

# ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION



**Amendments to:**  
**State Air Quality Control Plan**  
**Vol. II: III.D.7.9**  
**Attainment Demonstration**

**Public Notice Draft**

August 19, 2024

**Michael J. Dunleavy, Governor**

**Emma Pokon, Commissioner**

**Note: DEC proposes to repeal and replace this State Air Quality Control Plan section to address the disapproval of the Fairbanks North Star Borough PM<sub>2.5</sub> Serious SIP. To aid in the public comment process, the currently adopted section of the air quality plan can be found and referenced at the following internet site: <https://dec.alaska.gov/air/anpms/sip/fbks-pm2-5-regs-amends-2020/>**

## 7.9 Attainment Demonstration - 2027

Section 189(b)(1) of the Clean Air Act requires states with a Serious nonattainment area to meet the planning requirements contained in the Moderate Area Plan and, in addition, submit an implementation plan that includes:

*(A) A demonstration (including air quality modeling) -*

*(i) that the plan provides for attainment of the PM-10 national ambient air quality standard by the applicable attainment date, or*

*(ii) for any area for which the State is seeking, pursuant to section 188(e), an extension of the attainment date beyond the date set forth in section 188(c), that attainment by that date would be impracticable, and that the plan provides for attainment by the most expeditious alternative date practicable.*

*(B) Provisions to assure that the best available control measures for the control of PM-10 shall be implemented no later than 4 years after the date the area is classified (or reclassified) as a Serious Area.*

On August 24, 2016, EPA promulgated the final rule *Fine Particulate Matter National Ambient Air Quality Standards: State Implementation Plan Requirements*,<sup>1</sup> codified at 40 C.F.R. part 51, Subpart Z, to implement the Clean Air Act requirements applicable to PM<sub>2.5</sub> nonattainment areas, including the requirement for an attainment demonstration. The following regulations outline the attainment demonstration requirements.

Under 40 C.F.R. § 51.1003(b)(1)(iv), for any nonattainment area reclassified to Serious for a PM<sub>2.5</sub> NAAQS, in addition to meeting the Moderate area attainment plan submission requirements, the state shall submit a Serious area attainment plan that includes the attainment demonstration and modeling requirements set forth at § 51.1011.

Under 40 C.F.R. § 51.1011(b), for nonattainment areas reclassified to Serious, the attainment demonstration due to EPA as part of a serious area plan must meet all of the following criteria:

*(1) The attainment demonstration shall show the projected attainment date for the Serious nonattainment area that is as expeditious as practicable.*

*(2) The attainment demonstration shall meet the requirements of Appendix W of this part and shall include inventory data, modeling results, and emission reduction analyses on which the state has based its projected attainment date.*

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<sup>1</sup> 81 Fed. Reg. 58,010, 58,150 (Aug. 24, 2016).

*(3) The base year for the emissions inventories required for attainment demonstrations under this paragraph shall be one of the 3 years used for designations or another technically appropriate inventory year if justified by the state in the plan submission.*

*(4) The control strategies modeled as part of a Serious area attainment demonstration shall be consistent with the control strategies required pursuant to § 51.1003 and § 51.1010.*

*(5) Required timeframe for obtaining emissions reductions. For each Serious nonattainment area, the attainment plan must provide for implementation of all control measures needed for attainment as expeditiously as practicable. All control measures must be implemented no later than the beginning of the year containing the applicable attainment date, notwithstanding BACM implementation deadline requirements in § 51.1010.*

Under 40 C.F.R. § 51.1004 (attainment dates), a state that submits an attainment plan that demonstrates that a Serious PM<sub>2.5</sub> nonattainment area cannot practicably attain the PM<sub>2.5</sub> NAAQS by the end of the tenth calendar year following the effective date of designation of the area with the implementation of all control measures required under § 51.1010(a) must request an extension of the Serious area attainment date consistent with § 51.1005(b).

40 C.F.R. § 51.1004(a)(2)(ii). The request must propose a projected attainment date for the nonattainment area that is as expeditious as practicable, but no later than the end of the fifteenth calendar year following the effective date of designation of the area.

Under 40 C.F.R. § 51.1005(b)(1)(i) (attainment date extensions), a state may apply for one attainment date extension not to exceed 5 years for a Serious nonattainment area if the state demonstrates that attainment of the applicable PM<sub>2.5</sub> NAAQS by the approved attainment date for the area would be impracticable or, in the absence of an approved attainment date, attainment of the applicable PM<sub>2.5</sub> NAAQS by the applicable statutory attainment date for the area would be impracticable. 40 C.F.R. § 51.1005(b)(1)(i).<sup>2</sup>

At the time of application for an attainment date extension, the state shall submit to the EPA a Serious area attainment plan that includes the attainment demonstration and modeling requirements set forth at § 51.1011 (listed above) that justify the state's conclusion under § 51.1005(b)(1)(i) (directly above), and that demonstrate attainment as expeditiously as practicable. 40 C.F.R. § 51.1005(b)(2)(iii).

