 345 kV line (from bus 270717 to bus 270737 ckt 1) loads from 97.65% to 100.46% (**DC power flow**) of its emergency rating (1479 MVA) for the single line contingency outage of 'COMED_P2-1_111-L1223T__'. This project contributes approximately 43.57 MW to the thermal violation.

CONTINGENCY 'COMED_P2-1_111-L1223T__'
TRIP BRANCH FROM BUS 270717 TO BUS 270731 CKT 1 / DRES; R 345 ELECT;4R 345
END

Multiple Facility Contingency

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

1. (MISO NIPS - CE) The 17GREEN_ACRE-GREENACRE; T 345 kV line (from bus 255104 to bus 270771 ckt 1) loads from 99.82% to 100.16% (**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 23.19 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.

Contribution to Previously Identified Overloads

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

1. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line (from bus 247610 to bus 243219 ckt 2) loads from 123.08% to 123.31% (**DC power flow**) of its emergency rating (1409 MVA) for the line fault with failed breaker contingency outage of 'AEP_P4_#2978_05DUMONT 765'. This project contributes approximately 21.07 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.

2. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line (from bus 247610 to bus 243219 ckt 2) loads from 113.85% to 114.09% (**DC power flow**) of its emergency rating (1409 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT4-5__'. This project contributes approximately 22.34 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
```

3. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line (from bus 247610 to bus 243219 ckt 2) loads from 113.85% to 114.09% (**DC power flow**) of its emergency rating (1409 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT3-4__'. This project contributes approximately 22.34 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
```

4. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line (from bus 247610 to bus 243219 ckt 2) loads from 113.83% to 114.07% (**DC power flow**) of its emergency rating (1409 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_023-65-BT4-5__'. This project contributes approximately 22.34 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
```

5. (MISO NIPS - CE) The 17STJOHN-ST JOHN ; T 345 kV line (from bus 255112 to bus 270886 ckt 1) loads from 111.02% to 111.4% (**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 25.34 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.

6. (MISO NIPS - CE) The 17STJOHN-ST JOHN ; T 345 kV line (from bus 255112 to bus 270886 ckt 1) loads from 110.27% to 110.65% (**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 25.48 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
```

7. (MISO NIPS - CE) The 17STJOHN-ST JOHN ; T 345 kV line (from bus 255112 to bus 270886 ckt 1) loads from 110.26% to 110.64% (**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 25.48 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
```

8. (MISO NIPS - CE) The 17STJOHN-ST JOHN ; T 345 kV line (from bus 255112 to bus 270886 ckt 1) loads from 110.19% to 110.57% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_023-65-BT4-5__'. This project contributes approximately 25.44 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
```

9. (MISO NIPS - AEP) The 17STILLWELL-05DUMONT 345 kV line (from bus 255113 to bus 243219 ckt 1) loads from 163.68% to 164.13% (**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 40.83 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 4 for a table containing the generators having contribution to this flowgate.

10. (MISO NIPS - AEP) The 17STILLWELL-05DUMONT 345 kV line (from bus 255113 to bus 243219 ckt 1) loads from 160.57% to 161.03% (**DC power flow**) of its emergency rating (1409 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_023-65-BT2-3__'. This project contributes approximately 41.66 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. (MISO NIPS - AEP) The 17STILLWELL-05DUMONT 345 kV line (from bus 255113 to bus 243219 ckt 1) loads from 160.37% to 160.84% (**DC power flow**) of its emergency rating (1409 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_023-65-BT4-5__'. This project contributes approximately 41.48 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
```

12. (MISO NIPS - AEP) The 17STILLWELL-05DUMONT 345 kV line (from bus 255113 to bus 243219 ckt 1) loads from 116.37% to 117.18% (**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 24.97 MW to the thermal violation.

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

13. (CE - AEP) The WILTON ; -05DUMONT 765 kV line (from bus 270644 to bus 243206 ckt 1) loads from 108.46% to 108.83% (**DC power flow**) of its emergency rating (4105 MVA) for the tower line contingency outage of 'COMED_P7_345-L94507_B-S+_345-L97008_R-S'. This project contributes approximately 94.2 MW to the thermal violation.

```
CONTINGENCY 'COMED_P7_345-L94507_B-S+_345-L97008_R-S'  
TRIP BRANCH FROM BUS 274750 TO BUS 255112 CKT 1 / CRETE;BP 345 17STJOHN 345  
TRIP BRANCH FROM BUS 274804 TO BUS 243229 CKT 1 / UPNOR;RP 345 05OLIVE 345  
END
```

Please refer to Appendix 5 for a table containing the generators having contribution to this flowgate.

14. (CE - AEP) The WILTON ; -05DUMONT 765 kV line (from bus 270644 to bus 243206 ckt 1) loads from 105.42% to 105.77% (**DC power flow**) of its emergency rating (4105 MVA) for the tower line contingency outage of 'COMED_P7_641'. This project contributes approximately 92.13 MW to the thermal violation.

```
CONTINGENCY 'COMED_P7_641'  
OPEN BRANCH FROM BUS 243229 TO BUS 270771 CKT 1 / 243229 05OLIVE 345 270771 GREENACRE; T 345 1  
OPEN BRANCH FROM BUS 243229 TO BUS 274804 CKT 1 / 243229 05OLIVE 345 274804 UNIV PK N;RP 345 1  
END
```

15. (CE - MISO NIPS) The BURNHAM ; 0R-17MUNSTER 345 kV line (from bus 270677 to bus 255109 ckt 1) loads from 132.15% to 132.6% (**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 34.0 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.

16. (CE - MISO NIPS) The BURNHAM ; 0R-17MUNSTER 345 kV line (from bus 270677 to bus 255109 ckt 1) loads from 131.74% to 132.2% (**DC power flow**) of its emergency rating (1195 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_023-65-BT2-3__'. This project contributes approximately 34.26 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
```

17. (CE - MISO NIPS) The BURNHAM ; 0R-17MUNSTER 345 kV line (from bus 270677 to bus 255109 ckt 1) loads from 131.24% to 131.69% (**DC power flow**) of its emergency rating (1195 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_023-65-BT4-5__'. This project contributes approximately 33.98 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
```

18. (CE - CE) The DRESDEN ; R-ELWOOD ; R 345 kV line (from bus 270717 to bus 270737 ckt 1) loads from 114.52% to 117.62% (**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 48.06 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

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

19. (CE - CE) The DRESDEN ; R 345/138 kV transformer (from bus 270717 to bus 275180 ckt 1) loads from 118.66% to 121.23% (**DC power flow**) of its emergency rating (480 MVA) for the single line contingency outage of 'COMED_P1-2_345-L1222__R-S'. This project contributes approximately 12.39 MW to the thermal violation.

CONTINGENCY 'COMED_P1-2_345-L1222__R-S'
TRIP BRANCH FROM BUS 270717 TO BUS 270737 CKT 1 / DRES; R 345 ELWOO; R 345
END

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

20. (CE - CE) The ELWOOD ; B-GOODINGS ;4B 345 kV line (from bus 270736 to bus 270770 ckt 1) loads from 132.68% to 133.88% (**DC power flow**) of its emergency rating (1479 MVA) for the single line contingency outage of 'COMED_P1-2_345-L11622_R-S'. This project contributes approximately 17.27 MW to the thermal violation.

CONTINGENCY 'COMED_P1-2_345-L11622_R-S'
TRIP BRANCH FROM BUS 270737 TO BUS 270769 CKT 1 / ELWOO; R 345 GOODI;1R 345
END

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

21. (CE - CE) The ELWOOD ; B-GOODINGS ;4B 345 kV line (from bus 270736 to bus 270770 ckt 1) loads from 119.9% to 120.97% (**DC power flow**) of its normal rating (1201 MVA) for non-contingency condition. This project contributes approximately 12.94 MW to the thermal violation.

22. (CE - CE) The ELWOOD ; B-GOODINGS ;4B 345 kV line (from bus 270736 to bus 270770 ckt 1) loads from 111.11% to 112.25% (**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 16.49 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

23. (CE - CE) The ELWOOD ; R-GOODINGS ;2R 345 kV line (from bus 270737 to bus 270769 ckt 1) loads from 132.69% to 133.86% (**DC power flow**) of its emergency rating (1479 MVA) for the single line contingency outage of 'COMED_P1-2_345-L11620_B-S'. This project contributes approximately 16.88 MW to the thermal violation.

CONTINGENCY 'COMED_P1-2_345-L11620_B-S'

TRIP BRANCH FROM BUS 270736 TO BUS 270770 CKT 1 / ELWOO; B 345
GOODI;3B 345
END

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

24. (CE - CE) The ELWOOD ; R-GOODINGS ;2R 345 kV line (from bus 270737 to bus 270769 ckt 1) loads from 116.96% to 118.02% (**DC power flow**) of its normal rating (1201 MVA) for non-contingency condition. This project contributes approximately 12.39 MW to the thermal violation.

25. (CE - CE) The ELWOOD ; R-GOODINGS ;2R 345 kV line (from bus 270737 to bus 270769 ckt 1) loads from 111.39% to 112.49% (**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 15.97 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

26. (CE - AEP) The GREENACRE; T-05OLIVE 345 kV line (from bus 270771 to bus 243229 ckt 1) loads from 112.08% to 112.46% (**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 23.19 MW to the thermal violation.

CONTINGENCY 'AEP_P4_#2978_05DUMONT 765'

OPEN BRANCH FROM BUS 243206 TO BUS 907040 CKT 1 / 243206 05DUMONT 765 X1-020
OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1 / 243206 05DUMONT 765 270644 WILTON ; 765 1
END

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

27. (CE - AEP) The GREENACRE; T-05OLIVE 345 kV line (from bus 270771 to bus 243229 ckt 1) loads from 110.73% to 111.12% (**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 23.39 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

28. (CE - AEP) The GREENACRE; T-05OLIVE 345 kV line (from bus 270771 to bus 243229 ckt 1) loads from 110.72% to 111.1% (**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 23.32 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
```

29. (CE - MISO AMIL) The KINCAID ; B-7AUSTIN 345 kV line (from bus 270796 to bus 347955 ckt 1) loads from 101.2% to 102.02% (**DC power flow**) of its emergency rating (956 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_080-45-BT4-5__'. This project contributes approximately 16.42 MW to the thermal violation.

```
CONTINGENCY 'COMED_P4_080-45-BT4-5__'  
TRIP BRANCH FROM BUS 270852 TO BUS 270668 CKT 1 / PONTI; B 345 BLUEM; B 345  
TRIP BRANCH FROM BUS 270852 TO BUS 270704 CKT 1 / PONTI; B 345 LORET; B 345  
END
```

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

30. (CE - MISO NIPS) The ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 111.02% to 111.4% (**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 25.34 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 13 for a table containing the generators having contribution to this flowgate.

