Generation Interconnection
Feasibility Study Report

For

PJM Generation Interconnection Request Queue Position AB1-091

Davis Creek

July 2016

Network Impacts for Option 1 (Davis Creek Blue)

The Queue Project AB1-091 was evaluated as a 575.0 MW (Capacity 550.0 MW) injection at the Davis Creek 345 kV substation in the ComEd area. Project AB1-091 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AB1-091 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 DAVIS CRK; B 345/138 kV transformer (from bus 270710 to bus 275174 ckt 1) loads from 79.12% to 118.99% (**DC power flow**) of its emergency rating (480 MVA) for the single line contingency outage of '345-L17907TB-S'. This project contributes approximately 191.37 MW to the thermal violation.

```
CONTINGENCY '345-L17907TB-S'
 TRIP BRANCH FROM BUS 270662 TO BUS 270710 CKT 1          / BLOOM; B 345 DAVIS; B 345
 TRIP BRANCH FROM BUS 275158 TO BUS 270662 CKT 1          / BLOOM;4M 138 BLOOM; B 345
 TRIP BRANCH FROM BUS 275158 TO BUS 271098 CKT 1          / BLOOM;4M 138 BLOOM; B 138
 TRIP BRANCH FROM BUS 275158 TO BUS 275258 CKT 1          / BLOOM;4M 138 BLOOM;4C 34.5
 END
```

2. (CE - CE) The DAVIS CRK; B 345/138 kV transformer (from bus 270710 to bus 275174 ckt 1) loads from 78.65% to 118.6% (**DC power flow**) of its emergency rating (480 MVA) for the single line contingency outage of '086-CB_34___'. This project contributes approximately 191.76 MW to the thermal violation.

```
CONTINGENCY '086-CB_34___'
 TRIP BRANCH FROM BUS 270662 TO BUS 270710 CKT 1          / BLOOM; B 345 DAVIS; B 345
 END
```

3. (CE - CE) The DAVIS CRK;3M-DAVIS CRK; B 138 kV line (from bus 275174 to bus 271294 ckt 1) loads from 79.1% to 118.97% (**DC power flow**) of its emergency rating (480 MVA) for the single line contingency outage of '345-L17907TB-S'. This project contributes approximately 191.37 MW to the thermal violation.

```
CONTINGENCY '345-L17907TB-S'
 TRIP BRANCH FROM BUS 270662 TO BUS 270710 CKT 1          / BLOOM; B 345 DAVIS; B 345
 TRIP BRANCH FROM BUS 275158 TO BUS 270662 CKT 1          / BLOOM;4M 138 BLOOM; B 345
 TRIP BRANCH FROM BUS 275158 TO BUS 271098 CKT 1          / BLOOM;4M 138 BLOOM; B 138
 TRIP BRANCH FROM BUS 275158 TO BUS 275258 CKT 1          / BLOOM;4M 138 BLOOM;4C 34.5
 END
```

4. (CE - CE) The DAVIS CRK;3M-DAVIS CRK; B 138 kV line (from bus 275174 to bus 271294 ckt 1) loads from 78.65% to 118.6% (**DC power flow**) of its emergency rating (480 MVA) for the single line contingency outage of '086-CB_34___'. This project contributes approximately 191.76 MW to the thermal violation.

```
CONTINGENCY '086-CB_34___'
 TRIP BRANCH FROM BUS 270662 TO BUS 270710 CKT 1          / BLOOM; B 345 DAVIS; B 345
 END
```

Multiple Facility Contingency

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

1. (AEP - AEP) The 05OLIVE-X2-052 TAP 345 kV line (from bus 243229 to bus 909144 ckt 2) loads from 93.34% to 94.79% (**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 46.35 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
```

2. (MISO NIPS - CE) The 17STJOHN-ST JOHN ; T 345 kV line (from bus 255112 to bus 270886 ckt 1) loads from 97.12% to 99.46% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of '2978_C2_05DUMONT 765-B_A'. This project contributes approximately 56.68 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
```

3. (MISO NIPS - CE) The 17STJOHN-ST JOHN ; T 345 kV line (from bus 255112 to bus 270886 ckt 1) loads from 96.36% to 98.72% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of '112-65-BT4-5__'. This project contributes approximately 57.18 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
```

4. (MISO NIPS - CE) The 17STJOHN-ST JOHN ; T 345 kV line (from bus 255112 to bus 270886 ckt 1) loads from 96.32% to 98.68% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of '112-65-BT3-4__'. This project contributes approximately 57.18 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
```

5. (CE - CE) The DAVIS CRK; B 345/138 kV transformer (from bus 270710 to bus 275174 ckt 1) loads from 85.85% to 110.89% (**DC power flow**) of its emergency rating (530 MVA) for the tower line contingency outage of '345-L2004__R-S_+_138-L8607__R-S'. This project contributes approximately 132.73 MW to the thermal violation.

```
CONTINGENCY '345-L2004__R-S_+_138-L8607__R-S'
 TRIP BRANCH FROM BUS 270671 TO BUS 270670 CKT 1          / BRAID; R 345 BRAID; B 345
 TRIP BRANCH FROM BUS 270671 TO BUS 270711 CKT 1          / BRAID; R 345 DAVIS; R 345
 TRIP BRANCH FROM BUS 271295 TO BUS 272789 CKT 1          / DAVIS; R 138 WILMI; 138
 END
```

6. (CE - AEP) The GREENACRE; T-05OLIVE 345 kV line (from bus 270771 to bus 243229 ckt 1) loads from 95.17% to 97.7% (**DC power flow**) of its emergency rating (971 MVA) for the line fault with failed breaker contingency outage of '2978_C2_05DUMONT 765-B_A'. This project contributes approximately 54.37 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
```

7. (CE - AEP) The GREENACRE; T-05OLIVE 345 kV line (from bus 270771 to bus 243229 ckt 1) loads from 87.94% to 90.49% (**DC power flow**) of its emergency rating (971 MVA) for the

line fault with failed breaker contingency outage of '112-65-BT4-5__'. This project contributes approximately 55.09 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
```

8. (CE - AEP) The GREENACRE; T-05OLIVE 345 kV line (from bus 270771 to bus 243229 ckt 1) loads from 87.94% to 90.49% (**DC power flow**) of its emergency rating (971 MVA) for the line fault with failed breaker contingency outage of '112-65-BT3-4__'. This project contributes approximately 55.09 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
```

9. (CE - MISO NIPS) The ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 97.12% to 99.46% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of '2978_C2_05DUMONT 765-B_A'. This project contributes approximately 56.68 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
```

10. (CE - MISO NIPS) The ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 96.36% to 98.72% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of '112-65-BT4-5__'. This project contributes approximately 57.18 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. (CE - MISO NIPS) The ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 96.32% to 98.68% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of '112-65-BT3-4__'. This project contributes approximately 57.18 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 17HIPLE-05COLNGW 345 kV line (from bus 255105 to bus 243214 ckt 1) loads from 103.57% to 103.71% (**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 44.51 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
```

2. (MISO NIPS - AEP) The 17STILLWELL-05DUMONT 345 kV line (from bus 255113 to bus 243219 ckt 1) loads from 126.61% to 129.73% (**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 97.48 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
```

3. (MISO NIPS - AEP) The 17STILLWELL-05DUMONT 345 kV line (from bus 255113 to bus 243219 ckt 1) loads from 116.57% to 119.77% (**DC power flow**) of its emergency rating (1409 MVA) for the line fault with failed breaker contingency outage of '023-65-BT2-3__'. This project contributes approximately 100.37 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
```

4. (MISO NIPS - AEP) The 17STILLWELL-05DUMONT 345 kV line (from bus 255113 to bus 243219 ckt 1) loads from 116.48% to 119.69% (**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 100.45 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
```

