

5.9 ATTAINMENT DEMONSTRATION

Section 189 of the Clean Air Act¹ requires states with a Moderate nonattainment area to prepare an implementation plan which satisfies the following requirements:

(A) For the purpose of meeting the requirements of section 7502 (c)(5) of this title, a permit program providing that permits meeting the requirements of section 7503 of this title are required for the construction and operation of new and modified major stationary sources of PM-10.

(B) Either

(i) a demonstration (including air quality modeling) that the plan will provide for attainment by the applicable attainment date; or

(ii) a demonstration that attainment by such date is impracticable.

(C) Provisions to assure that reasonably available control measures for the control of PM-10 shall be implemented no later than December 10, 1993, or 4 years after designation in the case of an area classified as moderate after November 15, 1990.

Information demonstrating compliance with the subsection A permit program requirements for PM_{2.5} is presented in Section III.D.5.7. Compliance with subsection C requirements is documented in the summary of the reasonably available control measure (RACM) analysis findings, including RACT (reasonably available control technologies) presented in Section III.D.5.7; it shows:

- The State of Alaska and FNSB evaluated all emission units with emissions greater than 5 tons per year of PM_{2.5} or its precursors (NO_x and SO₂) and concluded that the current level of controls meets RACT for all of the pollutants (VOCs, NH₃, NO_x, SO₂) from all of the emission units.
- The State of Alaska and FNSB also determined that the control measures listed below are RACM.
 - Education and Outreach programs for residential wood combustion
 - Voluntary curtailment of wood burning on episode days
 - Require new wood combustion units to be EPA-certified
 - Provide subsidies to encourage retirement/replacement of old, noncertified wood-burning equipment
 - Reinstate open-burning bans on episode days
 - Prohibit the use of burn barrels
 - Subsidize heating upgrades and weatherization

¹ CAA Part D, subpart 4, Section 189(a)(1)(B)

Many of these measures were implemented between 2008 and 2013 to encourage changes in behavior that produce emission reductions. The Borough and State continue to operate these programs and plan to do so in the future. Since many of these programs are voluntary and it is difficult to quantify their impact on behavior, the total credit taken was limited to the EPA Guidance for voluntary measures in a SIP at 6%.

The remainder of this section presents information addressing the subsection B demonstration requirements. The deadline for demonstrating attainment for a Moderate PM_{2.5} is December 31, 2015.² Section III.D.5.6 quantified the emission benefits of the control measures selected in Section III.D.5.7, including the following:

- ARA (catalyst retrofit of OHHs);
- Wood stove change out program; and
- Natural turnover (vehicles, wood burning appliances, etc.).

As shown in Table 5.6-22, these measures are estimated to reduce directly emitted PM_{2.5} within the nonattainment area by 10.4% between the 2008 Baseline Year and the 2015 Attainment Year; impacts on precursor emissions varied by pollutant.

Section III.D.5.8 documents the use of the resulting emission inventory estimates in combination with meteorological inputs developed for the selected episodes to quantify their impact on modeled concentrations. The 2008 Baseline Year and the 2015 Attainment Year concentrations were input to the required EPA nine-step process for SMAT³ (Speciated Modeled Attainment Test) to produce a final future design value for 2015.

The nine steps involved in the SMAT process are included below with further details available in Appendix III.D.5.8.

1. Identify the highest observed daily PM_{2.5} concentrations at the State Office Building monitor between 2006 and 2010.
2. Quarterly PM_{2.5} concentrations were calculated for OC, EC, SO₄, NO₃, NH₄, OPP (other primary particulate), PBW (particle bound water), salt, and blank mass at the State Office Building monitor for observed top 25% concentration days. The average of winter quarters 1 & 4 were used in step 5 for the purpose of projecting future air quality.
3. High ambient daily PM_{2.5} species concentrations are calculated based on the component concentrations in step 2 and the high ambient observed days in step 1.

