**Changes and Updates from 2.5L2 to 2.6:**

* **UAF**  All changes in 2011BASEUnit\_Availability\_v2.6\_15HOGJanuary2017\_code1\_01.zip from Wendy. The following changes were made between 2.5L2 and 2.6, but are contained in Wendy's Jan2017 file listed above:
  + Added 0.24 in column AM (UF limitation) for ORIS 10567 Unit GT1, based on CT email from Wendy Jacobs.
  + Changed nominal\_heat\_rate form 12000 to 10000 for ORIS 1366, Unit ID 12 as the original submittal from the state suggested the use of 10000.
  + Made changes to OK units as listed in the 12/22/2016 email from Tom Richardson (OK) to Doris McLeod.
  + Left MD oil-to-gas units at ORIS 1554, unit 1; 1571, 3 and 4 as oil units with a notation they've switched to gas in comments.
  + Changed retirement date for ORIS 995, Units 7 & 8 to May 31, 2018 based on email from John Welch (IN) to Doris McLeod.
  + Added OK units as new units. However, they operated in 2011 but not as Part 75 reporters:ORIS 3006, units 4, 5, 6, and ORIS 50558, CC01. These were labeled as "new" units in the UAF.
  + Added OK units for AES Shady Point, ORIS 10671, Units 1A, 1B, 2A, 2B. Set these units as "full" units and supplied hourly BY data in the hourly nonCAMD file. Base year data supplied by OK as these units were not reporting under Part 75 in 2011.
  + **Two changes needed for next CONUS runs:** 
    - **ORIS 165, Unit ID 2 needs a "N" in column AY. This won't change results, but it will ensure consistency between the OK submission, the documentation file, and the input files.**
    - **ORIS 55651, CT-01, CT-02, CT-03, and CT-04, column AK (max unit heat input) needs to be changed from 980.8 to 890.8. I typed that value into the input file incorrectly.**
* **Controls** All changes in 2011ASEControl File\_v2.6\_15HOGJanuary2017\_code1\_01.zip Includes the following changes, which are in the Jan 2017 documentation file.
  + Added MD SO2 rates for 1554, unit 1 and 1571 units 3 and 4 to reflect gas use.
  + Made changes to OK units as listed in the 12/22/2016 email from Tom Richardson (OK) to Doris McLeod.
* **Seasonal Controls** All changes in 2011ASEControl File\_v2.6\_15HOGJanuary2017\_code1\_01.zip. These changes include the following:
  + Added MD NOx rates for OS/Non OS for 1554, unit 1 and 1571, units 3 and 4 as provided by Emily Bull (MD)
* **Input Variables**
  + Added AZNM Oil, CAMX Oil, ERCT Oil, RMPA Oil just to get rid of warnings in the preprocessor
* **Growth Rates**
  + Supplied by growth committee (Tom Shanley, MI) for 2017, 2018, 2019, 2020, 2023, 2025, 2028, and 2030. File named, "CONUSv2.5L2\_ertac\_growth\_rates.xlsx" and in email dated 10/10/2016 from Tom to D. McLeod
  + Changed peak growth rates for all years for SRVC to the following based on maximum capacity of the system in the outyears:
    - Coal: 0.96
    - Boiler Gas: 3.0
  + For 2020 and 2025, for SRVC and NYCW, interpolated the growth rates from submitted data for 2019 and 2023 (for 2020) and 2023 and 2028 (for 2025).
* **NonCAMD Hourly File**
  + Added hourly data for AES Shady Point, 10671, Units 1A, 1B, 2A and 2B. Used supplied heat input data and supplied emission factors of 0.21, 0.17, 0.19 and 0.17 lbs NOX /mmbtu, respectively. Data supplied by Tom Richardson, OK.
  + I also deleted out some extraneous headers.
* **State\_Total\_Listing File**
  + Updated the information to reflect the final CSAPR rule (Table VII.D-1, 81 FR 74562, published 10-26-2016. I used the assurance levels.
  + Deleted NC since they were not listed.
  + For Arkansas, which was the only state to receive a 2017 and 2018 budget, I used the same assurance delta for both years, since the assurance level for 2018 was not specifically listed in the table. The delta was 2,530 tons. The budget for 2017 was 12,048, and the 2017 assurance level was 14,578. The budget for 2018 was 9,210, and the assurance level I used was 9,210+2,530=11,740 tons.
* **Group\_Total\_Listing file**
  + Updated the information to reflect the final CSAPR rule (Table VII.D-1, 81 FR 74562, published 10-26-2016.
  + Deleted NC since they were not listed.
  + Arkansas received a 2017 and 2018 budget, so I included a 2018 overall budget as well. The 2018 total budget is the 2017 budget but reduced by the amount Arkansas' budget was reduced between 2018 and 2018 (2,838 tons). This reduced the total annual budget from 316,464 tin 2017 to 313,626 in 2018.