5. (CE - AEP) The WILTON ;-05DUMONT 765 kV line (from bus 270644 to bus 243206 ckt 1) loads from 112.7% to 114.54% (**DC power flow**) of its emergency rating (4444 MVA) for the tower line contingency outage of '345-L94507_B-S_+_345-L97008_R-S'. This project contributes approximately 181.02 MW to the thermal violation.

```
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
```

6. (CE - AEP) The WILTON ;-05DUMONT 765 kV line (from bus 270644 to bus 243206 ckt 1) loads from 111.19% to 113.03% (**DC power flow**) of its emergency rating (4444 MVA) for the tower line contingency outage of '345-L6607__B-S_+_345-L97008_R-S'. This project contributes approximately 181.26 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
```

7. (CE - MISO NIPS) The BURNHAM ; B-17SHEFFIELD 345 kV line (from bus 270674 to bus 255111 ckt 1) loads from 111.33% to 118.97% (**DC power flow**) of its emergency rating (1069 MVA) for the line fault with failed breaker contingency outage of '2978_C2_05DUMONT 765-B_A'. This project contributes approximately 81.89 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
```

8. (CE - MISO NIPS) The BURNHAM ; B-17SHEFFIELD 345 kV line (from bus 270674 to bus 255111 ckt 1) loads from 111.05% to 118.72% (**DC power flow**) of its emergency rating (1069 MVA) for the line fault with failed breaker contingency outage of '023-65-BT2-3__'. This project contributes approximately 82.24 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
```

9. (CE - MISO NIPS) The BURNHAM ; B-17SHEFFIELD 345 kV line (from bus 270674 to bus 255111 ckt 1) loads from 110.67% to 118.37% (**DC power flow**) of its emergency rating (1069 MVA) for the line fault with failed breaker contingency outage of '023-65-BT4-5__'. This project contributes approximately 82.45 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
```

10. (CE - MISO NIPS) The BURNHAM ;0R-17MUNSTER 345 kV line (from bus 270677 to bus 255109 ckt 1) loads from 104.75% to 107.62% (**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 76.1 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
```

11. (CE - MISO NIPS) The BURNHAM ;0R-17MUNSTER 345 kV line (from bus 270677 to bus 255109 ckt 1) loads from 104.67% to 107.55% (**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 76.45 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
```

12. (CE - MISO NIPS) The BURNHAM ;0R-17MUNSTER 345 kV line (from bus 270677 to bus 255109 ckt 1) loads from 104.17% to 107.06% (**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 76.73 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
```

13. (CE - CE) The WILTON ; B-WILTON ;3M 345 kV line (from bus 270926 to bus 275232 ckt 1) loads from 121.83% to 124.21% (**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 84.62 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
```

14. (CE - CE) The WILTON ; R-WILTON ;4M 345 kV line (from bus 270927 to bus 275233 ckt 1) loads from 125.16% to 127.59% (**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 86.43 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
```

15. (CE - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line (from bus 274750 to bus 255112 ckt 1) loads from 126.57% to 129.07% (**DC power flow**) of its emergency rating (1390 MVA) for the line fault with failed breaker contingency outage of '112-65-BT4-5__'. This project contributes approximately 77.05 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
```

16. (CE - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line (from bus 274750 to bus 255112 ckt 1) loads from 126.64% to 129.12% (**DC power flow**) of its emergency rating (1390 MVA) for the line fault with failed breaker contingency outage of '2978_C2_05DUMONT 765-B_A'. This project contributes approximately 76.57 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
```

17. (CE - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line (from bus 274750 to bus 255112 ckt 1) loads from 126.5% to 129.0% (**DC power flow**) of its emergency rating (1390 MVA) for the line fault with failed breaker contingency outage of '112-65-BT3-4__'. This project contributes approximately 77.04 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
```

18. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 120.1% to 123.06% (**DC power flow**) of its emergency rating (971 MVA) for the line fault with failed breaker contingency outage of '2978_C2_05DUMONT 765-B_A'. This project contributes approximately 63.76 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
```

19. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 118.74% to 121.73% (**DC power flow**) of its emergency rating (971 MVA) for the line fault with failed breaker contingency outage of '112-65-BT4-5__'. This project contributes approximately 64.37 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
```

20. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 118.71% to 121.69% (**DC power flow**) of its emergency rating (971 MVA) for the line fault with failed breaker contingency outage of '112-65-BT3-4__'. This project contributes approximately 64.37 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
```

21. (CE - CE) The WILTON ; 765/345 kV transformer (from bus 275232 to bus 270644 ckt 1) loads from 111.41% to 113.79% (**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 84.62 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
```

22. (CE - CE) The WILTON ; 765/345 kV transformer (from bus 275233 to bus 270644 ckt 1) loads from 113.71% to 116.14% (**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 86.43 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
```

23. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line (from bus 909144 to bus 243219 ckt 2) loads from 116.73% to 118.22% (**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 46.35 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
```

24. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line (from bus 909144 to bus 243219 ckt 2) loads from 106.39% to 108.02% (**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 51.04 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
```

25. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line (from bus 909144 to bus 243219 ckt 2) loads from 106.38% to 108.01% (**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 51.04 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)

No violations identified.

Affected System Analysis & Mitigation

External PJM Impacts:

External PJM Impacts with MISO to be determined during later study phases.

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 05DUMONT-05SORENS 765 kV line (from bus 243206 to bus 246999 ckt 1) loads from 100.93% to 101.06% (**DC power flow**) of its normal rating (4257 MVA) for the single line contingency outage of '709_B2_TOR546'. This project contributes approximately 135.83 MW to the thermal violation.

```
CONTINGENCY '709_B2_TOR546'
 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 102.36% to 102.49% (**DC power flow**) of its normal rating (1409

MVA) for the single line contingency outage of '7442_B2_TOR200545'. This project contributes approximately 44.1 MW to the thermal violation.

```
CONTINGENCY '7442_B2_TOR200545'
 OPEN BRANCH FROM BUS 243206 TO BUS 246999 CKT 1          / 243206 05DUMONT 765 246999 05SORENS 765 1
 END
```

3. (MISO NIPS - CE) The 17STJOHN-ST JOHN ; T 345 kV line (from bus 255112 to bus 270886 ckt 1) loads from 95.88% to 98.24% (**DC power flow**) of its emergency rating (1091 MVA) for the single line contingency outage of '695_B2'. This project contributes approximately 57.15 MW to the thermal violation.

```
CONTINGENCY '695_B2'
 OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1          / 243206 05DUMONT 765 270644 WILTO; 765 1
 END
```

4. (MISO NIPS - AEP) The 17STILLWELL-05DUMONT 345 kV line (from bus 255113 to bus 243219 ckt 1) loads from 116.25% to 119.46% (**DC power flow**) of its normal rating (1409 MVA) for the single line contingency outage of '695_B2'. This project contributes approximately 100.43 MW to the thermal violation.

```
CONTINGENCY '695_B2'
 OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1          / 243206 05DUMONT 765 270644 WILTO; 765 1
 END
```

5. (CE - CE) The COLLINS ;-WILTON ; 765 kV line (from bus 270607 to bus 270644 ckt 1) loads from 99.11% to 100.11% (**DC power flow**) of its normal rating (4142 MVA) for non-contingency condition. This project contributes approximately 91.79 MW to the thermal violation.

