Transmission Interconnection
Feasibility Study Report

For

PJM Transmission Interconnection Request Queue Position AB1-121

Byron

July 2016

Network Impacts

The Queue Project AB1-121 was evaluated as a 1927.0 MW (Capacity 1927.0 MW) injection at the Byron 345kV substation in the COMED area. Project AB1-121 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AB1-121 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 BYRON ; B-CHERRY VA; B 345 kV line (from bus 270678 to bus 270694 ckt 1) loads from 87.03% to 116.37% (**DC power flow**) of its emergency rating (1441 MVA) for the single line contingency outage of '345-L0622__R-R'. This project contributes approximately 422.73 MW to the thermal violation.

```
CONTINGENCY '345-L0622__R-R'
 TRIP BRANCH FROM BUS 270679 TO BUS 270695 CKT 1              / BYRON; R 345 CHERR; R 345
 END
```

2. (CE - CE) The BYRON ; R-CHERRY VA; R 345 kV line (from bus 270679 to bus 270695 ckt 1) loads from 89.1% to 119.06% (**DC power flow**) of its emergency rating (1479 MVA) for the single line contingency outage of '345-L0621__B-R'. This project contributes approximately 443.21 MW to the thermal violation.

```
CONTINGENCY '345-L0621__B-R'
 TRIP BRANCH FROM BUS 270678 TO BUS 270694 CKT 1              / BYRON; B 345 CHERR; B 345
 END
```

3. (CE - CE) The CHERRY VA; R-GARDEN PR; R 345 kV line (from bus 270695 to bus 270759 ckt 1) loads from 98.31% to 131.94% (**DC power flow**) of its emergency rating (1479

MVA) for the single line contingency outage of '345-L0626__B-R_B'. This project contributes approximately 498.26 MW to the thermal violation.

```
CONTINGENCY '345-L0626__B-R_B'
 TRIP BRANCH FROM BUS 930480 TO BUS 270916 CKT 1          / AB1-089 TAP 345 WAYNE ; B 345
 END
```

4. (CE - CE) The CHERRY VA; R-GARDEN PR; R 345 kV line (from bus 270695 to bus 270759 ckt 1) loads from 79.37% to 113.06% (**DC power flow**) of its emergency rating (1479 MVA) for the single line contingency outage of '345-L0626__B-R_A'. This project contributes approximately 498.26 MW to the thermal violation.

```
CONTINGENCY '345-L0626__B-R_A'
 TRIP BRANCH FROM BUS 270678 TO BUS 930480 CKT 1          / BYRON ; B 345 AB1-089 TAP 345
 END
```

5. (CE - CE) The CHERRY VA; R-GARDEN PR; R 345 kV line (from bus 270695 to bus 270759 ckt 1) loads from 73.89% to 102.55% (**DC power flow**) of its normal rating (1201 MVA) for non-contingency condition. This project contributes approximately 344.24 MW to the thermal violation.

6. (CE - CE) The GARDEN PR; R-SILVER LK; R 345 kV line (from bus 270759 to bus 270883 ckt 1) loads from 85.34% to 103.2% (**DC power flow**) of its emergency rating (1479 MVA) for the single line contingency outage of '345-L0626__B-R_B'. This project contributes approximately 498.26 MW to the thermal violation.

```
CONTINGENCY '345-L0626__B-R_B'
 TRIP BRANCH FROM BUS 930480 TO BUS 270916 CKT 1          / AB1-089 TAP 345 WAYNE ; B 345
 END
```

7. (CE - CE) The WAYNE ; B-TOLLWAY ; B 345 kV line (from bus 270916 to bus 270900 ckt 1) loads from 86.65% to 108.47% (**DC power flow**) of its emergency rating (1201 MVA) for the single line contingency outage of '345-L11126_B-N'. This project contributes approximately 262.05 MW to the thermal violation.

```
CONTINGENCY '345-L11126_B-N'
 TRIP BRANCH FROM BUS 270730 TO BUS 270916 CKT 1          / ELEC JUNC; B 345 WAYNE ; B 345
 TRIP BRANCH FROM BUS 270916 TO BUS 270917 CKT 1          / WAYNE ; B 345 WAYNE ; R 345
 END
```

8. (CE - CE) The AB1-089 TAP-WAYNE ; B 345 kV line (from bus 930480 to bus 270916 ckt 1) loads from 96.49% to 125.33% (**DC power flow**) of its normal rating (1679 MVA) for non-

contingency condition. This project contributes approximately 484.14 MW to the thermal violation.

9. (CE - CE) The AB1-089 TAP-WAYNE ; B 345 kV line (from bus 930480 to bus 270916 ckt 1) loads from 92.7% to 121.36% (**DC power flow**) of its emergency rating (2058 MVA) for the single line contingency outage of '345-L15616__-R'. This project contributes approximately 590.53 MW to the thermal violation.

```
CONTINGENCY '345-L15616__-R'
 TRIP BRANCH FROM BUS 270695 TO BUS 270759 CKT 1              / CHERR; R 345 U3-021 GARDEN PRAIRIE
 END
```

10. (CE - CE) The AB1-089 TAP-WAYNE ; B 345 kV line (from bus 930480 to bus 270916 ckt 1) loads from 92.5% to 121.2% (**DC power flow**) of its emergency rating (2058 MVA) for the single line contingency outage of '345-L97116__-R'. This project contributes approximately 590.53 MW to the thermal violation.

```
CONTINGENCY '345-L97116__-R'
 TRIP BRANCH FROM BUS 270759 TO BUS 270883 CKT 1              / U3-021 SILVE; R 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 94.79% to 100.13% (**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 145.05 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 99.46% to 107.8% (**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 171.52 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 98.72% to 107.11% (**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 172.76 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 98.68% to 107.07% (**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 172.72 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 BYRON ; B-CHERRY VA; B 345 kV line (from bus 270678 to bus 270694 ckt 1) loads from 93.13% to 148.13% (**DC power flow**) of its emergency rating (1768 MVA) for the line fault with failed breaker contingency outage of '006-45-BT7-8__A'. This project contributes approximately 972.38 MW to the thermal violation.

```
CONTINGENCY '006-45-BT7-8__A'
 TRIP BRANCH FROM BUS 270678 TO BUS 930480 CKT 1          / BYRON ; B 345 AB1-089 TAP 345
 TRIP BRANCH FROM BUS 270678 TO BUS 270679 CKT 1          / BYRON ; B 345 BYRON ; R 345
 END
```

6. (CE - CE) The CHERRY VA; R-GARDEN PR; R 345 kV line (from bus 270695 to bus 270759 ckt 1) loads from 92.05% to 119.66% (**DC power flow**) of its emergency rating (1768 MVA) for the line fault with failed breaker contingency outage of '144-45-BT4-7__'. This project contributes approximately 489.98 MW to the thermal violation.

```
CONTINGENCY '144-45-BT4-7__'
 TRIP BRANCH FROM BUS 270730 TO BUS 270916 CKT 1          / ELEC JUNC; B 345 WAYNE ; B 345
 TRIP BRANCH FROM BUS 270916 TO BUS 270917 CKT 1          / WAYNE ; B 345 WAYNE ; R 345
 TRIP BRANCH FROM BUS 270916 TO BUS 270900 CKT 1          / WAYNE ; B 345 TOLLWAY ; B 345
```

```
TRIP BRANCH FROM BUS 275228 TO BUS 270916 CKT 1          / WAYNE ;1M 138 WAYNE ; B 345
TRIP BRANCH FROM BUS 275228 TO BUS 272740 CKT 1          / WAYNE ;1M 138 WAYNE ; B 138
TRIP BRANCH FROM BUS 275228 TO BUS 275328 CKT 1          / WAYNE ;1M 138 WAYNE ;1C 34.5
END
```

7. (CE - AEP) The GREENACRE; T-05OLIVE 345 kV line (from bus 270771 to bus 243229 ckt 1) loads from 97.7% to 106.22% (**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 156.09 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 - AEP) The GREENACRE; T-05OLIVE 345 kV line (from bus 270771 to bus 243229 ckt 1) loads from 90.49% to 99.09% (**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 157.53 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
```

9. (CE - AEP) The GREENACRE; T-05OLIVE 345 kV line (from bus 270771 to bus 243229 ckt 1) loads from 90.49% to 99.09% (**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 157.53 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
```

10. (CE - MISO NIPS) The ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 99.46% to 107.8% (**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 171.52 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 ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 98.72% to 107.11% (**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 172.76 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
```

12. (CE - MISO NIPS) The ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 98.68% to 107.07% (**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 172.72 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
```

13. (MISO WEC - CE) The PLS PR1-ZION EC ;RP 345 kV line (from bus 699432 to bus 274817 ckt 1) loads from 99.69% to 103.42% (**DC power flow**) of its emergency rating (1526 MVA) for the tower line contingency outage of '345-L2221__R-N_+_345-L2222__B-N'. This project contributes approximately 107.57 MW to the thermal violation.

