

## Annual ARR Allocation and FTR Auction Transmission Outage Modeling

PJM determines the transmission outages to model in the simultaneous feasibility test utilized in the Annual ARR Allocation and FTR Auction using the following procedure.

PJM executes the SFT analysis on transmission outages as follows:

1. PJM begins with the initial outage list as it is submitted to PJM by the transmission owners posted on the PJM OASIS. This is a raw list of outages available to the public on the PJM OASIS page. This list is not necessarily a list of approved outages or actual outages that will be occurring as it changes daily and many of the outages are not yet approved. This list consists of all transmission outages of duration of two weeks or longer. Transmission outages will only be considered in final model if scheduled for at least two months or if identified in step four below.
2. PJM reviews the initial outage list for all PJM transmission zones and identifies outages that are occurring during the period of the Annual ARR allocation and FTR Auction which do not occur simultaneously. Outages often occur during different times of the year and would not be approved to occur simultaneously because they would cause reliability concerns. Therefore, PJM models the best representation of outages to reflect the expected conditions of the auction time period. In many instances it is impractical and unrealistic to model multiple outages in a similar region that occur during different time periods because the Annual ARR/FTR model is a single year period and if these multiple outages were modeled the optimization program would fail because of a power imbalance or infeasibility.
3. PJM market engineers also review all transmission outages of interest with the PJM interconnection and operations group for the likelihood of the outages actually occurring. In many instances outages are submitted to PJM and posted on OASIS that are not yet approved and will be delayed, cancelled, or rescheduled. Outages might be rescheduled, cancelled, or delayed for reasons such as cancelled transmission upgrades, conflicts with other outages, maintenance cancellations, etc. This information is gathered by the PJM Interconnection Planning department, PJM System Operations department, and the actual transmission owners.
4. PJM market engineers will review the transmission outage list and identify transmission outages that could have a large impact on congestion and possibly FTR revenue adequacy. This determination is made by comparing transmission outages to historical data, focusing on higher voltage transmission outages, considering outage duration, and performing power flow congestion analysis.
5. After this analysis is performed on the initial OASIS outage list and PJM determines the actual outages that will be placed in the optimization program, PJM posts a separate FTR outage list to the FTR web page. This separate FTR outage list is posted publicly along with the actual FTR model usually at least one week before the

bidding window opens so that PJM members have a transparent view of the conditions to be used for the optimization program.

PJM must use reasonable assumptions for the topology to be used as part of the optimization program. The goal of the simultaneous feasibility determination shall be to ensure that there are sufficient revenues from Transmission Congestion Charges to satisfy all Financial Transmission Rights obligations for the auction period under expected conditions and to ensure that there are sufficient revenues from the Annual Financial Transmission Right Auction to satisfy all Auction Revenue Rights obligations.

The SFT analysis has resulted in the below transmission outages to be modeled in the 2019/2020 Annual ARR Allocation and FTR Auction.

| 2019/2020 Annual ARR/FTR Outages |                         |      |                |                        |                        |
|----------------------------------|-------------------------|------|----------------|------------------------|------------------------|
| Zone                             | Facility Name           | Type | Modeled Period | Scheduled Start Day    | Scheduled End Day      |
| AE                               | CARDIFF 230 KV CAR-CED  | LINE | All            | 9/23/2019              | 12/6/2019              |
| AE                               | DOROTHY 138 KV DOR-LEW  | LINE | All            | 9/23/2019              | 12/6/2019              |
| AE                               | ENGLAND 138 KV ENG-SCU7 | LINE | All            | 3/2/2020               | 5/9/2020               |
| AE                               | ENGLAND 138 KV ENG-SCU8 | LINE | All            | 3/2/2020               | 5/9/2020               |
| AE                               | FAIRTON 69 KV FAI-LAU   | LINE | All            | 3/9/2020               | 4/17/2020              |
| AE                               | HIGBEE 69 KV HIG-LEW1   | LINE | All            | 9/23/2019              | 5/6/2020               |
| AE                               | HIGBEE 69 KV HIG-LEWI   | LINE | All            | 9/23/2019              | 5/6/2020               |
| AE                               | LAKEAVEN69 KV LAK-MIDT  | LINE | All            | 1/6/2020               | 5/6/2020               |
| AE                               | LAUREL 69 KV LAU-ROA    | LINE | All            | 3/9/2020               | 4/17/2020              |
| AE                               | LEWIS 138 KV LEW-MIN2   | LINE | All            | 9/23/2019              | 12/6/2019              |
| AE                               | LEWIS 69 KV LEW-ONT2    | LINE | All            | 9/23/2019              | 5/6/2020               |
| AE                               | MANTUA 69 KV MAN-MIC    | LINE | All            | 3/16/2020              | 4/6/2020               |
| AE                               | MARVENAE69 KV HIG-MARV  | LINE | All            | 2/24/2020              | 5/6/2020               |
| AE                               | MICKLETO230 KV MICK #4  | XFMR | All            | 10/14/2019             | 4/6/2020               |
| AE                               | MICKLETO69 KV MIC-VALT  | LINE | All            | 9/4/2019<br>3/16/2020  | 10/9/2019<br>5/6/2020  |
| AE                               | MONR AE 69 KV MON-TAN   | LINE | All            | 10/14/2019             | 5/10/2020              |
| AE                               | VALERO 69 KV VAL-VALT   | LINE | All            | 9/4/2019               | 4/6/2020               |
| AEP                              | ADAMSAEP138 KV ADA-SEA1 | LINE | All            | 3/2/2020               | 5/29/2020              |
| AEP                              | ALMENA 69 KV ALM-HAR    | LINE | All            | 9/9/2019               | 11/8/2019              |
| AEP                              | BAKER 138 KV BAK-BIG1   | LINE | All            | 12/6/2018              | 11/18/2019             |
| AEP                              | BANISTER138 KV BAN-BAN1 | LINE | All            | 10/31/2019<br>1/9/2020 | 1/6/2020<br>2/7/2020   |
| AEP                              | BEATTY 138 KV BEA-MCC1  | LINE | All            | 9/25/2019              | 11/26/2019             |
| AEP                              | BIXBY 345 KV BIX-KIR1   | LINE | All            | 9/18/2019<br>3/4/2020  | 11/5/2019<br>3/17/2020 |
| AEP                              | BOSSERMN138 KV BOS-TRA  | LINE | All            | 12/16/2019             | 1/3/2020               |