In addition, since Fairbanks failed to attain the 24-hour PM<sub>2.5</sub> NAAQS by the statutorily required date of December 2019, it is now subject to CAA Section 189(d) requirements. Under 40 C.F.R. § 51.1004(a)(3), the projected attainment date for a Serious PM<sub>2.5</sub> nonattainment area that failed to attain the PM<sub>2.5</sub> NAAQS by the applicable Serious area attainment date shall be as expeditious as practicable, but no later than 5 years following the effective date of the EPA's

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<sup>2</sup> A discussion of how the state meets the additional conditions for obtaining an extension to the serious area attainment date are included in Sections III.D.7.1.8, III.D.7.2.9, III.D.7.7.3, and III.D.7.11.

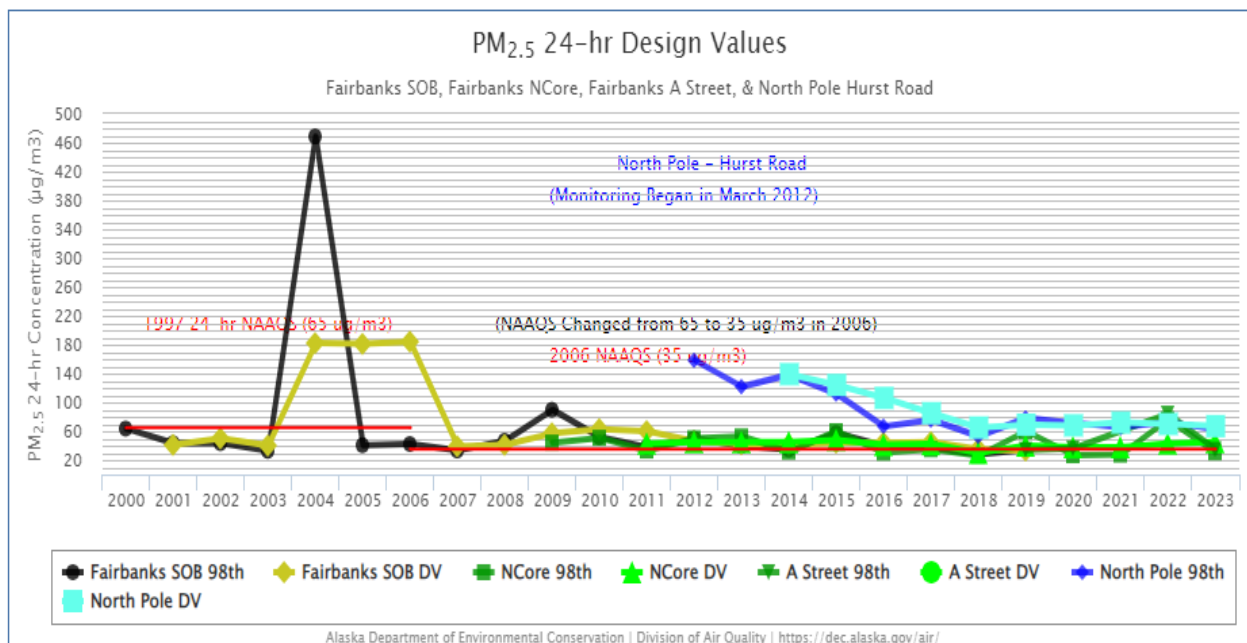
finding that the area failed to attain by the original Serious area attainment date, except that the Administrator may extend the attainment date to the extent the Administrator deems appropriate, for a period no greater than 10 years from the effective date of the EPA's determination that the area failed to attain, considering the severity of nonattainment and the availability and feasibility of pollution control measures.

The analysis documented in this section of the 2024 Amendments to the 189(d) Plan for the Fairbanks Areas Serious Plan (subsequently referred to as 2024 Amendments) demonstrates that calendar year 2027 reflects attainment “as expeditiously as practicable” in compliance with 40 C.F.R. § 51.1004(a)(3) as described in greater detail in Section 7.9.3.

Information demonstrating that the area meets CAA Section 189(b)(1)(B) regarding BACT implementation requirements is found in Section III.D.7.7, the Control Measure section.

As required by CAA Section 189(b)(1)(A)(ii), 40 C.F.R. §§ 51.1004(a)(2)(ii) and 51.1005(b), information demonstrating that the area was unable to demonstrate monitored attainment by the applicable 2019 attainment date is shown in Figure 7.9-1 and Table 7.9-1. The 24-hour PM<sub>2.5</sub> National Ambient Air Quality Standard (NAAQS) is 35 µg/m<sup>3</sup>. The monitoring design values listed in Table 7.9-1 and plotted in Figure 7.9-1 are three-year running averages of the 98<sup>th</sup> percentile concentrations, reported in the last year of the average. As seen in Table 7.9-1, the 2023 three-year design value at the Hurst Road (North Pole) monitor was 56 µg/m<sup>3</sup>, which significantly exceeds the 35 µg/m<sup>3</sup> NAAQS.<sup>3</sup>