```
CONTINGENCY '345-L2221__R-N_+_345-L2222__B-N'
 TRIP BRANCH FROM BUS 270940 TO BUS 270941 CKT 1          / ZION ; B 345 ZION ; R 345
 TRIP BRANCH FROM BUS 270940 TO BUS 270942 CKT 1          / ZION ; B 345 ZION ;0B 345
 TRIP BRANCH FROM BUS 270941 TO BUS 699432 CKT 1          / ZION ; R 345 PLS PR2 345
 TRIP BRANCH FROM BUS 270942 TO BUS 699247 CKT 1          / ZION ;0B 345 ARCADN3 345
 CLOSE BRANCH FROM BUS 270941 TO BUS 270942 CKT 1          / ZION ; R 345 ZION ;0B 345
 END
```

14. (CE - CE) The AB1-089 TAP-WAYNE ; B 345 kV line (from bus 930480 to bus 270916 ckt 1) loads from 96.17% to 123.56% (**DC power flow**) of its emergency rating (2280 MVA) for the tower line contingency outage of '345-L0621__B-R_+_345-L0622__R-R'. This project contributes approximately 630.82 MW to the thermal violation.

```
CONTINGENCY '345-L0621__B-R_+_345-L0622__R-R'
 TRIP BRANCH FROM BUS 270678 TO BUS 270694 CKT 1          / BYRON; B 345 CHERR; B 345
 TRIP BRANCH FROM BUS 270679 TO BUS 270695 CKT 1          / BYRON; R 345 CHERR; R 345
 TRIP BRANCH FROM BUS 270694 TO BUS 270695 CKT 1          / CHERR; B 345 CHERR; R 345
 END
```

15. (CE - CE) The AB1-089 TAP-WAYNE ; B 345 kV line (from bus 930480 to bus 270916 ckt 1) loads from 94.42% to 121.08% (**DC power flow**) of its emergency rating (2280 MVA) for the tower line contingency outage of '345-L15616__-R_+_138-L15627_R-R'. This project contributes approximately 609.24 MW to the thermal violation.

```
CONTINGENCY '345-L15616__-R_+_138-L15627_R-R'
 TRIP BRANCH FROM BUS 270695 TO BUS 270759 CKT 1          / U3-021 SILVE; R 345
 TRIP BRANCH FROM BUS 271193 TO BUS 271581 CKT 1          / CHERR; R 138 B200 ; R 138
 TRIP BRANCH FROM BUS 271558 TO BUS 272730 CKT 1          / GLIDD; B 138 WATER;3B 138
 TRIP BRANCH FROM BUS 271581 TO BUS 272757 CKT 1          / B200 ; R 138 W DEK;7T 138
 TRIP BRANCH FROM BUS 272757 TO BUS 271558 CKT 1          / W DEK;7T 138 GLIDD; B 138
 TRIP BRANCH FROM BUS 272757 TO BUS 272761 CKT 1          / W DEK;7T 138 W DEK;7R 138
 MOVE 100 PERCENT LOAD FROM BUS 272761 TO BUS 272759        / W DEK;7R 138 W DEK;4R 138
 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 103.71% to 104.19% (**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 132.56 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 129.73% to 140.0% (**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 273.09 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 119.77% to 130.25% (**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 278.47 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 119.69% to 130.18% (**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 278.78 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 114.54% to 121.87% (**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 614.94 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 113.03% to 120.37% (**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 615.77 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 118.97% to 127.92% (**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 181.08 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 118.72% to 127.68% (**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 181.1 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 118.37% to 127.37% (**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 181.99 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 107.62% to 117.53% (**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 223.53 MW to the thermal violation.

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

11. (CE - MISO NIPS) The BURNHAM ;0R-17MUNSTER 345 kV line (from bus 270677 to bus 255109 ckt 1) loads from 107.55% to 117.46% (**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 223.4 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 107.06% to 117.02% (**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 224.53 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 WEMPLETOW; B 345/138 kV transformer (from bus 270918 to bus 275231 ckt 1) loads from 103.56% to 116.69% (**DC power flow**) of its emergency rating (520 MVA) for the tower line contingency outage of '345-L0621__B-R_+_345-L0622__R-R'. This project contributes approximately 128.82 MW to the thermal violation.

```
CONTINGENCY '345-L0621__B-R_+_345-L0622__R-R'
 TRIP BRANCH FROM BUS 270678 TO BUS 270694 CKT 1          / BYRON; B 345 CHERR; B 345
 TRIP BRANCH FROM BUS 270679 TO BUS 270695 CKT 1          / BYRON; R 345 CHERR; R 345
 TRIP BRANCH FROM BUS 270694 TO BUS 270695 CKT 1          / CHERR; B 345 CHERR; R 345
 END
```

14. (CE - CE) The WILTON ; B-WILTON ;3M 345 kV line (from bus 270926 to bus 275232 ckt 1) loads from 124.21% to 133.21% (**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 271.75 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
```

15. (CE - CE) The WILTON ; R-WILTON ;4M 345 kV line (from bus 270927 to bus 275233 ckt 1) loads from 127.59% to 136.78% (**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 277.51 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
```

16. (CE - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line (from bus 274750 to bus 255112 ckt 1) loads from 129.07% to 138.25% (**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 240.78 MW to the thermal violation.

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

17. (CE - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line (from bus 274750 to bus 255112 ckt 1) loads from 129.12% to 138.24% (**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 239.31 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
```

18. (CE - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line (from bus 274750 to bus 255112 ckt 1) loads from 129.0% to 138.18% (**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 240.72 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
```

19. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 123.06% to 133.31% (**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 187.92 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
```

20. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 121.73% to 132.06% (**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 189.33 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
```

21. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 121.69% to 132.03% (**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 189.33 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
```

22. (CE - CE) The WILTON ; 765/345 kV transformer (from bus 275232 to bus 270644 ckt 1) loads from 113.79% to 122.78% (**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 271.75 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
```

23. (CE - CE) The WILTON ; 765/345 kV transformer (from bus 275233 to bus 270644 ckt 1) loads from 116.14% to 125.33% (**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 277.51 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
```

24. (MISO AMIL - AEP) The 7CASEY-05BREED 345 kV line (from bus 346809 to bus 243213 ckt 1) loads from 114.35% to 121.26% (**DC power flow**) of its normal rating (1332 MVA) for

the single line contingency outage of '286_B2_TOR1687'. This project contributes approximately 173.83 MW to the thermal violation.

```
CONTINGENCY '286_B2_TOR1687'
 OPEN BRANCH FROM BUS 243221 TO BUS 348885 CKT 1          / 243221 05EUGENE 345 348885 7BUNSONVILLE 345 1
 OPEN BRANCH FROM BUS 348885 TO BUS 348887 CKT 1          / 348885 7BUNSONVILLE 345 348887 7SIDNEY 345 1
 OPEN BRANCH FROM BUS 348885 TO BUS 348886 CKT 1          / 348885 7BUNSONVILLE 345 348886 4BUNSONVILLE 138 1
 END
```

25. (MISO AMIL - AEP) The 7CASEY-05BREED 345 kV line (from bus 346809 to bus 243213 ckt 1) loads from 114.38% to 120.95% (**DC power flow**) of its normal rating (1332 MVA) for the single line contingency outage of '1363_B2'. This project contributes approximately 165.07 MW to the thermal violation.

```
CONTINGENCY '1363_B2'
 OPEN BRANCH FROM BUS 348885 TO BUS 348887 CKT 1          / 348885 7BUNSONVILLE 345 348887 7SIDNEY 345 1
 END
```

26. (MISO AMIL - AEP) The 7BUNSONVILLE-05EUGENE 345 kV line (from bus 348885 to bus 243221 ckt 1) loads from 110.65% to 120.21% (**DC power flow**) of its normal rating (822 MVA) for the single line contingency outage of '685_B2_TOR1686'. This project contributes approximately 148.21 MW to the thermal violation.