**2019/2020 Annual ARR/FTR Outages**

| Zone | Facility Name           | Type | Modeled Period | Scheduled Start Day                          | Scheduled End Day                                 |
|------|-------------------------|------|----------------|--|---|
| AEP  | CARROLLT138 KV CAR-SUN1 | LINE | All            | 7/9/2018<br>10/2/2019                        | 6/28/2019<br>1/28/2020                            |
| AEP  | CLINTOCS138 KV CLI-KEN1 | LINE | All            | 9/4/2019                                     | 12/3/2019   |
| AEP  | CLOVERD2765 KV CLO-JOS1 | LINE | All            | 9/9/2019<br>12/2/2019                        | 9/13/2019<br>12/6/2019                            |
| AEP  | CORRIDOR345 KV COR-JUG  | LINE | All            | 9/16/2019<br>3/9/2020                        | 12/19/2019<br>5/26/2020                           |
| AEP  | DEERCREE138 KV DEE-DOO  | LINE | All            | 6/17/2019                                    | 11/8/2019   |
| AEP  | DEERCREE138 KV DEE-MIS  | LINE | All            | 9/9/2019                                     | 11/8/2019   |
| AEP  | DELAWAIM138 KV DEL-HOG1 | LINE | All            | 9/10/2019                                    | 12/17/2019  |
| AEP  | DELAWAIM138 KV DEL-LAN1 | LINE | All            | 9/10/2019                                    | 12/17/2019  |
| AEP  | DELAWAIM138 KV DEL-MOD1 | LINE | All            | 9/10/2019                                    | 12/17/2019  |
| AEP  | DELAWAIM138 KV DEL-SEL1 | LINE | All            | 3/5/2019                                     | 12/17/2019  |
| AEP  | DELAWAIM138 KV DEL-VAN1 | LINE | All            | 5/6/2019                                     | 12/17/2019  |
| AEP  | DELAWAIM138 KV DEL-WES1 | LINE | All            | 9/10/2019                                    | 12/17/2019  |
| AEP  | DELAWARE138 KV DEL-TAN1 | LINE | All            | 7/31/2018                                    | 12/28/2020  |
| AEP  | DEQUINE 345 KV DEQ-WES1 | LINE | All            | 10/21/2019<br>5/11/2020                      | 11/8/2019<br>9/4/2020                             |
| AEP  | EDENSRID138 KV EDE-WKI1 | LINE | All            | 5/4/2020                                     | 5/21/2020   |
| AEP  | ELEIPSIC138 KV ELE-RIC1 | LINE | All            | 3/2/2020                                     | 12/18/2020  |
| AEP  | GOODHOPE138 KV GOO-HAR1 | LINE | All            | 10/24/2018<br>9/10/2019<br>2/25/2020         | 6/27/2019<br>12/12/2019<br>5/14/2020              |
| AEP  | GORSUCH 138 KV GOR-HAR  | LINE | All            | 3/16/2020                                    | 5/29/2020   |
| AEP  | GRANGER 138 KV GRA-TWI1 | LINE | All            | 9/3/2019                                     | 12/20/2019  |
| AEP  | GUARDIAN138 KV GUA-TWI1 | LINE | All            | 6/4/2019<br>7/2/2019<br>9/4/2019<br>4/6/2020 | 6/29/2019<br>8/30/2019<br>12/13/2019<br>5/29/2020 |
| AEP  | HAPCREME138 KV HAP-MOR1 | LINE | All            | 2/26/2020                                    | 5/26/2020   |
| AEP  | HARTFORD69 KV HAR-SHA1  | LINE | All            | 9/9/2019                                     | 11/8/2019   |
| AEP  | HAZARD 161 KV HAZ-WOO   | LINE | All            | 3/16/2020                                    | 12/18/2020  |
| AEP  | HEDDINGR138 KV HED-FUL1 | LINE | All            | 2/11/2020                                    | 5/29/2020   |
| AEP  | HICKORYC138 KV HIC-NIC1 | LINE | All            | 6/17/2019                                    | 10/18/2019  |
| AEP  | JACKSONS500 KV JAC-ANT1 | LINE | All            | 3/2/2020                                     | 6/12/2020   |
| AEP  | JEFFERSO765 KV JEF-ROC1 | LINE | All            | 9/9/2019<br>9/16/2019<br>11/4/2019           | 9/13/2019<br>10/25/2019<br>11/8/2019              |
| AEP  | KAMMER2 138 KV KAM-ORM1 | LINE | All            | 7/25/2018                                    | 8/30/2019   |