**Figure 7.9-1. PM<sub>2.5</sub> 24-hr Design Values**



<sup>3</sup> <https://dec.alaska.gov/air/air-monitoring/alaska-concerns/community-data/fnsb-summary-pm25/>

**Table 7.9-1 PM<sub>2.5</sub> 24-Hour Design Values 2020-2023**

	2020	2021	2022	2023
NCORE 98 <sup>TH</sup> PERCENTILE	26.6	27.5	76.3 (29.1 <sup>1</sup> )	30.7 (20 <sup>1</sup> )
NCORE 24-HR DESIGN VALUE	37 (27 <sup>1</sup> )	38 (27.3 <sup>1</sup> )	44 (28 <sup>1</sup> )	45 (26 <sup>1</sup> )
A STREET 98 <sup>TH</sup> PERCENTILE	36.1	N/A <sup>2</sup>	N/A <sup>2</sup>	34.4 (27.8 <sup>1</sup> )
A STREET 24-HR DESIGN VALUE	--	N/A <sup>3</sup>	N/A <sup>3</sup>	N/A <sup>3</sup>
NORTH POLE 98 <sup>TH</sup> PERCENTILE	71.4	65.5	72.5 (51.2 <sup>1</sup> )	62.5 (51.9 <sup>1</sup> )
NORTH POLE 24-HR DESIGN VALUE	68 (63 <sup>1</sup> )	72 (67.3 <sup>1</sup> )	70 (63 <sup>1</sup> )	67 (56 <sup>1</sup> )

With the inability to demonstrate attainment in 2019, CAA 189(d) requires areas that fail to attain to submit, within 12 months after the applicable attainment date, plan revisions which provide for attainment and show annual reduction of emissions within the area of not less than 5 percent. This 2024 Amendment contains these plan revisions, which include updates to the 2020 Amendment.

For attainment modeling, four or five-year design values are generally required. For the earlier Serious Area Plan, the base year modeling design value was 131.6  $\mu\text{g}/\text{m}^3$ . The latest five-year (2017-2021) design value for the controlling (i.e., highest concentration) Hurst Road monitor is 64.9  $\mu\text{g}/\text{m}^3$  (this five-year modeling design value is different than the 3-year monitoring design value in Table 7.9-1). This is the base year 2020 modeling design value for this Amendment. Improvements in PM<sub>2.5</sub> air quality have been measured at Hurst Road monitor over the last few years and as discussed in detail in Section III.D.7.4.4, are not the result of milder weather in these years.

This section of the 2024 Amendment provides DEC's revised attainment demonstration based on this latest 2017-2021 design value that, given its decrease from the Serious SIP design value, helps to significantly advance model-forecasted attainment. It also includes a demonstration that the revised plan fulfills the CAA 189(d) annual emission reduction requirement of not less than 5 percent. DEC has determined that 2027 is the most expeditious attainment date based on this latest design value coupled with modeling of air quality impacts from quantified emission reductions associated with control measures evaluated in Section III.D.7.7.

### 7.9.1 Modeled Attainment Demonstration - 2027

Methodologies used to perform the emissions inventory and air quality modeling analyses supporting the modeled expeditious attainment demonstration in 2027 are summarized in Section III.D.7.9.1.1 and Section III.D.7.9.1.2, respectively. The inventory methods and sources are described in further detail in Section III.D.7.6, including procedures used to calculate emission benefits from adopted control measures. (Section III.D.7.7 contains detailed discussions of the evaluation and development of the control measures.) Similarly, the detailed air quality modeling methods are also further described in Section III.D.7.8. The summarized

analyses presented in the following two sub-sections are fully consistent with data sources and methods discussed in these preceding sections (III.D.7.6, III.D.7.7 and III.D.7.8).

### 7.9.1.1 Inventory Analysis to Support Expeditious Attainment

Building on the 2020 Baseline inventory developed in support of the 2024 Amendment and described in detail in Section III.D.7.6.9, a series of future year emission inventories were developed for each calendar year from 2020 through 2029. Since the development of the future year inventories preceded the air quality modeling analysis used to evaluate modeled attainment, inventories were developed for each of these calendar years: (1) to ensure the attainment year was sufficiently bounded; and (2) to develop emission estimates within the nonattainment area for intervening years required to satisfy Reasonable Further Progress requirements discussed in Section III.D.7.10, as well as 5 percent reduction requirements for Serious areas that fail to attain the NAAQS by the required attainment date discussed in Section III.D.7.9.2.2.

Each of these future year inventories accounted for growth in source activity over time (e.g., increases in residential heating emissions resulting from forecasted housing growth). They also accounted for emission reductions associated with both on-going state/local control programs (such as the Wood Stove Change Out and Solid Fuel-Burning Appliance Curtailment programs) and control measures adopted under the Serious SIP or these 2024 Amendments. Thus, these future year inventories are referred to as Control inventories since they account for both source activity growth and control measure benefits applicable to each year.