**Changes and Updates from 2.5 to 2.5L2:**

* **UAF** 
  + TN units ORIS 3393, Allen, Units 1-3: Added retirement date of 12/31/2018 per email dated July 13, 2016 from Joshua Bartlett, TN DEP.
  + MA units ORIS 1626 Salem Harbor Unit IDs N25001 and N25002: these new units had a start date of 6/1/2016. The start date for both units was revised to 6/1/2017 based on information from Marc Cohen, MA DEP. Email dated 8/8/2016 to Wendy Jacobs.
  + NJ units ORIS codes updated for the following units (Adam Lewis):
    - Hess Newark Energy Center: Temporary ORIS=993402, Actual ORIS = 58079
    - Woodbridge Energy Center: Temporary ORIS=993403, Actual ORIS=57839
  + OH Units
    - ORIS 2866, Unit IDs 1-4, assigned an offline\_start\_date of 5/1/2020 (W H Sammis facility) per email from Chris Beekman, Ohio DEP, 7/25/2016
  + IL Units (John Welch)
    - ORIS 6017, Unit ID 2 assigned an offline\_start\_date of 9/31/2016
    - ORIS 889, Unit ID 1 assigned an offline\_start\_date of 10/31/2016
    - ORIS 889, Unit ID 3 assigned an offline\_start\_date of 3/31/2017
  + MI Units (Tom Shanley)
    - ORIS 1740, Units 2 and 3 assigned offline\_start\_date of 2016 and 2021, respectively
    - ORIS 1743, units 1,2,3,4,6,7 assigned offline\_start\_date of 2022
    - ORIS 1745, unit 9A assigned offline\_start\_date of 2022
  + CT Units for Towantic Energy LLC (email from Wendy)
    - ORIS 990901, Unit IDs N0901, N0902, starting in 2018.
    - New combined cycle operation
  + WI Units (Bob Lopez)
    - Added N55001 and N55002 to Riverside (ORIS 55641), as combined cycles, 7000 btu/kw-hr, 350 MW, 2450 mmbtu/hr.
  + IA Units (Bob Lopez)
    - Updated new Marshalltown CTs (ORIS 1068) to 325 MW (2275 mmbtu/hr @ 7000 btu/kw-hr)
  + Units listed in the nonCAMD hourly file as having one hour of data supplied due to the no hourly data bug also had an optimal load threshold, nominal heat rate, and UF state input supplied. Almost all had those anyway.
  + For the following coal to boiler-gas units in RFCE, from Randy Bordner (PA Units) and Judy Rand/Adam Lewis (NJ Units):
    - Max UF of 0.3 added to coal line item Brunner Island (PA)
    - Max UF of 0.6 added to coal line items for New Castle and Shawville (PA)
    - For the NJ coal units, the following UFs were assigned:
      * Hudson 2=0.16
      * Mercer 1=0.09
      * Mercer 2=0.08
    - Boiler gas line item deleted
    - Coal line item had offline\_start\_date set to 2050
    - The purpose of these changes was to run the RFCE coal system with the boiler gas units included to capture boiler gas peak operations and to prevent GDUs.

| **ORIS** | **Unit ID** | **Facility** |
| --- | --- | --- |
| 2403 | 2 | Hudson Generating Station |
| 2408 | 1 | Mercer Generating Station |
| 2408 | 2 | Mercer Generating Station |
| 3131 | 1 | Shawville |
| 3131 | 2 | Shawville |
| 3131 | 3 | Shawville |
| 3131 | 4 | Shawville |
| 3138 | 3 | New Castle |
| 3138 | 4 | New Castle |
| 3138 | 5 | New Castle |
| 3140 | 1 | Brunner Island |
| 3140 | 2 | Brunner Island |
| 3140 | 3 | Brunner Island |

* **Controls File**
  + TN Units (from Joshua Bartlett, email 7/13/2016 from Joshua Bartlett of TN DEP to MARAMA regarding comments on MARAMA inventory):
    - Changed control start date for FGD for 3403 Gallatin, Units 1-4, from 12/31/2017 to 12/31/2016. Changed the control rate from 0.15 lbs SO2/mmbtu to 0.06 lbs SO2/mmbtu.
    - Added controls for SO2 for Kingston, ORIS 3407, Units 1-9 equivalent to the 2015 value as listed in table below, using digits beyond the decimal. Control start date was 1/1/2012.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| State | Facility Name | Facility ID (ORISPL) | Unit ID | Year | Program | SO2 (tons) | Heat Input (MMBtu) | SO2 Rate (lb/MMBtu) |
| TN | Kingston | 3407 | 1 | 2015 | ARP | 145.723 | 4,400,403 | 0.066232 |
| TN | Kingston | 3407 | 2 | 2015 | ARP | 131.041 | 4,017,601 | 0.065233 |
| TN | Kingston | 3407 | 3 | 2015 | ARP | 137.369 | 4,159,780 | 0.066046 |
| TN | Kingston | 3407 | 4 | 2015 | ARP | 111.352 | 3,257,546 | 0.068366 |
| TN | Kingston | 3407 | 5 | 2015 | ARP | 222.379 | 6,942,342 | 0.064065 |
| TN | Kingston | 3407 | 6 | 2015 | ARP | 190.553 | 6,192,926 | 0.061539 |
| TN | Kingston | 3407 | 7 | 2015 | ARP | 153.483 | 4,382,579 | 0.070042 |
| TN | Kingston | 3407 | 8 | 2015 | ARP | 190.413 | 6,894,293 | 0.055238 |
| TN | Kingston | 3407 | 9 | 2015 | ARP | 189.625 | 5,850,419 | 0.064824 |