6. (CE - CE) The COLLINS ;-WILTON ; 765 kV line (from bus 270607 to bus 270644 ckt 1) loads from 96.51% to 97.47% (**DC power flow**) of its emergency rating (4460 MVA) for the single line contingency outage of '345-L16703_R-S'. This project contributes approximately 95.3 MW to the thermal violation.

```
CONTINGENCY '345-L16703_R-S'
 TRIP BRANCH FROM BUS 270846 TO BUS 270847 CKT 1          / PLANO ; B 345 PLANO ; R 345
 TRIP BRANCH FROM BUS 270847 TO BUS 270733 CKT 1          / PLANO ; R 345 ELEC JUNC;3R 345
 END
```

7. (CE - AEP) The WILTON ;-05DUMONT 765 kV line (from bus 270644 to bus 243206 ckt 1) loads from 115.25% to 117.14% (**DC power flow**) of its normal rating (4047 MVA) for the single line contingency outage of '238_B3'. This project contributes approximately 170.45 MW to the thermal violation.

```
CONTINGENCY '238_B3'
```

```
OPEN BRANCH FROM BUS 243219 TO BUS 255113 CKT 1          / 243219 05DUMONT 345 255113 17STILLWELL 345 1
OPEN BRANCH FROM BUS 255100 TO BUS 255113 CKT 1          / 255100 17BABCOCK 345 255113 17STILLWELL 345 1
OPEN BRANCH FROM BUS 255113 TO BUS 255180 CKT 1          / 255113 17STILLWELL 345 255180 17STILLWELL 138 1
END
```

8. (CE - CE) The BLOOM ; B 345/138 kV transformer (from bus 270662 to bus 275158 ckt 1) loads from 79.99% to 101.4% (**DC power flow**) of its emergency rating (480 MVA) for the single line contingency outage of '345-L17908TB-S'. This project contributes approximately 102.79 MW to the thermal violation.

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

9. (CE - MISO NIPS) The BURNHAM ; B-17SHEFFIELD 345 kV line (from bus 270674 to bus 255111 ckt 1) loads from 109.83% to 117.52% (**DC power flow**) of its emergency rating (1069 MVA) for the single line contingency outage of '695_B2'. This project contributes approximately 82.4 MW to the thermal violation.

```
CONTINGENCY '695_B2'
 OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1          / 243206 05DUMONT 765 270644 WILTO; 765 1
 END
```

10. (CE - MISO NIPS) The BURNHAM ;0R-17MUNSTER 345 kV line (from bus 270677 to bus 255109 ckt 1) loads from 103.29% to 106.18% (**DC power flow**) of its emergency rating (1195 MVA) for the single line contingency outage of '695_B2'. This project contributes approximately 76.66 MW to the thermal violation.

```
CONTINGENCY '695_B2'
 OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1          / 243206 05DUMONT 765 270644 WILTO; 765 1
 END
```

11. (CE - CE) The DAVIS CRK; B 345/138 kV transformer (from bus 270710 to bus 275174 ckt 1) loads from 92.73% to 122.26% (**DC power flow**) of its emergency rating (480 MVA) for the single line contingency outage of '345-L2004__R-S'. This project contributes approximately 141.74 MW to the thermal violation.

```
CONTINGENCY '345-L2004__R-S'
 TRIP BRANCH FROM BUS 270671 TO BUS 270670 CKT 1          / BRAID; R 345 BRAID; B 345
 TRIP BRANCH FROM BUS 270671 TO BUS 270711 CKT 1          / BRAID; R 345 DAVIS; R 345
 END
```

12. (CE - CE) The E FRANKFO; B-CRETE EC ;BP 345 kV line (from bus 270728 to bus 274750 ckt 1) loads from 106.96% to 109.38% (**DC power flow**) of its emergency rating (1399

MVA) for the single line contingency outage of '695_B2'. This project contributes approximately 77.9 MW to the thermal violation.

```
CONTINGENCY '695_B2'
 OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1              / 243206 05DUMONT 765 270644 WILTO; 765 1
 END
```

13. (CE - AEP) The GREENACRE; T-05OLIVE 345 kV line (from bus 270771 to bus 243229 ckt 1) loads from 87.87% to 90.43% (**DC power flow**) of its normal rating (971 MVA) for the single line contingency outage of '695_B2'. This project contributes approximately 55.08 MW to the thermal violation.

```
CONTINGENCY '695_B2'
 OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1              / 243206 05DUMONT 765 270644 WILTO; 765 1
 END
```

14. (CE - CE) The PLANO ; B-ELECT JCT; B 345 kV line (from bus 270846 to bus 270730 ckt 1) loads from 101.79% to 102.8% (**DC power flow**) of its emergency rating (1341 MVA) for the single line contingency outage of '765-L11216__-S'. This project contributes approximately 29.87 MW to the thermal violation.

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

15. (CE - MISO NIPS) The ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 95.88% to 98.24% (**DC power flow**) of its emergency rating (1091 MVA) for the single line contingency outage of '695_B2'. This project contributes approximately 57.15 MW to the thermal violation.

```
CONTINGENCY '695_B2'
 OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1              / 243206 05DUMONT 765 270644 WILTO; 765 1
 END
```

16. (CE - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line (from bus 274750 to bus 255112 ckt 1) loads from 125.75% to 128.24% (**DC power flow**) of its emergency rating (1390 MVA) for the single line contingency outage of '695_B2'. This project contributes approximately 76.98 MW to the thermal violation.

```
CONTINGENCY '695_B2'
 OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1              / 243206 05DUMONT 765 270644 WILTO; 765 1
 END
```

17. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 118.26% to 121.24% (**DC power flow**) of its normal rating (971 MVA) for the

single line contingency outage of '695_B2'. This project contributes approximately 64.34 MW to the thermal violation.

```
CONTINGENCY '695_B2'
 OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1              / 243206 05DUMONT 765 270644 WILTO; 765 1
 END
```

18. (CE - CE) The BLOOM ;4M-BLOOM ; B 138 kV line (from bus 275158 to bus 271098 ckt 1) loads from 79.97% to 101.38% (**DC power flow**) of its emergency rating (480 MVA) for the single line contingency outage of '345-L17908TB-S'. This project contributes approximately 102.79 MW to the thermal violation.

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

19. (CE - CE) The DAVIS CRK;3M-DAVIS CRK; B 138 kV line (from bus 275174 to bus 271294 ckt 1) loads from 92.71% to 122.24% (**DC power flow**) of its emergency rating (480 MVA) for the single line contingency outage of '345-L2004__R-S'. This project contributes approximately 141.74 MW to the thermal violation.

```
CONTINGENCY '345-L2004__R-S'
 TRIP BRANCH FROM BUS 270671 TO BUS 270670 CKT 1             / BRAID; R 345 BRAID; B 345
 TRIP BRANCH FROM BUS 270671 TO BUS 270711 CKT 1             / BRAID; R 345 DAVIS; R 345
 END
```

20. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line (from bus 909144 to bus 243219 ckt 2) loads from 106.23% to 107.86% (**DC power flow**) of its normal rating (1409 MVA) for the single line contingency outage of '695_B2'. This project contributes approximately 51.02 MW to the thermal violation.

```
CONTINGENCY '695_B2'
 OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1              / 243206 05DUMONT 765 270644 WILTO; 765 1
 END
```

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)

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. (CE - CE) The DAVIS CRK; B 345/138 kV transformer (from bus 270710 to bus 275174 ckt 1) loads from 79.12% to 118.99% (**DC power flow**) of its emergency rating (480 MVA) for the single line contingency outage of '345-L17907TB-S'. This project contributes approximately 191.37 MW to the thermal violation.