31. (CE - MISO NIPS) The ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 110.27% to 110.65% (**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 25.48 MW to the thermal violation.

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

32. (CE - MISO NIPS) The ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 110.26% to 110.64% (**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 25.48 MW to the thermal violation.

```
CONTINGENCY 'COMED_P4_112-65-BT3-4__'
TRIP BRANCH FROM BUS 270644 TO BUS 243206 CKT 1 / WILTO; 765 05DUMONT 765
TRIP BRANCH FROM BUS 275232 TO BUS 270644 CKT 1 / WILTO;3M 345 WILTO; 765
TRIP BRANCH FROM BUS 275232 TO BUS 270926 CKT 1 / WILTO;3M 345 WILTO; B 345
TRIP BRANCH FROM BUS 275232 TO BUS 275332 CKT 1 / WILTO;3M 345 WILTO;3C 33
END
```

33. (CE - MISO NIPS) The ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 110.18% to 110.56% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_023-65-BT4-5__'. This project contributes approximately 25.44 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
```

34. (CE - CE) The WILTON ; B-WILTON ;3M 345 kV line (from bus 270926 to bus 275232 ckt 1) loads from 145.25% to 145.83% (**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 46.23 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 14 for a table containing the generators having contribution to this flowgate.

35. (CE - CE) The WILTON ; R-WILTON ;4M 345 kV line (from bus 270927 to bus 275233 ckt 1) loads from 148.32% to 148.92% (**DC power flow**) of its load dump rating (1379 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT2-3__'. This project contributes approximately 47.19 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 15 for a table containing the generators having contribution to this flowgate.

36. (CE - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line (from bus 274750 to bus 255112 ckt 1) loads from 128.4% to 128.81% (**DC power flow**) of its emergency rating (1399 MVA) for the line fault with failed breaker contingency outage of 'AEP_P4_#2978_05DUMONT 765'. This project contributes approximately 35.23 MW to the thermal violation.

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

Please refer to Appendix 16 for a table containing the generators having contribution to this flowgate.

37. (CE - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line (from bus 274750 to bus 255112 ckt 1) loads from 128.01% to 128.42% (**DC power flow**) of its emergency rating (1399 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT4-5__'. This project contributes approximately 35.38 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
```

38. (CE - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line (from bus 274750 to bus 255112 ckt 1) loads from 127.98% to 128.4% (**DC power flow**) of its emergency rating (1399 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT3-4__'. This project contributes approximately 35.38 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
```

39. (CE - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line (from bus 274750 to bus 255112 ckt 1) loads from 127.78% to 128.2% (**DC power flow**) of its emergency rating (1399 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_023-65-BT4-5__'. This project contributes approximately 35.34 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
```

40. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 134.73% to 135.19% (**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 28.05 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 17 for a table containing the generators having contribution to this flowgate.

41. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 133.69% to 134.15% (**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 28.22 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
```

42. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 133.68% to 134.15% (**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 28.22 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
```

43. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 133.58% to 134.04% (**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 28.23 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
```

44. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 107.55% to 108.37% (**DC power flow**) of its normal rating (971 MVA) for the single line contingency outage of 'COMED_P1-2_695_B2'. This project contributes approximately 16.93 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
```

45. (CE - CE) The DRESDEN ;3M-DRESDEN ; B 138 kV line (from bus 275180 to bus 271336 ckt 1) loads from 118.62% to 121.19% (**DC power flow**) of its emergency rating (480 MVA) for the single line contingency outage of 'COMED_P1-2_345-L1222__R-S'. This project contributes approximately 12.39 MW to the thermal violation.

```
CONTINGENCY 'COMED_P1-2_345-L1222__R-S'
TRIP BRANCH FROM BUS 270717 TO BUS 270737 CKT 1      / DRESD; R 345 ELWOO; R 345
END
```

Please refer to Appendix 18 for a table containing the generators having contribution to this flowgate.

46. (CE - CE) The DRESDEN ;3M-DRESDEN ; B 138 kV line (from bus 275180 to bus 271336 ckt 1) loads from 110.54% to 112.48% (**DC power flow**) of its load dump rating (480 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_900-45-BT2-3__'. This project contributes approximately 20.63 MW to the thermal violation.

```
CONTINGENCY 'COMED_P4_900-45-BT2-3__'
TRIP BRANCH FROM BUS 270717 TO BUS 270737 CKT 1      / DRESD; R 345 ELWOO; R 345
TRIP BRANCH FROM BUS 270737 TO BUS 274757 CKT 1      / ELWOO; R 345 ELWOO;1P 345
TRIP BRANCH FROM BUS 274757 TO BUS 274729 CKT 1      / ELWOO;1P 345 ELWOO;1P 18
TRIP BRANCH FROM BUS 274757 TO BUS 274731 CKT 1      / ELWOO;1P 345 ELWOO;2P 18
TRIP BRANCH FROM BUS 274757 TO BUS 274733 CKT 1      / ELWOO;1P 345 ELWOO;3P 18
TRIP BRANCH FROM BUS 274757 TO BUS 274735 CKT 1      / ELWOO;1P 345 ELWOO;4P 18
REMOVE UNIT 1 FROM BUS 274729                        / ELWOO;1P 18
REMOVE UNIT 2 FROM BUS 274731                        / ELWOO;2P 18
REMOVE UNIT 3 FROM BUS 274733                        / ELWOO;3P 18
REMOVE UNIT 4 FROM BUS 274735                        / ELWOO;4P 18
END
```

47. (CE - CE) The WILTON ; 765/345 kV transformer (from bus 275232 to bus 270644 ckt 1) loads from 145.25% to 145.83% (**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 46.23 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 19 for a table containing the generators having contribution to this flowgate.

48. (CE - CE) The WILTON ; 765/345 kV transformer (from bus 275233 to bus 270644 ckt 1) loads from 148.32% to 148.92% (**DC power flow**) of its load dump rating (1379 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT2-3__'. This project contributes approximately 47.19 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 20 for a table containing the generators having contribution to this flowgate.

49. (MISO AMIL - AEP) The 7CASEY-05SULLIVAN 345 kV line (from bus 346809 to bus 247712 ckt 1) loads from 126.48% to 127.23% (**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 23.95 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

Please refer to Appendix 21 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)

No issues identified

Affected System Analysis & Mitigation

MISO Impacts:

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

Delivery of Energy Portion of Interconnection Request

PJM also studied the delivery of the energy portion of this interconnection request. Any problems identified below are likely to result in operational restrictions to the project under study. The developer can proceed with network upgrades to eliminate the operational restriction at their discretion by submitting a Merchant Transmission Interconnection request. Only the most severely overloaded conditions are listed. There is no guarantee of full delivery of energy for this project by fixing only the conditions listed in this section. With a Transmission Interconnection Request, a subsequent analysis will be performed, which will study all overload conditions associated with the overloaded element(s) identified.

1. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line (from bus 247610 to bus 243219 ckt 2) loads from 113.83% to 114.07% (**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 22.34 MW to the thermal violation.

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

2. (MISO NIPS - CE) The 17STJOHN-ST JOHN ; T 345 kV line (from bus 255112 to bus 270886 ckt 1) loads from 110.18% to 110.57% (**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 25.47 MW to the thermal violation.

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

3. (MISO NIPS - AEP) The 17STILLWELL-05DUMONT 345 kV line (from bus 255113 to bus 243219 ckt 1) loads from 160.36% to 160.82% (**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 41.62 MW to the thermal violation.

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

4. (CE - AEP) The WILTON ; -05DUMONT 765 kV line (from bus 270644 to bus 243206 ckt 1) loads from 100.99% to 101.33% (**DC power flow**) of its normal rating (4105 MVA) for the single line contingency outage of 'COMED_P1-2_697_B2'. This project contributes approximately 87.78 MW to the thermal violation.

CONTINGENCY 'COMED_P1-2_697_B2'
OPEN BRANCH FROM BUS 243229 TO BUS 274804 CKT 1 / 243229 05OLIVE 345 274804 UPNOR;RP 345 1
END

5. (CE - MISO NIPS) The BURNHAM ; 0R-17MUNSTER 345 kV line (from bus 270677 to bus 255109 ckt 1) loads from 131.21% to 131.66% (**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 34.16 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 COLLINS ; R-COLLINS ; 2M 345 kV line (from bus 270697 to bus 275168 ckt 1) loads from 108.84% to 111.76% (**DC power flow**) of its emergency rating (1379 MVA) for the single line contingency outage of 'COMED_P1-2_765-L2315___-S'. This project contributes approximately 39.27 MW to the thermal violation.

CONTINGENCY 'COMED_P1-2_765-L2315___-S'
TRIP BRANCH FROM BUS 270607 TO BUS 270630 CKT 1 / COLLI; 765 PLANO; 765
END

7. (CE - CE) The COLLINS ; R-COLLINS ;2M 345 kV line (from bus 270697 to bus 275168 ckt 1) loads from 100.3% to 103.24% (**DC power flow**) of its normal rating (1200 MVA) for non-contingency condition. This project contributes approximately 34.13 MW to the thermal violation.

8. (CE - CE) The DRESDEN ; R-ELWOOD ; R 345 kV line (from bus 270717 to bus 270737 ckt 1) loads from 128.1% to 133.38% (**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 80.1 MW to the thermal violation.