Post-2020 Source Activity Growth – Source activity growth rates used to project 2020 Control inventory emissions in calendar years 2021 through 2029 were generally based on the 2020-2024 and 2024-2035 annualized growth rates by source sector presented in Table 7.6-10 of Section III.D.7.6.10.1 with the following exception for space heating:

Although source activity growth after 2027 used the same domain average annual growth rate of 1.7%, the effect of oil price shifts in wood vs. oil use was capped after 2027. As explained earlier in the Emission Inventory chapter (Section III.D.7.6) and the Emission Inventory appendix, an oil price-based approach was used to project wood vs. oil use based on a local, historically developed elasticity between wood and oil use driven by the price of heating oil. The base year (2020) price of heating oil was \$2.42/gallon and as of the end of 2022 the price had risen to \$4.73/gallon. Based on regional energy price forecasts developed by the Energy Information Administration (EIA) in its 2023 Annual Energy Outlook (AEO), the projected Fairbanks heating oil price in 2027 was \$4.76/gallon after peaking at \$5.10/gallon in 2024. Given the difficulty in reliably forecasting long-term energy prices this effect was capped after 2024. In other words, 2028 and later year space heating emissions reflect no changes in oil price from that forecasted in 2027.

Beyond these activity growth projections, the effects of the federal mobile source and fuel control programs in projecting mobile source emissions from 2021 through 2029 were accounted for using EPA's MOVES3 vehicle emissions model.

Control Measure Benefits - Table 7.9-2 lists the state and local control measures for which emission benefits were quantified<sup>4</sup> and included in the alternative attainment date analysis. The Borough's Wood Stove Change Out (WSCO) Program is shown at the top of Table 7.9-2. It will continue to provide benefits from change outs projected through 2025 based on currently available funding. The column labeled "Start Year" in Table 7.9-2 identifies the initial year scheduled for implementation. This is defined as the first full year for which a measure is in place. (For example, a measure implemented in October 2021 has a start year of 2022.)

Measures in Table 7.9-2 below the WSCO Program reflect State measures for which benefits were quantified and included in the expeditious attainment analysis. Table 7.7-7 of the SIP Control Strategies section (Section III.D.7.7) provides a more detailed description of each measure along with a crosswalk to proposed State regulation sections.

**Table 7.9-1  
List of Control Measures for Which Emission Benefits Were Quantified**

<b>Measure ID</b>	<b>Measure Summary</b>	<b>Start Year<sup>b</sup></b>
WSCO	Borough Wood Stove Change Out Program, reflecting future change outs using currently secured funding <sup>a</sup>	On-going, thru 2029
Curtailement	Solid Fuel Burning Appliance (SFBA) Episodic Curtailement Program, reflects enhanced compliance by future attainment date	On-going
STF-12, BACM 51	Shift residential and commercial space heating from #2 to #1 oil	2023
STF-13, Modified BACM 31, 32	Requires commercially sold wood to be dry before sale	2022
STF-17b, 18 BACM 16, 17, R6, R10	Removal of all uncertified devices and cordwood outdoor hydronic heaters (OHHs)	2024
BACM R8, R9, R16, R17 Modified, R5 Modified	Requires 2.0 g/hr (stoves/inserts) and 0.10 lb/mmBTU (hydronic heaters) certified PM emission rates for new or re-conveyed wood devices	2020
BACM 48, 49	Removal of coal heaters	2024
STF-22, 31 BACM 3, 24	Wood-fired devices may not be primary or only heating source	2020
STF-23, 24, 26, 27 BACM 25, 27	NOASH/Exemption requirements	2020

<sup>a</sup> Reflects WSCO program funding through 2016, 2017, 2018, 2019-2020, 2021, and 2022 EPA-awarded Targeted Airshed Grants (TAGs).

<sup>b</sup> Start year refers to the first full calendar year of measure implementation. For example, a measure implemented in September 2022 has a start year of 2023. In SIP inventory development and attainment modeling, a measure must be fully implemented over an entire calendar year for its control benefits to be counted in that year.

<sup>4</sup> The package of measures planned for adoption by Alaska include additional measures beyond those listed in Table 7.9-5 for which data were not fully available to quantify emission benefits.

As explained earlier in Section III.D.7.6.9.3, DEC also evaluated effects of the expansion of natural gas availability being implemented by the Interior Gas Utility (IGU) but chose not to quantify reductions (through 2029) from this expansion due to the degree of uncertainty associated with the forecasted expansion and customer conversions. Instead, DEC plans to estimate emission reductions from natural gas expansion in Reasonable Further Progress reporting based on historical, rather than forecasted residential and commercial natural gas conversions. Thus, natural gas expansion (NGE) was not listed in Table 7.9-2.

Table 7.9-3 provides further details on the phase-in percentage estimated for each control measure for calendar years 2020 through 2027. Except where footnoted, this phase-in percentage reflects a combined compliance and penetration rate for each measure.

