APPENDIX 12

Regional Photochemical Modeling Assessment Methodology

Wisconsin relies on two related regional modeling assessments to support forecasts of 2017 attainment/maintenance for the Chicago nonattainment area. One modeling effort was conducted by EPA, and the other by the Lake Michigan Air Directors Consortium (LADCO). This appendix describes the methodological approaches used in this modeling. Both modeling efforts project continued reductions in ozone concentrations in the Chicago nonattainment area through 2017, indicating continued attainment of the 2008 ozone NAAQS. The modeling results are discussed in greater detail in Section 7.2 of the main redesignation request document.

EPA Regional Ozone Modeling

EPA conducted regional photochemical grid modeling in support of the development of the Cross-State Air Pollution Rule Update to address the CAA Section 110(a)(2)(D) "Good Neighbor" SIP obligations related to the 2008 ozone standard. EPA released their modeling results via a Notice of Data Availability (NODA) in August 2015 (80 FR 46271).

EPA modeling used the Comprehensive Air Quality Model with Extensions (CAMx) version 6.11, with a modeling domain of 12 km x 12 km. EPA applied 2011 meteorology from version 3.4 of the Weather Research Forecast Model (WRF) to model years 2011 and 2017 and obtained boundary conditions from the Goddard Earth Observing System global chemical transport model (GEOS-Chem). EPA used 2011 emissions and projected 2017 emissions that consider the impact of rules, other legal obligations and changes in activity between 2011 and 2017.[1] While EPA relied heavily on portions of the 2011 NEI for emissions data, various intermediary tools transcribe annual and ozone day inventories into hourly modeling utilizing formal emissions profiles dependent on the day of week, hour of day and hourly weather conditions.

The method used to forecast attainment or nonattainment air quality involves the use of a modeled attainment test. This approach compares ozone concentrations from the modeling for 2011 and 2017 to determine the projected fractional reductions in ozone concentrations between the two years (the "relative response factor"). The relative response factor is then applied to the 5-year weighted average design value centered on 2011 (e.g., the average of design values for 2009-2011, 2010-2012, and 2011-2013) to determine the projected 2017 average design value. The projected 2017 average design value can be compared with the level of the 2008 ozone NAAQS to forecast attainment or maintenance.

Additional information on modeling methodology and adjustments or refinements EPA made to the CAMx platform is available as part of the "Notice of Availability of the Environmental Protection Agency's Updated Ozone Transport Modeling Data for the 2008 Ozone National Ambient Air Quality Standard (NAAQS)" (80 FR 46271) and references therein.

[1] Note that 2011 is the nonattainment year used for comparison with attainment and maintenance year inventories within this request for redesignation of the Wisconsin portion of the Chicago nonattainment area. Ozone monitoring data from the 2017 design value year will be used to assess whether moderate nonattainment areas have achieved the 2008 ozone NAAQS by the 2018 attainment date.

LADCO Regional Ozone Modeling

LADCO conducted regional ozone modeling in order to evaluate the potential for attainment of the 2008 ozone NAAQS in the LADCO region by 2017. This modeling also allowed analysis of the sensitivity of the model projections to variations in emissions forecasts for the EGU and mobile sectors.

LADCO modeling was conducted with EPA's 2011EH modeling platform using CAMx version 6.20. The core meteorological data set and model application was consistent with the EPA modeling discussed above. The primary differences between the two modeling efforts were the use of an alternative EGU model (the ERTAC EGU Growth Model) for growth assumptions for the power sector, improvements to the onroad inventory using LADCO state-specific MOVES model inputs, and the use of a more refined assessment of certain non-road mobile sector emissions in the LADCO modeling. LADCO also assumed limited changes to the projected and temporalized 2017 inventories developed by EPA and used for the regional modeling. Future design values were projected using EPA's current Model Attainment Test Software (MATS V2.6.1).