| 2019/2020 Annual ARR/FTR Outages |                         |      |                |                                  |                                      |  |
|----------------------------------|-------------------------|------|----------------|----------------------------------|--------------------------------------|--|
| Zone                             | Facility Name           | Type | Modeled Period | Scheduled Start Day              | Scheduled End Day                    |  |
| AEP                              | LAPORTE 69 KV LAP-NEW1  | LINE | All            | 12/16/2019                       | 7/17/2020                            |  |
| AEP                              | LIGONIER138 KV COU-LIG  | LINE | All            | 6/3/2019<br>7/2/2019<br>9/4/2019 | 6/29/2019<br>8/30/2019<br>12/13/2019 |  |
| AEP                              | MADDOXCR345 KV ELI-MAD  | LINE | All            | 3/9/2020                         | 5/28/2020                            |  |
| AEP                              | MARQUIS2138 KV MAR-WAV  | LINE | All            | 9/16/2019                        | 12/13/2019                           |  |
| AEP                              | MILLBROO138 KV MIL-NPO1 | LINE | All            | 2/3/2020<br>3/16/2020            | 3/13/2020<br>4/24/2020               |  |
| AEP                              | MUSKING2138 KV MUS-SCA1 | LINE | All            | 10/17/2019                       | 11/24/2019                           |  |
| AEP                              | NEWCARLI138 KV NEW-PIN1 | LINE | All            | 7/19/2019                        | 1/17/2020                            |  |
| AEP                              | TANNERSC345 KV TAN-MIA1 | LINE | All            | 5/4/2020                         | 9/18/2020                            |  |
| AEP                              | VANBUREN138 KV VAN-SOR1 | LINE | All            | 5/6/2019<br>9/10/2019            | 7/3/2019<br>12/17/2019               |  |
| AEP                              | WEFOSTOR138 KV WEF-02W1 | LINE | All            | 1/13/2020                        | 3/18/2020                            |  |
| AEP                              | WINDFALL138 KV NWA-WIN  | LINE | All            | 9/4/2019                         | 12/20/2019                           |  |
| AEP-AP                           | CHEMICAL138 KV . 1      | XFMR | All            | 9/29/2017                        | 12/31/2019                           |  |
| AEP-AP                           | JACKSONS765 KV . 1      | XFMR | All            | 3/2/2020                         | 6/12/2020                            |  |
| AEP-AP                           | JOSHUAF2765 KV . 1      | XFMR | All            | 9/9/2019<br>12/2/2019            | 9/13/2019<br>12/6/2019               |  |
| AEP-AP                           | TRISTATE345 KV 1        | XFMR | All            | 11/15/2019                       | 3/26/2020                            |  |
| AEP-AP                           | TRISTATE345 KV 2        | XFMR | All            | 3/26/2020                        | 7/16/2020                            |  |
| AEP-IM                           | HICKORYC138 KV 4-P      | XFMR | All            | 4/15/2019                        | 8/2/2019                             |  |
| AEP-IM                           | OLIVE 138 KV 2-S        | XFMR | All            | 1/20/2020<br>3/23/2020           | 3/20/2020<br>4/24/2020               |  |
| AEP-IM                           | OLIVE 345 KV 2-P        | XFMR | All            | 1/20/2020<br>3/23/2020           | 3/20/2020<br>4/24/2020               |  |
| AEP-IM                           | TWINBRAN345 KV T-6      | XFMR | All            | 11/4/2019                        | 12/13/2019                           |  |
| AEP-IM                           | TWINBRAN345 KV T-7      | XFMR | All            | 11/4/2019                        | 12/13/2019                           |  |
| AEP-IM                           | VANBUREN12 KV 1-T       | XFMR | All            | 9/10/2019                        | 12/17/2019                           |  |
| AEP-IM                           | VANBUREN138 KV 1-P      | XFMR | All            | 5/6/2019<br>9/10/2019            | 7/3/2019<br>12/17/2019               |  |
| AEP-IM                           | VANBUREN69 KV 1-S       | XFMR | All            | 9/10/2019                        | 12/17/2019                           |  |
| AEP-KY                           | BAKER 345 KV 200        | XFMR | All            | 12/6/2018                        | 11/18/2019                           |  |
| AEP-KY                           | HAZARD 161 KV 3         | XFMR | All            | 3/16/2020                        | 12/18/2020                           |  |
| AEP-OH                           | GABLESW 138 KV GAB-TID  | LINE | All            | 7/8/2019                         | 8/5/2019                             |  |
| AEP-OH                           | HIGHLND269 KV HIG-PET1  | LINE | All            | 9/9/2019                         | 12/13/2019                           |  |
| AEP-OH                           | HYATTCS 345 KV 1A       | XFMR | All            | 3/8/2017                         | 12/30/2019                           |  |
| AEP-OH                           | HYATTCS 345 KV 1B       | XFMR | All            | 7/1/2019                         | 11/15/2019                           |  |
| AEP-OH                           | MALISZEW765 KV 1        | XFMR | All            | 9/23/2019                        | 12/20/2019                           |  |

**2019/2020 Annual ARR/FTR Outages**

| Zone   | Facility Name            | Type | Modeled Period | Scheduled Start Day    | Scheduled End Day       |
|--------|--------------------------|------|----------------|------------------------|-------------------------|
| AEP-OH | NEWCOMER138 KV 1-P       | XFMR | All            | 3/11/2020              | 6/2/2020                |
| AEP-OH | TIDD_AEP13 KV B-T        | XFMR | All            | 7/8/2019               | 8/5/2019                |
| AEP-OH | TIDD_AEP138 KV B-S       | XFMR | All            | 7/8/2019               | 8/5/2019                |
| AEP-OH | TIDD_AEP345 KV B-P       | XFMR | All            | 7/8/2019               | 8/5/2019                |
| APSS   | ALLENPOR138 KV ALL-CHA   | LINE | All            | 12/2/2019              | 5/29/2020               |
| APSS   | BELMON 138 KV BEL-SHE    | LINE | All            | 12/2/2019              | 5/29/2020               |
| APSS   | BELMONT 500 KV TRAN 3    | XFMR | All            | 10/7/2019              | 10/11/2019              |
| APSS   | BELMONT 765 KV BEL-KAM   | LINE | All            | 10/7/2019              | 10/11/2019              |
| APSS   | BELMONT 765 KV BEL-MOU   | LINE | All            | 10/7/2019              | 10/11/2019              |
| APSS   | BELMONT 765 KV TRAN 5    | XFMR | All            | 10/7/2019              | 10/25/2019              |
| APSS   | BETHELPA138 KV BET-WIL   | LINE | All            | 9/30/2019              | 2/1/2020                |
| APSS   | CATOCTIN138 KV CAT-RIN   | LINE | All            | 3/11/2020              | 5/1/2020                |
| APSS   | EWAYNESB138 KV EWA-RIN   | LINE | All            | 3/11/2020              | 5/1/2020                |
| APSS   | GARFLD_T138 KV GAR-RIN   | LINE | All            | 3/11/2020              | 11/20/2020              |
| APSS   | MITCHELL138 KV MIT-SHE   | LINE | All            | 12/2/2019              | 5/29/2020               |
| APSS   | REID 138 KV REI-RIN      | LINE | All            | 9/3/2019<br>3/11/2020  | 10/4/2019<br>5/1/2020   |
| APSS   | RINGGOLD230 KV T3        | XFMR | All            | 3/11/2020              | 5/1/2020                |
| APSS   | SHEPLJCT138 KV SHE-SMI   | LINE | All            | 12/2/2019              | 5/29/2020               |
| APSS   | SMITHTON138 KV SMI-YUK2  | LINE | All            | 12/2/2019              | 5/29/2020               |
| BC     | CONASTON500 KV CNS-PEA   | LINE | All            | 12/2/2019<br>3/27/2020 | 12/20/2019<br>3/31/2020 |
| BC     | JERICHO230 KV JER-WAU0   | LINE | All            | 9/10/2019              | 12/13/2019              |
| BC     | RIVERSID230 KV 230-1     | XFMR | All            | 9/15/2019              | 12/15/2019              |
| CIN    | WESTWOOD345 KV 1         | XFMR | All            | 10/21/2019             | 11/8/2019               |
| COMED  | 110 DEVO138 KV 11414 2   | LINE | All            | 9/1/2019               | 9/14/2019               |
| COMED  | 113 WATE138 KV 11106 6   | LINE | All            | 10/28/2019             | 12/13/2019              |
| COMED  | 114 NORT138 KV 11414 1   | LINE | All            | 9/1/2019               | 9/14/2019               |
| COMED  | 155 NELS138 KV 15508 1   | LINE | All            | 2/10/2020              | 5/15/2020               |
| COMED  | 159 NORT138 KV TR82CT-S  | XFMR | All            | 9/16/2019              | 11/22/2019              |
| COMED  | 159 NORT34.5 KV TR82CT-T | XFMR | All            | 9/16/2019              | 11/22/2019              |
| COMED  | 159 NORT345 KV 1625      | LINE | All            | 9/16/2019              | 11/22/2019              |
| COMED  | 159 NORT345 KV TR82CT-P  | XFMR | All            | 9/16/2019              | 11/22/2019              |
| COMED  | 192 RIDG138 KV TR74B 69  | XFMR | All            | 9/16/2019              | 12/12/2019              |
| COMED  | 192 RIDG138 KV TR74R 69  | XFMR | All            | 9/16/2019              | 12/12/2019              |
| COMED  | 7615 138 KV 7615 Z1      | LINE | All            | 12/30/2017             | 12/28/2019              |
| COMED  | 84 ROSEH138 KV 11414 3   | LINE | All            | 9/1/2019               | 9/14/2019               |
| COMED  | 88 SKOKI345 KV 15925     | LINE | All            | 9/16/2019              | 11/22/2019              |