* + NJ units ORIS codes updated for the following units (Adam Lewis):
    - Hess Newark Energy Center: Temporary ORIS=993402, Actual ORIS = 58079
    - Woodbridge Energy Center: Temporary ORIS=993403, Actual ORIS=57839
  + (From Adam Lewis) Added 2408, 1 and 2 SO2 rates (Mercer Units 1 and 2) of 0.04 lbs/mmbtu SO2 starting 01/01/2017 to reflect natural gas fuel. Units were already controlled for NOx to 0.09 lbs NOx/mmbtu.
  + (From Wendy Jacobs) Added 990901, N0901, and N0902 (CPV Towantic, LLC), SO2 = 0.0006 lbs/mmbtu and NOx = 0.0075 lbs/mmbtu.
  + (From Bob Lopez) Added 55641 (Riverside) N55001 and N55002 SO2 = 0.0006 lbs mmbtu/hr and NOx = 0.0094 lbs/mmbtu
* **Growth Rates File** 
  + SRVC oil peak rate changed from 2.531 to 2.478. The SRVC specific growth rates were developed by comparing max hourly capacity to BY actual, and assuming worst case increases with no GDU development. The capacity in 2023 of SRVC oil changed, but the peak rate wasn't adjusted to reflect the capacity change in 2.5. This mistake was corrected in 2.5L2 (Trial 2023-2) and on.
  + Deleted AZNM, oil; CAMX, oil; ERCT, oil; RMPA, oil; SPPR, coal; and SRDA, coal to reduce log warnings.
  + Added SRCE boiler gas to reduce log warnings. SRCE boiler gas units in the FY do not process due to no base year activity for that fuel/unit type in that region. SRCE boiler gas data was not supplied in growth committee spreadsheets, so I used growth rates for simple cycle gas in SRCE as the place holder for this region/fuel-unit type.
  + The growth committee supplied new growth rates for RFWZ in an email dated 7/18/2016, in a file called "Growth Rate Adjustments – ERTACv2\_5\_RFWZ\_MROZ\_MROS\_Jul18.xlsx", tab "Adjusted RFWZ Jul 18".
  + Due to various infrastructure and ownership changes, the growth committee decided to combine regions MROZ, MROW, and RFCM into one region called MROS.
    - Growth rates for MROS were included in a file called "Growth Rate Adjustments – ERTACv2\_5\_RFWZ\_MROZ\_MROS\_Jul18.xlsx", tab "New MROS July 18", received from the growth committee in an email dated 7/18/2016. Oil growth rate was not included for MROS. Therefore, the RFCM growth rate for oil was used from previous runs based on the growth committee file called "AEO2015 ESD2015 GRs 3-21-2016" as RFCM's oil rate in this file was midway between MROZ's and MROW's oil growth rate.
    - Lines for MROZ, MROW, and RFCM were removed from the growth rate file to reduce warnings in the log.
* **Seasonal Controls File** –
  + Added the following MD units' NOx rates starting in 2017. Rates come from MD, Emily Bull, email dated 8/10/2016. Added an end date of 12/31/2017 since email states that these rates are only for 2017.

|  |  |  |  |
| --- | --- | --- | --- |
| ORIS | Unit ID | OS NOx rate, lbs/mmbtu | nonOS NOx rate, lbs/mmbtu |
| 602 | 1 | 0.0647 | 0.194 |
| 602 | 2 | 0.0733 | 0.211 |
| 1554 | 2 | 0.2222 | 0.395 |
| 1554 | 3 | 0.0552 | 0.157 |
| 1571 | 1 | 0.1186 | 0.191 |
| 1571 | 2 | 0.1985 | 0.253 |
| 1572 | 1 | 0.2197 | 0.285 |
| 1572 | 2 | 0.2212 | 0.290 |
| 1572 | 3 | 0.2178 | 0.288 |
| 1573 | 1 | 0.0386 | 0.038 |
| 1573 | 2 | 0.0309 | 0.035 |
| 10678 | 001 | 0.0514 | 0.159 |
| 1552 | 1 | 0.2783 | 0.449 |
| 1552 | 2 | 0.2351 | 0.407 |

* + Added the following MD units' NOx rates starting in 2023. Rates come from MD, Emily Bull, email dated 8/10/2016. Added an end date of 12/31/2023 since they email states these are only for 2023.

|  |  |  |  |
| --- | --- | --- | --- |
| ORIS | Unit ID | OS NOx rate, lbs/mmbtu | nonOS NOx rate, lbs/mmbtu |
| 602 | 1 | 0.0647 | 0.194 |
| 602 | 2 | 0.0733 | 0.211 |
| 1554 | 2 | 0.2222 | 0.395 |
| 1554 | 3 | 0.0552 | 0.157 |
| 1571 | 1 | 0.1186 | 0.191 |
| 1571 | 2 | 0.1278 | 0.253 |
| 1572 | 1 | 0.1414 | 0.285 |
| 1572 | 2 | 0.1424 | 0.290 |
| 1572 | 3 | 0.1402 | 0.288 |
| 1573 | 1 | 0.0386 | 0.038 |
| 1573 | 2 | 0.0309 | 0.035 |
| 10678 | 001 | 0.0514 | 0.159 |
| 1552 | 1 | 0.1500 | 0.449 |
| 1552 | 2 | 0.1500 | 0.407 |

* + Added 2403, Unit 2 (Hudson Generating Station) to file for SO2, to reflect 0.1 lbs SO2/mmbtu in Jan-Apr and Oct-Dec. Reflects 0.002 lbs SO2/mmbtu in May-September, when burning gas. Other months are coal.
  + Added 3131, Shawville, 1, 2,3, and 4 to file for SO2 and NOx:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ORIS | Unit ID | OS SO2 rate, lbs/mmbtu | nonOS SO2 rate, lbs/mmbtu | OS NOx rate, lbs/mmbtu | nonOS NOx rate, lbs/mmbtu |
| 3131 | 1 | 0.0006 | 0.25 | 0.1000 | 0.12 |
| 3131 | 2 | 0.0006 | 0.25 | 0.1000 | 0.12 |
| 3131 | 3 | 0.0006 | 0.25 | 0.1000 | 0.12 |
| 3131 | 4 | 0.0006 | 0.25 | 0.1000 | 0.12 |

* + Added 3138, New Castle, 3, 4 and 5 to file for SO2 and NOx.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ORIS | Unit ID | OS SO2 rate, lbs/mmbtu | nonOS SO2 rate, lbs/mmbtu | OS NOx rate, lbs/mmbtu | nonOS NOx rate, lbs/mmbtu |
| 3138 | 3 | 0.0006 | 0.25 | 0.1000 | 0.12 |
| 3138 | 4 | 0.0006 | 0.25 | 0.1000 | 0.12 |
| 3138 | 5 | 0.0006 | 0.25 | 0.1000 | 0.12 |

