

**Generation Interconnection
Feasibility Study Report
For
PJM Generation Interconnection Request Queue Position
AA2-108 Plano
September 2015**

Network Impacts

The Queue Project AA2-108 was evaluated as a 2060 MW (Capacity 2060 MW) injection at Plano 765 kV substation in the ComEd area. Project AA2-108 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AA2-108 was studied with a commercial probability of 53%. Potential network impacts were as follows:

Summer Peak Analysis - 2019

Generator Deliverability

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

1. (CE - CE) The COLLINS ; 765/345 kV transformer (from bus 270607 to bus 275168 ckt 1) loads from 65.42% to 116.81% (**DC power flow**) of its emergency rating (1379 MVA) for the single line contingency outage of '765-L11216__-S'. This project contributes approximately 708.7 MW to the thermal violation.

CONTINGENCY '765-L11216__-S'
TRIP BRANCH FROM BUS 270644 TO BUS 270607 CKT 1 / WILTO; 765 COLLI; 765
END

2. (CE - CE) The PLANO ; R-ELECT JCT;3R 345 kV line (from bus 270847 to bus 270733 ckt 1) loads from 81.07% to 100.78% (**DC power flow**) of its emergency rating (1528 MVA) for the single line contingency outage of '345-L16704TB-S'. This project contributes approximately 301.11 MW to the thermal violation.

CONTINGENCY '345-L16704TB-S'
TRIP BRANCH FROM BUS 270846 TO BUS 270730 CKT 1 / PLANO ; B 345 ELEC JUNC; B 345
TRIP BRANCH FROM BUS 272250 TO BUS 272278 CKT 2 / PLANO ; B 138 PLANO;1I 138
TRIP BRANCH FROM BUS 272250 TO BUS 272278 CKT 1 / PLANO ; B 138 PLANO;1I 138
TRIP BRANCH FROM BUS 270846 TO BUS 272278 TO BUS 275354 CKT 1 / PLANO ; B 345 PLANO;1I 138 PLANO;1C 34.5
END

3. (CE - CE) The COLLINS ;2M-COLLINS ; R 345 kV line (from bus 275168 to bus 270697 ckt 1) loads from 66.48% to 117.87% (**DC power flow**) of its emergency rating (1379 MVA) for the single line contingency outage of '765-L11216__-S'. This project contributes approximately 708.7 MW to the thermal violation.

CONTINGENCY '765-L11216__-S'
 TRIP BRANCH FROM BUS 270644 TO BUS 270607 CKT 1 / WILTO; 765 COLLI; 765
 END

Multiple Facility Contingency

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

1. (AEP - OVEC) The 05JEFRSO-06CLIFTY 345 kV line (from bus 242865 to bus 248000 ckt Z1) loads from 93.69% to 100.86% (**DC power flow**) of its emergency rating (2354 MVA) for the line fault with failed breaker contingency outage of '6189_C2_05HANG R 765-D1'. This project contributes approximately 213.95 MW to the thermal violation.

CONTINGENCY '6189_C2_05HANG R 765-D1'
 OPEN BRANCH FROM BUS 242921 TO BUS 242924 CKT 1 / 242921 05CORNU 765 242924 05HANG R 765 1
 OPEN BRANCH FROM BUS 242924 TO BUS 243208 CKT 1 / 242924 05HANG R 765 243208 05JEFRSO 765 1
 END

2. (MISO NIPS - AEP) The 17HIPLE-05COLNGW 345 kV line (from bus 255105 to bus 243214 ckt 1) loads from 93.84% to 98.0% (**DC power flow**) of its emergency rating (1409 MVA) for the line fault with failed breaker contingency outage of '7444_C2_05DUMONT 765-A2'. This project contributes approximately 148.79 MW to the thermal violation.