| 2019/2020 Annual ARR/FTR Outages |                         |      |                |                        |                         |  |
|----------------------------------|-------------------------|------|----------------|------------------------|-------------------------|--|
| Zone                             | Facility Name           | Type | Modeled Period | Scheduled Start Day    | Scheduled End Day       |  |
| CONS                             | ARGENTA2345 KV ANG-DUM  | LINE | All            | 11/4/2019              | 12/13/2019              |  |
| DAYTON                           | HUTCHING138 KV HUT-MID  | LINE | All            | 3/3/2020               | 5/28/2020               |  |
| DEOK                             | 08BROWN 138 KV 08B-STU1 | LINE | All            | 11/1/2019<br>2/24/2020 | 12/15/2019<br>5/29/2020 |  |
| DEOK                             | BECKJORD138 KV BEC-08C1 | LINE | All            | 3/2/2020               | 5/1/2020                |  |
| DEOK                             | BECKJORD138 KV BK9      | XFMR | All            | 3/2/2020               | 5/1/2020                |  |
| DEOK                             | BECKJORD138 KV PIE-BEC5 | LINE | All            | 11/11/2019<br>3/2/2020 | 12/13/2019<br>5/1/2020  |  |
| DEOK                             | BECKJORD69 KV BEC-08T1  | LINE | All            | 3/2/2020               | 5/1/2020                |  |
| DEOK                             | PIERC_DK345 KV BK18     | XFMR | All            | 11/11/2019<br>3/2/2020 | 12/13/2019<br>5/1/2020  |  |
| DEOK                             | PIERC_DK345 KV PIE-PIE2 | LINE | All            | 11/11/2019<br>3/2/2020 | 12/13/2019<br>5/1/2020  |  |
| DEOK                             | REDBANK 345 KV RED-SIL1 | LINE | All            | 4/27/2020              | 5/22/2020               |  |
| DOM-C                            | BANISTE4138 KV TX1      | XFMR | All            | 10/31/2019<br>1/9/2020 | 1/6/2020<br>2/7/2020    |  |
| DOM-C                            | BANISTE4138 KV TX2      | XFMR | All            | 10/31/2019<br>1/9/2020 | 1/6/2020<br>2/7/2020    |  |
| DOM-C                            | BOYTNPRD115 KV 171      | LINE | All            | 8/18/2019<br>9/8/2019  | 9/1/2019<br>12/9/2019   |  |
| DOM-C                            | BROWNBOV115 KV 72D      | LINE | All            | 6/3/2019               | 8/30/2019               |  |
| DOM-C                            | CARSON4 500 KV TX1H     | XFMR | All            | 9/20/2018              | 1/19/2020               |  |
| DOM-C                            | CENTRAL 115 KV 1012A    | LINE | All            | 9/9/2019               | 12/9/2019               |  |
| DOM-C                            | CHASECTY115 KV 36A      | LINE | All            | 9/9/2019<br>3/2/2020   | 12/9/2019<br>5/4/2020   |  |
| DOM-C                            | CHASECTY115 KV 40A      | LINE | All            | 9/9/2019               | 12/9/2019               |  |
| DOM-C                            | CHASECTY115 KV 98A2     | LINE | All            | 9/23/2019<br>3/2/2020  | 11/22/2019<br>3/25/2020 |  |
| DOM-C                            | CHASECTY115 KV TX1      | XFMR | All            | 9/9/2019               | 12/9/2019               |  |
| DOM-C                            | CHESTER4230 KV 217A     | LINE | All            | 6/2/2019               | 12/20/2019              |  |
| DOM-C                            | CHESTER4230 KV TX9      | XFMR | All            | 7/15/2019              | 11/1/2019               |  |
| DOM-C                            | CHICKHOM230 KV 287A     | LINE | All            | 6/2/2019               | 8/30/2019               |  |
| DOM-C                            | CHICKHOM500 KV TX1      | XFMR | All            | 4/1/2019               | 8/17/2019               |  |
| DOM-C                            | CLOVER 500 KV 556B      | LINE | All            | 9/16/2019              | 11/18/2019              |  |
| DOM-C                            | CLOVER 500 KV TX7       | XFMR | All            | 9/16/2019              | 11/18/2019              |  |
| DOM-C                            | CLOVER 500 KV TX8       | XFMR | All            | 9/16/2019              | 11/18/2019              |  |
| DOM-C                            | CLOVER 500 KV TX9       | XFMR | All            | 9/16/2019              | 11/18/2019              |  |
| DOM-C                            | ELMONT4 230 KV TX5      | XFMR | All            | 6/3/2019               | 9/12/2019               |  |
| DOM-C                            | HOPEWEL4230 KV 211A     | LINE | All            | 9/15/2019              | 5/1/2020                |  |