* **Input Variables File**
  + Removed MROW, MROZ, and RFCM to reduce warnings in log file.
* **NonCAMD hourly file**
  + The following units had 1 hour of zero data supplied to the nonCAMD hourly file to get them to process.

| **STATE** | **FACILITY\_NAME** | **ORISPL\_CODE** | **UNITID** |
| --- | --- | --- | --- |
| CO | Cameo | 468 | 2 |
| FL | Riviera | 619 | PRV3 |
| FL | Riviera | 619 | PRV4 |
| FL | Avon Park | 624 | P1 |
| FL | Arvah B Hopkins | 688 | HP2A |
| IL | Meredosia | 864 | 01 |
| IL | Meredosia | 864 | 02 |
| IL | Meredosia | 864 | 03 |
| IL | Meredosia | 864 | 04 |
| KS | Hutchinson Energy Center | 1248 | CT-1 |
| KS | Hutchinson Energy Center | 1248 | CT-2 |
| KS | Hutchinson Energy Center | 1248 | CT-3 |
| KS | Hutchinson Energy Center | 1248 | CT-4 |
| MI | Mistersky | 1822 | 6 |
| MI | Mistersky | 1822 | 7 |
| MS | Chevron Cogenerating Station | 2047 | AA001 |
| MS | Chevron Cogenerating Station | 2047 | AA002 |
| MS | Chevron Cogenerating Station | 2047 | AA003 |
| MS | Chevron Cogenerating Station | 2047 | AA004 |
| MS | Sweatt Electric Generating Plant | 2048 | AA003 |
| MS | Rex Brown | 2053 | AA001 |
| MS | Moselle Generating Plant | 2070 | AA008 |
| MS | Moselle Generating Plant | 2070 | AA009 |
| MS | Moselle Generating Plant | 2070 | AA010 |
| MS | Moselle Generating Plant | 2070 | AA011 |
| NC | Buck | 2720 | 5 |
| NC | Buck | 2720 | 6 |
| NC | Buck | 2720 | 7 |
| NC | Buck | 2720 | 9C |
| NC | Cliffside | 2721 | 1 |
| NC | Cliffside | 2721 | 2 |
| NC | Cliffside | 2721 | 3 |
| NC | Cliffside | 2721 | 4 |
| OH | R E Burger | 2864 | 5 |
| OH | R E Burger | 2864 | 6 |
| TX | Permian Basin | 3494 | 5 |
| CT | AES Thames | 10675 | UNITA |
| CT | AES Thames | 10675 | UNITB |
| WA | Ferndale Generating Station | 54537 | CT-1A |
| WA | Ferndale Generating Station | 54537 | CT-1B |

* **State and Group Total Files** – no change from 2.5L

**Changes and Updates from 2.4 to 2.5 Reference Case:**

* **UAF**  is based off the UAF documentation file 2011BASEUnit\_Availability\_V2.5\_15HOGApril282016\_code1\_01.zip.
  + Any units with an offline\_start\_date of 01/01/2030 had the date switched to 01/01/2050 to facilitate a 2030 projection year. Any units with an offline\_start\_date of 2030 had the date switched to 2050.
* **Controls File** is based off the controls documentation file called 2011BASEControl\_File\_v2.5\_15HOGApril282016\_code1\_01.zip.
  + Any control end date of 01/01/2030 or blank control end date was changed to 01/01/2050
* **Growth Rates File** is based off the AEO2015 ESD2015 GRs.xlsx file from Tom Shanley, provided via email dated 3/21/2016
  + For SRVC, NC provided annual and peak growth rates in the June 30, 2015 memo from the SC, NC, VA, and WV air directors to ERTAC. The TPs for combined cycle were set at 200 and 5000 to reflect the base load nature of combined cycle. The TPs were set at 10/2000 for boiler gas to push the huge increase into the middle range of the hours. In 2028 and 2030, the boiler gas peak growth rate was reduced from 069 to 3.067 to reflect the retirement of two small coal-to-gas converted boilers. (SAME AS 2.4). NC provided growth rates from this set of information for years 2020 and 2021 in a March 31, 2016 email (Paula Hemmer to Doris McLeod). Data is in spreadsheet called SRVC Fuel Growth Rate – Final – with Additional Years 03-30-2016.xlsx.
  + NYCW 2017 GRs based on the NY memo to MARAMA, dated 02-11-2016. For 2018, 2019, 2021, 2023, 2028, and 2030, NYCW GRs based on the NY memo to MARAMA dated 3-31-2016.
* **Seasonal Controls File** – based off 2.4
  + Brunner Island (ORIS 3140) Units 1, 2 and 3 were added to the seasonal controls file based on PA's input (email chain from Julie McDill and Randy Bordner dated 4/8/2016. Months 5-9, 0.1 lbs/mmbtu NOx and 0.0006 lbs/mmbtu SO2 were used to represent natural gas firing. Other months 0.3 lbs/mmbtu NOx and 0.39 lbs/mmbtu SO2 for coal firing.
  + All factor\_end\_date values were changed from 12/31/2030 to 12/31/2050.
* **Input Variables File** is identical to 2.4.
* **NonCAMD hourly file** is identical to 2.4.
* **State and Group Total Files** included line items to identify state proposed assurance levels and regional the proposed budget from the CSAPR-08 proposed rule. All other line items remain the same as 2.4.