**Table 7.9-2  
Control Measure Phase-In Forecast for Inventory Years 2020-2027**

Measure Summary and ID	Phase-In Percentages (%) by Year								Benefit Type
	2020	2021	2022	2023	2024	2025	2026	2027	
Borough Wood Stove Change Out Program (WSCO)	2,791 <sup>a</sup>	3,055 <sup>a</sup>	3,267 <sup>a</sup>	3,576 <sup>a</sup>	3,974 <sup>a</sup>	4,524 <sup>a</sup>	5,078 <sup>a</sup>	5,628 <sup>a</sup>	Accumulative as funded
SFBA Episodic Curtailment Program (Curtailment) <sup>b</sup>	30%	33%	38%	38%	38%	38%	38%	38%	Recurrent
(Shift space heating from #2 to #1 oil (STF-12))	n/a	n/a	n/a	72%	95%	95%	95%	95%	One-Time
Requires commercially sold wood to be dry before sale (STF-13)	n/a	n/a	40%	40%	45%	45%	45%	50%	One-Time
Removal of all uncertified devices & cordwood OHHs (STF-17)	0%	5%	15%	30%	30%	30%	30%	30%	One-Time
2.0 g/hr and 0.10 lb/mmBTU certified emission rates for new or re-conveyed wood devices (BACM-R8)	22%	25%	30%	35%	35%	35%	35%	35%	Accumulative
Removal of coal heaters (BACM-48)	n/a	n/a	n/a	n/a	25%	25%	25%	25%	One-Time
Wood-fired devices may not be primary or only heating source (STF-22)	0%, 0% <sup>c</sup>	0%, 0% <sup>c</sup>	0%, 0% <sup>c</sup>	0%, 0% <sup>c</sup>	20%, 40% <sup>c</sup>	20%, 40% <sup>c</sup>	20%, 40% <sup>c</sup>	20%, 40% <sup>c</sup>	Partially Accumulative
NOASH/Exemption requirements (STF-23)	0%	10%	10%	30%	30%	30%	50%	50%	One-Time

n/a – Not applicable in years preceding start year.

<sup>a</sup> WSCO program phase-in metric is cumulative change outs since program inception (July 2010) and reflects projected device change-outs/conversions developed by the Borough based on currently secured funding.

<sup>b</sup> Metric shown for Curtailment Program is the compliance rate. Although not shown in the table, the emission benefits analysis also includes State revisions to Curtailment program strengthening alert stage thresholds from 25 and 35  $\mu\text{g}/\text{m}^3$  to 20 and 30  $\mu\text{g}/\text{m}^3$  for Stages 1 and 2, respectively, effective January 2020.

<sup>c</sup> Paired percentages for Measure STF-22 reflect compliance/penetration rates for existing and new home components of the measure, respectively.



As shown in Table 7.9-3, the increases in phase-in percentages shown by inventory year generally reflect improvements in compliance and/or accumulation of benefits over time, where supported. The rationale for these improvements/changes over time is provided separately by measure as follows:

- *Wood Stove Change Out Program* – The projected change outs listed in Table 7.9-3 are based on funding from the 2016, 2017, 2018, 2019-2020, 2021, and 2022 Targeted Airshed Grants (TAGs). In addition, the TAG funding-based change outs will also incentivize compliance/penetration for other measures as noted below.
- *Curtailment Program* – In the earlier Serious SIP and 2020 Amendments, DEC projected the compliance rate would increase from 30% in 2020 to 45% in 2023. That projected compliance rate increase was estimated based on TAG funding that would be used to: (1) deploy roadway dynamic message sign (DMS) systems within the nonattainment area to increase public awareness of curtailment alerts; (2) purchase and use an infrared camera for dark/low-light winter conditions; (3) increase compliance staffing; and (4) perform additional in-field curtailment compliance assessment and enforcement surveys. In winter 2022-2023, DEC conducted an observational field study from which Curtailment Program compliance was estimated to be 38.1%; described in Appendix III.D.7.09 Attainment Demonstration. A similar study was conducted during winter 2023-2024. Until DEC has an opportunity to analyze those results, the Curtailment Program compliance rate is conservatively being held at 38% over the attainment analysis horizon.
- *Shift to #1 Oil (STF-12)* – This measure required a one-time shift from the current mix of #2 and #1 heating oil refined and sold in the nonattainment area by September 2022. The 72% penetration rate in 2023 reflects an adjustment to account for the residential oil tank volumes fill frequencies based on the 2023 Home Heating survey. It accounts for the fact that tanks were mostly been filled with #1 oil as of the start of 2023. In 2024 and later years the penetration rate has been estimated at 95% (rather than 100%) to reflect anecdotal evidence that a small number of residents may be importing #2 oil from sellers outside the nonattainment area.
- *Commercially-Sold Dry Wood (STF-13)* – Regulations adopted under the Serious SIP (18 AAC 50.076) require commercially sold wood after October 1, 2021 to be dry, or if sold as 8-ft length rounds, to require proof of proper/adequate storage for drying by the buyer. Under the Serious SIP, DEC has estimated initial compliance in 2022 (first full year) to be 50% based on moisture data collected at that time from commercial wood sellers. An updated analysis was conducted with more recent wood seller data and also accounted for operation of Aurora Energy’s wood drying kiln, which began operation in 2020 and ramped up throughput in subsequent years. Despite inclusion of data from the Aurora kiln, it was found that fewer sellers were drying and measuring wood moisture content and selling more wood in 8-ft rounds for which moisture measurements are problematic. As a result, the updated compliance rate was calculated to be 40% in 2022 and is projected to nominally increase over the attainment analysis horizon to reflect local demand for dry wood.
- *Solid-Fuel Device Removal Measures (STF-17, BACM-48)* – Compliance rates in the first full year of implementation (2024) of these uncertified wood and coal heating device