```
CONTINGENCY '685_B2_TOR1686'
 OPEN BRANCH FROM BUS 243213 TO BUS 346809 CKT 1          / 243213 05BREED 345 346809 7CASEY 345 1
 END
```

27. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line (from bus 909144 to bus 243219 ckt 2) loads from 118.22% to 123.67% (**DC power flow**) of its emergency rating (1409 MVA) for the line fault with failed breaker contingency outage of '2978_C2_05DUMONT 765-B_A'. This project contributes approximately 145.05 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
```

28. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line (from bus 909144 to bus 243219 ckt 2) loads from 108.02% to 113.83% (**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 154.22 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
```

29. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line (from bus 909144 to bus 243219 ckt 2) loads from 108.01% to 113.82% (**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 154.22 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

Delivery of Energy Portion of Interconnection Request

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

Not Applicable

Light Load Analysis - 2019

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

System Reinforcements

Short Circuit

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

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 BYRON ; B-CHERRY VA; B 345 kV line (from bus 270678 to bus 270694 ckt 1) loads from 87.03% to 116.37% (**DC power flow**) of its emergency rating (1441 MVA) for the single line contingency outage of '345-L0622__R-R'. This project contributes approximately 422.73 MW to the thermal violation.

Reinforcement: ComEd 345kV L0621 SSTE rating is 1568 MVA. The post contingency flow exceeds the rating. Upgrades are required. At Cherry Valley upgrade the 345kV BT 4-13 CB current transformers. Sag mitigation on L0621. The new ratings will be 1334/1726/2084 MVA, SN/SE/SLD and the new SSTE will be 1837 MVA.
Cost: $18.3 M
Time: 24-30 months.

2. (CE - CE) The BYRON ; R-CHERRY VA; R 345 kV line (from bus 270679 to bus 270695 ckt 1) loads from 89.1% to 119.06% (**DC power flow**) of its emergency rating (1479 MVA) for the single line contingency outage of '345-L0621__B-R'. This project contributes approximately 443.21 MW to the thermal violation.

Reinforcement: ComEd 345kV L0622 SSTE rating is 1568 MVA. The post contingency flow exceeds the rating. Upgrades are required. At Cherry Valley upgrade the 345kV BT 4-13 CB current transformers. Sag mitigation on L0622. The new ratings will be 1334/1726/2084 MVA, SN/SE/SLD and the new SSTE will be 1837 MVA.
Cost: $18.3 M
Time: 24-30 months.

3. (CE - CE) The CHERRY VA; R-GARDEN PR; R 345 kV line (from bus 270695 to bus 270759 ckt 1) loads from 98.31% to 131.94% (**DC power flow**) of its emergency rating (1479

MVA) for the single line contingency outage of '345-L0626__B-R_B'. This project contributes approximately 498.26 MW to the thermal violation.

Reinforcement: ComEd 345kV L15616 SSTE is 1568 MVA. Upgrade L15616 line conductor and line terminal conductor at TSS 138 Silver Lakes and TSS 156 Cherry Valley. Relay review at TSS 156 for L15616 with possibility of new relays (to be determined by ComEd Relay & Protective Services), new 345kV BT 3-4 CB at TSS 156 as well as associated disconnect switches and upgrade 345kV L15616 motor operated disconnect switch. Upon completion of this upgrade the new ratings will be 1478/1863/1975/2232 MVA SN/SE/SSTE/SLD.
Cost: $47.5 M
Time: 24-30 months.

4. (CE - CE) The CHERRY VA; R-GARDEN PR; R 345 kV line (from bus 270695 to bus 270759 ckt 1) loads from 79.37% to 113.06% (**DC power flow**) of its emergency rating (1479 MVA) for the single line contingency outage of '345-L0626__B-R_A'. This project contributes approximately 498.26 MW to the thermal violation.

Same as Generator Deliverability #3

5. (CE - CE) The CHERRY VA; R-GARDEN PR; R 345 kV line (from bus 270695 to bus 270759 ckt 1) loads from 73.89% to 102.55% (**DC power flow**) of its normal rating (1201 MVA) for non-contingency condition. This project contributes approximately 344.24 MW to the thermal violation.

Reinforcement: ComEd 345kV L15616 SN rating is 1201 MVA. Upgrades include re-conductor of L15616 and L15616 station conductor upgrades at both station terminals. Upon completion of upgrade, the ratings will be 1448/1863/2232 MVA, SN/SE/SLD.
Cost: $45.2M
Time: 24-30 months.

6. (CE - CE) The GARDEN PR; R-SILVER LK; R 345 kV line (from bus 270759 to bus 270883 ckt 1) loads from 85.34% to 103.2% (**DC power flow**) of its emergency rating (1479 MVA) for the single line contingency outage of '345-L0626__B-R_B'. This project contributes approximately 498.26 MW to the thermal violation.

Reinforcement: ComEd 345kV L15616 SSTE rating is 1568 MVA. Upgrades include re-conductor of L15616 and L15616 station conductor upgrades at both station terminals. Upon completion of upgrade, the ratings will be 1448/1863/2232 MVA, SN/SE/SLD.
Cost: $45.2M
Time: 24-30 months.

7. (CE - CE) The WAYNE ; B-TOLLWAY ; B 345 kV line (from bus 270916 to bus 270900 ckt 1) loads from 86.65% to 108.47% (**DC power flow**) of its emergency rating (1201 MVA) for the single line contingency outage of '345-L11126_B-N'. This project contributes approximately 262.05 MW to the thermal violation.

Reinforcement: ComEd 345kV L14402 SSTE rating is 1251 MVA. Upgrade will be to mitigate sag limitation on L14402. A preliminary order of magnitude cost will be $2.3 M with a timeline of 20-24 months. New SSTE rating limit upon completion will be 1523 MVA.
Cost: $2.3M
Time: 20-24 months

8. (CE - CE) The AB1-089 TAP-WAYNE ; B 345 kV line (from bus 930480 to bus 270916 ckt 1) loads from 96.49% to 125.33% (**DC power flow**) of its normal rating (1679 MVA) for non-contingency condition. This project contributes approximately 484.14 MW to the thermal violation.
Reinforcement: ComEd 345kV L0626 SN rating is 1679 MVA. Upgrade will be to re-conductor L0626. Upon field completion of the upgrade the new ratings will be 2888/3062/3358 MVA, SN/SE/SLD.
Cost: $26M
Time: 24-36 months

9. (CE - CE) The AB1-089 TAP-WAYNE ; B 345 kV line (from bus 930480 to bus 270916 ckt 1) loads from 92.7% to 121.36% (**DC power flow**) of its emergency rating (2058 MVA) for the single line contingency outage of '345-L15616__-R'. This project contributes approximately 590.53 MW to the thermal violation.

Reinforcement: ComEd 345kV L0626 SSTE rating is 2107 MVA. Upgrade will be construction of a new 345kV line parallel to L0626. (assumption is that ComEd will be utilizing the existing ROW for L0626).
Cost: $70M
Time: 24-36 months

10. (CE - CE) The AB1-089 TAP-WAYNE ; B 345 kV line (from bus 930480 to bus 270916 ckt 1) loads from 92.5% to 121.2% (**DC power flow**) of its emergency rating (2058 MVA) for the single line contingency outage of '345-L97116__-R'. This project contributes approximately 590.53 MW to the thermal violation.

Same as Generator Deliverability #9

Multiple Facility Contingency

1. (AEP - AEP) The 05OLIVE-X2-052 TAP 345 kV line (from bus 243229 to bus 909144 ckt 2) loads from 94.79% to 100.13% (**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 145.05 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. If deemed necessary to rebuild section of line
Cost: $56,000-Sag study. $28,000,000-Line rebuild
Time: 6 to 12 months-sag study. 24 to 36 months-sag study

2. (MISO NIPS - CE) The 17STJOHN-ST JOHN ; T 345 kV line (from bus 255112 to bus 270886 ckt 1) loads from 99.46% to 107.8% (**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 171.52 MW to the thermal violation.

Comed
345kV L6617 SLD is 1237 MVA. No update 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 98.72% to 107.11% (**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 172.76 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 98.68% to 107.07% (**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 172.72 MW to the thermal violation.

Same as Multiple Facility #2

5. (CE - CE) The BYRON ; B-CHERRY VA; B 345 kV line (from bus 270678 to bus 270694 ckt 1) loads from 93.13% to 148.13% (**DC power flow**) of its emergency rating (1768 MVA) for the line fault with failed breaker contingency outage of '006-45-BT7-8__A'. This project contributes approximately 972.38 MW to the thermal violation.

Reinforcement: ComEd 345kV L0621 SLD rating is 1768 MVA with an ALDR equal to 2033 MVA. Network upgrade will be a new 345kV line from Byron to Cherry Valley. Preliminary estimate is $74M with a construction time of 24-36 months subject to right of way clearance.
Cost: $74M
Time: 24-36 months.

6. (CE - CE) The CHERRY VA; R-GARDEN PR; R 345 kV line (from bus 270695 to bus 270759 ckt 1) loads from 92.05% to 119.66% (**DC power flow**) of its emergency rating (1768 MVA) for the line fault with failed breaker contingency outage of '144-45-BT4-7__'. This project contributes approximately 489.98 MW to the thermal violation.

Reinforcement: ComEd 345kV L15616 ALDR is 2033 MVA. The post-contingency flow exceeds the ALDR therefore a portion of L15616 will need to be re-conductored.
Cost: $45M
Time: 24-36 months.

7. (CE - AEP) The GREENACRE; T-05OLIVE 345 kV line (from bus 270771 to bus 243229 ckt 1) loads from 97.7% to 106.22% (**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 156.09 MW to the thermal violation.

Comed
ComEd SLD rating of 1237 MVA (ALDR is 1423 MVA). No upgrade.

AEP
Reinforcement: Olive - Green Acres 345 kV line is a sag derated 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: 6-12months-sag study. 24-36 months line rebuild

8. (CE - AEP) The GREENACRE; T-05OLIVE 345 kV line (from bus 270771 to bus 243229 ckt 1) loads from 90.49% to 99.09% (**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 157.53 MW to the thermal violation.

Same as Multiple Facility #7

9. (CE - AEP) The GREENACRE; T-05OLIVE 345 kV line (from bus 270771 to bus 243229 ckt 1) loads from 90.49% to 99.09% (**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 157.53 MW to the thermal violation.

Same as Multiple Facility #7

10. (CE - MISO NIPS) The ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 99.46% to 107.8% (**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 171.52 MW to the thermal violation.

Comed
Reinforcement: Olive - ComEd 345kV L6617 sag mitigation.
Cost: $3.0M
Time: 18-24 months

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

11. (CE - MISO NIPS) The ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 98.72% to 107.11% (**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 172.76 MW to the thermal violation.

Same as Multiple Facility #10

12. (CE - MISO NIPS) The ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 98.68% to 107.07% (**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 172.72 MW to the thermal violation.

Same as Multiple Facility #10

13. (MISO WEC - CE) The PLS PR1-ZION EC ;RP 345 kV line (from bus 699432 to bus 274817 ckt 1) loads from 99.69% to 103.42% (**DC power flow**) of its emergency rating (1526 MVA) for the tower line contingency outage of '345-L2221__R-N_+_345-L2222__B-N'. This project contributes approximately 107.57 MW to the thermal violation.