**Changes and Updates from 2.3 to 2.4 Reference Case:**

* Control file is based on the documentation control file received from Wendy: 2011BASEControl File\_v2.4\_14June92015\_code1\_01.zip.
* Seasonal controls are the same as 2.3 (GA and VA units).
* UAF is based on the documentation UAF received from Wendy: 2011BASEUnit\_Availability\_v2.4\_14June 92015\_code1\_01.zip
  + All SPPR and SRDA coal fired units were changed to a region called SPDA. This was to ameliorate coal fired GDUs.
  + All NEWE, NYLI, and NYUP units in all 5 fuel/unit types were changed to a region called NELU.
  + Since we have no information from CA on new, planned units, I used the information found at the bottom of this webpage to include the following NPUs for CAMX. <http://www.energy.ca.gov/sitingcases/all_projects.html> All were located at existing ORIS. Names were changed. For the new units, I kept the new names, and included all existing ORIS information. I labeled the new units at the ORIS as “N04XXX”. I started each one on 01/01/2018 since I had no other data. I also assumed they’d be high efficiency, with a heat rate of 6,700 btu/kw-hr. These are only supposed to be place holders since CAMX had so many calculated GDUs.



* ORIS 2331, Unit ID 1 (NWPP) was removed because it caused a crash with the 2011 BY data in previous reference runs.
* Growth rates used were the same as in CONUS2.3, with the following changes:
  + SPDA (combination of coal units from SPPR and SRDA) coal growth rates were taken from the file called **Simple Tables Growth for combined SPP plus SRDA.xlsx**
  + I removed the SPPR coal line and the SRDA coal line.
  + I updated the 2017, 2018, 2019, 2023, and 2028 growth rates for coal and oil fuel/unit types in NELU using the spreadsheet called “Northeast\_Composite\_AEO2014\_2015 07282015.xlsx”, tab “Index Compare AEO2014-2015.” Rows #3, and #4 were used for annual data and Rows #22 and #23 were used for peak rates.
  + I updated the 2017, 2018, 2019, 2023, and 2028 growth rates for combined cycle, simple cycle, and boiler gas in NELU using the spreadsheet called “Northeast\_Composite\_AEO2014-2015 07282015.xlsx”, tab “3 Region Growth Factor Summary”. Rows #5, #6, and #7 were for annual and rows #14, #15, and #16 were used for peak rates. Peak rate TPs were set at 50/1000 for Boiler gas.
  + For RFCM, I used the file “Updated AEO2014 GR for RFCM CC and RFCM AEO2015 GR.xlsx”, tab “RFCM AEO2015” for all annual growth rates and for peak growth rates for BG, CC, and SC. The accompanying email notes that annual growth rates for boiler gas and simple cycle units are 1. The peak growth rates for coal and oil remained the same as 2.3. TPs for combined cycle were set at 1000 and 7000.
  + For SRVC, I used the annual and peak growth rates in the June 30, 2015 memo from the SC, NC, VA, and WV air directors to ERTAC. The TPs for combined cycle were set at 200 and 5000 to reflect the base load nature of combined cycle. The TPs were set at 10/2000 for boiler gas to push the huge increase into the middle range of the hours. In 2028, I reduced the boiler gas peak growth rate from 3.069 to 3.067 to reflect the retirement of two small coal-to-gas converted boilers.
  + For SRSE, I used the following peak rates, for all years, based on the 7/20/2015 email from Bob Lopez to Byeong Kim with the subject “SRSE Peak Growth Rates”:

|  |  |  |
| --- | --- | --- |
| Fuel/unit type in SRSE | Peak growth rate | Transition hrs |
| Coal | 0.8 | 400/4000 |
| Combined cycle | 1.45 | 400/4000 |
| Simple cycle | 1.00 | 10/50 |
| Boiler gas | 1.45 | 200/4000 |

* For MROZ and RFWZ, I used the spreadsheet called “Summary for MROZ and RFWZ for CONUS2.4.xlsx, tab “Summary MROZ&RFWZ.” For RFWZ, lines 52 through 56 were used for annual rates. For peak rates, line 58 was multiplied by the annual value to determine the peak value. Any peak rate above 1.3 was set back to 1.3. For MROZ, lines 16 through 20 were used for annual. Line 22 was multiplied by the annual rate to determine the peak rate. Peak rates above 1.3 were set at 1.3 based on Bob’s email dated 7/23/2015, subject: MROZ forecast starter using AEO2015. Also, for RFWZ, CC, in 2018 I set the TPs to 200/4000 because of the very large difference between the peak and annual growth rates.
* For CAMX, I set the CC peak rates equal to the annual rates in all years.
* For the input variables, I used the same file as CONUS2.3, with the following changes:
  + I changed the capacity demand deficit review from 3000 to 7000 so as to not miss any GDUs.
  + I added a line for coal/SPDA and removed the SPPR coal line and SRDA coal line.
  + I changed the RFCM/Combined Cycle new unit hierarchy percentile to 75th.
  + I removed all rows for all fuel/unit types for NEWE, NYLI, and NYUP. I replaced them with one set of 5 rows for NELU. For NELU, I used all default inputs.
* For the nonCAMD hourly file, the following data was concatenated to the nonCAMD hourly file used in CONUS2.3:
  + FRCC (Florida) updated the gross load of some of the combined cycle units in their state to reflect nonreported power. The data was supplied in an email from Justin Rivard to the [ertacegufeedback@gmail.com](mailto:ertacegufeedback@gmail.com) box. The email was dated April 1, 2015.
  + RFCM (Michigan) updated the gross load of some of the combined cycle units in their state to reflect nonreported power. The updates to the hourly data were performed by VA, but the adjustment factors were calculated by MI and were supplied in an email from Tom Shanley to Doris McLeod on 11/20/2014, with a subject line: RE: 2011 gross load adjustments.