measures were estimated at 30% and 25% respectively based on existing/on-going public education/outreach efforts. As shown in Table 7.9-3, compliance with STF-17 was estimated to begin ramping up prior to the first full year of implementation based on these education/outreach efforts. (Due to the small number of coal devices found in the 2023 Home Heating survey, compliance for BACM-48 was not assumed to begin until the initial 2024 implementation year.) For 2025 and later years, DEC has conservatively held compliance/penetration rates for these measures constant as shown in Table 7.9-3. The rationale here is that a key forcing mechanism for solid fuel device removal will be increased compliance with and stringency of the Curtailment Program. As DEC continues to gather information on solid fuel device in the nonattainment area through NOASH applications, the Wood Stove Change Out Program and on-going Curtailment Program compliance field study measurements, the future compliance/penetration rates for these measures will be further examined.

- *Wood Device Emission Rates (BACM-R8)* – The compliance/penetration rates estimated for this measure reflect the volume of home sales (projected from historical data) coupled with DEC’s adoption of 18 AAC 50.077(h), which requires registration of wood-fired heating devices upon sale or conveyance of a property. Compliance/penetration is conservatively held constant after 2023 due to uncertainty around Alaska’s current list of approved solid-fuel appliances for sale within the nonattainment area.
- *Prohibit Wood Devices as Primary Heat Source (STF-22)* – Similar to the measure above, the compliance/penetration rates of 80%/100% for new sales and reconveyance transactions are based on enforcement through the registration requirements under 18 AAC 50.077(h). However, since the Serious SIP DEC has re-examined the enforcement mechanisms supporting this measure. In short, mechanisms anticipated in conjunction with the real estate industry have not been achieved at the levels expected under the Serious SIP. As a result, compliance/penetration of this measure has been delayed until 2024 as shown in Table 7.9-3, and with rates of 20% for new sales compliance and 40% for resales. As estimated under the Serious SIP, the new sales compliance rate is discounted from 40% to 20% to account for the estimated portion of large lot (greater than 2 acre) cabins which are exempted from this requirement.
- *NOASH/Exemption Requirements (STF-23)* – The rates given in Table 7.9-3 for this measure reflect projected penetration rate increases associated with annual renewal and device registration requirements, proper installation and maintenance determinations from third-party verifiers, and requirements for catalyst replacement when manufacturer-recommended catalyst useful life is reached (estimated at six years averaged across manufacturers). These elements are also coupled with projected impacts from the NOASH reduction program funded under currently secured TAGs.

Beyond these 2020-2027 phase-in percentages focal to the expeditious attainment analysis, Section III.D.7.10 provides further projections of measure penetration at three-year Reasonable Further Progress (RFP) intervals through 2029.

Table 7.9-3 also identifies the nature of the calculated emission benefits in the “Benefit Type” column. Accumulative benefits represent those that grow over time beyond the initial implementation year. For example, emission benefits from Measure BACM-R8 requiring new or

re-conveyed devices to meet more stringent (2.0 g/hr, 0.10 lb/mmBTU) certification standards will accumulate over time as cleaner devices are installed in new construction or re-conveyed rental units. One-Time benefits indicate reductions that are applied as a single reduction that remains constant going forward, subject only to increased measure penetration/compliance. The Episodic Curtailment Program is classified as Recurrent to reflect on-going operational requirements to execute the program each winter.

Based on these measure phase-in forecasts a detailed spreadsheet was developed to calculate PM<sub>2.5</sub> and SO<sub>2</sub> emission reductions within the space heating sector for each measure in each inventory year. The source activity data, device/fuel splits, emission factors, and methods used to calculate control measure emission benefits to support the control inventories developed for the expeditious attainment analysis are discussed in detail in Section III.7.6.11.1. As explained there, the control measure emission benefits calculations also accounted for the effects of overlap between measures that impact the same source category, properly eliminating double counting. That spreadsheet is also included in the electronic appendix to this section (Section III.7.9).

The emission reductions from these controls and their impacts on the overall emissions inventory are presented later in Section III.D.7.9.4.