Reinforcement: ComEd limiting element is Tr. 83 @ TSS 86 Davis Creek. Based on the contingency the applicable rating is the SSTE rating of 520 MVA. However, per ComEd Transmission Planning Criteria document dated March 23, 2015 Table 1 note-1, the loading on the line must return to normal ratings post contingency, load shed is not allowed. Therefore, the SN rating of 420 MVA will apply. Based on the overload value of 571 MVA, the following upgrades at TSS 86 Davis Creek are required. Installation of a 4th -300MVA Auto-Transformer and associated bus work and isolation devices, Upgrade Tr. 83 Current Transformer, Upgrade Tr. 83 Circuit Breaker and station conductor. Upon field completion, the SN rating will be 584 MVA.
Cost: $15M
Time: 24-30 months

2. (CE - CE) The DAVIS CRK; B 345/138 kV transformer (from bus 270710 to bus 275174 ckt 1) loads from 78.65% to 118.6% (**DC power flow**) of its emergency rating (480 MVA) for the single line contingency outage of '086-CB_34___'. This project contributes approximately 191.76 MW to the thermal violation.

Same as Generator Deliverability #1

3. (CE - CE) The DAVIS CRK;3M-DAVIS CRK; B 138 kV line (from bus 275174 to bus 271294 ckt 1) loads from 79.1% to 118.97% (**DC power flow**) of its emergency rating (480 MVA) for the single line contingency outage of '345-L17907TB-S'. This project contributes approximately 191.37 MW to the thermal violation.

Same as Generator Deliverability #1

4. (CE - CE) The DAVIS CRK;3M-DAVIS CRK; B 138 kV line (from bus 275174 to bus 271294 ckt 1) loads from 78.65% to 118.6% (**DC power flow**) of its emergency rating (480 MVA) for the single line contingency outage of '086-CB_34___'. This project contributes approximately 191.76 MW to the thermal violation.

Same as Generator Deliverability #1

Multiple Facility Contingency

1. (AEP - AEP) The 05OLIVE-X2-052 TAP 345 kV line (from bus 243229 to bus 909144 ckt 2) loads from 93.34% to 94.79% (**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 46.35 MW to the thermal violation.

Reinforcement: 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.
Cost: $56,000 (Sag study), $28,000,000 (Line rebuild)
Time: 6 to 12 months (sag study), 24 to 36 months (Line rebuild)

2. (MISO NIPS - CE) The 17STJOHN-ST JOHN ; T 345 kV line (from bus 255112 to bus 270886 ckt 1) loads from 97.12% to 99.46% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of '2978_C2_05DUMONT 765-B_A'. This project contributes approximately 56.68 MW to the thermal violation.

ComEd
No upgrade required.

NIPSCO (MISO) will have to evaluate this violation during the SIS phase.

3. (MISO NIPS - CE) The 17STJOHN-ST JOHN ; T 345 kV line (from bus 255112 to bus 270886 ckt 1) loads from 96.36% to 98.72% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of '112-65-BT4-5__'. This project contributes approximately 57.18 MW to the thermal violation.

Same as Multiple Facility #2

4. (MISO NIPS - CE) The 17STJOHN-ST JOHN ; T 345 kV line (from bus 255112 to bus 270886 ckt 1) loads from 96.32% to 98.68% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of '112-65-BT3-4__'. This project contributes approximately 57.18 MW to the thermal violation.

Same as Multiple Facility #2

5. (CE - AEP) The GREENACRE; T-05OLIVE 345 kV line (from bus 270771 to bus 243229 ckt 1) loads from 95.17% to 97.7% (**DC power flow**) of its emergency rating (971 MVA) for the line fault with failed breaker contingency outage of '2978_C2_05DUMONT 765-B_A'. This project contributes approximately 54.37 MW to the thermal violation.

ComEd
ComEd SLD rating of 1237 MVA (ALDR is 1423 MVA), no upgrade required.

AEP
Olive - Green Acres 345 kV line is a sag de-rated tie line and thus a sag check will be required for the entire 40.64 miles of ACSR/PE ~ 1414 ~ 62/19 Conductor section 1 to determine if the line can be operated above its emergency rating 971 MVA. If deemed necessary to rebuild the entire 40.64 miles of the section of the line.
Cost: $162,560 (sag study), $81,280,000 (line rebuild)
Time: 6-12 months (sag study), 24-36 months (line rebuild)

6. (CE - AEP) The GREENACRE; T-05OLIVE 345 kV line (from bus 270771 to bus 243229 ckt 1) loads from 87.94% to 90.49% (**DC power flow**) of its emergency rating (971 MVA) for the line fault with failed breaker contingency outage of '112-65-BT4-5__'. This project contributes approximately 55.09 MW to the thermal violation.

Same as Multiple Facility #5

7. (CE - AEP) The GREENACRE; T-05OLIVE 345 kV line (from bus 270771 to bus 243229 ckt 1) loads from 87.94% to 90.49% (**DC power flow**) of its emergency rating (971 MVA) for the line fault with failed breaker contingency outage of '112-65-BT3-4__'. This project contributes approximately 55.09 MW to the thermal violation.

Same as Multiple Facility #5

8. (CE - MISO NIPS) The ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 97.12% to 99.46% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of '2978_C2_05DUMONT 765-B_A'. This project contributes approximately 56.68 MW to the thermal violation.

ComEd

The ComEd facility is 345kV L6617. The SLD rating of 1237 MVA (ALDR is 1423 MVA). No upgrade required.

NIPSCO (MISO) will have to review this overload during the SIS phase.

9. (CE - MISO NIPS) The ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 96.36% to 98.72% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of '112-65-BT4-5__'. This project contributes approximately 57.18 MW to the thermal violation.

Same as Multiple Facility #8

10. (CE - MISO NIPS) The ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 96.32% to 98.68% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of '112-65-BT3-4__'. This project contributes approximately 57.18 MW to the thermal violation.

Same as Multiple Facility #8

Contribution to Previously Identified System Reinforcements
(Overloads initially caused by prior Queue positions with additional contribution to overloading by this project. This project may have a % allocation cost responsibility which will be calculated and reported for the Impact Study)
(Summary form of Cost allocation for transmission lines and transformers will be inserted here if any)

1. (MISO NIPS - AEP) The 17HIPLE-05COLNGW 345 kV line (from bus 255105 to bus 243214 ckt 1) loads from 103.57% to 103.71% (**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 44.51 MW to the thermal violation.

AEP
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.
Cost: 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).
Time: 6 to 12 months (sag study), 24 to 36 months (line rebuild)

NIPSCO (MISO) will have to review this overload during the SIS phase.

2. (MISO NIPS - AEP) The 17STILLWELL-05DUMONT 345 kV line (from bus 255113 to bus 243219 ckt 1) loads from 126.61% to 129.73% (**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 97.48 MW to the thermal violation.

AEP
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 9 mile section of line would need to be rebuilt. Replace the Dumont wave-trap (2500 A)
Cost: $40,000 (sag study), $18,000,000 (line rebuild), $300,000 (Dumont wave trap replacement)
Time: 6 to 12 months (sag study), 24 to 36 months (line rebuild)

NIPSCO (MISO) will have to review this overload during the SIS phase.