**2019/2020 Annual ARR/FTR Outages**

| Zone  | Facility Name        | Type | Modeled Period | Scheduled Start Day    | Scheduled End Day        |
|-------|----------------------|------|----------------|------------------------|--------------------------|
| DOM-C | HOPEWEL4230 KV 228A  | LINE | All            | 9/15/2019              | 5/1/2020                 |
| DOM-C | PAMPLIN 115 KV 154D  | LINE | All            | 6/3/2019               | 1/3/2020                 |
| DOM-C | PLSNTHTP115 KV 130B  | LINE | All            | 9/30/2019              | 5/29/2020                |
| DOM-C | SWAMP 230 KV 2144    | LINE | All            | 1/13/2020              | 5/13/2020                |
| DOM-E | CRANYISL230 KV 257A  | LINE | All            | 9/2/2019               | 1/20/2020                |
| DOM-E | CRANYISL230 KV 257C  | LINE | All            | 9/2/2019               | 1/20/2020                |
| DOM-E | LANEXA 230 KV 224A   | LINE | All            | 7/1/2019               | 2/14/2020                |
| DOM-E | SEAFORD 115 KV 76A   | LINE | All            | 9/1/2019               | 5/23/2020                |
| DOM-E | SEAFORD 115 KV 79A   | LINE | All            | 9/1/2019               | 4/30/2020                |
| DOM-E | SEPTA4 500 KV 579A1  | LINE | All            | 3/16/2020              | 3/26/2020                |
| DOM-E | SEWELLPT230 KV 257D  | LINE | All            | 9/2/2019               | 1/20/2020                |
| DOM-E | SMITHFLD230 KV 223B  | LINE | All            | 8/2/2019<br>12/30/2019 | 12/18/2019<br>2/14/2020  |
| DOM-E | TANNERPT230 KV 257B  | LINE | All            | 9/2/2019               | 1/20/2020                |
| DOM-E | YORKTOW4115 KV RSS2  | XFMR | All            | 11/4/2018              | 12/31/2019               |
| DOM-N | AIRPORT 230 KV 2148B | LINE | All            | 7/22/2019              | 10/15/2019               |
| DOM-N | BRAMBLET500 KV 590A  | LINE | All            | 3/30/2020              | 4/9/2020                 |
| DOM-N | CTRYCLDP115 KV 145C  | LINE | All            | 5/16/2019              | 8/25/2019                |
| DOM-N | DUMFRIES230 KV 2022B | LINE | All            | 4/17/2019              | 8/14/2019                |
| DOM-N | MARSHRUN230 KV 280A  | LINE | All            | 12/2/2019              | 5/1/2020                 |
| DOM-N | MINEROAD230 KV 2090A | LINE | All            | 6/11/2019              | 7/2/2019                 |
| DOM-N | POSSUMP4115 KV 145A  | LINE | All            | 5/16/2019              | 8/25/2019                |
| DOM-N | REMINGTN230 KV 2077A | LINE | All            | 12/2/2019              | 5/1/2020                 |
| DOM-N | REMINGTN230 KV TX3   | XFMR | All            | 12/2/2019              | 5/1/2020                 |
| DOM-N | SMOKTNDP115 KV 145D  | LINE | All            | 5/16/2019              | 8/25/2019                |
| DOM-S | CHOWAN 230 KV 2131C  | LINE | All            | 9/30/2019<br>11/4/2019 | 10/25/2019<br>12/13/2019 |
| DOM-S | PANTEGO 115 KV 189B  | LINE | All            | 6/1/2019               | 10/14/2019               |
| DOM-S | PANTEGO 115 KV 189C  | LINE | All            | 6/1/2019               | 10/14/2019               |
| DOM-S | TARBORO 230 KV TX4   | XFMR | All            | 8/9/2019<br>9/27/2019  | 9/23/2019<br>11/15/2019  |
| DOM-S | WHARTON4115 KV 189A  | LINE | All            | 6/1/2019               | 10/14/2019               |
| DOM-S | WHARTON4115 KV 82A   | LINE | All            | 10/24/2018             | 10/16/2019               |
| DOM-W | BREMO4 230 KV 2028B  | LINE | All            | 9/4/2019               | 10/31/2019               |
| DOM-W | BREMO4 230 KV TX5_   | XFMR | All            | 9/4/2019               | 10/31/2019               |
| DOM-W | COVINGTN138 KV 161B  | LINE | All            | 2/17/2020              | 6/12/2020                |
| DOM-W | GORDONSV115 KV 11A   | LINE | All            | 12/2/2019              | 3/1/2020                 |
| DOM-W | GORDONSV230 KV 2088A | LINE | All            | 12/2/2019              | 3/1/2020                 |