**Changes and Updates from 2.2\_GR14, 2.2\_M114, and 2.2M214 to 2.3 Reference Case:**

* UAF:
  + For the 2.3 Reference case, I used the documentation UAF called **2011BASEUnit\_Availability\_v2.3\_13\_14September82014\_code1.01.zip.**
  + I made a significant amount of changes to this listing to address units without enough base year data to calculate variables and other issues. These fixes are detailed in the document **My changes for 2\_3 from Wendys file.docx.** The following lists out major changes:
    - Deleted ORIS 2723 IDs 11C and 12C for NC.
    - Added in ORIS/Unit ID information for the following facility/units for states that don’t typically report: ORIS 465, ID 4 (CO); ORIS 1248, IDs CT-1, CT-2, CT-3, CT-4 (KS); ORIS 2790, CT6 (ND); ORIS 56237, CT03, CT04 (UT)
    - Changed ORIS 6253, IDs P30 through P37 to nonEGUs as they caused a crash in MROZ for the Oil category.
    - Deleted ORIS 994802 and 994804 for TX as they are on hold. Changed 994803 ORIS codes to 58001 and changed 1 and 2 to CTG1 and CTG2. Changed 994801 ORIS code to 58005 (all TX units)
    - Changed 993404 to 56963 and renumbered 1 and 2 to E101 and E102.
    - Changed 992601, Unit IDs N2601 and N2602 to ORIS 58427, Unit IDs 100 and 200.
    - Changed 4937 U1 and U2 to CT-1 and CT-2.
    - Removed the coal-to-gas conversion units for the nonEGU ORIS 992 as they caused a crash.
    - Removed 994810 as it was a biomass unit and wouldn’t be grown.
    - Updated the RFCW and MROE regional boundaries to RFWZ and MROZ according to the files sent by R. Lopez called **ERTAC\_MROE corrected Region\_adjustment\_Summary2.xlsx.**
    - Updated the following MI new combined cycle units’ HR to 7,500 btu/kw-hr from 10,000 btu/kw-hr: ORIS 10745, N2604, N2605; ORIS 992601, N2601, N2602; ORIS 992603, N2603; ORIS 992605, N2608, N2909.
    - Changed the fuel/unit type from SC to CC for the following ORIS/Unit IDs based on info from MI: 55088 GT2100 and GT3100.
* Controls File:
  + For the 2.3 Reference case, I used the documentation controls file called **2011BASEControl File v2.3\_13\_14September 82014\_code1\_01.zip.**
  + Edits were made to state data that seemed to be typos and a detailed listing may be found in **My changes for 2\_3 from Wendys files.docx.**
  + Major changes are as follows:
    - Moved the NOx controls from the controls file to the seasonal controls file for the following GA units: ORIS 703: 1BLR, 2BLR, 3BLR, 4BLR; ORIS 708: 4; ORIS 710: 4A, 4B, 5A, 5B, 6A, 6B; ORIS 6052: 1, 2; ORIS 6257: 1, 2, 3, 4. Also, did this for 2 VA units: ORIS 3797: 4, 5.
    - Added 2790, unit ID CT6, with a NOx rate of 0.044 lbsl/mmbtu based on information from ND.
    - Deleted out the following ORIS as they are no longer in the UAF; 994802, 994804; Deleted out the following ORIS/Units as they are no longer in the UAF: 2723, 11C & 12C; Deleted out the following ORIS/Units as they are already controlled in 2011 and appear to have the incorrect ORIS assigned, based on the facility name (NCEMC-Hamlet): ORIS 2712, IDs ES-6-A, ES-6-B
    - Changed the NOx rates for the units listed in NY’s email attachment called **CONUS\_V2 2 2018\_NYSDEC\_revisions.xlsx.**

| **ORIS** | **Unit ID** | **Facility** | **NY Revised NOx Rate** |
| --- | --- | --- | --- |
| 2516 | 4 | Northport | **0.0573** |
| 2490 | 20 | Arthur Kill | **0.0894** |
| 2516 | 3 | Northport | **0.1094** |
| 2511 | 10 | E F Barrett | **0.0798** |
| 2490 | 30 | Arthur Kill | **0.0906** |
| 2500 | 10 | Ravenswood Generating Station | **0.0662** |
| 2516 | 2 | Northport | **0.1006** |
| 2500 | 30 | Ravenswood Generating Station | **0.0822** |
| 2516 | 1 | Northport | **0.0977** |
| 2500 | 20 | Ravenswood Generating Station | **0.0700** |
| 2511 | 20 | E F Barrett | **0.0481** |
| 2517 | 4 | Port Jefferson Energy Center | **0.0573** |
| 2517 | 3 | Port Jefferson Energy Center | **0.1094** |