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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
```

9. (CE - CE) The DRESDEN ; R-ELWOOD ; R 345 kV line (from bus 270717 to bus 270737 ckt 1) loads from 97.26% to 102.26% (**DC power flow**) of its normal rating (1201 MVA) for non-contingency condition. This project contributes approximately 60.13 MW to the thermal violation.

10. (CE - CE) The E FRANKFO; B-CRETE EC ;BP 345 kV line (from bus 270728 to bus 274750 ckt 1) loads from 110.06% to 110.48% (**DC power flow**) of its emergency rating (1399 MVA) for the single line contingency outage of 'COMED_P1-2_695_B2'. This project contributes approximately 35.82 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
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11. (CE - CE) The ELWOOD ; B-GOODINGS ;4B 345 kV line (from bus 270736 to bus 270770 ckt 1) loads from 117.69% to 118.64% (**DC power flow**) of its emergency rating (1479 MVA) for the single line contingency outage of 'COMED_P1-2_345-L11622_R-S'. This project contributes approximately 28.78 MW to the thermal violation.

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CONTINGENCY 'COMED_P1-2_345-L11622_R-S'  
TRIP BRANCH FROM BUS 270737 TO BUS 270769 CKT 1      / ELWOO; R 345 GOODI;1R 345  
END
```

12. (CE - CE) The ELWOOD ; B-GOODINGS ;4B 345 kV line (from bus 270736 to bus 270770 ckt 1) loads from 105.77% to 106.68% (**DC power flow**) of its normal rating (1201 MVA) for non-contingency condition. This project contributes approximately 21.57 MW to the thermal violation.

13. (CE - CE) The ELWOOD ; R-GOODINGS ;2R 345 kV line (from bus 270737 to bus 270769 ckt 1) loads from 117.2% to 118.13% (**DC power flow**) of its emergency rating (1479 MVA) for the single line contingency outage of 'COMED_P1-2_345-L11620_B-S'. This project contributes approximately 28.13 MW to the thermal violation.

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CONTINGENCY 'COMED_P1-2_345-L11620_B-S'
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TRIP BRANCH FROM BUS 270736 TO BUS 270770 CKT 1 / ELWOO; B 345 GOODI;3B 345
END

14. (CE - CE) The ELWOOD ; R-GOODINGS ;2R 345 kV line (from bus 270737 to bus 270769 ckt 1) loads from 102.72% to 103.56% (**DC power flow**) of its normal rating (1201 MVA) for non-contingency condition. This project contributes approximately 20.66 MW to the thermal violation.

15. (CE - AEP) The GREENACRE; T-05OLIVE 345 kV line (from bus 270771 to bus 243229 ckt 1) loads from 110.71% to 111.09% (**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 23.38 MW to the thermal violation.

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

16. (CE - CE) The PONTIAC ; B-LORETTO ; B 345 kV line (from bus 270852 to bus 270704 ckt 1) loads from 158.05% to 167.94% (**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 151.23 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

17. (CE - CE) The PONTIAC ; B-LORETTO ; B 345 kV line (from bus 270852 to bus 270704 ckt 1) loads from 119.61% to 123.48% (**DC power flow**) of its normal rating (1364 MVA) for non-contingency condition. This project contributes approximately 52.83 MW to the thermal violation.

18. (CE - MISO NIPS) The ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 110.17% to 110.56% (**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 25.47 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

19. (CE - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line (from bus 274750 to bus 255112 ckt 1) loads from 127.78% to 128.19% (**DC power flow**) of its emergency rating (1399 MVA) for the single line contingency outage of 'COMED_P1-2_695_B2'. This project contributes approximately 35.35 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

20. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 133.58% to 134.04% (**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 28.21 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

21. (CE - CE) The DRESDEN ;3M-DRESDEN ; B 138 kV line (from bus 275180 to bus 271336 ckt 1) loads from 108.81% to 110.75% (**DC power flow**) of its emergency rating (480 MVA) for the single line contingency outage of 'COMED_P1-2_345-L1222__R-S'. This project contributes approximately 20.65 MW to the thermal violation.

CONTINGENCY 'COMED_P1-2_345-L1222__R-S'
TRIP BRANCH FROM BUS 270717 TO BUS 270737 CKT 1 / DRESD; R 345 ELWOO; R 345
END

22. (MISO AMIL - AEP) The 7CASEY-05SULLIVAN 345 kV line (from bus 346809 to bus 247712 ckt 1) loads from 123.05% to 123.82% (**DC power flow**) of its normal rating (1451 MVA) for the single line contingency outage of 'AEP_P1-2_#286'. This project contributes approximately 24.25 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

23. (MISO AMIL - AEP) The 7CASEY-05SULLIVAN 345 kV line (from bus 346809 to bus 247712 ckt 1) loads from 105.3% to 105.9% (**DC power flow**) of its normal rating (1451 MVA) for non-contingency condition. This project contributes approximately 18.95 MW to the thermal violation.

24. (CE - CE) The AD1-100 TAP-WILTON ; B 345 kV line (from bus 934720 to bus 270926 ckt 1) loads from 124.29% to 129.2% (**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 73.84 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

25. (CE - CE) The AD1-100 TAP-WILTON ; B 345 kV line (from bus 934720 to bus 270926 ckt 1) loads from 111.95% to 112.91% (**DC power flow**) of its normal rating (1364 MVA) for non-contingency condition. This project contributes approximately 28.97 MW to the thermal violation.

26. (CE - CE) The AD1-133 TAP-DRESDEN ; R 345 kV line (from bus 935000 to bus 270717 ckt 1) loads from 155.68% to 168.82% (**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 200.54 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

27. (CE - CE) The AD1-133 TAP-DRESDEN ; R 345 kV line (from bus 935000 to bus 270717 ckt 1) loads from 104.55% to 117.48% (**DC power flow**) of its normal rating (1334 MVA) for non-contingency condition. This project contributes approximately 172.25 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)

Generator Deliverability

1. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line (from bus 247610 to bus 243219 ckt 2) loads from 99.77% to 100.23% (**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 13.4 MW to the thermal violation.

AEP:

- (1) The upgrade is to perform a sag study which shows remediation work will include the replacement of tower 20 with a custom steel pole and the removal of swing angle brackets on 2 structures (PJM Network Upgrade N4512). Cost estimate is \$1.0775M. The sag study will raise the SE rating to 1868 MVA which is not sufficient. The line conductor sections 1 and 2 will have to be reconducted/rebuilt. Estimated Cost: \$28.6 Million.**
- (2) Replace Dumont circuit breaker G2 , Estimated cost : \$ 1,500,000.**

Estimated Schedule: The standard time required for construction differs from state to state. An Approximate construction would be 24 to 36 months after signing an interconnection agreement.

2. (CE - CE) The DRESDEN ; R-ELWOOD ; R 345 kV line (from bus 270717 to bus 270737 ckt 1) loads from 97.65% to 100.46% (**DC power flow**) of its emergency rating (1479 MVA) for the single line contingency outage of 'COMED_P2-1_111-L1223T__'. This project contributes approximately 43.57 MW to the thermal violation.

COMED:

The post contingency flow for this event exceeds the rating therefore an upgrade is required. A portion of the line will require re-conductoring. Upon completion of this work the ratings will be 1334/1726/2084 MVA, SN/SE/SLD. A preliminary estimate for this upgrade is \$12.4 M with an estimated construction timeline of 24-30 months.

Multiple Facility Contingency

1. (MISO NIPS - CE) The 17GREEN_ACRE-GREENACRE; T 345 kV line (from bus 255104 to bus 270771 ckt 1) loads from 99.82% to 100.16% (**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 23.19 MW to the thermal violation.

COMED:

ComEd 345kV L6615 SLD & ALDR ratings are 1195 MVA & 1374 MVA. No upgrade is required.

MISO NIPS:

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

Contribution to Previously Identified System Reinforcements

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

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

1. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line (from bus 247610 to bus 243219 ckt 2) loads from 123.08% to 123.31% (**DC power flow**) of its emergency rating (1409 MVA) for the line fault with failed breaker contingency outage of 'AEP_P4_#2978_05DUMONT 765'. This project contributes approximately 21.07 MW to the thermal violation.

AEP:

(1) The upgrade is to perform a sag study which shows remediation work will include the replacement of tower 20 with a custom steel pole and the removal of

swing angle brackets on 2 structures (PJM Network Upgrade N4512). Cost estimate is \$1.0775M. The sag study will raise the SE rating to 1868 MVA which is not sufficient. The line conductor sections 1 and 2 will have to be recondored/rebuilt. Estimated Cost: \$28.6 Million.

(2) Replace Dumont circuit breaker G2, Estimated cost: \$ 1,500,000.

Estimated Schedule: The standard time required for construction differs from state to state. An Approximate construction would be 24 to 36 months after signing an interconnection agreement.

2. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line (from bus 247610 to bus 243219 ckt 2) loads from 113.85% to 114.09% (**DC power flow**) of its emergency rating (1409 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT4-5__'. This project contributes approximately 22.34 MW to the thermal violation.

Same as Contribution to Previously Identified #1

3. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line (from bus 247610 to bus 243219 ckt 2) loads from 113.85% to 114.09% (**DC power flow**) of its emergency rating (1409 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT3-4__'. This project contributes approximately 22.34 MW to the thermal violation.

Same as Contribution to Previously Identified #1

4. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line (from bus 247610 to bus 243219 ckt 2) loads from 113.83% to 114.07% (**DC power flow**) of its emergency rating (1409 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_023-65-BT4-5__'. This project contributes approximately 22.34 MW to the thermal violation.

Same as Contribution to Previously Identified #1

5. (MISO NIPS - CE) The 17STJOHN-ST JOHN ; T 345 kV line (from bus 255112 to bus 270886 ckt 1) loads from 111.02% to 111.4% (**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 25.34 MW to the thermal violation.

COMED:

ComEd 345kV L94507 SLD rating is 1508 MVA and the ALDR is 1734 MVA. No upgrade is required.

MISO NIPS:

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

6. (MISO NIPS - CE) The 17STJOHN-ST JOHN ; T 345 kV line (from bus 255112 to bus 270886 ckt 1) loads from 110.27% to 110.65% (**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 25.48 MW to the thermal violation.

Same as Contribution to Previously Identified #5

7. (MISO NIPS - CE) The 17STJOHN-ST JOHN ; T 345 kV line (from bus 255112 to bus 270886 ckt 1) loads from 110.26% to 110.64% (**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 25.48 MW to the thermal violation.

Same as Contribution to Previously Identified #5

8. (MISO NIPS - CE) The 17STJOHN-ST JOHN ; T 345 kV line (from bus 255112 to bus 270886 ckt 1) loads from 110.19% to 110.57% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_023-65-BT4-5__'. This project contributes approximately 25.44 MW to the thermal violation.