**2019/2020 Annual ARR/FTR Outages**

| Zone  | Facility Name           | Type | Modeled Period | Scheduled Start Day                  | Scheduled End Day                     |
|-------|-------------------------|------|----------------|--------------------------------------|---------------------------------------|
| DOM-W | GORDONSV230 KV TX3      | XFMR | All            | 12/2/2019                            | 3/1/2020                              |
| DOM-W | LEXINGTN230 KV TX4      | XFMR | All            | 9/19/2019                            | 12/6/2019                             |
| DOM-W | MITCHLDP115 KV 2C1      | LINE | All            | 8/5/2019<br>12/2/2019                | 9/1/2019<br>5/31/2020                 |
| DOM-W | OAKGREEN115 KV 11D      | LINE | All            | 12/11/2018                           | 12/1/2019                             |
| DOM-W | ROCKBRDG115 KV 26D      | LINE | All            | 5/29/2019                            | 10/31/2019                            |
| DOM-W | VALLEY4 500 KV 549A     | LINE | All            | 9/15/2019                            | 5/28/2020                             |
| DOM-W | VALLEY4 500 KV TX1      | XFMR | All            | 9/16/2019                            | 10/25/2019                            |
| DPL   | CARTANZA230 KV CAR-RED  | LINE | All            | 4/1/2020                             | 5/15/2020                             |
| DPL   | COOLSPRI230 KV COL-MIL  | LINE | All            | 3/9/2020                             | 4/5/2020                              |
| DPL   | INDIANRI138 KV IND-ROB  | LINE | All            | 2/3/2020                             | 5/22/2020                             |
| DPL   | MASSEY 69 KV MAS-MAS    | LINE | All            | 9/18/2019<br>11/8/2019               | 10/4/2019<br>12/22/2019               |
| DPL   | MILFORD 230 KV AT20     | XFMR | All            | 9/9/2019                             | 10/8/2019                             |
| DPL   | MTHERMON69 KV MTH-NSA   | LINE | All            | 4/6/2020                             | 5/15/2020                             |
| DPL   | NSALISBU69 KV NSA-ROCK  | LINE | All            | 9/3/2019                             | 12/31/2019                            |
| DPL   | NSEAFORD138 KV NSE-SHA  | LINE | All            | 9/2/2019                             | 9/29/2019                             |
| DUQU  | ARSENAL 138 KV ARS-OAK  | LINE | All            | 9/16/2019                            | 5/29/2020                             |
| DUQU  | BEAV DUQ345 KV BEA-CRE  | LINE | All            | 9/16/2019<br>10/17/2019<br>4/14/2020 | 10/15/2019<br>11/13/2019<br>4/28/2020 |
| DUQU  | BETTIS 138 KV BET-CAR   | LINE | All            | 9/16/2019                            | 12/6/2019                             |
| DUQU  | BRUNOTIS138 KV BRU-NEV  | LINE | All            | 9/15/2019                            | 3/15/2020                             |
| DUQU  | CARS DUQ138 KV CAR-DRA  | LINE | All            | 9/16/2019                            | 12/6/2019                             |
| DUQU  | CRES DUQ138 KV CRE-MON  | LINE | All            | 9/15/2019                            | 3/15/2020                             |
| DUQU  | DRAVOSBU138 KV DRA-WMI4 | LINE | All            | 10/7/2019                            | 12/13/2019                            |
| DUQU  | NEVILLE 138 KV NEV-NEV  | LINE | All            | 9/15/2019                            | 3/15/2020                             |
| DUQU  | NEVILTAP138 KV NEV-SEW  | LINE | All            | 9/15/2019                            | 3/15/2020                             |
| EKPC  | AIRPRT_R69 KV AIR-ELIO  | LINE | All            | 3/18/2019                            | 10/4/2019                             |
| EKPC  | HLSBR_EK69 KV HLS-WYOM  | LINE | All            | 3/25/2019                            | 12/20/2019                            |
| EKPC  | MONTICE369 KV MON-SLAT  | LINE | All            | 6/10/2019                            | 8/9/2019                              |
| EKPC  | PEASTICK69 KV PEA-WYOM  | LINE | All            | 3/25/2019                            | 12/20/2019                            |
| FE    | 02WOODVJ138 KV 02W-LEM1 | LINE | All            | 1/13/2020                            | 3/18/2020                             |
| FE    | 02WOODVJ138 KV 02W-WOO1 | LINE | All            | 1/13/2020                            | 3/18/2020                             |
| FE    | AETNA 138 KV TR1        | XFMR | All            | 3/2/2020                             | 5/29/2020                             |
| FE    | BLUEBELL138 KV BLU-02A1 | LINE | All            | 1/11/2019                            | 12/31/2019                            |
| FE    | LORDSTWN345 KV LOR-SAM  | LINE | All            | 11/11/2019<br>1/6/2020               | 12/20/2019<br>2/21/2020               |