Comed
ComEd 345kV PLPL41 ALDR (ComEd) is 2792 MVA. No upgrade.

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

14. (CE - CE) The AB1-089 TAP-WAYNE ; B 345 kV line (from bus 930480 to bus 270916 ckt 1) loads from 96.17% to 123.56% (**DC power flow**) of its emergency rating (2280 MVA) for the tower line contingency outage of '345-L0621__B-R_+_345-L0622__R-R'. This project contributes approximately 630.82 MW to the thermal violation.

Reinforcement: ComEd 345kV L0626 SLD rating per ComEd Project Diagram and the ALDR is 2622 MVA. The post contingency flow exceeds the ALDR therefore the upgrade will be a new 345kV line to run parallel to L0626.
Cost: $126M
Time: 24-36 months subject to right of way clearance.

15. (CE - CE) The AB1-089 TAP-WAYNE ; B 345 kV line (from bus 930480 to bus 270916 ckt 1) loads from 94.42% to 121.08% (**DC power flow**) of its emergency rating (2280 MVA) for the tower line contingency outage of '345-L15616__-R_+_138-L15627_R-R'. This project contributes approximately 609.24 MW to the thermal violation.

Same as Multiple Facility #14

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 103.71% to 104.19% (**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 132.56 MW to the thermal violation.

AEP
Reinforcement: 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 remediations 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 evaluate this violation during the SIS phase.

2. (MISO NIPS - AEP) The 17STILLWELL-05DUMONT 345 kV line (from bus 255113 to bus 243219 ckt 1) loads from 129.73% to 140.0% (**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 273.09 MW to the thermal violation.

AEP
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 9 mile section of line would need to be rebuilt. Replace the Dumont Wavetrap (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 evaluate this violation during the SIS phase.

3. (MISO NIPS - AEP) The 17STILLWELL-05DUMONT 345 kV line (from bus 255113 to bus 243219 ckt 1) loads from 119.77% to 130.25% (**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 278.47 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 119.69% to 130.18% (**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 278.78 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 114.54% to 121.87% (**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 614.94 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
Reinforcement: AEP rating of Dumont - Wilton Center 765 kV tie is S/N: 3555 MVA and S/E: 4105 MVA. The Dumont Wavetrap (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 113.03% to 120.37% (**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 615.77 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 118.97% to 127.92% (**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 181.08 MW to the thermal violation.

Comed
ComEd 345kV L17705 SLD rating is 1768 MVA. No upgrades required.

NIPSCO (MISO) will have to evaluate this violation 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 118.72% to 127.68% (**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 181.1 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 118.37% to 127.37% (**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 181.99 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 107.62% to 117.53% (**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 223.53 MW to the thermal violation.

Comed
ComEd 345kV L17703 SLD is 1768 MVA. No upgrades required.

NIPSCO (MISO) will have to evaluate this violation 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 107.55% to 117.46% (**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 223.4 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 107.06% to 117.02% (**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 224.53 MW to the thermal violation.

Same as Contribution to Previously Identified Overloads #10

13. (CE - CE) The WEMPLETOW; B 345/138 kV transformer (from bus 270918 to bus 275231 ckt 1) loads from 103.56% to 116.69% (**DC power flow**) of its emergency rating (520 MVA) for the tower line contingency outage of '345-L0621__B-R_+_345-L0622__R-R'. This project contributes approximately 128.82 MW to the thermal violation.

Reinforcement: The limit is Tr. 84 @ TSS 172 Wempletown. The applicable rating is the ALDR which is 598 MVA. Upgrades are Tr. 84 relay trip settings with a potential for relay upgrades. Upon completion the new ALDR would be 773 MVA.
Cost: $318K
Time: 18-24 months.

14. (CE - CE) The WILTON ; B-WILTON ;3M 345 kV line (from bus 270926 to bus 275232 ckt 1) loads from 124.21% to 133.21% (**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 271.75 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

15. (CE - CE) The WILTON ; R-WILTON ;4M 345 kV line (from bus 270927 to bus 275233 ckt 1) loads from 127.59% to 136.78% (**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 277.51 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.

16. (CE - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line (from bus 274750 to bus 255112 ckt 1) loads from 129.07% to 138.25% (**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 240.78 MW to the thermal violation.

Comed
The limiting element is 345kV L94507. ComEd ALDR for L94507 is 1925 MVA. No upgrade from ComEd

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

17. (CE - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line (from bus 274750 to bus 255112 ckt 1) loads from 129.12% to 138.24% (**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 239.31 MW to the thermal violation.

Same as Contribution to Previously Identified Overload #16

18. (CE - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line (from bus 274750 to bus 255112 ckt 1) loads from 129.0% to 138.18% (**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 240.72 MW to the thermal violation.

Same as Contribution to Previously Identified Overload #16

19. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 123.06% to 133.31% (**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 187.92 MW to the thermal violation.

Comed
ComEd 345kV L97008 SLD rating is 1237MVA (ALDR is 1423 MVA). No upgrade 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- reconductor/rebuild AEP section of line. $1,400,000-Olive switches. :$600,000-Relays
Time: 6-12 months sag study. 24-36 months-line rebuild

20. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 121.73% to 132.06% (**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 189.33 MW to the thermal violation.

Same as Contribution to Previously Identified Overloads #19

21. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 121.69% to 132.03% (**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 189.33 MW to the thermal violation.

Same as Contribution to Previously Identified Overloads #19

22. (CE - CE) The WILTON ; 765/345 kV transformer (from bus 275232 to bus 270644 ckt 1) loads from 113.79% to 122.78% (**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 271.75 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 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

23. (CE - CE) The WILTON ; 765/345 kV transformer (from bus 275233 to bus 270644 ckt 1) loads from 116.14% to 125.33% (**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 277.51 MW to the thermal violation.

Same as Contribution to Previously Identified Overloads #22

24. (MISO AMIL - AEP) The 7CASEY-05BREED 345 kV line (from bus 346809 to bus 243213 ckt 1) loads from 114.35% to 121.26% (**DC power flow**) of its normal rating (1332 MVA) for the single line contingency outage of '286_B2_TOR1687'. This project contributes approximately 173.83 MW to the thermal violation.

AEP
Reinforcement: AEP owns 0.6 mile section of line between Sullivan/Breed and West Casey 345 kV stations which will need to be rebuilt to increase AEP end ratings.
This is an AEP-AMIL tie line therefore, PJM is going to have to coordinate this upgrade with Ameren IL. Per our records, AMIL's portion of the conductor also needs to be reconductored/rebuilt to mitigate this overload. Ratings provided are based on the fact that AEP owned 3000A wavetrap at Sullivan will set new limits.
Cost: $2 Million
Time: 24-36 months

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

25. (MISO AMIL - AEP) The 7CASEY-05BREED 345 kV line (from bus 346809 to bus 243213 ckt 1) loads from 114.38% to 120.95% (**DC power flow**) of its normal rating (1332 MVA) for the single line contingency outage of '1363_B2'. This project contributes approximately 165.07 MW to the thermal violation.

Same as Contribution to Previously Identified Overloads #24

26. (MISO AMIL - AEP) The 7BUNSONVILLE-05EUGENE 345 kV line (from bus 348885 to bus 243221 ckt 1) loads from 110.65% to 120.21% (**DC power flow**) of its normal rating (822 MVA) for the single line contingency outage of '685_B2_TOR1686'. This project contributes approximately 148.21 MW to the thermal violation.

AEP
This facility is an AEP-Ameren IL tie. SN/SE ratings on this facility is 1692/1793 MVA. Therefore, under these ratings, this facility should not exceed its ratings for this IPP and under this event.
AMIL (MISO) will have to evaluate this violation during the SIS phase.

27. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line (from bus 909144 to bus 243219 ckt 2) loads from 118.22% to 123.67% (**DC power flow**) of its emergency rating (1409 MVA) for the line fault with failed breaker contingency outage of '2978_C2_05DUMONT 765-B_A'. This project contributes approximately 145.05 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.. If deemed necessary to rebuild section of line,
Cost: $56,000 Sag Study. $28,000,000. Line rebuild
Time: 6-12 months sag study. 24-36 months for line rebuild

28. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line (from bus 909144 to bus 243219 ckt 2) loads from 108.02% to 113.83% (**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 154.22 MW to the thermal violation.

Same as Contribution to Previously Identified Overloads #27

29. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line (from bus 909144 to bus 243219 ckt 2) loads from 108.01% to 113.82% (**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 154.22 MW to the thermal violation.

Same as Contribution to Previously Identified Overloads #27

Secondary Point of Interconnection

The Interconnection Customer (IC) AB1-121 proposes to interconnect with the ComEd transmission system at Plano TSS167 through two 765kV transmission lines from their DC/AC Converter Station.

Network Impacts for Secondary Point of Interconnection

The Queue Project AB1-121 was evaluated as a 1927 MW (Capacity 1927 MW) injection at the Plano 765kV substation in the COMED area. Project AB1-121 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AB1-121 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 BYRON ; B-CHERRY VA; B 345 kV line (from bus 270678 to bus 270694 ckt 1) loads from 87.05% to 116.38% (**DC power flow**) of its emergency rating (1441 MVA) for the single line contingency outage of '345-L0622__R-R'. This project contributes approximately 422.73 MW to the thermal violation.