Same as Contribution to Previously Identified #5

9. (MISO NIPS - AEP) The 17STILLWELL-05DUMONT 345 kV line (from bus 255113 to bus 243219 ckt 1) loads from 163.68% to 164.13% (**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 40.83 MW to the thermal violation.

AEP:

- **(N4058) Sag study results: Stillwell - Dumont 345 kV line work will include the replacement of tower 20 with a custom steel pole, replacement of tower 24 with a custom H-frame and the removal of swing angle brackets on 2 structures. Cost estimate is \$1.613M. New SE rating will be 1718 MVA limited by a Dumont wavetrapped and possibly the conductor.**
 - **This upgrade is driven by a prior queue. Per PJM cost allocation rules, AC1-002 LTF presently does not receive cost allocation for this upgrade. Note: as changes to the interconnection process occur, such as prior queued projects withdrawing from the queue, AC1-002 LTF could receive cost allocation.**
- **Additional AEP-end upgrade: Rebuild 8.6 miles of the AEP owned line and upgrade necessary Dumont terminal equipment (wavetrapped) at a cost of \$20M. PJM Network Upgrade N4790. New AEP-end ratings to be 1409/2045 MVA (SN/SE). Limited by Dumont risers.**
- **Additional AEP-end upgrade: In addition to upgrading the Dumont risers, a different conductor (compared to the prior upgrade) will need to be selected to achieve the desired rating. The new conductor would be 1272 dual ACSR conductor. The additional cost for this work scope is \$2M. The new AEP-end ratings to be 1690/2278 MVA SN/SE (limited by the conductor). PJM Network Upgrade N5064.**

- **Additional AEP-end upgrade:** AEP said it would cost \$4.8M to string a second Stillwell- Dumont 345 kV line on the existing tower. The \$4.8M is for 8.5 miles of the AEP portion. Would need a NIPSCO portion (2.87 miles) cost estimate.
- **MISO end – ratings are 1409/1779 MVA. MISO end upgrade:** Rebuild NIPSCO portion of line (2.87 miles) at a cost of \$6.5M and upgrade Stillwell substation equipment at a cost of \$1.5M. Total cost is \$8.0M. New expected MISO end ratings will be 1582/1898 MVA SN/SE.
- **Additional MISO-end upgrade:** Reconductor 2.87 miles of transmission conductor to bundled 954 ACSS, replace substation conductor to bundled 2500 AL, and replace wavetrap. \$12M. New MISO-end ratings to be 2550/2923 MVA SN/SE.

Estimated Schedule: (1) Sag study : 6 to 12 months. (2) Rebuild. The standard time required for construction differs from state to state. An Approximate construction would be 36 to 48 months after signing an interconnection agreement.

MISO NIPS:

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

10. (MISO NIPS - AEP) The 17STILLWELL-05DUMONT 345 kV line (from bus 255113 to bus 243219 ckt 1) loads from 160.57% to 161.03% (**DC power flow**) of its emergency rating (1409 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_023-65-BT2-3__'. This project contributes approximately 41.66 MW to the thermal violation.

Same as Contribution to Previously Identified #9

11. (MISO NIPS - AEP) The 17STILLWELL-05DUMONT 345 kV line (from bus 255113 to bus 243219 ckt 1) loads from 160.37% to 160.84% (**DC power flow**) of its emergency rating (1409 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_023-65-BT4-5__'. This project contributes approximately 41.48 MW to the thermal violation.

Same as Contribution to Previously Identified #9

12. (MISO NIPS - AEP) The 17STILLWELL-05DUMONT 345 kV line (from bus 255113 to bus 243219 ckt 1) loads from 116.37% to 117.18% (**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 24.97 MW to the thermal violation.

Same as Contribution to Previously Identified #9

13. (CE - AEP) The WILTON ;-05DUMONT 765 kV line (from bus 270644 to bus 243206 ckt 1) loads from 108.46% to 108.83% (**DC power flow**) of its emergency rating (4105 MVA) for the tower line contingency outage of 'COMED_P7_345-L94507_B-S+_345-L97008_R-S'. This project contributes approximately 94.2 MW to the thermal violation.

COMED:

ComEd 765kV L11215 SLD rating is 4802 MVA and the ALDR is 5522 MVA. No upgrade is required.

AEP:

An Engineering study need to be conducted to determine if the relay compliance trip limits settings can be adjusted to mitigate the overload, Estimated Cost: \$25,000. New relay packages will be required if the settings cannot be adjusted, Estimated Cost: \$600,000. An approximate construction time would be 12 months after signing an interconnection agreement.

14. (CE - AEP) The WILTON ; -05DUMONT 765 kV line (from bus 270644 to bus 243206 ckt 1) loads from 105.42% to 105.77% (**DC power flow**) of its emergency rating (4105 MVA) for the tower line contingency outage of 'COMED_P7_641'. This project contributes approximately 92.13 MW to the thermal violation.

Same as Contribution to Previously Identified #13

15. (CE - MISO NIPS) The BURNHAM ; 0R-17MUNSTER 345 kV line (from bus 270677 to bus 255109 ckt 1) loads from 132.15% to 132.6% (**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 34.0 MW to the thermal violation.

COMED:

ComEd 345kV L17703 SLD rating is 1367 MVA and the ALDR is 1572 MVA. The post contingency flow exceeds the rating therefore an upgrade is required. The upgrade will be to mitigate the sag on the line. Upon completion of this upgrade the ratings will be 1201/1479/1768 MVA, SN/SE/SLD. A preliminary estimate for the upgrade will be \$8.6 M with an estimated construction timeline of 20 months.

MISO NIPS:

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

16. (CE - MISO NIPS) The BURNHAM ; 0R-17MUNSTER 345 kV line (from bus 270677 to bus 255109 ckt 1) loads from 131.74% to 132.2% (**DC power flow**) of its emergency rating (1195 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_023-65-BT2-3__'. This project contributes approximately 34.26 MW to the thermal violation.

Same as Contribution to Previously Identified #15

17. (CE - MISO NIPS) The BURNHAM ; 0R-17MUNSTER 345 kV line (from bus 270677 to bus 255109 ckt 1) loads from 131.24% to 131.69% (**DC power flow**) of its emergency rating (1195 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_023-65-BT4-5__'. This project contributes approximately 33.98 MW to the thermal violation.

Same as Contribution to Previously Identified #15

18. (CE - CE) The DRESDEN ; R-ELWOOD ; R 345 kV line (from bus 270717 to bus 270737 ckt 1) loads from 114.52% to 117.62% (**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 48.06 MW to the thermal violation.

COMED:

The post contingency flow for this event exceeds the rating therefore an upgrade is required. A portion of the line will require re-conductoring. Upon completion of this work the ratings will be 1334/1726/2084 MVA, SN/SE/SLD. A preliminary estimate for this upgrade is \$12.4 M with an estimated construction timeline of 24-30 months.

19. (CE - CE) The DRESDEN ; R 345/138 kV transformer (from bus 270717 to bus 275180 ckt 1) loads from 118.66% to 121.23% (**DC power flow**) of its emergency rating (480 MVA) for the single line contingency outage of 'COMED_P1-2_345-L1222__R-S'. This project contributes approximately 12.39 MW to the thermal violation.

COMED:

The post contingency flow exceeds the rating therefore an upgrade is required. ComEd Project Diagram- P.D. 0P180075 (PJM ID B2732.1) will add 2-345kV lines to the 345kV Red Bus at Dresden. Estimated Cost: 25.32 M, Estimated ISD: 06/01/19. Pending PJM modeling for verification, this project may alleviate this post contingency overload.

20. (CE - CE) The ELWOOD ; B-GOODINGS ; 4B 345 kV line (from bus 270736 to bus 270770 ckt 1) loads from 132.68% to 133.88% (**DC power flow**) of its emergency rating (1479 MVA) for the single line contingency outage of 'COMED_P1-2_345-L11622_R-S'. This project contributes approximately 17.27 MW to the thermal violation.

COMED:

The post contingency flow exceeds the rating therefore an upgrade is required. Re-conductor a portion of the line, mitigate sections of the line and replace a 345kV circuit breaker at Goodings Grove so that the new ratings will be 1560/1802/2477 MVA, SN/SE/SLD will clear the overload. A preliminary estimate for this upgrade is \$23.5 M with an estimated construction timeline of 30 months.

21. (CE - CE) The ELWOOD ; B-GOODINGS ; 4B 345 kV line (from bus 270736 to bus 270770 ckt 1) loads from 119.9% to 120.97% (**DC power flow**) of its normal rating (1201 MVA) for non-contingency condition. This project contributes approximately 12.94 MW to the thermal violation.

Same as Contribution to Previously Identified #20

22. (CE - CE) The ELWOOD ; B-GOODINGS ; 4B 345 kV line (from bus 270736 to bus 270770 ckt 1) loads from 111.11% to 112.25% (**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 16.49 MW to the thermal violation.

Same as Contribution to Previously Identified #20

23. (CE - CE) The ELWOOD ; R-GOODINGS ;2R 345 kV line (from bus 270737 to bus 270769 ckt 1) loads from 132.69% to 133.86% (**DC power flow**) of its emergency rating (1479 MVA) for the single line contingency outage of 'COMED_P1-2_345-L11620_B-S'. This project contributes approximately 16.88 MW to the thermal violation.

COMED:

The post contingency flow exceeds the rating therefore an upgrade is required. Re-conductor a portion of the line, mitigate sections of the line and replace a 345kV circuit breaker at Goodings Grove so that the new ratings will be 1560/1802/2477 MVA, SN/SE/SLD will clear the overload. A preliminary estimate for this upgrade is \$23.5 M with an estimated construction timeline of 30 months.

24. (CE - CE) The ELWOOD ; R-GOODINGS ;2R 345 kV line (from bus 270737 to bus 270769 ckt 1) loads from 116.96% to 118.02% (**DC power flow**) of its normal rating (1201 MVA) for non-contingency condition. This project contributes approximately 12.39 MW to the thermal violation.

Same as Contribution to Previously Identified #23

25. (CE - CE) The ELWOOD ; R-GOODINGS ;2R 345 kV line (from bus 270737 to bus 270769 ckt 1) loads from 111.39% to 112.49% (**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 15.97 MW to the thermal violation.