CONTINGENCY '7444_C2_05DUMONT 765-A2'
 OPEN BRANCH FROM BUS 243206 TO BUS 246999 CKT 1 / 243206 05DUMONT 765 246999 05SORENS 765 1
 OPEN BRANCH FROM BUS 243206 TO BUS 243219 CKT 2 / 243206 05DUMONT 765 243219 05DUMONT 345 2
 OPEN BRANCH FROM BUS 243219 TO BUS 909144 CKT 2 / 243219 05DUMONT 345 909144 X2-052 TAP 345 2
 END

3. (CE - CE) The PLANO ; 765/345 kV transformer (from bus 270630 to bus 275207 ckt 1) loads from .0% to 128.67% (**DC power flow**) of its emergency rating (1601 MVA) for the line fault with failed breaker contingency outage of '167-65-BT4-5__'. This project contributes approximately 2060.0 MW to the thermal violation.

CONTINGENCY '167-65-BT4-5__'
 TRIP BRANCH FROM BUS 275208 TO BUS 270630 CKT 1 / PLANO;4M 345 PLANO; 765
 TRIP BRANCH FROM BUS 275208 TO BUS 270847 CKT 1 / PLANO;4M 345 PLANO; R 345
 TRIP BRANCH FROM BUS 275208 TO BUS 275308 CKT 1 / PLANO;4M 345 PLANO;4C 33
 TRIP BRANCH FROM BUS 270607 TO BUS 270630 CKT 1 / COLLI; 765 PLANO; 765
 END

4. (CE - CE) The PLANO ; 765/345 kV transformer (from bus 270630 to bus 275207 ckt 1) loads from 83.99% to 125.22% (**DC power flow**) of its emergency rating (1601 MVA) for the line fault with failed breaker contingency outage of '112-65-BT5-6__'. This project contributes approximately 660.09 MW to the thermal violation.

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CONTINGENCY '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
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5. (CE - CE) The PLANO ; 765/345 kV transformer (from bus 270630 to bus 275207 ckt 1) loads from 83.99% to 125.22% (**DC power flow**) of its emergency rating (1601 MVA) for the line fault with failed breaker contingency outage of '112-65-BT2-3__'. This project contributes approximately 660.07 MW to the thermal violation.

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CONTINGENCY '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
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6. (CE - CE) The PLANO ; 765/345 kV transformer (from bus 270630 to bus 275208 ckt 1) loads from 87.97% to 131.17% (**DC power flow**) of its emergency rating (1601 MVA) for the line fault with failed breaker contingency outage of '112-65-BT5-6__'. This project contributes approximately 691.6 MW to the thermal violation.

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CONTINGENCY '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
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7. (CE - CE) The PLANO ; 765/345 kV transformer (from bus 270630 to bus 275208 ckt 1) loads from 87.97% to 131.17% (**DC power flow**) of its emergency rating (1601 MVA) for the line fault with failed breaker contingency outage of '112-65-BT2-3__'. This project contributes approximately 691.58 MW to the thermal violation.

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CONTINGENCY '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
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TRIP BRANCH FROM BUS 275232 TO BUS 275332 CKT 1 / WILTO;3M 345 WILTO;3C 33
END

8. (CE - AEP) The WILTON ; -05DUMONT 765 kV line (from bus 270644 to bus 243206 ckt 1) loads from 99.14% to 119.94% (**DC power flow**) of its emergency rating (4802 MVA) for the tower line contingency outage of '345-L6607__B-S+_345-L97008_R-S'. This project contributes approximately 998.98 MW to the thermal violation.

CONTINGENCY '345-L6607__B-S+_345-L97008_R-S'
TRIP BRANCH FROM BUS 270728 TO BUS 274750 CKT 1 / E FRA; B 345 CRETE;BP 345
TRIP BRANCH FROM BUS 274804 TO BUS 243229 CKT 1 / UPNOR;RP 345 05OLIVE 345
END

9. (CE - CE) The WILTON ; 765/345 kV transformer (from bus 270644 to bus 275232 ckt 1) loads from 86.34% to 118.68% (**DC power flow**) of its emergency rating (1601 MVA) for the line fault with failed breaker contingency outage of '112-65-BT4-5__'. This project contributes approximately 517.78 MW to the thermal violation.

CONTINGENCY '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

10. (CE - CE) The WILTON ; 765/345 kV transformer (from bus 270644 to bus 275233 ckt 1) loads from 88.36% to 121.46% (**DC power flow**) of its emergency rating (1601 MVA) for the line fault with failed breaker contingency outage of '112-65-BT3-4__'. This project contributes approximately 529.83 MW to the thermal violation.