```
CONTINGENCY '345-L0622__R-R'
 TRIP BRANCH FROM BUS 270679 TO BUS 270695 CKT 1              / BYRON; R 345 CHERR; R 345
 END
```

2. (CE - CE) The BYRON ; B-CHERRY VA; B 345 kV line (from bus 270678 to bus 270694 ckt 1) loads from 78.82% to 104.69% (**DC power flow**) of its emergency rating (1441 MVA) for the single line contingency outage of '345-L0626__B-R_B'. This project contributes approximately 372.72 MW to the thermal violation.

```
CONTINGENCY '345-L0626__B-R_B'
 TRIP BRANCH FROM BUS 930480 TO BUS 270916 CKT 1              / AB1-089 TAP 345 WAYNE ; B 345
 END
```

3. (CE - CE) The BYRON ; R-CHERRY VA; R 345 kV line (from bus 270679 to bus 270695 ckt 1) loads from 89.11% to 119.08% (**DC power flow**) of its emergency rating (1479 MVA) for the single line contingency outage of '345-L0621__B-R'. This project contributes approximately 443.21 MW to the thermal violation.

```
CONTINGENCY '345-L0621__B-R'
 TRIP BRANCH FROM BUS 270678 TO BUS 270694 CKT 1          / BYRON; B 345 CHERR; B 345
 END
```

4. (CE - CE) The BYRON ; R-CHERRY VA; R 345 kV line (from bus 270679 to bus 270695 ckt 1) loads from 85.32% to 113.17% (**DC power flow**) of its emergency rating (1479 MVA) for the single line contingency outage of '345-L0626__B-R_B'. This project contributes approximately 411.93 MW to the thermal violation.

```
CONTINGENCY '345-L0626__B-R_B'
 TRIP BRANCH FROM BUS 930480 TO BUS 270916 CKT 1          / AB1-089 TAP 345 WAYNE ; B 345
 END
```

5. (CE - CE) The CHERRY VA; R-GARDEN PR; R 345 kV line (from bus 270695 to bus 270759 ckt 1) loads from 98.36% to 131.99% (**DC power flow**) of its emergency rating (1479 MVA) for the single line contingency outage of '345-L0626__B-R_B'. This project contributes approximately 498.32 MW to the thermal violation.

```
CONTINGENCY '345-L0626__B-R_B'
 TRIP BRANCH FROM BUS 930480 TO BUS 270916 CKT 1          / AB1-089 TAP 345 WAYNE ; B 345
 END
```

6. (CE - CE) The CHERRY VA; R-GARDEN PR; R 345 kV line (from bus 270695 to bus 270759 ckt 1) loads from 79.42% to 113.11% (**DC power flow**) of its emergency rating (1479 MVA) for the single line contingency outage of '345-L0626__B-R_A'. This project contributes

```
CONTINGENCY '345-L0626__B-R_A'
 TRIP BRANCH FROM BUS 270678 TO BUS 930480 CKT 1          / BYRON ; B 345 AB1-089 TAP 345
 END
```

7. (CE - CE) The CHERRY VA; R-GARDEN PR; R 345 kV line (from bus 270695 to bus 270759 ckt 1) loads from 73.92% to 102.58% (**DC power flow**) of its normal rating (1201 MVA) for non-contingency condition. This project contributes approximately 344.24 MW to the thermal violation.

8. (CE - CE) The GARDEN PR; R-SILVER LK; R 345 kV line (from bus 270759 to bus 270883 ckt 1) loads from 85.39% to 103.25% (**DC power flow**) of its emergency rating (1479 MVA) for the single line contingency outage of '345-L0626__B-R_B'. This project contributes approximately 498.32 MW to the thermal violation.

```
CONTINGENCY '345-L0626__B-R_B'
 TRIP BRANCH FROM BUS 930480 TO BUS 270916 CKT 1          / AB1-089 TAP 345 WAYNE ; B 345
 END
```

9. (CE - CE) The NELSON ; B-WALTO; B 345 kV line (from bus 270828 to bus 270932 ckt 1) loads from 90.36% to 107.96% (**DC power flow**) of its emergency rating (1528 MVA) for the single line contingency outage of '345-L0626__B-R_B'. This project contributes approximately 268.95 MW to the thermal violation.