Same as Contribution to Previously Identified #23

26. (CE - AEP) The GREENACRE; T-05OLIVE 345 kV line (from bus 270771 to bus 243229 ckt 1) loads from 112.08% to 112.46% (**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 23.19 MW to the thermal violation.

COMED:

ComEd 345Kv L6615 SLD & ALDR ratings are 2070 MVA & 2381 MVA. No upgrade required.

AEP:

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

(2) This is a CE -AEP tie line , therefore PJM will have to coordinate this upgrade with CE as well as to make sure their equipment will not set a limit lower than what is specified here.

(3) Replace olive line risers , estimated cost :\$ 100,000.

Estimated Time: (1) Sag study : 6 to 12 months. (2) Rebuild. The standard time required for construction differs from state to state. An Approximate construction would be 24 to 36 months after signing an interconnection agreement.

27. (CE - AEP) The GREENACRE; T-05OLIVE 345 kV line (from bus 270771 to bus 243229 ckt 1) loads from 110.73% to 111.12% (**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 23.39 MW to the thermal violation.

Same as Contribution to Previously Identified #26

28. (CE - AEP) The GREENACRE; T-05OLIVE 345 kV line (from bus 270771 to bus 243229 ckt 1) loads from 110.72% to 111.1% (**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 23.32 MW to the thermal violation.

Same as Contribution to Previously Identified #26

29. (CE - MISO AMIL) The KINCAID ; B-7AUSTIN 345 kV line (from bus 270796 to bus 347955 ckt 1) loads from 101.2% to 102.02% (**DC power flow**) of its emergency rating (956 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_080-45-BT4-5__'. This project contributes approximately 16.42 MW to the thermal violation.

COMED:

ComEd 345kV L2106 SLD & ALDR ratings are 1805 MVA & 2077 MVA. No upgrade required.

MISO AMIL:

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

30. (CE - MISO NIPS) The ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 111.02% to 111.4% (**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 25.34 MW to the thermal violation.

COMED:

ComEd 345Kv L6617 SLD & ALDR ratings are 1237 MVA & 1423 MVA. No upgrade is required.

MISO NIPS:

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

31. (CE - MISO NIPS) The ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 110.27% to 110.65% (**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 25.48 MW to the thermal violation.

Same as Contribution to Previously Identified #30

32. (CE - MISO NIPS) The ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 110.26% to 110.64% (**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 25.48 MW to the thermal violation.

Same as Contribution to Previously Identified #30

33. (CE - MISO NIPS) The ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 110.18% to 110.56% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_023-65-BT4-5__'. This project contributes approximately 25.44 MW to the thermal violation.

Same as Contribution to Previously Identified #30

34. (CE - CE) The WILTON ; B-WILTON ;3M 345 kV line (from bus 270926 to bus 275232 ckt 1) loads from 145.25% to 145.83% (**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 46.23 MW to the thermal violation.

COMED:

ComEd post contingency facility overloaded by this event is Tr. 93 @ Station 112 Wilton Center. The upgrade will be to build out the 765kV ring bus at Wilton Center, installation of two 765 kV Bus Tie Circuit Breakers (BT 6-8 & 8-2) along with a relocation of 765kV L11216 from bus 6 to bus 8. Preliminary estimate for upgrade is \$8M with an estimated construction time line of 24 months. Note, the rating for Tr. 93 at Wilton Center will remain current however with this upgrade the 112-65-BT5-6 contingency file will no longer include the Wilton Center Tr. 94 and will allow both transformers to remain in service eliminating the overload.

35. (CE - CE) The WILTON ; R-WILTON ;4M 345 kV line (from bus 270927 to bus 275233 ckt 1) loads from 148.32% to 148.92% (**DC power flow**) of its load dump rating (1379 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT2-3__'. This project contributes approximately 47.19 MW to the thermal violation.

COMED:

ComEd TSS 112 Tr. 94 SLD & ALDR ratings are 1601 MVA & 1841 MVA. The post contingency flow for this event exceeds the ratings therefore an upgrade is required. The proposed upgrade will be to install a third transformer at Wilton Center. Upgrades include expansion on the 765kV & 345kV buses at Wilton Center. The preliminary estimate for this upgrade is \$15.2M with a preliminary construction time line of 24-30 months

36. (CE - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line (from bus 274750 to bus 255112 ckt 1) loads from 128.4% to 128.81% (**DC power flow**) of its emergency rating (1399 MVA) for the line fault with failed breaker contingency outage of 'AEP_P4_#2978_05DUMONT 765'. This project contributes approximately 35.23 MW to the thermal violation.

COMED:

ComEd 345kV L94507 SLD is 1674 MVA & ALDR is 1925 MVA. No upgrade required.

MISO NIPS:

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

37. (CE - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line (from bus 274750 to bus 255112 ckt 1) loads from 128.01% to 128.42% (**DC power flow**) of its emergency rating (1399 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT4-5__'. This project contributes approximately 35.38 MW to the thermal violation.

Same as Contribution to Previously Identified #36

38. (CE - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line (from bus 274750 to bus 255112 ckt 1) loads from 127.98% to 128.4% (**DC power flow**) of its emergency rating (1399 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT3-4__'. This project contributes approximately 35.38 MW to the thermal violation.

Same as Contribution to Previously Identified #36

39. (CE - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line (from bus 274750 to bus 255112 ckt 1) loads from 127.78% to 128.2% (**DC power flow**) of its emergency rating (1399 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_023-65-BT4-5__'. This project contributes approximately 35.34 MW to the thermal violation.

Same as Contribution to Previously Identified #36

40. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 134.73% to 135.19% (**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 28.05 MW to the thermal violation.

COMED:

ComEd 345kV L97008 SLD is 1237 MVA and the ALDR is 1423 MVA. No upgrade required.

AEP:

(1) The 40.64 mile section of line will have to reconducted/rebuilt to mitigate the overload. Estimated Cost is \$80.42 million.

(2) This is a CE -AEP tie line , therefore PJM is going to coordinate this upgrade with CE as well as to make sure that this equipment will not set a limit lower than what is specified here.

(3) Replace the Olive switches to line risers , estimated cost :100,000.

(4) An Engineering study need to be conducted to determine if the relay compliance trip limits settings can be adjusted to mitigate the overload, Estimated Cost: \$25,000. New relay packages will be required if the settings cannot be adjusted, Estimated cost: \$600,000.

Estimated Schedule: An Approximate construction time would be 24 to 36 months after signing an interconnection agreement.

41. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 133.69% to 134.15% (**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 28.22 MW to the thermal violation.

Same as Contribution to Previously Identified #40

42. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 133.68% to 134.15% (**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 28.22 MW to the thermal violation.

Same as Contribution to Previously Identified #40

43. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 133.58% to 134.04% (**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 28.23 MW to the thermal violation.

Same as Contribution to Previously Identified #40

44. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 107.55% to 108.37% (**DC power flow**) of its normal rating (971 MVA) for the single line contingency outage of 'COMED_P1-2_695_B2'. This project contributes approximately 16.93 MW to the thermal violation.

Same as Contribution to Previously Identified #40

45. (CE - CE) The DRESDEN ;3M-DRESDEN ; B 138 kV line (from bus 275180 to bus 271336 ckt 1) loads from 118.62% to 121.19% (**DC power flow**) of its emergency rating (480 MVA) for the single line contingency outage of 'COMED_P1-2_345-L1222__R-S'. This project contributes approximately 12.39 MW to the thermal violation.

COMED:

The post contingency flow for this event exceeds the rating. Therefore an upgrade is required. The resolution is a ComEd proposed plan for a cutover 345kV L93505 from TSS 935 Kendall to Dresden Station Bus 12. The plan would include a 345kV bus extension at Dresden. Upon completion of this work the preliminary estimate is \$16M with a timeline of 24-30 months.

46. (CE - CE) The DRESDEN ;3M-DRESDEN ; B 138 kV line (from bus 275180 to bus 271336 ckt 1) loads from 110.54% to 112.48% (**DC power flow**) of its load dump rating (480 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_900-45-BT2-3__'. This project contributes approximately 20.63 MW to the thermal violation.

Same as Contribution to Previously Identified #45

47. (CE - CE) The WILTON ; 765/345 kV transformer (from bus 275232 to bus 270644 ckt 1) loads from 145.25% to 145.83% (**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 46.23 MW to the thermal violation.

Same as Contribution to Previously Identified #34

48. (CE - CE) The WILTON ; 765/345 kV transformer (from bus 275233 to bus 270644 ckt 1) loads from 148.32% to 148.92% (**DC power flow**) of its load dump rating (1379 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT2-3__'. This project contributes approximately 47.19 MW to the thermal violation.

Same as Contribution to Previously Identified #35

49. (MISO AMIL - AEP) The 7CASEY-05SULLIVAN 345 kV line (from bus 346809 to bus 247712 ckt 1) loads from 126.48% to 127.23% (**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 23.95 MW to the thermal violation.

AEP:

(1) This is a MISO AMIL -AEP tie line , therefore PJM is going to coordinate this upgrade with MISO AMIL as well as to make sure that this equipment will not set a limit lower than what is specified here.

(2) 0.6 miles of conductor will be rebuild/reconductored, estimated cost: \$1.2 million

(3) 0.22 miles of conductor will be rebuild/reconductored, estimated cost: \$440,000

(4) 1.44 miles of conductor will be rebuild/reconducted, estimated cost: \$2.88 million

Estimated Schedule: An Approximate construction time would be 24 to 36 months after signing an interconnection agreement.

MISO AMIL:

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

Light Load Load Flow Analysis Reinforcements

New System Reinforcements

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

None

Contribution to Previously Identified System Reinforcements

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

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

None

Secondary Point of Interconnection (Option-2)

Under this option, the IC (IC) AD1-133, a 300MW solar facility, proposes to be interconnected with the ComEd transmission system by tying into the Loretto-Wilton Center 345kV Line 11212.

Attachment Facilities

The IC AD1-133 generator lead would 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 cost for the attachment facilities is estimated at \$1.0M.

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)	\$ 1,000,000

Direct Connection Network Upgrades

In order to accommodate interconnection of AD1-133, a new 345kV Interconnection Substation would need to be built close to the Loretto-Wilton Center 345kV Line 11212 approximately 26 miles from the Wilton Center substation.

The scope of work includes the installation of three 345kV circuit breakers in a “breaker-and-a-half” bus configuration and cutting in the Interconnection Substation to the Loretto-Wilton Center 345kV Line 11212, as shown in the one line diagram below.