CONTINGENCY '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

11. (CE - CE) The WILTON ; 765/345 kV transformer (from bus 270644 to bus 275233 ckt 1) loads from 75.75% to 104.13% (**DC power flow**) of its emergency rating (1601 MVA) for the line fault with failed breaker contingency outage of '023-65-BT4-5__'. This project contributes approximately 454.37 MW to the thermal violation.

CONTINGENCY '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 - MISO NIPS) The BURNHAM ;0R-17MUNSTER 345 kV line (from bus 270677 to bus 255109 ckt 1) loads from 94.02% to 106.06% (**DC power flow**) of its emergency rating (1195 MVA) for the line fault with failed breaker contingency outage of '2978_C2_05DUMONT 765-B_A'. This project contributes approximately 271.41 MW to the thermal violation.

CONTINGENCY '2978_C2_05DUMONT 765-B_A'
OPEN BRANCH FROM BUS 243206 TO BUS 907040 CKT 1 / 243206 05DUMONT 765 907040 X1-020 TAP 765 1
OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1 / 243206 05DUMONT 765 270644 WILTON ; 765 1
END

13. (CE - MISO NIPS) The BURNHAM ;0R-17MUNSTER 345 kV line (from bus 270677 to bus 255109 ckt 1) loads from 93.29% to 105.58% (**DC power flow**) of its emergency rating (1195 MVA) for the line fault with failed breaker contingency outage of '023-65-BT4-5__'. This project contributes approximately 277.17 MW to the thermal violation.

CONTINGENCY '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

14. (CE - MISO NIPS) The BURNHAM ;0R-17MUNSTER 345 kV line (from bus 270677 to bus 255109 ckt 1) loads from 93.78% to 105.33% (**DC power flow**) of its emergency rating (1195 MVA) for the line fault with failed breaker contingency outage of '023-65-BT2-3__'. This project contributes approximately 260.49 MW to the thermal violation.

CONTINGENCY '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

15. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 95.18% to 105.45% (**DC power flow**) of its emergency rating (1117 MVA) for the line fault with failed breaker contingency outage of '2978_C2_05DUMONT 765-B_A'. This project contributes approximately 216.53 MW to the thermal violation.

CONTINGENCY '2978_C2_05DUMONT 765-B_A'
OPEN BRANCH FROM BUS 243206 TO BUS 907040 CKT 1 / 243206 05DUMONT 765 907040 X1-020 TAP 765 1

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

16. (CE - CE) The PLANO ;3M-PLANO ; B 345 kV line (from bus 275207 to bus 270846 ckt 1) loads from .0% to 128.67% (**DC power flow**) of its emergency rating (1601 MVA) for the line fault with failed breaker contingency outage of '167-65-BT4-5__'. This project contributes approximately 2060.0 MW to the thermal violation.

CONTINGENCY '167-65-BT4-5__'
TRIP BRANCH FROM BUS 275208 TO BUS 270630 CKT 1 / PLANO;4M 345 PLANO; 765
TRIP BRANCH FROM BUS 275208 TO BUS 270847 CKT 1 / PLANO;4M 345 PLANO; R 345
TRIP BRANCH FROM BUS 275208 TO BUS 275308 CKT 1 / PLANO;4M 345 PLANO;4C 33
TRIP BRANCH FROM BUS 270607 TO BUS 270630 CKT 1 / COLLI; 765 PLANO; 765
END

17. (CE - CE) The PLANO ;3M-PLANO ; B 345 kV line (from bus 275207 to bus 270846 ckt 1) loads from 83.99% to 125.22% (**DC power flow**) of its emergency rating (1601 MVA) for the line fault with failed breaker contingency outage of '112-65-BT5-6__'. This project contributes approximately 660.09 MW to the thermal violation.

CONTINGENCY '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

18. (CE - CE) The PLANO ;3M-PLANO ; B 345 kV line (from bus 275207 to bus 270846 ckt 1) loads from 83.99% to 125.22% (**DC power flow**) of its emergency rating (1601 MVA) for the line fault with failed breaker contingency outage of '112-65-BT2-3__'. This project contributes approximately 660.07 MW to the thermal violation.