```
CONTINGENCY '345-L0626__B-R_B'
 TRIP BRANCH FROM BUS 930480 TO BUS 270916 CKT 1          / AB1-089 TAP 345 WAYNE ; B 345
 END
```

10. (CE - CE) The WAYNE ; B-TOLLWAY ; B 345 kV line (from bus 270916 to bus 270900 ckt 1) loads from 86.66% to 108.48% (**DC power flow**) of its emergency rating (1201 MVA) for the single line contingency outage of '345-L11126_B-N'. This project contributes approximately 262.05 MW to the thermal violation.

```
CONTINGENCY '345-L11126_B-N'
 TRIP BRANCH FROM BUS 270730 TO BUS 270916 CKT 1          / ELEC JUNC; B 345 WAYNE ; B 345
 TRIP BRANCH FROM BUS 270916 TO BUS 270917 CKT 1          / WAYNE ; B 345 WAYNE ; R 345
 END
```

11. (CE - CE) The WAYNE ; B 345/138 kV transformer (from bus 270916 to bus 275228 ckt 1) loads from 79.65% to 103.89% (**DC power flow**) of its emergency rating (465 MVA) for the single line contingency outage of '345-L11126_B-N'. This project contributes approximately 112.73 MW to the thermal violation.

```
CONTINGENCY '345-L11126_B-N'
 TRIP BRANCH FROM BUS 270730 TO BUS 270916 CKT 1          / ELEC JUNC; B 345 WAYNE ; B 345
 TRIP BRANCH FROM BUS 270916 TO BUS 270917 CKT 1          / WAYNE ; B 345 WAYNE ; R 345
 END
```

12. (CE - CE) The WALTO; B-ELECT JCT; B 345 kV line (from bus 270932 to bus 270730 ckt 1) loads from 90.76% to 108.36% (**DC power flow**) of its emergency rating (1528 MVA) for the single line contingency outage of '345-L0626__B-R_B'. This project contributes approximately 268.95 MW to the thermal violation.

```
CONTINGENCY '345-L0626__B-R_B'
 TRIP BRANCH FROM BUS 930480 TO BUS 270916 CKT 1          / AB1-089 TAP 345 WAYNE ; B 345
 END
```

13. (CE - CE) The WAYNE ;1M-WAYNE ; B 138 kV line (from bus 275228 to bus 272740 ckt 1) loads from 79.63% to 103.87% (**DC power flow**) of its emergency rating (465 MVA) for the single line contingency outage of '345-L11126_B-N'. This project contributes approximately 112.73 MW to the thermal violation.

```
CONTINGENCY '345-L11126_B-N'
 TRIP BRANCH FROM BUS 270730 TO BUS 270916 CKT 1          / ELEC JUNC; B 345 WAYNE ; B 345
 TRIP BRANCH FROM BUS 270916 TO BUS 270917 CKT 1          / WAYNE ; B 345 WAYNE ; R 345
 END
```

14. (CE - CE) The AB1-089 TAP-WAYNE ; B 345 kV line (from bus 930480 to bus 270916 ckt 1) loads from 96.53% to 125.36% (**DC power flow**) of its normal rating (1679 MVA) for non-contingency condition. This project contributes approximately 484.14 MW to the thermal violation.

15. (CE - CE) The AB1-089 TAP-WAYNE ; B 345 kV line (from bus 930480 to bus 270916 ckt 1) loads from 92.74% to 121.4% (**DC power flow**) of its emergency rating (2058 MVA) for the single line contingency outage of '345-L15616__-R'. This project contributes approximately 590.55 MW to the thermal violation.

```
CONTINGENCY '345-L15616__-R'
 TRIP BRANCH FROM BUS 270695 TO BUS 270759 CKT 1          / CHERR; R 345 U3-021 GARDEN PRAIRIE
 END
```

16. (CE - CE) The AB1-089 TAP-WAYNE ; B 345 kV line (from bus 930480 to bus 270916 ckt 1) loads from 92.53% to 121.23% (**DC power flow**) of its emergency rating (2058 MVA) for the single line contingency outage of '345-L97116__-R'. This project contributes approximately 590.55 MW to the thermal violation.

```
CONTINGENCY '345-L97116__-R'
 TRIP BRANCH FROM BUS 270759 TO BUS 270883 CKT 1              / U3-021 SILVE; R 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 94.86% to 100.2% (**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 145.06 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 99.49% to 107.83% (**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 171.54 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 98.75% to 107.14% (**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 172.77 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 98.71% to 107.1% (**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 172.74 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 BLUE ISL ;RT-BLUE ISL ; R 345 kV line (from bus 270667 to bus 270665 ckt 1) loads from 94.53% to 98.01% (**DC power flow**) of its emergency rating (1768 MVA) for the line fault with failed breaker contingency outage of '023-65-BT2-3__'. This project contributes approximately 116.14 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
```

6. (CE - CE) The BYRON ; B-CHERRY VA; B 345 kV line (from bus 270678 to bus 270694 ckt 1) loads from 93.16% to 148.16% (**DC power flow**) of its emergency rating (1768 MVA) for the line fault with failed breaker contingency outage of '006-45-BT7-8__A'. This project contributes approximately 972.42 MW to the thermal violation.

```
CONTINGENCY '006-45-BT7-8__A'
 TRIP BRANCH FROM BUS 270678 TO BUS 930480 CKT 1          / BYRON ; B 345 AB1-089 TAP 345
 TRIP BRANCH FROM BUS 270678 TO BUS 270679 CKT 1          / BYRON ; B 345 BYRON ; R 345
 END
```

7. (CE - CE) The BYRON ; R-CHERRY VA; R 345 kV line (from bus 270679 to bus 270695 ckt 1) loads from 81.21% to 107.03% (**DC power flow**) of its emergency rating (1768 MVA) for the line fault with failed breaker contingency outage of '156-45-BT4-13_'. This project contributes approximately 456.47 MW to the thermal violation.

```
CONTINGENCY '156-45-BT4-13_'
 TRIP BRANCH FROM BUS 270678 TO BUS 270694 CKT 1          / BYRON; B 345 CHERR; B 345
 TRIP BRANCH FROM BUS 270694 TO BUS 270918 CKT 1          / CHERR; B 345 WEMPL; B 345
 END
```

8. (CE - CE) The BYRON ; R-CHERRY VA; R 345 kV line (from bus 270679 to bus 270695 ckt 1) loads from 78.05% to 102.71% (**DC power flow**) of its emergency rating (1768 MVA) for the tower line contingency outage of '345-L0621__B-R_+_138-L15621_R-R'. This project contributes approximately 435.91 MW to the thermal violation.

```
CONTINGENCY '345-L0621__B-R_+_138-L15621_R-R'
 TRIP BRANCH FROM BUS 270678 TO BUS 270694 CKT 1          / BYRON; B 345 CHERR; B 345
 TRIP BRANCH FROM BUS 271193 TO BUS 272517 CKT 1          / CHERR; R 138 STILL;RT 138
 END
```

9. (CE - CE) The BYRON ; R-WEMPLETOW; B 345 kV line (from bus 270679 to bus 270918 ckt 1) loads from 80.21% to 107.53% (**DC power flow**) of its emergency rating (2084 MVA) for the tower line contingency outage of '345-L0621__B-R_+_345-L0622__R-R'. This project contributes approximately 570.1 MW to the thermal violation.

```
CONTINGENCY '345-L0621__B-R_+_345-L0622__R-R'
 TRIP BRANCH FROM BUS 270678 TO BUS 270694 CKT 1          / BYRON; B 345 CHERR; B 345
 TRIP BRANCH FROM BUS 270679 TO BUS 270695 CKT 1          / BYRON; R 345 CHERR; R 345
 TRIP BRANCH FROM BUS 270694 TO BUS 270695 CKT 1          / CHERR; B 345 CHERR; R 345
 END
```

10. (CE - CE) The CHERRY VA; R-GARDEN PR; R 345 kV line (from bus 270695 to bus 270759 ckt 1) loads from 92.09% to 119.69% (**DC power flow**) of its emergency rating (1768 MVA) for the line fault with failed breaker contingency outage of '144-45-BT4-7__'. This project contributes approximately 490.02 MW to the thermal violation.