3. (MISO NIPS - AEP) The 17STILLWELL-05DUMONT 345 kV line (from bus 255113 to bus 243219 ckt 1) loads from 116.57% to 119.77% (**DC power flow**) of its emergency rating (1409 MVA) for the line fault with failed breaker contingency outage of '023-65-BT2-3__'. This project contributes approximately 100.37 MW to the thermal violation.

Same as Contribution to Previously Identified Overloads #2

4. (MISO NIPS - AEP) The 17STILLWELL-05DUMONT 345 kV line (from bus 255113 to bus 243219 ckt 1) loads from 116.48% to 119.69% (**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 100.45 MW to the thermal violation.

Same as Contribution to Previously Identified Overloads #2

5. (CE - AEP) The WILTON ;-05DUMONT 765 kV line (from bus 270644 to bus 243206 ckt 1) loads from 112.7% to 114.54% (**DC power flow**) of its emergency rating (4444 MVA) for the tower line contingency outage of '345-L94507_B-S_+_345-L97008_R-S'. This project contributes approximately 181.02 MW to the thermal violation.

ComEd
Reinforcement: ComEd 765kV L11215. SLD is 4802 MVA. The relay thermal for this line is 5466 MVA. Based on the contingency above, the overload exceeds the relay thermal rating therefore the upgrade will be a new 765kV line. Contingent upon procurement of a right of way assuming the current right of way containing L11215 does not have land.
Cost: $300M
Time: 36 months

AEP
AEP's rating of Dumont - Wilton Center 765 kV tie line is S/N: 3555 MVA and S/E: 4105 MVA; the Dumont wave trap (2500A) will have to be replaced.
Cost: $500,000.
Time: 12-24 months

6. (CE - AEP) The WILTON ;-05DUMONT 765 kV line (from bus 270644 to bus 243206 ckt 1) loads from 111.19% to 113.03% (**DC power flow**) of its emergency rating (4444 MVA) for the tower line contingency outage of '345-L6607__B-S_+_345-L97008_R-S'. This project contributes approximately 181.26 MW to the thermal violation.

Same as Contribution to Previously Identified Overloads #5

7. (CE - MISO NIPS) The BURNHAM ; B-17SHEFFIELD 345 kV line (from bus 270674 to bus 255111 ckt 1) loads from 111.33% to 118.97% (**DC power flow**) of its emergency rating (1069 MVA) for the line fault with failed breaker contingency outage of '2978_C2_05DUMONT 765-B_A'. This project contributes approximately 81.89 MW to the thermal violation.

ComEd
ComEd 345kV L17705 SLD rating is 1768 MVA, no upgrade required.

NIPSCO (MISO) will have to review this overload during the SIS phase.

8. (CE - MISO NIPS) The BURNHAM ; B-17SHEFFIELD 345 kV line (from bus 270674 to bus 255111 ckt 1) loads from 111.05% to 118.72% (**DC power flow**) of its emergency rating (1069 MVA) for the line fault with failed breaker contingency outage of '023-65-BT2-3__'. This project contributes approximately 82.24 MW to the thermal violation.

Same as Contribution to Previously Identified Overloads #7

9. (CE - MISO NIPS) The BURNHAM ; B-17SHEFFIELD 345 kV line (from bus 270674 to bus 255111 ckt 1) loads from 110.67% to 118.37% (**DC power flow**) of its emergency rating (1069 MVA) for the line fault with failed breaker contingency outage of '023-65-BT4-5__'. This project contributes approximately 82.45 MW to the thermal violation.

Same as Contribution to Previously Identified Overloads #7

10. (CE - MISO NIPS) The BURNHAM ;0R-17MUNSTER 345 kV line (from bus 270677 to bus 255109 ckt 1) loads from 104.75% to 107.62% (**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 76.1 MW to the thermal violation.

ComEd
ComEd 345kV L17703 SLD is 1768 MVA. No upgrades required. Note the limit of 1195 MVA is a NIPSCO limit.

NIPSCO (MISO) will have to review this overload during the SIS phase.

11. (CE - MISO NIPS) The BURNHAM ;0R-17MUNSTER 345 kV line (from bus 270677 to bus 255109 ckt 1) loads from 104.67% to 107.55% (**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 76.45 MW to the thermal violation.

Same as Contribution to Previously Identified Overloads #10

12. (CE - MISO NIPS) The BURNHAM ;0R-17MUNSTER 345 kV line (from bus 270677 to bus 255109 ckt 1) loads from 104.17% to 107.06% (**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 76.73 MW to the thermal violation.

Same as Contribution to Previously Identified Overloads #10

13. (CE - CE) The WILTON ; B-WILTON ;3M 345 kV line (from bus 270926 to bus 275232 ckt 1) loads from 121.83% to 124.21% (**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 84.62 MW to the thermal violation.

Reinforcement: The limit is Tr. 93 @ TSS 112 Wilton Center. The SLD is 1601 MVA (ALDR is 1841 MVA). Upgrade required at TSS 112 Wilton Center. Relocate 765kV L11216 from Bus 6 to Bus 8. Build out the 765kV bus and install 2 new 765kV Bus Tie CB’s (BT 6-8 & 8-2), upgrade Tr. 93 station conductor and upgrade Tr. 93 forward relay trip setting. Upon completion the new ratings will be 1248/1479/1982 MVA, SN/SE/SLD (ALDR of 2279 MVA).
Cost: $13M
Time: 24-30 months

14. (CE - CE) The WILTON ; R-WILTON ;4M 345 kV line (from bus 270927 to bus 275233 ckt 1) loads from 125.16% to 127.59% (**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 86.43 MW to the thermal violation.

Reinforcement: The limit is Tr. 94 @ TSS 112 Wilton Center.
The SLD is 1601 MVA (ALDR is 1841 MVA). Upgrade required at TSS 112 Wilton Center.

Relocate 765kV L11216 from Bus 6 to Bus 8. Build out the 765kV bus and install 2 new 765kV Bus Tie CB's (BT 6-8 & 8-2) and upgrade Tr. 93 station conductor at TSS 112, Tr. 94 CT upgrades and Forward Relay Trip reviewed and upgraded. The new ratings would be 1248/1479/2221 MVA SN/SE/SLD (ALDR of 2390 MVA).
Cost: $13M
Time: 24-30 months.

15. (CE - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line (from bus 274750 to bus 255112 ckt 1) loads from 126.57% to 129.07% (**DC power flow**) of its emergency rating (1390 MVA) for the line fault with failed breaker contingency outage of '112-65-BT4-5__'. This project contributes approximately 77.05 MW to the thermal violation.

ComEd:
Reinforcement: The limiting element is 345kV L94507. ComEd SLD is 1674 MVA (ALDR for L94507 is 1925 MVA).Upgrade L94507 1414 kcmil paper expanded conductor to 2156 kcmil. Upon field completion, the ratings will be 1091/1399/2084 MVA SN/SE/SLD.
Cost: $17.2M
Time: 24 -30 months

NIPSCO (MISO) will have to review this overload during the SIS phase.

16. (CE - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line (from bus 274750 to bus 255112 ckt 1) loads from 126.64% to 129.12% (**DC power flow**) of its emergency rating (1390 MVA) for the line fault with failed breaker contingency outage of '2978_C2_05DUMONT 765-B_A'. This project contributes approximately 76.57 MW to the thermal violation.

Same as Contribution to Previously Identified Overloads #15

17. (CE - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line (from bus 274750 to bus 255112 ckt 1) loads from 126.5% to 129.0% (**DC power flow**) of its emergency rating (1390 MVA) for the line fault with failed breaker contingency outage of '112-65-BT3-4__'. This project contributes approximately 77.04 MW to the thermal violation.