CONTINGENCY '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

19. (CE - CE) The PLANO ;4M-PLANO ; R 345 kV line (from bus 275208 to bus 270847 ckt 1) loads from 87.97% to 131.17% (**DC power flow**) of its emergency rating (1601 MVA) for the line fault with failed breaker contingency outage of '112-65-BT5-6__'. This project contributes approximately 691.6 MW to the thermal violation.

CONTINGENCY '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

20. (CE - CE) The PLANO ;4M-PLANO ; R 345 kV line (from bus 275208 to bus 270847 ckt 1) loads from 87.97% to 131.17% (**DC power flow**) of its emergency rating (1601 MVA) for the line fault with failed breaker contingency outage of '112-65-BT2-3__'. This project contributes approximately 691.58 MW to the thermal violation.

CONTINGENCY '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

21. (CE - CE) The WILTON ;3M-WILTON ; B 345 kV line (from bus 275232 to bus 270926 ckt 1) loads from 88.77% to 121.11% (**DC power flow**) of its emergency rating (1601 MVA) for the line fault with failed breaker contingency outage of '112-65-BT4-5__'. This project contributes approximately 517.78 MW to the thermal violation.

CONTINGENCY '112-65-BT4-5__'
 TRIP BRANCH FROM BUS 270644 TO BUS 243206 CKT 1 / WILTO; 765 05DUMONT 765
 TRIP BRANCH FROM BUS 275233 TO BUS 270644 CKT 1 / WILTO;4M 345 WILTO; 765
 TRIP BRANCH FROM BUS 275233 TO BUS 270927 CKT 1 / WILTO;4M 345 WILTO; R 345
 TRIP BRANCH FROM BUS 275233 TO BUS 275333 CKT 1 / WILTO;4M 345 WILTO;4C 33
 END

22. (CE - CE) The WILTON ;4M-WILTON ; R 345 kV line (from bus 275233 to bus 270927 ckt 1) loads from 90.84% to 123.94% (**DC power flow**) of its emergency rating (1601 MVA) for the line fault with failed breaker contingency outage of '112-65-BT3-4__'. This project contributes approximately 529.83 MW to the thermal violation.

CONTINGENCY '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

Contribution to Previously Identified Overloads

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

1. (MISO NIPS - AEP) The 17STILLWELL-05DUMONT 345 kV line (from bus 255113 to bus 243219 ckt 1) loads from 115.68% to 127.77% (**DC power flow**) of its emergency rating (1409 MVA) for the line fault with failed breaker contingency outage of '2978_C2_05DUMONT 765-B_A'. This project contributes approximately 321.4 MW to the thermal violation.

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CONTINGENCY '2978_C2_05DUMONT 765-B_A'  
OPEN BRANCH FROM BUS 243206 TO BUS 907040 CKT 1 / 243206 05DUMONT 765 907040 X1-020 TAP 765 1  
OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1 / 243206 05DUMONT 765 270644 WILTON ; 765 1  
END
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2. (MISO NIPS - AEP) The 17STILLWELL-05DUMONT 345 kV line (from bus 255113 to bus 243219 ckt 1) loads from 105.31% to 117.76% (**DC power flow**) of its emergency rating (1409 MVA) for the line fault with failed breaker contingency outage of '023-65-BT4-5__'. This project contributes approximately 331.1 MW to the thermal violation.

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CONTINGENCY '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
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3. (CE - AEP) The WILTON ; -05DUMONT 765 kV line (from bus 270644 to bus 243206 ckt 1) loads from 100.54% to 121.32% (**DC power flow**) of its emergency rating (4802 MVA) for the tower line contingency outage of '345-L94507_B-S+_345-L97008_R-S'. This project contributes approximately 998.09 MW to the thermal violation.

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CONTINGENCY '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
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4. (CE - CE) The WILTON ; B-WILTON ;3M 345 kV line (from bus 270926 to bus 275232 ckt 1) loads from 111.73% to 121.97% (**DC power flow**) of its emergency rating (1601 MVA) for the line fault with failed breaker contingency outage of '112-65-BT5-6__'. This project contributes approximately 309.39 MW to the thermal violation.