```
CONTINGENCY '144-45-BT4-7__'
 TRIP BRANCH FROM BUS 270730 TO BUS 270916 CKT 1          / ELEC JUNC; B 345 WAYNE ; B 345
 TRIP BRANCH FROM BUS 270916 TO BUS 270917 CKT 1          / WAYNE ; B 345 WAYNE ; R 345
```

```
 TRIP BRANCH FROM BUS 270916 TO BUS 270900 CKT 1          / WAYNE ; B 345 TOLLWAY ; B 345
 TRIP BRANCH FROM BUS 275228 TO BUS 270916 CKT 1          / WAYNE ;1M 138 WAYNE ; B 345
 TRIP BRANCH FROM BUS 275228 TO BUS 272740 CKT 1          / WAYNE ;1M 138 WAYNE ; B 138
 TRIP BRANCH FROM BUS 275228 TO BUS 275328 CKT 1          / WAYNE ;1M 138 WAYNE ;1C 34.5
 END
```

11. (CE - CE) The DRESDEN ; B 345/138 kV transformer (from bus 270716 to bus 275179 ckt 1) loads from 80.97% to 84.46% (**DC power flow**) of its emergency rating (520 MVA) for the line fault with failed breaker contingency outage of '012-45-BT5-6__'. This project contributes approximately 38.0 MW to the thermal violation.

```
CONTINGENCY '012-45-BT5-6__'
 TRIP BRANCH FROM BUS 270716 TO BUS 270736 CKT 1          / DRESD; B 345 ELWOO; B 345
 TRIP BRANCH FROM BUS 270736 TO BUS 270737 CKT 1          / ELWOO; B 345 ELWOO; R 345
 TRIP BRANCH FROM BUS 270697 TO BUS 270716 CKT 1          / COLLI; R 345 DRESD; B 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 92.08% to 99.55% (**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 243.9 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
```

13. (CE - CE) The E FRANKFO; B-CRETE EC ;BP 345 kV line (from bus 270728 to bus 274750 ckt 1) loads from 92.12% to 99.54% (**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 242.44 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
```

14. (CE - CE) The E FRANKFO; B-CRETE EC ;BP 345 kV line (from bus 270728 to bus 274750 ckt 1) loads from 92.02% to 99.49% (**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 243.86 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 - AEP) The GREENACRE; T-05OLIVE 345 kV line (from bus 270771 to bus 243229 ckt 1) loads from 97.79% to 106.31% (**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 156.11 MW to the thermal violation.

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

16. (CE - AEP) The GREENACRE; T-05OLIVE 345 kV line (from bus 270771 to bus 243229 ckt 1) loads from 90.58% to 99.18% (**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 157.55 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
```

17. (CE - AEP) The GREENACRE; T-05OLIVE 345 kV line (from bus 270771 to bus 243229 ckt 1) loads from 90.58% to 99.18% (**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 157.55 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 - MISO NIPS) The ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 99.49% to 107.83% (**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 171.54 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 - MISO NIPS) The ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 98.75% to 107.14% (**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 172.77 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 - MISO NIPS) The ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 98.71% to 107.1% (**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 172.74 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 WAYNE ; B-TOLLWAY ; B 345 kV line (from bus 270916 to bus 270900 ckt 1) loads from 81.28% to 100.62% (**DC power flow**) of its emergency rating (1367 MVA) for

the line fault with failed breaker contingency outage of '144-45-BT4-9__'. This project contributes approximately 264.42 MW to the thermal violation.

```
CONTINGENCY '144-45-BT4-9__'
 TRIP BRANCH FROM BUS 270730 TO BUS 270916 CKT 1          / ELEC JUNC; B 345 WAYNE ; B 345
 TRIP BRANCH FROM BUS 270916 TO BUS 270917 CKT 1          / WAYNE ; B 345 WAYNE ; R 345
 TRIP BRANCH FROM BUS 270917 TO BUS 270883 CKT 1          / WAYNE ; R 345 SILVER LK; R 345
 END
```

22. (CE - CE) The DRESDEN ;1M-DRESDEN ; R 138 kV line (from bus 275179 to bus 271337 ckt 1) loads from 80.93% to 84.42% (**DC power flow**) of its emergency rating (520 MVA) for the line fault with failed breaker contingency outage of '012-45-BT5-6__'. This project contributes approximately 38.0 MW to the thermal violation.

```
CONTINGENCY '012-45-BT5-6__'
 TRIP BRANCH FROM BUS 270716 TO BUS 270736 CKT 1          / DRESD; B 345 ELWOO; B 345
 TRIP BRANCH FROM BUS 270736 TO BUS 270737 CKT 1          / ELWOO; B 345 ELWOO; R 345
 TRIP BRANCH FROM BUS 270697 TO BUS 270716 CKT 1          / COLLI; R 345 DRESD; B 345
 END
```

23. (MISO WEC - CE) The PLS PR1-ZION EC ;RP 345 kV line (from bus 699432 to bus 274817 ckt 1) loads from 99.73% to 103.46% (**DC power flow**) of its emergency rating (1526 MVA) for the tower line contingency outage of '345-L2221__R-N_+_345-L2222__B-N'. This project contributes approximately 107.57 MW to the thermal violation.

```
CONTINGENCY '345-L2221__R-N_+_345-L2222__B-N'
 TRIP BRANCH FROM BUS 270940 TO BUS 270941 CKT 1          / ZION ; B 345 ZION ; R 345
 TRIP BRANCH FROM BUS 270940 TO BUS 270942 CKT 1          / ZION ; B 345 ZION ;0B 345
 TRIP BRANCH FROM BUS 270941 TO BUS 699432 CKT 1          / ZION ; R 345 PLS PR2 345
 TRIP BRANCH FROM BUS 270942 TO BUS 699247 CKT 1          / ZION ;0B 345 ARCADN3 345
 CLOSE BRANCH FROM BUS 270941 TO BUS 270942 CKT 1          / ZION ; R 345 ZION ;0B 345
 END
```

24. (CE - CE) The AB1-089 TAP-WAYNE ; B 345 kV line (from bus 930480 to bus 270916 ckt 1) loads from 96.2% to 123.6% (**DC power flow**) of its emergency rating (2280 MVA) for the tower line contingency outage of '345-L0621__B-R_+_345-L0622__R-R'. This project contributes approximately 630.84 MW to the thermal violation.

```
CONTINGENCY '345-L0621__B-R_+_345-L0622__R-R'
 TRIP BRANCH FROM BUS 270678 TO BUS 270694 CKT 1          / BYRON; B 345 CHERR; B 345
 TRIP BRANCH FROM BUS 270679 TO BUS 270695 CKT 1          / BYRON; R 345 CHERR; R 345
 TRIP BRANCH FROM BUS 270694 TO BUS 270695 CKT 1          / CHERR; B 345 CHERR; R 345
```

```
END
```

25. (CE - CE) The AB1-089 TAP-WAYNE ; B 345 kV line (from bus 930480 to bus 270916 ckt 1) loads from 94.46% to 121.12% (**DC power flow**) of its emergency rating (2280 MVA) for the tower line contingency outage of '345-L15616__-R_+_138-L15627_R-R'. This project contributes approximately 609.26 MW to the thermal violation.

```
CONTINGENCY '345-L15616__-R_+_138-L15627_R-R'
 TRIP BRANCH FROM BUS 270695 TO BUS 270759 CKT 1          / U3-021 SILVE; R 345
 TRIP BRANCH FROM BUS 271193 TO BUS 271581 CKT 1          / CHERR; R 138 B200 ; R 138
 TRIP BRANCH FROM BUS 271558 TO BUS 272730 CKT 1          / GLIDD; B 138 WATER;3B 138
 TRIP BRANCH FROM BUS 271581 TO BUS 272757 CKT 1          / B200 ; R 138 W DEK;7T 138
 TRIP BRANCH FROM BUS 272757 TO BUS 271558 CKT 1          / W DEK;7T 138 GLIDD; B 138
 TRIP BRANCH FROM BUS 272757 TO BUS 272761 CKT 1          / W DEK;7T 138 W DEK;7R 138
 MOVE 100 PERCENT LOAD FROM BUS 272761 TO BUS 272759        / W DEK;7R 138 W DEK;4R 138
 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 103.79% to 104.28% (**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 132.56 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 129.86% to 140.13% (**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 273.13 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 119.79% to 130.27% (**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 278.8 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 119.61% to 130.09% (**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 278.49 MW to the thermal violation.

```
CONTINGENCY '023-65-BT2-3__'
 TRIP BRANCH FROM BUS 270644 TO BUS 243206 CKT 1          / WILTO; 765 05DUMONT 765
 TRIP BRANCH FROM BUS 270607 TO BUS 270630 CKT 1          / COLLI; 765 PLANO; 765
 END
```