### 7.9.1.2 Modeling Analysis to Support Expeditious Attainment

As noted earlier, control inventories for each year from 2020 through 2029 were prepared to support the analysis of expeditious attainment. Full modeling runs were completed for 2029, 2027 and 2026 in that order. From the 2029 modeling results, 2027 was selected as the next year to evaluate expeditious attainment. As explained in Section III.D.7.8.16, attainment modeling was conducted that utilized the updated 2020 Base year inventory.

First, the 2027 episodic modeling inventory (based on control measure phase-in/penetration in calendar year 2024 presented earlier in Table 7.9-3) was input to the CMAQ air quality model as described in Section III.D.7.8.14. Modeled concentration outputs for this 2027 Control inventory run were post-processed for each grid cell corresponding to ambient monitors for which design values could be computed and processed through DEC's Speciated Modeled Attainment Test (SMAT) tool (which is described in detail in Section III.D.7.8.9). The resultant 2024 modeled design value at the controlling Hurst Road monitor was found to be 31.9 µg/m<sup>3</sup>, comfortably below the 35 µg/m<sup>3</sup> NAAQS for 24-hour PM<sub>2.5</sub> and thus demonstrating modeled attainment by 2027.

To evaluate whether attainment could be advanced any sooner than 2027, DEC compiled another emissions inventory based on the Table 7.9-3 for 2026.

The 2026 CMAQ gridded outputs were then post-processed for the key monitor-based grid cells through the SMAT tool to develop modeled design values that reflected penetration of the State's control strategy package in 2026.

The resulting 2026 modeled design value at the Hurst Road monitor was found to be 38.1 µg/m<sup>3</sup>, which exceeds the 35 µg/m<sup>3</sup> NAAQS.

In addition, DEC also examined the question of whether attainment could be achieved sooner than 2027 if emission controls for pollutants/source sectors that were not required based on precursor pollutant significance modeling discussed in Section III.D.7.8 were instead applied. This consists primarily of SO<sub>2</sub> controls within the stationary point source sector (since SO<sub>2</sub> controls are already being applied in the stationary area source space heating sector). As explained in the SO<sub>2</sub> Precursor Demonstration (Section III.D.7.8.18), full control of stationary point source SO<sub>2</sub> emissions (i.e., full elimination of all point source SO<sub>2</sub>) would result in a modeled reduction in secondary sulfate PM<sub>2.5</sub> of at most 0.6 µg/m<sup>3</sup>, which would still not be sufficient to advance attainment earlier than 2027 (38.1 µg/m<sup>3</sup> - 0.6 µg/m<sup>3</sup> = 37.5 µg/m<sup>3</sup>).

## 7.9.2 Emission Reductions

Emission reductions from on-going or adopted local and state control measures under DEC's control strategy package are presented in this sub-section. As noted earlier, DEC has adopted several additional controls beyond those for which sufficient data were available and for which benefits were formally quantified to support attainment analysis.

For historical reference, attainment year control measure emission reductions developed under the Serious Area SIP are provided in Section III.D.7.9.2.1 below. Section III.D.7.9.2.2 presents emission reductions developed in support of the 2020 Amendments plan. Finally, Section III.D.7.9.2.3 provides emission reductions developed under this current 2024 Amendments Plan.

It is noted that the emission reductions in each of these sections are reported as initially estimated. As additional data have been collected through the SIP development process (e.g., the 2023 Home Heating Survey) the assumptions underlying these estimates are not the same, but the methodologies used to estimate the reductions were generally consistent across each version.

### 7.9.2.1 Emission Reductions – Serious Plan

Under the Serious Plan, the most expeditious modeled attainment date was 2029. This was largely because the modeling base year design value or “starting point” upon which the control measure reductions are applied was much higher than that under the 2020 Amendments.

Table 7.9-4 presents the projected calendar year 2029 PM<sub>2.5</sub> and SO<sub>2</sub> emission benefits associated with each of the measures/programs as modeled under the Serious SIP. (This was listed as Table 7.9-7 in the earlier Serious Area plan.)

No reductions were calculated for the other precursor pollutants. The benefits shown for each individual measure are discounted to account for the overlap of measures controlling the same sources within the combined control package.

Combined measure benefits shown at the bottom of Table 7.9-4 also properly account for measure overlap within the combined control package (eliminating double-counting).

A detailed spreadsheet containing all the data, assumptions, and calculations of these 2029 emission benefits by individual measure, and accounting for overlap, was included in the electronic appendix to this section in the Serious SIP.