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CONTINGENCY '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
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5. (CE - CE) The WILTON ; R-WILTON ;4M 345 kV line (from bus 270927 to bus 275233 ckt 1) loads from 114.85% to 125.31% (**DC power flow**) of its emergency rating (1601 MVA) for the line fault with failed breaker contingency outage of '112-65-BT2-3__'. This project contributes approximately 315.96 MW to the thermal violation.

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CONTINGENCY '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
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6. (CE - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line (from bus 274750 to bus 255112 ckt 1) loads from 136.48% to 148.48% (**DC power flow**) of its emergency rating (1195 MVA) for the line fault with failed breaker contingency outage of '2978_C2_05DUMONT 765-B_A'. This project contributes approximately 270.62 MW to the thermal violation.

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CONTINGENCY '2978_C2_05DUMONT 765-B_A'
OPEN BRANCH FROM BUS 243206 TO BUS 907040 CKT 1      / 243206 05DUMONT 765 907040 X1-020 TAP 765 1
OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1      / 243206 05DUMONT 765 270644 WILTON ; 765 1
END
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7. (CE - CE) The WILTON ; 765/345 kV transformer (from bus 275232 to bus 270644 ckt 1) loads from 101.31% to 111.55% (**DC power flow**) of its emergency rating (1601 MVA) for the line fault with failed breaker contingency outage of '112-65-BT5-6__'. This project contributes approximately 309.39 MW to the thermal violation.

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CONTINGENCY '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
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8. (CE - CE) The WILTON ; 765/345 kV transformer (from bus 275233 to bus 270644 ckt 1) loads from 103.4% to 113.86% (**DC power flow**) of its emergency rating (1601 MVA) for the line fault with failed breaker contingency outage of '112-65-BT2-3__'. This project contributes approximately 315.96 MW to the thermal violation.

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CONTINGENCY '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
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9. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line (from bus 909144 to bus 243219 ckt 2) loads from 112.55% to 118.67% (**DC power flow**) of its emergency rating (1409 MVA) for the line fault with failed breaker contingency outage of '2978_C2_05DUMONT 765-B_A'. This project contributes approximately 162.62 MW to the thermal violation.

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CONTINGENCY '2978_C2_05DUMONT 765-B_A'  
OPEN BRANCH FROM BUS 243206 TO BUS 907040 CKT 1      / 243206 05DUMONT 765 907040 X1-020 TAP 765 1  
OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1      / 243206 05DUMONT 765 270644 WILTON ; 765 1  
END
```

10. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line (from bus 909144 to bus 243219 ckt 2) loads from 102.0% to 108.64% (**DC power flow**) of its emergency rating (1409 MVA) for the line fault with failed breaker contingency outage of '112-65-BT4-5__'. This project contributes approximately 176.71 MW to the thermal violation.

```
CONTINGENCY '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
```

11. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line (from bus 909144 to bus 243219 ckt 2) loads from 101.99% to 108.63% (**DC power flow**) of its emergency rating (1409 MVA) for the line fault with failed breaker contingency outage of '112-65-BT3-4__'. This project contributes approximately 176.67 MW to the thermal violation.