² FRN / Vol. 79, No. 105 / Monday, June 2, 2014

³ USEPA (2011): Attachment A and B.

http://www.epa.gov/ttn/scram/guidance/guide/Update_to_the_24-hour_PM25_Modeled_Attainment_Test.pdf

4. Air quality modeling results for 2008 baseline and 2015 control scenario were used to derive modeled RRF (relative response factor) values averaged over the modeling episode days for the species-specific components of PM_{2.5}.
5. The model-derived RRFs (step 4) are multiplied into the quarterly component concentrations (step 2) to calculate the future quarterly PM_{2.5} component concentrations with the exception of ammonium and PBW.
6. Calculate the ammonium and PBW future year PM_{2.5} concentrations based on the nitrate and sulfate concentrations determined in step 5.
7. Components of PM_{2.5} are summed for each day in each year to calculate the total future 24-hr PM_{2.5} concentrations at the State Office Building site.
8. The future year 98th percentile concentrations are determined for each year.
9. A 5-year weighted average of the future year 98th percentile values is then calculated by averaging future year 98th percentile averages in three-year intervals.

The results of that process produced a 2015 concentration of 40.1 µg/m³, which was adjusted to 39.6 µg/m³ to reflect the 0.5 µg/m³ benefit of the voluntary control measures. While this value represents a substantial reduction from the 44.7 µg/m³ design value, it falls far short of the 35 µg/m³ standard. The weight of evidence discussion presented in Section III.D.5.8 indicates that calculated 2015 design value represents a best estimate and that if PTE levels for major point sources are included in the modeling, the design value would be increased by more than 0.5 µg/m³ (i.e., in the wrong direction relative to the standard). The proposed state control measures that were outlined in Section III.D.5.7 are not included in the modeled demonstration for 2015 because they will not be adopted until October 1, 2015. Under EPA modeling guidance, control measures need to be in place by the beginning of the year preceding the attainment date⁴. The control programs consisting of wood stove change outs, natural turnover of newer stoves, catalyst retrofits, and including a reduction for voluntary measures are not enough to reach attainment by 2015. For these reasons, the demonstration of attainment by the December 31, 2015 deadline is impracticable.

5.9.1. 2019 ATTAINMENT DEMONSTRATION AND UMAA

The 2015 impracticability demonstration, above, satisfies the requirements of the CAA Part D, Subpart 4 (sections 188-190), but also demonstrates that additional emission reductions are needed to bring the area into attainment of the 35 µg/m³ standard. This section, while not required, has been added to illustrate that there is a potential longer term path to demonstrate attainment by 2019. Since this section is not required and is for illustration only, the level of supporting documentation provided is not as detailed as that provided for the required 2015 demonstration.

⁴ EPA Modeling Guidance page 34-35

As discussed in Section III.D.5.7, additional control measures will be implemented after 2015; those measures include the following:

- State standards for wood burning appliances;
- Dry wood program; and
- Natural gas expansion.

Section III.D.5.6 shows that when the benefits of these programs are combined with the benefits of controls addressed in 2015, directly emitted PM_{2.5} is estimated to decline by 27.7% within the nonattainment area by 2019 relative to 2008. Table 5.6-26 also shows the estimated reductions in precursor pollutants. The modeled 2019 concentrations using the controlled emission inventory followed the nine-step SMAT process and produced a future design value of 34.0 µg/m³, which becomes 33.5 µg/m³ after accounting for the 0.5 µg/m³ benefit of voluntary measures. The weight of evidence discussion indicates that compressed wood “energy logs” may offer a new opportunity to further reduce that 2019 design value.

The future design values calculated for both 2015 and 2019 represent concentrations for the grid cell encompassing the State Office Building, which houses the monitor recording measurements used to set the baseline design value. A successful attainment demonstration, however, must show that attainment is achieved not only in that grid cell but also in all 202 x 202 grid cells that comprise the nonattainment area. In modeling, this is called the Unmonitored Area Analysis (UMAA) and every grid cell in the model represents an area of the Fairbanks NAA (details on the UMAA analysis are found the technical modeling Section III.D.5.8, section 7). Figure 5.9-1 displays the results of the UMAA calculations for each grid cell in the nonattainment area for 2019.