The IC is responsible for constructing all of the facilities on the IC side of the point of interconnection outside of the substation. It is assumed for the purposes of this report that the IC will obtain the site for the Interconnection Substation and right-of-way between the Interconnection Substation and the 345kV transmission line.

In the event that the IC exercises the option to build the interconnecting substation, the IC will be required to construct all interconnection facilities that will be turned over to ComEd in accordance with ComEd published standards and the PJM Tariff.

ComEd would design, engineer and construct the tie in of the Interconnection Substation to the Loretto-Wilton Center 345kV Line 11212.

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

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

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

Non-Direct Connection Network Upgrades

The integration of the new 345kV Interconnection Substation would require relay/communications/SCADA upgrades at Wilton Center TSS 112 and TSS 93 Loretto. The ComEd cost is given below:

Scope of Work	Cost Estimate
Relay/communications/SCADA upgrades at Wilton Center TSS 112	\$ 1,000,000
Relay/communications/SCADA upgrades at TSS 93 Loretto	\$ 1,000,000
Total Cost Estimate (see notes below on cost estimate)	\$ 2,000,000

Notes on Cost Estimate:

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

**AD1-133
SECONDARY POI OPTION**

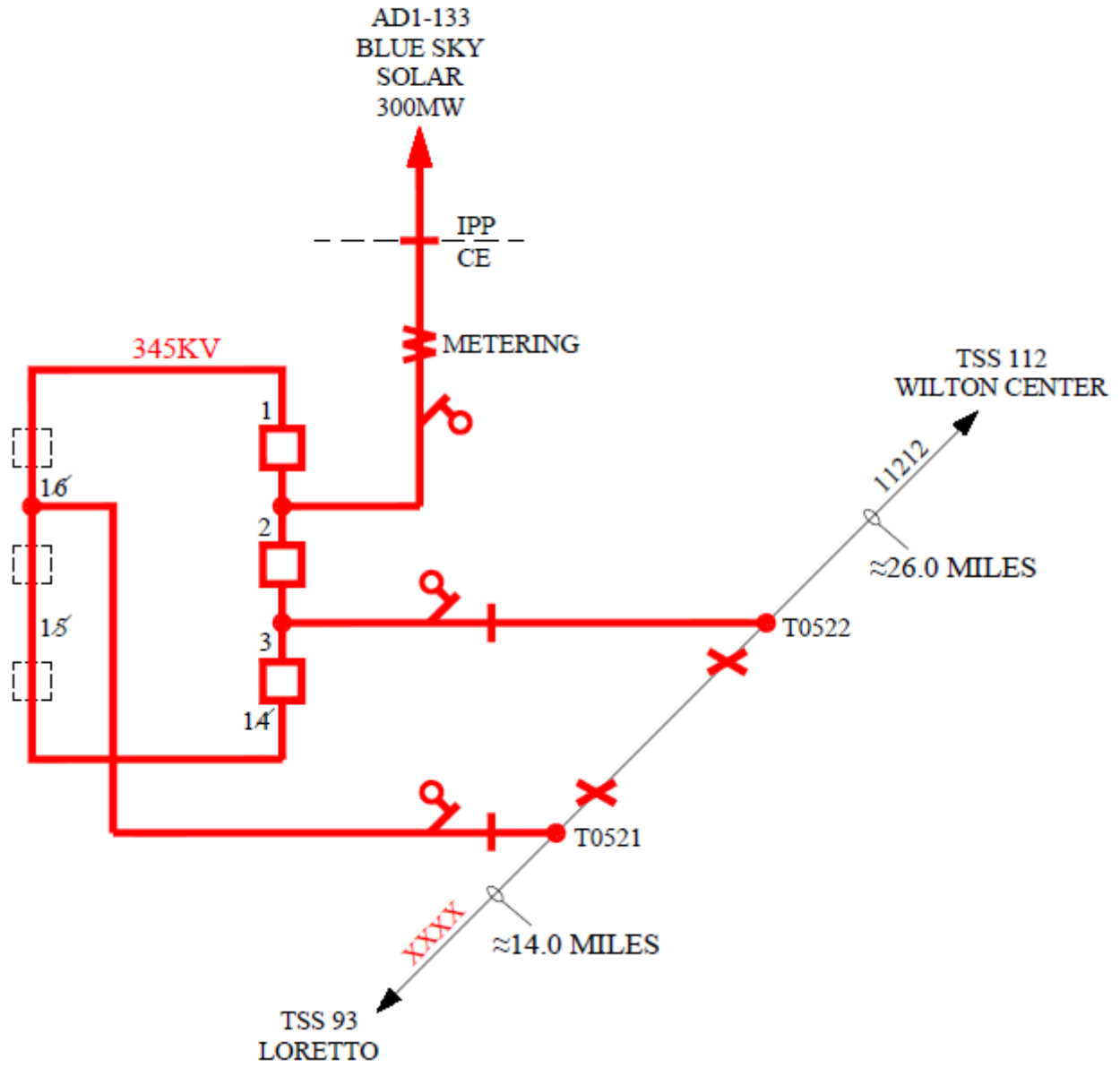


Figure 2. Single Line Diagram for Option 2

Network Impacts for Secondary POI

The Queue Project AD1-133 was evaluated as a 300.0 MW (Capacity 180.0 MW) injection tapping Loretto; B to Wilton; B 345kV line in the ComEd area. AD1-133 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AD1-133 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)

1. (CE - CE) The WILTON ; B-WILTON ;3M 345 kV line (from bus 270926 to bus 275232 ckt 1) loads from 99.38% to 107.79% (**DC power flow**) of its load dump rating (1601 MVA) for the tower line contingency outage of 'COMED_P7_345-L11613AB-S+_345-L11614AR-S'. This project contributes approximately 138.58 MW to the thermal violation.

```
CONTINGENCY 'COMED_P7_345-L11613AB-S+_345-L11614AR-S'  
TRIP BRANCH FROM BUS 270666 TO BUS 270664 CKT 1 / B ISL;BT 345 B ISL; B 345  
TRIP BRANCH FROM BUS 270666 TO BUS 270926 CKT 1 / B ISL;BT 345 WILTO; B 345  
TRIP BRANCH FROM BUS 270667 TO BUS 270665 CKT 1 / B ISL;RT 345 B ISL; R 345  
TRIP BRANCH FROM BUS 270667 TO BUS 270927 CKT 1 / B ISL;RT 345 WILTO; R 345  
TRIP BRANCH FROM BUS 270769 TO BUS 270667 CKT 1 / GOODI;2R 345 B ISL;RT 345  
TRIP BRANCH FROM BUS 270770 TO BUS 270666 CKT 1 / GOODI;4B 345 B ISL;BT 345  
TRIP BRANCH FROM BUS 270926 TO BUS 270927 CKT 1 / WILTO; B 345 WILTO; R 345  
END
```

2. (CE - CE) The WILTON ; R-BLUE ISL ;RT 345 kV line (from bus 270927 to bus 270667 ckt 1) loads from 99.75% to 101.81% (**DC power flow**) of its load dump rating (1479 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_076-45-BT4-5__'. This project contributes approximately 68.21 MW to the thermal violation.

```
CONTINGENCY 'COMED_P4_076-45-BT4-5__'  
TRIP BRANCH FROM BUS 270664 TO BUS 275162 CKT 1 / B ISL; B 345 B ISL;3M 138  
TRIP BRANCH FROM BUS 270674 TO BUS 270664 CKT 1 / BURNH; B 345 B ISL; B 345  
TRIP BRANCH FROM BUS 275162 TO BUS 271100 CKT 1 / B ISL;3M 138 B ISL; B 138  
TRIP BRANCH FROM BUS 275262 TO BUS 275162 CKT 1 / B ISL;3C 34.5 B ISL;3M 138  
TRIP BRANCH FROM BUS 270664 TO BUS 275181 CKT 1 / B ISL; B 345 B ISL;4M 138  
TRIP BRANCH FROM BUS 270666 TO BUS 270664 CKT 1 / B ISL;BT 345 B ISL; B 345  
TRIP BRANCH FROM BUS 270666 TO BUS 270926 CKT 1 / B ISL;BT 345 WILTO; B 345  
TRIP BRANCH FROM BUS 270770 TO BUS 270666 CKT 1 / GOODI;4B 345 B ISL;BT 345  
TRIP BRANCH FROM BUS 275181 TO BUS 271100 CKT 1 / B ISL;4M 138 B ISL; B 138  
TRIP BRANCH FROM BUS 275281 TO BUS 275181 CKT 1 / B ISL;4C 34.5 B ISL;4M 138  
END
```

3. (CE - CE) The WILTON ; 765/345 kV transformer (from bus 275232 to bus 270644 ckt 1) loads from 96.61% to 105.27% (**DC power flow**) of its load dump rating (1601 MVA) for the tower line contingency outage of 'COMED_P7_345-L11613AB-S+_345-L11614AR-S'. This project contributes approximately 138.58 MW to the thermal violation.

```
CONTINGENCY 'COMED_P7_345-L11613AB-S+_345-L11614AR-S'
TRIP BRANCH FROM BUS 270666 TO BUS 270664 CKT 1 / B ISL;BT 345 B ISL; B 345
TRIP BRANCH FROM BUS 270666 TO BUS 270926 CKT 1 / B ISL;BT 345 WILTO; B 345
TRIP BRANCH FROM BUS 270667 TO BUS 270665 CKT 1 / B ISL;RT 345 B ISL; R 345
TRIP BRANCH FROM BUS 270667 TO BUS 270927 CKT 1 / B ISL;RT 345 WILTO; R 345
TRIP BRANCH FROM BUS 270769 TO BUS 270667 CKT 1 / GOODI;2R 345 B ISL;RT 345
TRIP BRANCH FROM BUS 270770 TO BUS 270666 CKT 1 / GOODI;4B 345 B ISL;BT 345
TRIP BRANCH FROM BUS 270926 TO BUS 270927 CKT 1 / WILTO; B 345 WILTO; R 345
END
```