```
CONTINGENCY '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
```

Steady-State Voltage Requirements

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

To be determined

Short Circuit

(Summary of impacted circuit breakers)

To be determined

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.

Not Applicable

Light Load Analysis - 2019

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)

To be determined

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. (CE - CE) The COLLINS; 765/345 kV transformer:

A second transformer will need to be installed at Station 23 Collins. The second transformer will require a new breaker, bus work and potential civil work at the station. Preliminary estimate and timeline for this is \$30M and 30-36 month timeline from the point of agreement.

2. (CE - CE) The PLANO; R-ELECT JCT;3R 345 kV line:

The upgrade is a circuit breaker replacement. Estimate cost is \$4M and the timeline is 18-24 months after agreement.

3. (CE - CE) The COLLINS;2M-COLLINS ; R 345 kV line:

Same reinforcement as Generator Deliverability #1

Multiple Facility Contingency

1. (AEP - OVEC) The 05JEFRSO-06CLIFTY 345 kV line:

A Sag Study will be required on the 0.75 mile section of line to mitigate the overload on the Jefferson - Clifty Creek 345 kV line. Depending on the sag study results, cost for this upgrade is expected to be between \$4,000 (no remediation required just sag study) and \$2.0 million (complete line rebuild required).

(1) Sag Study: 6 to 12 months

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

2. (MISO NIPS - AEP) The 17HIPLE-05COLNGW 345 kV line:

A Sag Study will be required on the 33.46 mile section of line to mitigate the overload on the Collingwood - Hiple 345 kV line. Depending on the sag study results, cost for this upgrade is expected to be between \$133,840 (no remediation required just sag study) and \$67 million (complete line rebuild required). This is an AEP - NIPSCO tie line; PJM will coordinate this upgrade with NIPSCO as well to make sure that their equipment will not set a limit lower than what is specified here.

(1) Sag Study: 6 to 12 months.

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

3. (CE - CE) The PLANO; 765/345 kV transformer:

The upgrade is a third 765/345 kV transformer at TSS 167 Plano along with station required upgrades associated with the new transformer. Cost is \$30M. Timeline is 30-36 months (preliminary estimate).

4. (CE - CE) The PLANO; 765/345 kV transformer:
Same reinforcement as Multiple Facility #3

5. (CE - CE) The PLANO; 765/345 kV transformer:
Same reinforcement as Multiple Facility #3

6. (CE - CE) The PLANO; 765/345 kV transformer:
Same reinforcement as Multiple Facility #3

7. (CE - CE) The PLANO; 765/345 kV transformer:
Same reinforcement as Multiple Facility #3

8. (CE - AEP) The WILTON ; -05DUMONT 765 kV line (from bus 270644 to bus 243206 ckt 1) loads from 99.14% to 119.94% (**DC power flow**) of its emergency rating (4802 MVA) for the tower line contingency outage of '345-L6607__B-S+_345-L97008_R-S'. This project contributes approximately 998.98 MW to the thermal violation.

AEP:

Replace the Dumont wave trap (3150A). Estimated Cost: \$500,000; The estimated time required for construction is between 12 to 24 months after signing an interconnection agreement.

ComEd:

Based on the PJM data above, the limit is 765kV L11215. Post contingency flow is 119.94% of 4802 MVA = 5760 MVA. Limit of 4802 MVA is a sag limit on the line. AEP limit is 4945 MVA and the line load limit is 5466 MVA (Relay thermal limit for Enhanced Equipment Ratings Database – 8/4/15).

ComEd proposes two options regarding this overload.

The first option would be to re-conductor the line. A preliminary estimate for this work would be \$185M.

The second option, if re-conductoring is not an option then a new 765kV line would need to be constructed. A preliminary estimate for this work would be \$380M.

This cost would assume existing easements and a terminal at AEP-Dumont.

9. (CE - CE) The WILTON; 765/345 kV transformer:

The upgrade is a third 765/345 kV transformer at TSS 112 Wilton Center along with station required upgrades associated with the new transformer. Cost is \$30M. Timeline is 30-36 months (preliminary estimate).

10. (CE - CE) The WILTON; 765/345 kV transformer:
Same reinforcement as Multiple Facility #9

11. (CE - CE) The WILTON; 765/345 kV transformer:
Same reinforcement as Multiple Facility #9

12. (CE - MISO NIPS) The BURNHAM ;0R-17MUNSTER 345 kV line:
The limiting element is owned by NIPSCO; this violation will be further evaluated in the SIS phase.

13. (CE - MISO NIPS) The BURNHAM ;0R-17MUNSTER 345 kV line:
The limiting element is owned by NIPSCO; this violation will be further evaluated in the SIS phase.