Same as Contribution to Previously Identified Overloads #15

18. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 120.1% to 123.06% (**DC power flow**) of its emergency rating (971 MVA) for the line fault with failed breaker contingency outage of '2978_C2_05DUMONT 765-B_A'. This project contributes approximately 63.76 MW to the thermal violation.

ComEd:

The limiting element is 345kV L97008. ComEd SLTE rating for L94507 is 1134 MVA. No overload from ComEd.

AEP:
Reinforcement: 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 40.61 mile section of line would need to be rebuilt. The Olive switches to Line Riser will have to be replaced. For Olive RCTL, an engineering study will need to be conducted to determine if the Relay Compliance Trip limits settings can be adjusted to mitigate the overload. New relay packages will be required if the settings cannot be adjusted
Cost: $162,440 (sag study), $81,220,000 (re-conductor/rebuild AEP section of line), $1,400,000 (Olive switches), $600,000 (Relays)
Time: 6-12 months (sag study), 24-36 months (line rebuild)

19. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 118.74% to 121.73% (**DC power flow**) of its emergency rating (971 MVA) for the line fault with failed breaker contingency outage of '112-65-BT4-5__'. This project contributes approximately 64.37 MW to the thermal violation.

Same as Contribution to Previously Identified Overloads #18

20. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 118.71% to 121.69% (**DC power flow**) of its emergency rating (971 MVA) for the line fault with failed breaker contingency outage of '112-65-BT3-4__'. This project contributes approximately 64.37 MW to the thermal violation.

Same as Contribution to Previously Identified Overloads #18

21. (CE - CE) The WILTON ; 765/345 kV transformer (from bus 275232 to bus 270644 ckt 1) loads from 111.41% to 113.79% (**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 84.62 MW to the thermal violation.

Reinforcement: Reinforcement: The limit is Tr. 93 @ TSS 112 Wilton Center. The SLD is 1601 MVA (ALDR is 1841 MVA). Upgrade required at TSS 112 Wilton Center will be installation of a third transformer (3-333.3 MVA), 2-765kV Circuit Breakers to be and 1-345kV Circuit Breaker.
Cost: $25M
Time: 24-30 months.

22. (CE - CE) The WILTON ; 765/345 kV transformer (from bus 275233 to bus 270644 ckt 1) loads from 113.71% to 116.14% (**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 86.43 MW to the thermal violation.

Same as Contribution to Previously Identified Overloads #21

23. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line (from bus 909144 to bus 243219 ckt 2) loads from 116.73% to 118.22% (**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 46.35 MW to the thermal violation.

AEP:
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.
Cost: $56,000 (Sag Study), $28,000,000 (Line rebuild)
Time: 6-12 months (Sag Study), 24-36 months (Line rebuild)

24. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line (from bus 909144 to bus 243219 ckt 2) loads from 106.39% to 108.02% (**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 51.04 MW to the thermal violation.

Same as Contribution to Previously Identified Overloads #23

25. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line (from bus 909144 to bus 243219 ckt 2) loads from 106.38% to 108.01% (**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 51.04 MW to the thermal violation.

Same as Contribution to Previously Identified Overloads #23

Network Impacts for Option 2 (Davis Creek

The Queue Project AB1-091 was evaluated as a 575.0 MW (Capacity 550.0 MW) injection at the Davis Creek 345kV substation in the COMED area. Project AB1-091 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AB1-091 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)

None

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

1. (AEP - AEP) The 05OLIVE-X2-052 TAP 345 kV line (from bus 243229 to bus 909144 ckt 2) loads from 93.41% to 94.86% (**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 46.32 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
```

2. (MISO NIPS - CE) The 17STJOHN-ST JOHN ; T 345 kV line (from bus 255112 to bus 270886 ckt 1) loads from 97.2% to 99.49% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of '2978_C2_05DUMONT 765-B_A'. This project contributes approximately 55.48 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
```

3. (MISO NIPS - CE) The 17STJOHN-ST JOHN ; T 345 kV line (from bus 255112 to bus 270886 ckt 1) loads from 96.44% to 98.75% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of '112-65-BT4-5__'. This project contributes approximately 55.98 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
```

4. (MISO NIPS - CE) The 17STJOHN-ST JOHN ; T 345 kV line (from bus 255112 to bus 270886 ckt 1) loads from 96.4% to 98.71% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of '112-65-BT3-4__'. This project contributes approximately 55.98 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
```

5. (CE - CE) The DAVIS CRK; R 345/1 kV transformer (from bus 270711 to bus 999054 ckt 1) loads from .88% to 118.92% (**DC power flow**) of its emergency rating (480 MVA) for the line fault with failed breaker contingency outage of '086-45-BT1-2__'. This project contributes approximately 575.0 MW to the thermal violation.

```
CONTINGENCY '086-45-BT1-2__'
 TRIP BRANCH FROM BUS 270675 TO BUS 270711 CKT 1          / BURNH;1R 345 DAVIS; R 345
 TRIP BRANCH FROM BUS 275173 TO BUS 270711 CKT 1          / DAVIS;2M 138 DAVIS; R 345
 TRIP BRANCH FROM BUS 275173 TO BUS 271295 CKT 1          / DAVIS;2M 138 DAVIS; R 138
 TRIP BRANCH FROM BUS 275173 TO BUS 275273 CKT 1          / DAVIS;2M 138 DAVIS;2C 34.5
 TRIP BRANCH FROM BUS 270671 TO BUS 270670 CKT 1          / BRAID; R 345 BRAID; B 345
 TRIP BRANCH FROM BUS 270671 TO BUS 270711 CKT 1          / BRAID; R 345 DAVIS; R 345
 END
```

6. (CE - CE) The E FRANKFO; B-CRETE EC ;BP 345 kV line (from bus 270728 to bus 274750 ckt 1) loads from 90.14% to 92.08% (**DC power flow**) of its emergency rating (1674 MVA) for the line fault with failed breaker contingency outage of '112-65-BT4-5__'. This project contributes approximately 74.66 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
```

7. (CE - CE) The E FRANKFO; B-CRETE EC ;BP 345 kV line (from bus 270728 to bus 274750 ckt 1) loads from 90.19% to 92.12% (**DC power flow**) of its emergency rating (1674 MVA) for

the line fault with failed breaker contingency outage of '2978_C2_05DUMONT 765-B_A'. This project contributes approximately 74.18 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
```

8. (CE - CE) The E FRANKFO; B-CRETE EC ;BP 345 kV line (from bus 270728 to bus 274750 ckt 1) loads from 90.08% to 92.02% (**DC power flow**) of its emergency rating (1674 MVA) for the line fault with failed breaker contingency outage of '112-65-BT3-4__'. This project contributes approximately 74.66 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
```

9. (CE - AEP) The GREENACRE; T-05OLIVE 345 kV line (from bus 270771 to bus 243229 ckt 1) loads from 95.26% to 97.79% (**DC power flow**) of its emergency rating (971 MVA) for the line fault with failed breaker contingency outage of '2978_C2_05DUMONT 765-B_A'. This project contributes approximately 54.56 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
```