Contribution to Previously Identified Overloads

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

1. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line (from bus 247610 to bus 243219 ckt 2) loads from 122.73% to 123.13% (**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 20.68 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. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line (from bus 247610 to bus 243219 ckt 2) loads from 113.78% to 114.01% (**DC power flow**) of its emergency rating (1409 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT4-5__'. This project contributes approximately 22.06 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
```

3. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line (from bus 247610 to bus 243219 ckt 2) loads from 113.77% to 114.01% (**DC power flow**) of its emergency rating (1409 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-65-BT3-4__'. This project contributes approximately 22.06 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

4. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line (from bus 247610 to bus 243219 ckt 2) loads from 113.71% to 113.94% (**DC power flow**) of its emergency rating (1409 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_023-65-BT4-5__'. This project contributes approximately 22.1 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
```

5. (MISO NIPS - AEP) The 17STILLWELL-05DUMONT 345 kV line (from bus 255113 to bus 243219 ckt 1) loads from 163.72% to 164.21% (**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 42.65 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. (MISO NIPS - AEP) The 17STILLWELL-05DUMONT 345 kV line (from bus 255113 to bus 243219 ckt 1) loads from 160.46% to 160.97% (**DC power flow**) of its emergency rating (1409 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_023-65-BT2-3__'. This project contributes approximately 43.57 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
```

7. (MISO NIPS - AEP) The 17STILLWELL-05DUMONT 345 kV line (from bus 255113 to bus 243219 ckt 1) loads from 160.44% to 160.95% (**DC power flow**) of its emergency rating (1409 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_023-65-BT4-5__'. This project contributes approximately 43.63 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
```

8. (MISO NIPS - AEP) The 17STILLWELL-05DUMONT 345 kV line (from bus 255113 to bus 243219 ckt 1) loads from 116.19% to 117.02% (**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 26.12 MW to the thermal violation.

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

9. (CE - MISO NIPS) The BURNHAM ;0R-17MUNSTER 345 kV line (from bus 270677 to bus 255109 ckt 1) loads from 132.62% to 133.16% (**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 37.53 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 3 for a table containing the generators having contribution to this flowgate.

10. (CE - MISO NIPS) The BURNHAM ;0R-17MUNSTER 345 kV line (from bus 270677 to bus 255109 ckt 1) loads from 132.24% to 132.79% (**DC power flow**) of its emergency rating (1195 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_023-65-BT2-3__'. This project contributes approximately 38.08 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 BURNHAM ;0R-17MUNSTER 345 kV line (from bus 270677 to bus 255109 ckt 1) loads from 131.74% to 132.28% (**DC power flow**) of its emergency rating (1195 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_023-65-BT4-5__'. This project contributes approximately 37.87 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

12. (CE - CE) The GOODINGS ;4B-GOODINGS ;3B 345 kV line (from bus 270770 to bus 270766 ckt 1) loads from 132.54% to 133.24% (**DC power flow**) of its load dump rating (1802 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_116-45-L11614_'. This project contributes approximately 27.35 MW to the thermal violation.

CONTINGENCY 'COMED_P4_116-45-L11614_'
TRIP BRANCH FROM BUS 270667 TO BUS 270665 CKT 1 / B ISL;RT 345 B ISL; R 345
TRIP BRANCH FROM BUS 270667 TO BUS 270927 CKT 1 / B ISL;RT 345 WILTO; R 345
TRIP BRANCH FROM BUS 270769 TO BUS 270667 CKT 1 / GOODI;2R 345 B ISL;RT 345
DISCONNECT BUS 270769 / GOODI;2R 345
END

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

13. (CE - CE) The GOODINGS ;4B-GOODINGS ;3B 345 kV line (from bus 270770 to bus 270766 ckt 1) loads from 102.49% to 102.98% (**DC power flow**) of its emergency rating (1802 MVA) for the single line contingency outage of 'COMED_P1-2_695_B2'. This project contributes approximately 18.91 MW to the thermal violation.

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

14. (CE - CE) The PONTIAC ; R-DRESDEN ; R 345 kV line (from bus 270853 to bus 270717 ckt 1) loads from 104.32% to 109.82% (**DC power flow**) of its emergency rating (1528 MVA) for the single line contingency outage of 'COMED_P1-2_345-L11212_B-S-A'. This project contributes approximately 83.8 MW to the thermal violation.

```
CONTINGENCY 'COMED_P1-2_345-L11212_B-S-A'  
TRIP BRANCH FROM BUS 270926 TO BUS 935000 CKT 1 / WILTO; B 345 AD1-133 TAP 345  
END
```

Please refer to Appendix 5 for a table containing the generators having contribution to this flowgate.

15. (CE - CE) The WILTON ; B-BLUE ISL ;BT 345 kV line (from bus 270926 to bus 270666 ckt 1) loads from 111.14% to 113.63% (**DC power flow**) of its load dump rating (1479 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-45-BT6-7__'. This project contributes approximately 82.25 MW to the thermal violation.

```
CONTINGENCY 'COMED_P4_112-45-BT6-7__'  
TRIP BRANCH FROM BUS 270667 TO BUS 270665 CKT 1 / B ISL;RT 345 B ISL; R 345  
TRIP BRANCH FROM BUS 270667 TO BUS 270927 CKT 1 / B ISL;RT 345 WILTO; R 345  
TRIP BRANCH FROM BUS 270769 TO BUS 270667 CKT 1 / GOODI;2R 345 B ISL;RT 345  
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 6 for a table containing the generators having contribution to this flowgate.

16. (CE - CE) The WILTON ; B-BLUE ISL ;BT 345 kV line (from bus 270926 to bus 270666 ckt 1) loads from 110.85% to 112.82% (**DC power flow**) of its load dump rating (1479 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_116-45-L11614_'. This project contributes approximately 65.03 MW to the thermal violation.

```
CONTINGENCY 'COMED_P4_116-45-L11614_'  
TRIP BRANCH FROM BUS 270667 TO BUS 270665 CKT 1 / B ISL;RT 345 B ISL; R 345  
TRIP BRANCH FROM BUS 270667 TO BUS 270927 CKT 1 / B ISL;RT 345 WILTO; R 345  
TRIP BRANCH FROM BUS 270769 TO BUS 270667 CKT 1 / GOODI;2R 345 B ISL;RT 345  
DISCONNECT BUS 270769 / GOODI;2R 345  
END
```

17. (CE - CE) The WILTON ; B-BLUE ISL ;BT 345 kV line (from bus 270926 to bus 270666 ckt 1) loads from 110.53% to 112.65% (**DC power flow**) of its load dump rating (1479 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_023-65-BT2-3__'. This project contributes approximately 69.55 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

18. (CE - CE) The WILTON ; B-BLUE ISL ;BT 345 kV line (from bus 270926 to bus 270666 ckt 1) loads from 107.95% to 109.92% (**DC power flow**) of its load dump rating (1479 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_076-45-BT1-2__'. This project contributes approximately 64.96 MW to the thermal violation.

CONTINGENCY 'COMED_P4_076-45-BT1-2__'
TRIP BRANCH FROM BUS 270665 TO BUS 275160 CKT 1 / B ISL; R 345 B ISL;1M 138
TRIP BRANCH FROM BUS 270677 TO BUS 270665 CKT 1 / BURNH;0R 345 B ISL; R 345
TRIP BRANCH FROM BUS 275160 TO BUS 271101 CKT 1 / B ISL;1M 138 B ISL;1R 138
TRIP BRANCH FROM BUS 275260 TO BUS 275160 CKT 1 / B ISL;1C 34.5 B ISL;1M 138
TRIP BRANCH FROM BUS 270665 TO BUS 275161 CKT 1 / B ISL; R 345 B ISL;2M 138
TRIP BRANCH FROM BUS 270667 TO BUS 270665 CKT 1 / B ISL;RT 345 B ISL; R 345
TRIP BRANCH FROM BUS 270667 TO BUS 270927 CKT 1 / B ISL;RT 345 WILTO; R 345
TRIP BRANCH FROM BUS 270769 TO BUS 270667 CKT 1 / GOODI;2R 345 B ISL;RT 345
TRIP BRANCH FROM BUS 275161 TO BUS 271103 CKT 1 / B ISL;2M 138 B ISL;2R 138
TRIP BRANCH FROM BUS 275261 TO BUS 275161 CKT 1 / B ISL;2C 34.5 B ISL;2M 138
END

19. (CE - CE) The WILTON ; B-WILTON ;3M 345 kV line (from bus 270926 to bus 275232 ckt 1) loads from 152.95% to 154.3% (**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 75.23 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.

20. (CE - CE) The WILTON ; R-BLUE ISL ;RT 345 kV line (from bus 270927 to bus 270667 ckt 1) loads from 104.22% to 106.55% (**DC power flow**) of its load dump rating (1479 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_023-65-BT2-3__'. This project contributes approximately 75.5 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

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

21. (CE - CE) The WILTON ; R-BLUE ISL ;RT 345 kV line (from bus 270927 to bus 270667 ckt 1) loads from 102.36% to 104.44% (**DC power flow**) of its load dump rating (1479 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_116-45-L11613_'. This project contributes approximately 68.47 MW to the thermal violation.

```
CONTINGENCY 'COMED_P4_116-45-L11613_'
TRIP BRANCH FROM BUS 270666 TO BUS 270664 CKT 1 / B ISL;BT 345 B ISL; B 345
TRIP BRANCH FROM BUS 270666 TO BUS 270926 CKT 1 / B ISL;BT 345 WILTO; B 345
TRIP BRANCH FROM BUS 270770 TO BUS 270666 CKT 1 / GOODI;4B 345 B ISL;BT 345
DISCONNECT BUS 270770 / GOODI;4B 345
END
```

22. (CE - CE) The WILTON ; R-BLUE ISL ;RT 345 kV line (from bus 270927 to bus 270667 ckt 1) loads from 100.64% to 103.31% (**DC power flow**) of its load dump rating (1479 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_112-45-BT3-4__'. This project contributes approximately 87.23 MW to the thermal violation.