14. (CE - MISO NIPS) The BURNHAM ;0R-17MUNSTER 345 kV line:
The limiting element is owned by NIPSCO; this violation will be further evaluated in the SIS phase.

15. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line:

ComEd:

No upgrades required.

AEP:

A sag check will be required for the AEP owned section of the Olive - University Park (CE) 345 kV line to determine if the line section can be operated above its emergency rating of 971 MVA. The result could prove that no additional upgrades are necessary, that some upgrades on the circuit are necessary, or that the entire 40 mile section of line would need to be rebuilt. Estimated Cost for the Sag Study: \$160,000. Estimated Cost to re-conductor AEP section of line: \$45 Million. If deemed necessary to rebuild section of line, Estimated Cost: \$125 Million.

(1) Sag Study: 6 to 12 months

(2) Rebuild: The standard time required for construction differs from state to state. An approximate construction time would be 24 to 36 months after signing an interconnection agreement.

16. (CE - CE) The PLANO;3M-PLANO ; B 345 kV line:
Same reinforcement as Multiple Facility #3

17. (CE - CE) The PLANO;3M-PLANO ; B 345 kV line:
Same reinforcement as Multiple Facility #3

18. (CE - CE) The PLANO;3M-PLANO ; B 345 kV line:
Same reinforcement as Multiple Facility #3

19. (CE - CE) The PLANO;3M-PLANO ; B 345 kV line:

Same reinforcement as Multiple Facility #3

20. (CE - CE) The PLANO;3M-PLANO ; B 345 kV line:

Same reinforcement as Multiple Facility #3

21. (CE - CE) The WILTON;3M-WILTON ; B 345 kV line:

Same reinforcement as Multiple Facility #9

22. (CE - CE) The WILTON;3M-WILTON ; B 345 kV line:

Same reinforcement as Multiple Facility #9

Contribution to Previously Identified Overloads

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

1. (MISO NIPS - AEP) The 17STILLWELL-05DUMONT 345 kV line:

To mitigate the overload on the Dumont-Stillwell 345 kV, AEP would need to do a sag study on AEP owned section of the line. After mitigating violations identified under the sag study, the new ratings on this circuit will be 1409/1718 MVA (SN/SE). Per AEP current records, the wave trap at Dumont station will set the new limit. AEP owns approximately 9 miles of the line. Depending on the sag study results, cost for this upgrade is expected to be between \$40,000 (no remediation required) and \$18 million (complete line rebuild required).

(1) Sag Study: 6 to 12 months.

(2) Rebuild: The standard time required for construction differs from state to state. An approximate construction time would be 24 to 36 months after signing an interconnection agreement.

2. (MISO NIPS - AEP) The 17STILLWELL-05DUMONT 345 kV line:

Same reinforcement as Previously Identified #1

3. (CE - AEP) The WILTON ; -05DUMONT 765 kV line (from bus 270644 to bus 243206 ckt 1) loads from 100.54% to 121.32% (**DC power flow**) of its emergency rating (4802 MVA) for the tower line contingency outage of '345-L94507_B-S+_345-L97008_R-S'. This project contributes approximately 998.09 MW to the thermal violation.

AEP:

Same reinforcement as Multiple Facility #8

ComEd:

Same reinforcement as Multiple Facility #8

4. (CE - CE) The WILTON; B-WILTON;3M 345 kV line:
Same reinforcement as Multiple Facility #9

5. (CE - CE) The WILTON; R-WILTON;4M 345 kV line:
Same reinforcement as Multiple Facility #9

6. (CE - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line:
The ComEd portion of this line will need to be re-conducted to 2156 kcmil, approx. 4.7 miles. NIPSCO will also have to review this overload. The preliminary estimate is \$10M. The timeline is 18 – 24 months.

7. (CE - CE) The WILTON; 765/345 kV transformer:
Same reinforcement as Multiple Facility #9

8. (CE - CE) The WILTON; 765/345 kV transformer:
Same reinforcement as Multiple Facility #9

9. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line:
A sag check will be required for the ACSR ~ 954 ~ 45/7 ~ RAIL Conductor Section 1 to determine if the line section can be operated above its emergency rating of 1409 MVA. The result could prove that no additional upgrades are necessary, that some upgrades on the circuit are necessary, or that the entire 14 mile section of line would need to be rebuilt. Estimated Cost for the Sag Study: \$56,000. If deemed necessary to rebuild section of line, Estimated Cost: \$28,000,000. The standard time required for construction differs from state to state. An approximate construction time would be 24 to 36 months after signing an interconnection agreement.

10. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line:
Same reinforcement as Previously Identified #9

11. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line:
Same reinforcement as Previously Identified #9