10. (CE - AEP) The GREENACRE; T-05OLIVE 345 kV line (from bus 270771 to bus 243229 ckt 1) loads from 88.02% to 90.58% (**DC power flow**) of its emergency rating (971 MVA) for the line fault with failed breaker contingency outage of '112-65-BT4-5__'. This project contributes approximately 55.29 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. (CE - AEP) The GREENACRE; T-05OLIVE 345 kV line (from bus 270771 to bus 243229 ckt 1) loads from 88.02% to 90.58% (**DC power flow**) of its emergency rating (971 MVA) for the line fault with failed breaker contingency outage of '112-65-BT3-4__'. This project contributes approximately 55.29 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
```

12. (CE - MISO NIPS) The ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 97.2% to 99.49% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of '2978_C2_05DUMONT 765-B_A'. This project contributes approximately 55.48 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 ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 96.44% to 98.75% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of '112-65-BT4-5__'. This project contributes approximately 55.98 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
```

14. (CE - MISO NIPS) The ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 96.4% to 98.71% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of '112-65-BT3-4__'. This project contributes approximately 55.98 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
```

15. (CE - CE) The DAVIS CRK; R 138/1 kV transformer (from bus 999054 to bus 271295 ckt 1) loads from .88% to 118.92% (**DC power flow**) of its emergency rating (480 MVA) for the line fault with failed breaker contingency outage of '086-45-BT1-2__'. This project contributes approximately 575.0 MW to the thermal violation.

```
CONTINGENCY '086-45-BT1-2__'
 TRIP BRANCH FROM BUS 270675 TO BUS 270711 CKT 1          / BURNH;1R 345 DAVIS; R 345
 TRIP BRANCH FROM BUS 275173 TO BUS 270711 CKT 1          / DAVIS;2M 138 DAVIS; R 345
 TRIP BRANCH FROM BUS 275173 TO BUS 271295 CKT 1          / DAVIS;2M 138 DAVIS; R 138
 TRIP BRANCH FROM BUS 275173 TO BUS 275273 CKT 1          / DAVIS;2M 138 DAVIS;2C 34.5
```

```
TRIP BRANCH FROM BUS 270671 TO BUS 270670 CKT 1          / BRAID; R 345 BRAID; B 345
TRIP BRANCH FROM BUS 270671 TO BUS 270711 CKT 1          / BRAID; R 345 DAVIS; 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. (MISO NIPS - AEP) The 17HIPLE-05COLNGW 345 kV line (from bus 255105 to bus 243214 ckt 1) loads from 103.64% to 103.79% (**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 44.63 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
```

2. (MISO NIPS - AEP) The 17STILLWELL-05DUMONT 345 kV line (from bus 255113 to bus 243219 ckt 1) loads from 126.73% to 129.86% (**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 97.65 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
```

3. (MISO NIPS - AEP) The 17STILLWELL-05DUMONT 345 kV line (from bus 255113 to bus 243219 ckt 1) loads from 116.57% to 119.79% (**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 100.62 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
```

4. (MISO NIPS - AEP) The 17STILLWELL-05DUMONT 345 kV line (from bus 255113 to bus 243219 ckt 1) loads from 116.4% to 119.61% (**DC power flow**) of its emergency rating (1409 MVA) for the line fault with failed breaker contingency outage of '023-65-BT2-3__'. This project contributes approximately 100.55 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
```

5. (CE - AEP) The WILTON ;-05DUMONT 765 kV line (from bus 270644 to bus 243206 ckt 1) loads from 112.74% to 114.56% (**DC power flow**) of its emergency rating (4444 MVA) for the tower line contingency outage of '345-L94507_B-S_+_345-L97008_R-S'. This project contributes approximately 179.41 MW to the thermal violation.

```
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
```

6. (CE - AEP) The WILTON ;-05DUMONT 765 kV line (from bus 270644 to bus 243206 ckt 1) loads from 111.23% to 113.05% (**DC power flow**) of its emergency rating (4444 MVA) for the tower line contingency outage of '345-L6607__B-S_+_345-L97008_R-S'. This project contributes approximately 179.65 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
```

7. (CE - MISO NIPS) The BURNHAM ; B-17SHEFFIELD 345 kV line (from bus 270674 to bus 255111 ckt 1) loads from 111.44% to 113.71% (**DC power flow**) of its emergency rating (1069 MVA) for the line fault with failed breaker contingency outage of '2978_C2_05DUMONT 765-B_A'. This project contributes approximately 53.85 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
```

8. (CE - MISO NIPS) The BURNHAM ; B-17SHEFFIELD 345 kV line (from bus 270674 to bus 255111 ckt 1) loads from 111.16% to 113.44% (**DC power flow**) of its emergency rating (1069 MVA) for the line fault with failed breaker contingency outage of '023-65-BT2-3__'. This project contributes approximately 54.21 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
```

9. (CE - MISO NIPS) The BURNHAM ; B-17SHEFFIELD 345 kV line (from bus 270674 to bus 255111 ckt 1) loads from 110.77% to 113.06% (**DC power flow**) of its emergency rating (1069 MVA) for the line fault with failed breaker contingency outage of '023-65-BT4-5__'. This project contributes approximately 54.42 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
```

10. (CE - MISO NIPS) The BURNHAM ;0R-17MUNSTER 345 kV line (from bus 270677 to bus 255109 ckt 1) loads from 104.82% to 113.05% (**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 98.71 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
```

11. (CE - MISO NIPS) The BURNHAM ;0R-17MUNSTER 345 kV line (from bus 270677 to bus 255109 ckt 1) loads from 104.74% to 113.0% (**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 99.07 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
```

12. (CE - MISO NIPS) The BURNHAM ;0R-17MUNSTER 345 kV line (from bus 270677 to bus 255109 ckt 1) loads from 104.22% to 112.51% (**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 99.34 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
```

13. (CE - CE) The WILTON ; B-WILTON ;3M 345 kV line (from bus 270926 to bus 275232 ckt 1) loads from 121.9% to 124.27% (**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 84.2 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
```

14. (CE - CE) The WILTON ; R-WILTON ;4M 345 kV line (from bus 270927 to bus 275233 ckt 1) loads from 125.24% to 127.66% (**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 86.02 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
```

15. (CE - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line (from bus 274750 to bus 255112 ckt 1) loads from 126.65% to 129.04% (**DC power flow**) of its emergency rating (1390 MVA) for the line fault with failed breaker contingency outage of '112-65-BT4-5__'. This project contributes approximately 73.74 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
```

16. (CE - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line (from bus 274750 to bus 255112 ckt 1) loads from 126.72% to 129.1% (**DC power flow**) of its emergency rating (1390 MVA) for the line fault with failed breaker contingency outage of '2978_C2_05DUMONT 765-B_A'. This project contributes approximately 73.25 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
```

17. (CE - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line (from bus 274750 to bus 255112 ckt 1) loads from 126.58% to 128.97% (**DC power flow**) of its emergency rating (1390 MVA) for the line fault with failed breaker contingency outage of '112-65-BT3-4__'. This project contributes approximately 73.73 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
```

18. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 120.21% to 123.16% (**DC power flow**) of its emergency rating (971 MVA) for the line fault with failed breaker contingency outage of '2978_C2_05DUMONT 765-B_A'. This project contributes approximately 63.61 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
```

19. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 118.84% to 121.82% (**DC power flow**) of its emergency rating (971 MVA) for the line fault with failed breaker contingency outage of '112-65-BT4-5__'. This project contributes approximately 64.23 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
```

20. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 118.82% to 121.8% (**DC power flow**) of its emergency rating (971 MVA) for the line fault with failed breaker contingency outage of '112-65-BT3-4__'. This project contributes approximately 64.23 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
```

21. (CE - CE) The WILTON ; 765/345 kV transformer (from bus 275232 to bus 270644 ckt 1) loads from 111.48% to 113.85% (**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 84.2 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
```

22. (CE - CE) The WILTON ; 765/345 kV transformer (from bus 275233 to bus 270644 ckt 1) loads from 113.79% to 116.21% (**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 86.02 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
```

23. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line (from bus 909144 to bus 243219 ckt 2) loads from 116.81% to 118.29% (**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 46.32 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
```

24. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line (from bus 909144 to bus 243219 ckt 2) loads from 106.42% to 108.06% (**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 51.01 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
```

25. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line (from bus 909144 to bus 243219 ckt 2) loads from 106.41% to 108.05% (**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 51.01 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

Affected System Analysis & Mitigation

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 05DUMONT-05SORENS 765 kV line (from bus 243206 to bus 246999 ckt 1) loads from 100.91% to 101.05% (**DC power flow**) of its normal rating (4257 MVA) for the single line contingency outage of '709_B2_TOR546'. This project contributes approximately 135.77 MW to the thermal violation.