5. (CE - AEP) The WILTON ;-05DUMONT 765 kV line (from bus 270644 to bus 243206 ckt 1) loads from 114.56% to 121.9% (**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 614.94 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 113.05% to 120.4% (**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 615.75 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 113.71% to 122.69% (**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 181.1 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
```

8. (CE - MISO NIPS) The BURNHAM ; B-17SHEFFIELD 345 kV line (from bus 270674 to bus 255111 ckt 1) loads from 113.44% to 122.42% (**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 181.12 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 113.06% to 122.09% (**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 182.02 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 113.05% to 122.93% (**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 223.57 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
```

11. (CE - MISO NIPS) The BURNHAM ;0R-17MUNSTER 345 kV line (from bus 270677 to bus 255109 ckt 1) loads from 113.0% to 122.88% (**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 223.42 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 112.51% to 122.43% (**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 224.57 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 WEMPLETOW; B 345/138 kV transformer (from bus 270918 to bus 275231 ckt 1) loads from 103.6% to 116.73% (**DC power flow**) of its emergency rating (520 MVA) for the tower line contingency outage of '345-L0621__B-R_+_345-L0622__R-R'. This project contributes approximately 128.84 MW to the thermal violation.

```
CONTINGENCY '345-L0621__B-R_+_345-L0622__R-R'
 TRIP BRANCH FROM BUS 270678 TO BUS 270694 CKT 1          / BYRON; B 345 CHERR; B 345
 TRIP BRANCH FROM BUS 270679 TO BUS 270695 CKT 1          / BYRON; R 345 CHERR; R 345
 TRIP BRANCH FROM BUS 270694 TO BUS 270695 CKT 1          / CHERR; B 345 CHERR; R 345
 END
```

14. (CE - CE) The WILTON ; B-WILTON ;3M 345 kV line (from bus 270926 to bus 275232 ckt 1) loads from 124.27% to 133.27% (**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 271.76 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
```

15. (CE - CE) The WILTON ; R-WILTON ;4M 345 kV line (from bus 270927 to bus 275233 ckt 1) loads from 127.66% to 136.85% (**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 277.53 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
```

16. (CE - CE) The KELLEY RD; B-BELVIDERE; B 138 kV line (from bus 271852 to bus 271082 ckt 1) loads from 100.32% to 100.43% (**DC power flow**) of its emergency rating (177 MVA) for the tower line contingency outage of '345-L0621__B-R_+_345-L0622__R-R'. This project contributes approximately 33.16 MW to the thermal violation.

```
CONTINGENCY '345-L0621__B-R_+_345-L0622__R-R'
 TRIP BRANCH FROM BUS 270678 TO BUS 270694 CKT 1          / BYRON; B 345 CHERR; B 345
 TRIP BRANCH FROM BUS 270679 TO BUS 270695 CKT 1          / BYRON; R 345 CHERR; R 345
 TRIP BRANCH FROM BUS 270694 TO BUS 270695 CKT 1          / CHERR; B 345 CHERR; R 345
 END
```

17. (CE - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line (from bus 274750 to bus 255112 ckt 1) loads from 129.04% to 138.22% (**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 240.82 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
```

18. (CE - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line (from bus 274750 to bus 255112 ckt 1) loads from 129.1% to 138.22% (**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 239.33 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 - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line (from bus 274750 to bus 255112 ckt 1) loads from 128.97% to 138.15% (**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 240.76 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
```

20. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 123.16% to 133.42% (**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 187.94 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
```

21. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 121.82% to 132.16% (**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 189.37 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
```

22. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 121.8% to 132.14% (**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 189.35 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
```

23. (CE - CE) The ZION EC ;RP-ZION STA ; R 345 kV line (from bus 274817 to bus 270941 ckt 1) loads from 107.98% to 112.23% (**DC power flow**) of its emergency rating (1367 MVA) for the tower line contingency outage of '345-L2221__R-N_+_345-L2222__B-N'. This project contributes approximately 109.63 MW to the thermal violation.

```
CONTINGENCY '345-L2221__R-N_+_345-L2222__B-N'
 TRIP BRANCH FROM BUS 270940 TO BUS 270941 CKT 1          / ZION ; B 345 ZION ; R 345
 TRIP BRANCH FROM BUS 270940 TO BUS 270942 CKT 1          / ZION ; B 345 ZION ;0B 345
 TRIP BRANCH FROM BUS 270941 TO BUS 699432 CKT 1          / ZION ; R 345 PLS PR2 345
 TRIP BRANCH FROM BUS 270942 TO BUS 699247 CKT 1          / ZION ;0B 345 ARCADN3 345
 CLOSE BRANCH FROM BUS 270941 TO BUS 270942 CKT 1          / ZION ; R 345 ZION ;0B 345
 END
```

24. (CE - CE) The WEMPLETOW;4M-WEMPLETOW; R 138 kV line (from bus 275231 to bus 272747 ckt 1) loads from 103.56% to 116.69% (**DC power flow**) of its emergency rating (520 MVA) for the tower line contingency outage of '345-L0621__B-R_+_345-L0622__R-R'. This project contributes approximately 128.84 MW to the thermal violation.

```
CONTINGENCY '345-L0621__B-R_+_345-L0622__R-R'
 TRIP BRANCH FROM BUS 270678 TO BUS 270694 CKT 1          / BYRON; B 345 CHERR; B 345
 TRIP BRANCH FROM BUS 270679 TO BUS 270695 CKT 1          / BYRON; R 345 CHERR; R 345
 TRIP BRANCH FROM BUS 270694 TO BUS 270695 CKT 1          / CHERR; B 345 CHERR; R 345
 END
```

25. (CE - CE) The WILTON ; 765/345 kV transformer (from bus 275232 to bus 270644 ckt 1) loads from 113.85% to 122.84% (**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 271.76 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
```

26. (CE - CE) The WILTON ; 765/345 kV transformer (from bus 275233 to bus 270644 ckt 1) loads from 116.21% to 125.4% (**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 277.53 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
```

27. (MISO AMIL - AEP) The 7CASEY-05BREED 345 kV line (from bus 346809 to bus 243213 ckt 1) loads from 114.45% to 121.36% (**DC power flow**) of its normal rating (1332 MVA) for the single line contingency outage of '286_B2_TOR1687'. This project contributes approximately 173.85 MW to the thermal violation.

```
CONTINGENCY '286_B2_TOR1687'
 OPEN BRANCH FROM BUS 243221 TO BUS 348885 CKT 1          / 243221 05EUGENE 345 348885 7BUNSONVILLE 345 1
 OPEN BRANCH FROM BUS 348885 TO BUS 348887 CKT 1          / 348885 7BUNSONVILLE 345 348887 7SIDNEY 345 1
 OPEN BRANCH FROM BUS 348885 TO BUS 348886 CKT 1          / 348885 7BUNSONVILLE 345 348886 4BUNSONVILLE 138 1
 END
```

28. (MISO AMIL - AEP) The 7CASEY-05BREED 345 kV line (from bus 346809 to bus 243213 ckt 1) loads from 114.47% to 121.04% (**DC power flow**) of its normal rating (1332 MVA) for the single line contingency outage of '1363_B2'. This project contributes approximately 165.09 MW to the thermal violation.

```
CONTINGENCY '1363_B2'
 OPEN BRANCH FROM BUS 348885 TO BUS 348887 CKT 1          / 348885 7BUNSONVILLE 345 348887 7SIDNEY 345 1
 END
```

29. (MISO AMIL - AEP) The 7BUNSONVILLE-05EUGENE 345 kV line (from bus 348885 to bus 243221 ckt 1) loads from 110.78% to 120.33% (**DC power flow**) of its normal rating (822 MVA) for the single line contingency outage of '685_B2_TOR1686'. This project contributes approximately 148.22 MW to the thermal violation.

```
CONTINGENCY '685_B2_TOR1686'
 OPEN BRANCH FROM BUS 243213 TO BUS 346809 CKT 1          / 243213 05BREED 345 346809 7CASEY 345 1
 END
```

30. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line (from bus 909144 to bus 243219 ckt 2) loads from 118.29% to 123.75% (**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 145.06 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
```

31. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line (from bus 909144 to bus 243219 ckt 2) loads from 108.06% to 113.86% (**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 154.24 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
```

32. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line (from bus 909144 to bus 243219 ckt 2) loads from 108.05% to 113.85% (**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 154.24 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

Delivery of Energy Portion of Interconnection Request

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

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

Not Applicable

Light Load Analysis - 2019

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