| 2019/2020 Annual ARR/FTR Outages |                         |      |                |                         |                          |
|----------------------------------|-------------------------|------|----------------|-------------------------|--------------------------|
| Zone                             | Facility Name           | Type | Modeled Period | Scheduled Start Day     | Scheduled End Day        |
| FE                               | WAKRON 138 KV WAK-AET1  | LINE | All            | 3/2/2020                | 5/29/2020                |
| FE                               | WFREMONT138 KV WFR-WOO1 | LINE | All            | 3/18/2020               | 5/29/2020                |
| FECL                             | 02DUNKRK138 KV 02D-02N1 | LINE | All            | 9/16/2019               | 11/14/2019               |
| FECL                             | 02FOWLES138 KV 02F-02D2 | LINE | All            | 9/16/2019               | 11/14/2019               |
| FECL                             | 02HAMLTN138 KV 02H-HOR1 | LINE | All            | 9/16/2019               | 11/1/2019                |
| FECL                             | ASHTABUL345 KV TR-8     | XFMR | All            | 3/6/2020                | 5/25/2020                |
| FECL                             | AVONLAK2345 KV 91-AVT   | XFMR | All            | 9/16/2019               | 12/6/2019                |
| FECL                             | BEAVER 138 KV BEA-BLA1  | LINE | All            | 9/16/2019               | 5/15/2020                |
| FECL                             | BEAVER 138 KV BEA-JOH1  | LINE | All            | 9/16/2019               | 1/17/2020                |
| FECL                             | HORIZON1138 KV HOR-AIR1 | LINE | All            | 9/16/2019               | 11/1/2019                |
| FECL                             | JUNIPER 138 KV JUN-04N2 | LINE | All            | 11/7/2019<br>1/20/2020  | 12/19/2019<br>2/29/2020  |
| FECL                             | JUNIPER 138 KV JUN-04N4 | LINE | All            | 11/7/2019               | 12/19/2019               |
| FECL                             | LONGFIEL138 KV LON-04N1 | LINE | All            | 11/7/2019<br>1/20/2020  | 12/19/2019<br>2/29/2020  |
| FECL                             | LONGFIEL138 KV LON-04N2 | LINE | All            | 11/7/2019               | 12/19/2019               |
| FECL                             | LONGFIEL138 KV LON-MAX2 | LINE | All            | 11/7/2019               | 12/19/2019               |
| FECL                             | NORTHFLD138 KV 2        | XFMR | All            | 11/7/2019               | 12/19/2019               |
| FECL                             | NORTHFLD138 KV 4        | XFMR | All            | 11/7/2019               | 12/19/2019               |
| JC-N                             | BELVEDER115 KV BEL-DRA  | LINE | All            | 2/24/2020<br>4/27/2020  | 4/24/2020<br>5/29/2020   |
| JC-N                             | BELVEDER115 KV BEL-MER  | LINE | All            | 2/24/2020<br>4/27/2020  | 4/24/2020<br>5/29/2020   |
| JC-N                             | BELVEDER115 KV BEL-PEQ  | LINE | All            | 2/24/2020<br>4/27/2020  | 4/24/2020<br>5/29/2020   |
| JC-N                             | ILIFF 230 KV MNT-LLF    | LINE | All            | 9/17/2019               | 11/18/2019               |
| JC-N                             | MONTVILL230 KV BK 2TR   | XFMR | All            | 9/17/2019               | 11/18/2019               |
| LGEE                             | CLAY_VIL69 KV WFR-CLAY  | LINE | All            | 7/8/2019                | 2/13/2020                |
| ME                               | GLENDON 115 KV GLE-HOS  | LINE | All            | 10/16/2019              | 12/16/2019               |
| ME                               | HILL 115 KV HIL-JOH     | LINE | All            | 3/2/2020                | 5/30/2020                |
| ME                               | HOSENSME230 KV 4-115    | XFMR | All            | 10/16/2019              | 12/16/2019               |
| ME                               | HOSENSME230 KV HOS-SPR  | LINE | All            | 10/14/2019              | 12/14/2019               |
| ME                               | HUNTERST500 KV HUN-VIN  | LINE | All            | 3/16/2020               | 4/17/2020                |
| ME                               | JACK ME 230 KV JAC-TMI  | LINE | All            | 10/21/2019              | 11/15/2019               |
| ME                               | MIDDLJCT230 KV 3 BANK   | XFMR | All            | 9/16/2019<br>11/22/2019 | 11/13/2019<br>12/11/2019 |
| ME                               | PORTLAND230 KV 3 BANK   | XFMR | All            | 9/20/2019               | 10/16/2019               |
| PE                               | ELROY 500 KV ELR-ELR    | LINE | All            | 3/16/2020               | 5/29/2020                |

**2019/2020 Annual ARR/FTR Outages**

| Zone | Facility Name           | Type | Modeled Period | Scheduled Start Day   | Scheduled End Day      |
|------|-------------------------|------|----------------|-----------------------|------------------------|
| PE   | EMILIE 138 KV EMI-FAL   | LINE | All            | 9/3/2019              | 10/11/2019             |
| PEP  | AQUASCO 230 KV AQU-BOW  | LINE | All            | 9/10/2019             | 12/13/2019             |
| PEP  | BELLSMIL138 KV BEL-BET1 | LINE | All            | 9/16/2019             | 12/6/2019              |
| PEP  | BELLSMIL230 KV 121-13T  | XFMR | All            | 9/21/2019             | 12/20/2019             |
| PEP  | BELLSMIL230 KV 121-1T   | XFMR | All            | 9/21/2019             | 12/20/2019             |
| PEP  | BELLSMIL230 KV 121-5T   | XFMR | All            | 9/21/2019             | 12/20/2019             |
| PEP  | BELLSMIL230 KV BEL-QUI9 | LINE | All            | 9/21/2019             | 12/20/2019             |
| PEP  | BETHESDA138 KV 006-5T   | XFMR | All            | 9/16/2019             | 12/6/2019              |
| PEP  | BETHESDA138 KV BET-OST  | LINE | All            | 9/14/2019             | 12/14/2019             |
| PEP  | BETHESDA138 KV BET-VAN5 | LINE | All            | 9/16/2019             | 12/6/2019              |
| PEP  | BLUEPLAI230 KV BLU-PAL6 | LINE | All            | 9/14/2019             | 12/14/2019             |
| PEP  | BLUEPLAI230 KV BLU-POT2 | LINE | All            | 9/14/2019             | 12/14/2019             |
| PEP  | BOWIE 115 KV BOW-LAN6   | LINE | All            | 9/4/2019              | 12/20/2019             |
| PEP  | BOWIE 230 KV 162-1T     | XFMR | All            | 9/10/2019             | 12/13/2019             |
| PEP  | BOWIE 230 KV BOW-BUR4   | LINE | All            | 9/10/2019             | 12/13/2019             |
| PEP  | BOWIE 230 KV BOW-JER0   | LINE | All            | 9/10/2019             | 12/13/2019             |
| PEP  | BRIGHTON230 KV BRI-BUR2 | LINE | All            | 9/14/2019             | 6/6/2020               |
| PEP  | BRIGHTON230 KV BRI-BUR4 | LINE | All            | 9/14/2019             | 6/6/2020               |
| PEP  | BURTONSV230 KV BUR-MET7 | LINE | All            | 9/14/2019             | 12/7/2019              |
| PEP  | BURTONSV230 KV BUR-OAK2 | LINE | All            | 9/14/2019             | 12/7/2019              |
| PEP  | DICKERSH230 KV DIC-DIC4 | LINE | All            | 9/10/2019             | 11/15/2019             |
| PEP  | METZTAP 230 KV 163-2T   | XFMR | All            | 9/14/2019             | 12/7/2019              |
| PEP  | METZTAP 230 KV MET-TAK1 | LINE | All            | 9/14/2019             | 12/7/2019              |
| PEP  | POTOMAC 230 KV STAC-8T  | XFMR | All            | 9/14/2019             | 12/14/2019             |
| PEP  | TAKOMA 230 KV 027-6T    | XFMR | All            | 9/14/2019             | 12/7/2019              |
| PL   | ALBURTIS500 KV ALB-BRA  | LINE | All            | 8/5/2019              | 11/15/2019             |
| PL   | ALBURTIS500 KV ALB-BRN1 | LINE | All            | 9/18/2019             | 4/4/2020               |
| PL   | ALBURTIS500 KV ALB-BRN2 | LINE | All            | 9/18/2019             | 4/4/2020               |
| PL   | COLU PL 69 KV COL-DAN   | LINE | All            | 6/3/2019<br>7/22/2019 | 7/13/2019<br>9/28/2019 |
| PL   | COPPERST230 KV T2       | XFMR | All            | 5/13/2019<br>2/4/2020 | 7/12/2019<br>3/5/2020  |
| PL   | ELDRED 230 KV 1         | XFMR | All            | 5/22/2019             | 6/19/2019              |
| PL   | ELDRED 230 KV ELD-SUN   | LINE | All            | 5/22/2019             | 6/19/2019              |
| PL   | ELROYPL 138 KV 2 TR     | XFMR | All            | 3/16/2020             | 5/29/2020              |
| PL   | ELROYPL 500 KV 1 TR     | XFMR | All            | 3/16/2020             | 5/29/2020              |
| PL   | FACEROCK115 KV 1        | XFMR | All            | 9/4/2019              | 3/31/2020              |
| PL   | FACEROCK115 KV 2        | XFMR | All            | 9/4/2019              | 3/31/2020              |