* Growth Rate File:
  + For the 2.3 Reference case, I used the growth rates found in spreadsheet **Gas\_Adj\_AEO2014\_NERC2013 Growth Rates v4 method 1 and method2.xlsx,** tab **Gas-Adj Ref 2014 M1** with the following exceptions:
  + NYLI and NYCW growth rates were based on the same spreadsheet but used the tab called **New GR.**
  + MROZ and RFWZ annual growth rates were based on the 2018 growth rates in the spreadsheet called **FullTranslationWI\_Regions\_AdjustmentAEO2014.xlsx**, tab **Core Index for MROZ &**.
  + RFCM, MROZ, and MROW peak growth rates for combined cycle were set to 1.3 based on LADCO, Wisconsin, and Michigan input.
  + SRGW peak growth rate for oil was set to 2.0 to ameliorate an extremely high peak rate, per LADCO.
  + RFCM, MROZ, and MROW combined cycle transition hours peak->formula set to 200; formula-> nonpeak set to 2000 based on LADCO, WI, and MI input. All other transition hours remain at default levels.
  + For the 2028 estimates, to reduce the number of GDUs created solely for peak hour demand deficits, the following additional changes were made to the growth file:
  + The following regions/fuel-unit types had their peak rates set to 1.3 and their transition hours set to 200 and 2000: CAMX, combined cycle; NWPP, combined cycle; RFWZ, combined cycle; SRCE, combined cycle; SRGW, combined cycle
  + NYUP Coal had the peak rate set at 1.3.
* Input Variables:
  + Removed the specified facilities for new units from SRVC.
  + Changed CAMX, SRVC, SRSE, FRCC, and NEWE to 75th percentile for new CCs and SCs (NEWE CC was already at 75th for 2.2).
  + Added MROZ and RFWZ, and deleted MROE and RFCW.
  + Changed capacity Demand Deficit Review from 400 to 3000 for all regions and fuel/unit types.
* NonCAMD Hourly File:
  + Replaced all negative emissions values and load values with zero.
  + Added a full year of data for the ORIS 8906 (Astoria) Unit IDs 30, 40, and 50—summed the reheat and superheat reported data to create the pseudo units.
  + Added a full year of data for 7839 (Ladysmith) Unit 5, which is equivalent to that reported in 2011 for 7838 (Remington) Unit 5. 7838, 5 does not exist and this was a 2011 CAMD reporting error.
* Group and State Files are unchanged from 2.2 (Group contains both CAIR and CSAPR levels)

**Changes and Updates from 2.2 to 2.2\_GR14, 2.2\_M114, and 2.2M214:**

* Growth rates for 2018 came from **Gas\_Adj\_AEO2014\_NERC2013 Growth Rates v4 method1 and method2.xlsx**
  + For the run called 2.2\_GR14, I used the tab in this spreadsheet called “New GR” to develop the growth rate input file
  + For the run called 2.2\_M114, I used the tab in this spreadsheet called “Gas-Adj Ref 2014 M1”
  + For the run called 2.2\_M214, I used the tab in this spreadsheet called “Gas-Adj Ref 2014 M2”
* All other input files are the same as 2.2.

**Changes and Updates from 2.1L1 to 2.2:**

* UAF used in 2.2 was from file2011BASUnit\_Availability\_V2.2\_April222014\_code1\_01.xls
  + A couple of additional edits were made:
  + Laskin (1891) in MN: switched to gas as of 12/31/2017. A line item was added to the UAF to include the gas boiler.
  + Wheaton (4014) in WI had a county code switched to 55035 from 50089.
  + ORIS 50240 (Purdue University-Wade Utility) was changed to a nonEGU.
  + Removed the new unit flag Y from ORIS 564, CCB, as the unit started ops in 2009.
  + Added max\_unit\_heat\_input for 56807, Units 1A & 1B of 2,580 mmbtu/hr (each). (Honestly, those Virginia data people are complete idiots. Thank goodness the Virginia modelers are intelligent… ☺ )
  + ORIS 8042 Belew’s Creek was listed as retired in the UAF; NCs submittal showed it as having a 2030 retirement date, so I changed that retirement date to 2030.
  + ORIS 2709 (H F Lee): I changed one of the line items from “HF” to “H F” to alleviate a warning.
  + ORIS 2720 (Buck), 11C and 12C: The start date was in the mid/late 2011 period. This would provide a BY ozone season profile of activity of mainly zero. I changed the unit to “New”, added the New flag, and gave it a start up date of 01/01/2012 to allow the program to calculate an ozone season profile in the future year.
  + ORIS 4042, Units 1, 2, 3, and 4: These were coal units that had line items switching them to natural gas. All had a BY hours of operation of 10,000, which probably was the nominal heat capacity. So, I switched that data over to the nominal heat capacity column. For the coal units, I added in the BY hours of operation from CAMD: 8,080; 7,077; 4,446; and 5,620 respectively.
  + ORIS 2048, Unit AA003: This unit needed a state input UF to be used in the FY. I added in 0.9. I also changed the max\_unit\_heat\_input to 632 mmbtu/hr based on the comment field data.
  + I updated the listing of partial/full year reporters per Wendy’s email of 5/8/2014.
  + ORIS 992, Units 12, 13, and 14 were coal fired non-EGUs, which had been fuel-switched to natural gas in a year after 2011. This was done in an effort to use the UAF as a documentation tool, which has been discussed and agreed to by the ERTAC team in the past. However, the code does not accept this type of setup. For some reason, the fuel switch of a non-EGU in the FY can cause a crash of the preprocessor code. I searched the UAF to see if any other instances of this situation occurred. No other non-EGU fuel switches occurred. With the consent of the state (IN), I removed the gas line items for these units from the UAF and noted in the comments field that they had been switched to natural gas. I left the retirement date in the UAF for the coal units. The code had no problems accepting that information.
* Controls file used in 2.2 was from 2011BASEControl File\_v2.2\_April222014\_code1\_01.xls.
* To make use of the functionality of the 1.01 code, a seasonal controls file was culled from the main controls file. It looks like at this point only GA is taking advantage of this aspect of the tool.
* Growth rates for 2018 and 2020 came from ***v2Working Doc2\_v8a Growth Rates Regional Template\_ERTAC Derived from Round 1 6 \_Active for Base and Future Selected Yr. xlsx***. The tab used was ***It 7 v2.1.2 ref w-Gas Adj***. These use AEO2013 information. The growth rates were truncated to three decimal places, e.g. X.XXX.
  + For 2018 growth rates, three decimal places produced identical annual and peak growth rates for the following regions/fuel unit types. Therefore, I adjusted the peak rates as noted here:
    - NYUP/Oil-Peak and annual were 0.132. Peak was adjusted to 0.133
    - SRDA/CC-Peak and annual were 1.338. Peak adjusted to 1.350
    - SRDA/SC-Peak and annual were 1.338. Peak adjusted to 1.350
  + For the 2020 growth rates, three decimal places produced identical annual and peak growth rates for the following regions/fuel unit types. Therefore, I adjusted the peak rates as noted here:
    - NYLI/Oil-Peak and annual were 0.039. Peak adjusted to 0.040.
    - NYUP/Oil-Peak and annual were 0.105. Peak adjusted to 0.106.
    - SRDA/Oil-Peak and annual were 0.099. Peak adjusted to 0.100.
    - SRDA/BG-Peak and annual were 1.000. Peak adjusted to 1.001.
* In the Input Variables file, I removed the boiler gas ORIS codes for SRVC for any GDUs so that the program will place those automatically.
* For the state and group files, I added the CSAPR state and group totals from the file called CSAPR\_State\_Totals\_8-1-2012.xlsx and CSAPR\_Group\_Totals\_7-19-2012.xlsx. The state and group cap files contain both the CAIR levels and the CSAPR assurance and budget levels.