```
CONTINGENCY 'COMED_P4_112-45-BT3-4__'
TRIP BRANCH FROM BUS 270666 TO BUS 270664 CKT 1 / B ISL;BT 345 B ISL; B 345
TRIP BRANCH FROM BUS 270666 TO BUS 270926 CKT 1 / B ISL;BT 345 WILTO; B 345
TRIP BRANCH FROM BUS 270770 TO BUS 270666 CKT 1 / GOODI;4B 345 B ISL;BT 345
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
```

23. (CE - CE) The WILTON ; R-WILTON ;4M 345 kV line (from bus 270927 to bus 275233 ckt 1) loads from 149.61% to 150.97% (**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 76.61 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 9 for a table containing the generators having contribution to this flowgate.

24. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 107.58% to 108.38% (**DC power flow**) of its normal rating (971 MVA) for the single line contingency outage of 'COMED_P1-2_695_B2'. This project contributes approximately 16.56 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
```

25. (CE - CE) The WILTON ; 765/345 kV transformer (from bus 275232 to bus 270644 ckt 1) loads from 152.95% to 154.3% (**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 75.23 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 10 for a table containing the generators having contribution to this flowgate.

26. (CE - CE) The WILTON ; 765/345 kV transformer (from bus 275233 to bus 270644 ckt 1) loads from 149.6% to 150.96% (**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 76.61 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 11 for a table containing the generators having contribution to this flowgate.

27. (MISO AMIL - AEP) The 7CASEY-05SULLIVAN 345 kV line (from bus 346809 to bus 247712 ckt 1) loads from 127.61% to 128.28% (**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 21.17 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
```

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

28. (CE - CE) The AD1-133 TAP-WILTON ; B 345 kV line (from bus 935000 to bus 270926 ckt 1) loads from 151.08% to 164.74% (**DC power flow**) of its load dump rating (1528 MVA) for the line fault with failed breaker contingency outage of 'COMED_P4_012-45-BT11-14'. This project contributes approximately 208.78 MW to the thermal violation.

```
CONTINGENCY 'COMED_P4_012-45-BT11-14'
TRIP BRANCH FROM BUS 270717 TO BUS 270737 CKT 1 / DRESDEN ; R 345 ELWOOD ; R 345
TRIP BRANCH FROM BUS 270853 TO BUS 270717 CKT 1 / PONTIAC ; R 345 DRESDEN ; R 345
TRIP BRANCH FROM BUS 275210 TO BUS 270853 CKT 1 / PONTIAC ;2M 138 PONTIAC ; R 345
TRIP BRANCH FROM BUS 275210 TO BUS 272261 CKT 1 / PONTIAC ;2M 138 PONTIAC ; R 138
TRIP BRANCH FROM BUS 275210 TO BUS 275310 CKT 1 / PONTIAC ;2M 138 PONTIAC ;2C 34.5
CLOSE BRANCH FROM BUS 272260 TO BUS 272261 CKT 1 / PONTIAC ; B 138 PONTIAC ; R 138
END
```

Please refer to Appendix 13 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)

No issues identified.

Affected System Analysis & Mitigation

MISO Impacts:

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

Delivery of Energy Portion of Interconnection Request

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

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

1. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line (from bus 247610 to bus 243219 ckt 2) loads from 113.7% to 113.94% (**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 22.11 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 160.4% to 160.91% (**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 43.53 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. (CE - AEP) The WILTON ; -05DUMONT 765 kV line (from bus 270644 to bus 243206 ckt 1) loads from 101.76% to 102.23% (**DC power flow**) of its normal rating (4105 MVA) for the single line contingency outage of 'COMED_P1-2_697_B2'. This project contributes approximately 102.61 MW to the thermal violation.

CONTINGENCY 'COMED_P1-2_697_B2'
OPEN BRANCH FROM BUS 243229 TO BUS 274804 CKT 1 / 243229 05OLIVE 345 274804 UPNOR;RP 345 1
END

4. (CE - CE) The BLUE ISL ; RT-BLUE ISL ; R 345 kV line (from bus 270667 to bus 270665 ckt 1) loads from 104.86% to 105.93% (**DC power flow**) of its emergency rating (1479 MVA) for the single line contingency outage of 'COMED_P1-2_695_B2'. This project contributes approximately 37.49 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

5. (CE - MISO NIPS) The BURNHAM ; 0R-17MUNSTER 345 kV line (from bus 270677 to bus 255109 ckt 1) loads from 131.68% to 132.22% (**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 37.71 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 COLLINS ; R-COLLINS ; 2M 345 kV line (from bus 270697 to bus 275168 ckt 1) loads from 100.5% to 101.5% (**DC power flow**) of its emergency rating (1379 MVA) for the single line contingency outage of 'COMED_P1-2_345-L11212_B-S-A'. This project contributes approximately 29.37 MW to the thermal violation.

CONTINGENCY 'COMED_P1-2_345-L11212_B-S-A'
TRIP BRANCH FROM BUS 270926 TO BUS 935000 CKT 1 / WILTO; B 345 AD1-133 TAP 345
END

7. (CE - CE) The DRESDEN ; R-ELWOOD ; R 345 kV line (from bus 270717 to bus 270737 ckt 1) loads from 106.37% to 109.78% (**DC power flow**) of its emergency rating (1479 MVA) for the single line contingency outage of 'COMED_P1-2_345-L11212_B-S-A'. This project contributes approximately 50.37 MW to the thermal violation.

CONTINGENCY 'COMED_P1-2_345-L11212_B-S-A'
TRIP BRANCH FROM BUS 270926 TO BUS 935000 CKT 1 / WILTO; B 345 AD1-133 TAP 345
END

8. (CE - CE) The GOODINGS ; 4B-GOODINGS ; 3B 345 kV line (from bus 270770 to bus 270766 ckt 1) loads from 123.3% to 124.1% (**DC power flow**) of its emergency rating (1802 MVA) for the single line contingency outage of 'COMED_P1-2_695_B2'. This project contributes approximately 31.51 MW to the thermal violation.

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

9. (CE - CE) The GOODINGS ;4B-GOODINGS ;3B 345 kV line (from bus 270770 to bus 270766 ckt 1) loads from 104.19% to 104.86% (**DC power flow**) of its normal rating (1560 MVA) for non-contingency condition. This project contributes approximately 19.19 MW to the thermal violation.

10. (CE - AEP) The GREENACRE; T-05OLIVE 345 kV line (from bus 270771 to bus 243229 ckt 1) loads from 110.66% to 111.05% (**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 23.93 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

11. (CE - CE) The PONTIAC ; R-DRESDEN ; R 345 kV line (from bus 270853 to bus 270717 ckt 1) loads from 155.16% to 164.32% (**DC power flow**) of its emergency rating (1528 MVA) for the single line contingency outage of 'COMED_P1-2_345-L11212_B-S-A'. This project contributes approximately 139.66 MW to the thermal violation.

CONTINGENCY 'COMED_P1-2_345-L11212_B-S-A'
TRIP BRANCH FROM BUS 270926 TO BUS 935000 CKT 1 / WILTO; B 345 AD1-133 TAP 345
END

12. (CE - CE) The PONTIAC ; R-DRESDEN ; R 345 kV line (from bus 270853 to bus 270717 ckt 1) loads from 116.82% to 119.71% (**DC power flow**) of its normal rating (1334 MVA) for non-contingency condition. This project contributes approximately 38.44 MW to the thermal violation.

13. (CE - CE) The WILTON ; B-BLUE ISL ;BT 345 kV line (from bus 270926 to bus 270666 ckt 1) loads from 107.59% to 109.55% (**DC power flow**) of its emergency rating (1479 MVA) for the single line contingency outage of 'COMED_P1-2_345-L11614AR-S'. This project contributes approximately 65.03 MW to the thermal violation.

CONTINGENCY 'COMED_P1-2_345-L11614AR-S'
TRIP BRANCH FROM BUS 270667 TO BUS 270665 CKT 1 / B ISL;RT 345 B ISL; R 345
TRIP BRANCH FROM BUS 270667 TO BUS 270927 CKT 1 / B ISL;RT 345 WILTO; R 345
TRIP BRANCH FROM BUS 270769 TO BUS 270667 CKT 1 / GOODI;2R 345 B ISL;RT 345
END

14. (CE - CE) The WILTON ; R-BLUE ISL ;RT 345 kV line (from bus 270927 to bus 270667 ckt 1) loads from 99.55% to 101.62% (**DC power flow**) of its emergency rating (1479 MVA) for the single line contingency outage of 'COMED_P1-2_345-L11613AB-S'. This project contributes approximately 68.24 MW to the thermal violation.

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

15. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 133.2% to 133.74% (**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 27.61 MW to the thermal violation.

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

16. (MISO AMIL - AEP) The 7CASEY-05SULLIVAN 345 kV line (from bus 346809 to bus 247712 ckt 1) loads from 123.75% to 124.56% (**DC power flow**) of its normal rating (1451 MVA) for the single line contingency outage of 'AEP_P1-2_#286'. This project contributes approximately 21.56 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

17. (MISO AMIL - AEP) The 7CASEY-05SULLIVAN 345 kV line (from bus 346809 to bus 247712 ckt 1) loads from 105.82% to 106.35% (**DC power flow**) of its normal rating (1451 MVA) for non-contingency condition. This project contributes approximately 16.82 MW to the thermal violation.

18. (CE - CE) The AD1-133 TAP-WILTON ; B 345 kV line (from bus 935000 to bus 270926 ckt 1) loads from 150.98% to 164.63% (**DC power flow**) of its emergency rating (1528 MVA) for the single line contingency outage of 'COMED_P1-2_345-L8014_T_-S'. This project contributes approximately 208.8 MW to the thermal violation.

CONTINGENCY 'COMED_P1-2_345-L8014_T_-S'
TRIP BRANCH FROM BUS 270853 TO BUS 270717 CKT 1 / PONTIAC ; R 345 DRESDEN ; R 345
TRIP BRANCH FROM BUS 275210 TO BUS 270853 CKT 1 / PONTIAC ;2M 138 PONTIAC ; R 345
TRIP BRANCH FROM BUS 275210 TO BUS 272261 CKT 1 / PONTIAC ;2M 138 PONTIAC ; R 138
TRIP BRANCH FROM BUS 275210 TO BUS 275310 CKT 1 / PONTIAC ;2M 138 PONTIAC ;2C 34.5
CLOSE BRANCH FROM BUS 272260 TO BUS 272261 CKT 1 / PONTIAC ; B 138 PONTIAC ; R 138
END

19. (CE - CE) The AD1-133 TAP-WILTON ; B 345 kV line (from bus 935000 to bus 270926 ckt 1) loads from 114.01% to 127.63% (**DC power flow**) of its normal rating (1364 MVA) for non-contingency condition. This project contributes approximately 189.75 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).