```
CONTINGENCY '709_B2_TOR546'
 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 102.43% to 102.56% (**DC power flow**) of its normal rating (1409

MVA) for the single line contingency outage of '7442_B2_TOR200545'. This project contributes approximately 44.22 MW to the thermal violation.

```
CONTINGENCY '7442_B2_TOR200545'
 OPEN BRANCH FROM BUS 243206 TO BUS 246999 CKT 1          / 243206 05DUMONT 765 246999 05SORENS 765 1
 END
```

3. (MISO NIPS - CE) The 17STJOHN-ST JOHN ; T 345 kV line (from bus 255112 to bus 270886 ckt 1) loads from 95.95% to 98.26% (**DC power flow**) of its emergency rating (1091 MVA) for the single line contingency outage of '695_B2'. This project contributes approximately 55.95 MW to the thermal violation.

```
CONTINGENCY '695_B2'
 OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1          / 243206 05DUMONT 765 270644 WILTO; 765 1
 END
```

4. (MISO NIPS - AEP) The 17STILLWELL-05DUMONT 345 kV line (from bus 255113 to bus 243219 ckt 1) loads from 116.34% to 119.56% (**DC power flow**) of its normal rating (1409 MVA) for the single line contingency outage of '695_B2'. This project contributes approximately 100.61 MW to the thermal violation.

```
CONTINGENCY '695_B2'
 OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1          / 243206 05DUMONT 765 270644 WILTO; 765 1
 END
```

5. (CE - CE) The COLLINS ;-WILTON ; 765 kV line (from bus 270607 to bus 270644 ckt 1) loads from 99.14% to 100.13% (**DC power flow**) of its normal rating (4142 MVA) for non-contingency condition. This project contributes approximately 91.31 MW to the thermal violation.

6. (CE - CE) The COLLINS ;-WILTON ; 765 kV line (from bus 270607 to bus 270644 ckt 1) loads from 96.51% to 97.45% (**DC power flow**) of its emergency rating (4460 MVA) for the single line contingency outage of '345-L16703_R-S'. This project contributes approximately 94.69 MW to the thermal violation.

```
CONTINGENCY '345-L16703_R-S'
 TRIP BRANCH FROM BUS 270846 TO BUS 270847 CKT 1          / PLANO ; B 345 PLANO ; R 345
 TRIP BRANCH FROM BUS 270847 TO BUS 270733 CKT 1          / PLANO ; R 345 ELEC JUNC;3R 345
 END
```

7. (CE - AEP) The WILTON ;-05DUMONT 765 kV line (from bus 270644 to bus 243206 ckt 1) loads from 116.15% to 117.84% (**DC power flow**) of its normal rating (4047 MVA) for the

single line contingency outage of '363_B2_TOR1682'. This project contributes approximately 151.67 MW to the thermal violation.

```
CONTINGENCY '363_B2_TOR1682'
 OPEN BRANCH FROM BUS 243208 TO BUS 243209 CKT 1          / 243208 05JEFRSO 765 243209 05ROCKPT 765 1
 END
```

8. (CE - MISO NIPS) The BURNHAM ; B-17SHEFFIELD 345 kV line (from bus 270674 to bus 255111 ckt 1) loads from 109.94% to 112.23% (**DC power flow**) of its emergency rating (1069 MVA) for the single line contingency outage of '695_B2'. This project contributes approximately 54.38 MW to the thermal violation.

```
CONTINGENCY '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 103.37% to 111.65% (**DC power flow**) of its emergency rating (1195 MVA) for the single line contingency outage of '695_B2'. This project contributes approximately 99.28 MW to the thermal violation.

```
CONTINGENCY '695_B2'
 OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1          / 243206 05DUMONT 765 270644 WILTO; 765 1
 END
```

10. (CE - CE) The E FRANKFO; B-CRETE EC ;BP 345 kV line (from bus 270728 to bus 274750 ckt 1) loads from 107.04% to 109.36% (**DC power flow**) of its emergency rating (1399 MVA) for the single line contingency outage of '695_B2'. This project contributes approximately 74.59 MW to the thermal violation.

```
CONTINGENCY '695_B2'
 OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1          / 243206 05DUMONT 765 270644 WILTO; 765 1
 END
```

11. (CE - AEP) The GREENACRE; T-05OLIVE 345 kV line (from bus 270771 to bus 243229 ckt 1) loads from 87.95% to 90.52% (**DC power flow**) of its normal rating (971 MVA) for the single line contingency outage of '695_B2'. This project contributes approximately 55.29 MW to the thermal violation.

```
CONTINGENCY '695_B2'
 OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1          / 243206 05DUMONT 765 270644 WILTO; 765 1
 END
```

12. (CE - CE) The PLANO ; B-ELECT JCT; B 345 kV line (from bus 270846 to bus 270730 ckt 1) loads from 101.74% to 102.73% (**DC power flow**) of its emergency rating (1341 MVA) for

the single line contingency outage of '765-L11216__-S'. This project contributes approximately 29.24 MW to the thermal violation.

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

13. (CE - MISO NIPS) The ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 95.95% to 98.26% (**DC power flow**) of its emergency rating (1091 MVA) for the single line contingency outage of '695_B2'. This project contributes approximately 55.95 MW to the thermal violation.

```
CONTINGENCY '695_B2'
 OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1              / 243206 05DUMONT 765 270644 WILTO; 765 1
 END
```

14. (CE - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line (from bus 274750 to bus 255112 ckt 1) loads from 125.83% to 128.21% (**DC power flow**) of its emergency rating (1390 MVA) for the single line contingency outage of '695_B2'. This project contributes approximately 73.67 MW to the thermal violation.

```
CONTINGENCY '695_B2'
 OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1              / 243206 05DUMONT 765 270644 WILTO; 765 1
 END
```

15. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 118.36% to 121.34% (**DC power flow**) of its normal rating (971 MVA) for the single line contingency outage of '695_B2'. This project contributes approximately 64.2 MW to the thermal violation.

```
CONTINGENCY '695_B2'
 OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1              / 243206 05DUMONT 765 270644 WILTO; 765 1
 END
```

16. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line (from bus 909144 to bus 243219 ckt 2) loads from 106.26% to 107.9% (**DC power flow**) of its normal rating (1409 MVA) for the single line contingency outage of '695_B2'. This project contributes approximately 51.0 MW to the thermal violation.

```
CONTINGENCY '695_B2'
 OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1              / 243206 05DUMONT 765 270644 WILTO; 765 1
 END
```

Light Load Analysis - 2019

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