**2019/2020 Annual ARR/FTR Outages**

| Zone | Facility Name           | Type | Modeled Period | Scheduled Start Day                 | Scheduled End Day                    |
|------|-------------------------|------|----------------|-------------------------------------|--------------------------------------|
| PL   | FACEROCK115 KV FAC-FIV1 | LINE | All            | 9/4/2019                            | 3/31/2020                            |
| PL   | FACEROCK115 KV FAC-FIV2 | LINE | All            | 9/4/2019                            | 3/31/2020                            |
| PL   | HARWOOD 230 KV HAR-SIE  | LINE | All            | 7/8/2019                            | 8/28/2019                            |
| PL   | HOSENSAC500 KV HOS-LAU  | LINE | All            | 4/15/2020                           | 5/14/2020                            |
| PL   | LACKAWAN230 KV LAC-OXB  | LINE | All            | 9/16/2019                           | 5/15/2020                            |
| PL   | MILLWDPL69 KV MIL2-MNB  | LINE | All            | 3/2/2020                            | 6/26/2020                            |
| PL   | SUNBURY 230 KV 23       | XFMR | All            | 1/23/2019                           | 9/25/2019                            |
| PN   | BLAIRSVE115 KV BLA-FLO  | LINE | All            | 11/18/2019                          | 12/13/2019                           |
| PN   | BLAIRSVE115 KV BLA-SHE  | LINE | All            | 11/18/2019                          | 12/13/2019                           |
| PN   | CONEMAUG500 KV CNM-HUN  | LINE | All            | 3/16/2020                           | 4/17/2020                            |
| PN   | ETOWANDA115 KV ETO-GAS  | LINE | All            | 9/20/2019                           | 1/17/2020                            |
| PN   | FLORENCE115 KV FLO-SEW  | LINE | All            | 11/18/2019                          | 12/13/2019                           |
| PN   | GLADE 230 KV FOR-GLA1   | LINE | All            | 10/28/2019                          | 11/22/2019                           |
| PN   | HIGHPNT 115 KV HIG-ROC  | LINE | All            | 9/16/2019<br>3/2/2020               | 12/27/2019<br>5/29/2020              |
| PN   | HOOVERSV230 KV 3 TX 1   | XFMR | All            | 9/16/2019                           | 10/11/2019                           |
| PN   | HOOVERSV230 KV HOO-QUE  | LINE | All            | 9/16/2019                           | 10/11/2019                           |
| PN   | LEWISTOW230 KV LEW-RAY  | LINE | All            | 6/10/2019                           | 6/28/2019                            |
| PN   | ROXBURY 115 KV ROX-SHA  | LINE | All            | 9/23/2019                           | 10/14/2019                           |
| PS-N | ALDENE 230 KV ALD-WAR   | LINE | All            | 9/15/2019                           | 2/28/2020                            |
| PS-N | ATHENIA 230 KV ATH-SAD  | LINE | All            | 1/3/2020                            | 2/17/2020                            |
| PS-N | HILLSDAL230 KV HIL-WAL  | LINE | All            | 9/16/2019<br>3/19/2020              | 11/15/2019<br>5/3/2020               |
| PS-N | HUDSON 345 KV 345-1     | XFMR | All            | 1/15/2018                           | 12/31/2020                           |
| PS-N | KEARNY 230 KV KEA-NJT   | LINE | All            | 9/30/2019<br>11/5/2019<br>3/15/2020 | 10/30/2019<br>12/5/2019<br>4/15/2020 |
| PS-N | KINGSLAN230 KV KIN-NJT  | LINE | All            | 9/30/2019<br>11/5/2019<br>3/15/2020 | 10/30/2019<br>12/5/2019<br>4/15/2020 |
| PS-N | MAYWOOD 230 KV MAY-NEW  | LINE | All            | 1/2/2020<br>3/20/2020               | 3/3/2020<br>5/15/2020                |
| PS-N | MAYWOOD 230 KV T3       | XFMR | All            | 1/2/2020                            | 3/3/2020                             |
| PS-N | ROSELAND230 KV ROS-WHI  | LINE | All            | 9/16/2019                           | 10/18/2019                           |
| PS-S | HOPECREE230 KV HOP-SIL  | LINE | All            | 10/17/2019                          | 4/17/2020                            |
| PS-S | HOPECREE500 KV 500-1    | XFMR | All            | 10/17/2019                          | 4/17/2020                            |
| PS-S | LAWRENCE230 KV LAW-PLV  | LINE | All            | 10/21/2019                          | 1/6/2020                             |
| SENY | FARRAGUT345 KV FAR-HUDB | LINE | All            | 1/15/2018                           | 12/31/2020                           |
| SENY | FARRAGUT345 KV FAR-MAR  | LINE | All            | 1/15/2018                           | 12/31/2020                           |