**Changes and Updates from 2.1 to 2.1L1:**

* All input files based on CONUS2.1 including growth rates with the exception of Midwest updates to the control and UAF files. Changes to the control file were submitted by Indiana, Illinois, Wisconsin, Michigan and Ohio primarily for coal fired units; this file is dated March 3, 2014. The UAF file was updated to reflect changes to refueling and/or shutdowns for Indiana, Michigan and Wisconsin; the UAF is dated March 5, 2014 for coal fired units.

**Changes and Updates from 2.0 to 2.1:**

* UAF and Controls File Data – The UAF and controls file inputs for 2.0 were developed using the UAF and controls files dated July 18, 2013. The UAF and controls file for 2.1 were dated December 16, 2013. Changes provided by states included updates from the Midwest, Northeast (including NY information on RACT and other rule changes as well as updates from CT, NH, MD, and NJ), and SESARM (updates from VA and updates from KY including new information on the federal TVA consent agreement).
* The UAF was updated to ensure that any unit listed in the preprocessor as not having enough data to calculate an ertac heat rate, a base year utilization fraction, or a unit optimal load threshold had the appropriate data included in the UAF so that the unit could be processed and available for FY demand.
* In 2.0, Astoria (ORIS 8906) had 6 units identified by NY as being better represented by combining the data in to 3 units. Therefore, units 30, 40 and 50 were added to the UAF. 31RH, 32SH, 41SH, 42RH, 51RHY, and 52SH were marked as non-EGUs. Data from the 6 units were combined with consent and agreement by the state staff into 3 units within the nonCAMD hourly file.
* In 2.0, the preprocessor identified about 141 lines in the BY 2011 data where emissions were negative. CAMD representatives (Louis Nichols) explained these negative values were a by-product of the algorithm CAMD used to parse out data from units exhausting a combined stack and that CAMD was looking into the negative numbers. In 2.1, these 141 lines of hourly data were included in the nonCAMD hourly file, with the negative values replaced with zero. The flag for each was replaced with “ERTAC” to denote exactly which items of information had been substituted. Only negative values were replaced with zero.
* Growth rates used for 2.1 were from the file named, “v3b\_Merged\_gas-EGU-emissions plus capacity\_region.xlsx” from email correspondence with Bob Lopez on 12/5/2013. These rates in 2.1 reflect a no growth assumption (rate=1) for natural gas boilers, which was not included in the 2.0 growth rates. Combustion turbines and combined cycle units were adjusted in the 2.1 factors to account for the boiler-gas generation.

**Changes and Updates from 1.7 to 2.0:**

* Base Year Inventory - The hourly BY inventory for 1.7 was CAMD 2007. For 2.0, the hourly BY inventory was CAMD 2011.
* UAF and Controls File Data – The UAF and controls file inputs for 2.0 were developed using the UAF and controls files dated July 18, 2013. The UAF and controls file for 1.7 were also dated July 18, 2013, but these files were based on a BY of 2007.
* Growth Rate Data – 1.7 growth rates were based on AEO2013, in the file named, “2-6-2013 Growth Rates Regional Template ERTAC Round 1\_6.xlsx.” The 2.0 growth rates were based on AEO2013, in the final named “2-6-2013 Growth rates Regional Template ERTAC Round 2\_0.xlsx.” Both files are based on AEO2013 and NERC data. However, there were some differences in the way a few regions were aggregated, which changed a few growth rates, both annual and peak. Overall, growth rate changes between 1.7 and 2.0 were mainly due to the different base year rather than changes in methodology or base EIA data.

* Units with little or no base year data – In the 1.7 input files, some of these units were included in the nonCAMD hourly file, with one line item of “fake” data for each unit that would allow the tool to calculate reasonable heat rates, emission rates, etc for that unit. Others of these units had the additional data supplied in the UAF to allow the program to process these units in the FY, with no additional hourly data supplied in the nonCAMD hourly file. In the 2.0 input files, all units with little or no base year data were supplied the additional data needed in the UAF to allow processing of the units. Version 2.0 did not need a non CAMD input file.
* Non-EGUs – In the 1.7 UAF, some states included units that were non-EGUs in the UAF, while others omitted those units. In the 2.0 UAF, all non-EGUs were included in the UAF and marked as “non-EGUs.”
* In the 1.7 UAF, several units were identified as causing the tool to crash (for example, Alma, Paradise #3). In the 2.0 UAF, only one unit caused a tool crash, an oil fired unit in NWPP (ORIS 2331, unit 1)