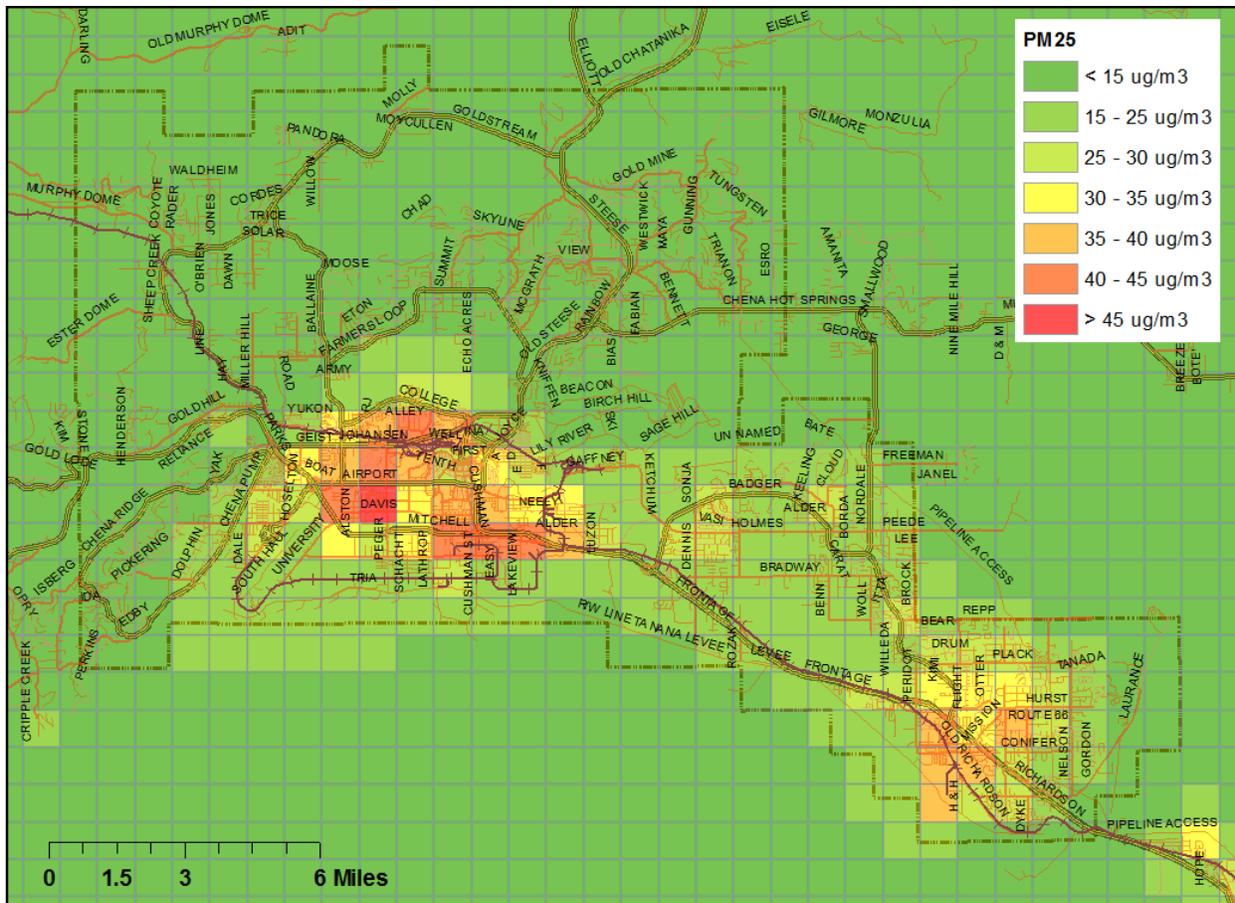


Figure 5.9-1. 2019 UMAA Concentrations for Fairbanks PM_{2.5} Nonattainment Area Grid Cells

While many grid cells including the one encompassing the State Office Building in downtown Fairbanks show compliance with the NAAQS in 2019, the remaining grid cells that do not show modeled attainment will be updated and revised in the coming years as additional controls become available and are implemented. Although air quality modeling is not required for 2019 in this 2015 impracticability SIP, the inclusion of the 2019 modeling forecast shows that a path to attainment has been identified.

Under the plan provisions for impracticability in a Moderate area, the NAA area will then be reclassified as a Serious area for failing to attain the standard if the 3-year monitored design value for 2015 is greater than 35 $\mu\text{g}/\text{m}^3$ as the modeled demonstration has predicted; with that reclassification to “Serious”, more restrictive requirements will apply (CAA Part D, Subpart 4 (Sections 189)).