**Table 7.9-3  
Projected 2029 Emission Reductions for Post-2019 Control Measures under  
Serious SIP Attainment Analysis**

Measure ID	Measure Summary	Emission Reductions <sup>a</sup> (tons/episodic day)	
		PM <sub>2.5</sub>	SO <sub>2</sub>
WSCO	Borough Wood Stove Change Out Program, reflecting future change outs using currently available funding	0.29	<0.01
Curtailement	Solid Fuel Burning Application Episodic Curtailement Program, reflects enhanced compliance by future attainment date	S1 <sup>b</sup> : 0.14 S2 <sup>b</sup> : 0.22	S1 <sup>b</sup> : -0.09 S2 <sup>b</sup> : -0.13
STF-12, BACM 51	Shift residential and commercial space heating from #2 to #1 oil	<0.01	1.77
STF-13, Modified BACM 31, 32	Required commercially sold wood to be dry before sale	0.10	0.01
STF-17b, 18 BACM 16, 17, R6, R10	Removal of all uncertified device and cordwood outdoor hydronic heaters	0.82	0.01
BACM R8, R9, R16, R17 Modified, R5 Modified	Requires 2.0 g/hr (stoves/inserts) and 0.10 lb/mmBTU certified emission rates for new of re-conveyed wood devices	0.62	0.02
BACM 48, 49	Removal of coal heaters	0.04	0.07
STF-22, 31 BACM 3, 24	Wood-fired devices may not be primary or only heating source	0.39	-0.04
STF-23, 24, 26, 27 BACM 25, 27	NOASH/Exemption requirements	<0.01	<0.01
n/a	IGU-projected natural gas expansion through 2029	0.24	0.59
<b>Combined Total, Area Space Heating (accounting for measure overlap)</b>		<b>S1<sup>b</sup>: 2.65 S2<sup>b</sup>: 2.73</b>	<b>S1<sup>b</sup>: 2.33 S2<sup>b</sup>: 2.29</b>
n/a	Point Source fuel-based sulfur controls by 2029	n/a	4.46
<b>Combined Total, Point Sources</b>		<b>n/a</b>	<b>4.46</b>

<sup>a</sup> Emission reductions shown for each measure account for effects of overlap within the combined control package.

<sup>b</sup> S1 and S2 refer to benefits under Curtailement program Stage 1 (20 µg/m<sup>3</sup>) and Stage 2 (30 µg/m<sup>3</sup>) alert conditions.  
n/a – Not Applicable.

### 7.9.2.2 Emission Reductions – 2020 Amendments Plan

Emissions Reductions to Support Attainment Analysis – Under the 2020 Amendments, emission inventories for calendar years 2023 and 2024 were used to support the attainment modeling contained in that revised plan. Table 7.9-5 presents the PM<sub>2.5</sub> and SO<sub>2</sub> emission reductions for each measure in the State’s control strategy package for which benefits were quantified. Individual measure reductions and combined reductions are shown in a manner similar to those presented earlier in Table 7.9-4. Again, reductions were quantified only for PM<sub>2.5</sub> and SO<sub>2</sub> and

overlapping effects of individual measures were accounted for to avoid double-counting of emission benefits.

**Table 7.9-4  
Projected 2023 and 2024 Emission Reductions for Post-2019 Control Measures under  
2020 Amendments Expeditious Attainment Analysis**

Measure ID	Measure Summary	Emission Reductions <sup>a</sup> (tons/episodic day)			
		2023		2024	
		PM <sub>2.5</sub>	SO <sub>2</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>
WSCO	Borough Wood Stove Change Out Program, reflecting future change outs using currently available funding	0.66	0.01	0.68	0.01
Curtailment	Solid Fuel Burning Application Episodic Curtailment Program, reflects enhanced compliance by future attainment date	S1 <sup>b</sup> : 0.31 S2 <sup>b</sup> : 0.51	S1 <sup>b</sup> : -0.09 S2 <sup>b</sup> : -0.13	S1 <sup>b</sup> : 0.26 S2 <sup>b</sup> : 0.42	S1 <sup>b</sup> : -0.10 S2 <sup>b</sup> : -0.13
STF-12, BACM 51	Shift residential and commercial space heating from #2 to #1 oil	0.01	1.93	0.01	1.95
STF-13, Modified BACM 31, 32	Required commercially sold wood to be dry before sale	0.10	<0.01	0.10	<0.01
STF-17b, 18 BACM 16, 17, R6, R10	Removal of all uncertified device and cordwood outdoor hydronic heaters	0.00	0.00	0.16	<0.01
BACM R8, R9, R16, R17 Modified, R5 Modified	Requires 2.0 g/hr (stoves/inserts) and 0.10 lb/mmBTU certified emission rates for new of re-conveyed wood devices	0.33	0.01	0.39	0.01
BACM 48, 49	Removal of coal heaters	0.00	0.00	0.02	0.02
STF-22, 31 BACM 3, 24	Wood-fired devices may not be primary or only heating source	0.34	-0.01	0.35	-0.01
STF-23, 24, 26, 27 BACM 25, 27	NOASH/Exemption requirements	<0.01	<0.01	<0.01	<0.01
n/a	IGU-projected natural gas expansion through 2029	0.00	0.00	0.00	0.00
<b>Combined Total, Area Space Heating (accounting for measure overlap)</b>		<b>S1<sup>b</sup>: 1.76 S2<sup>b</sup>: 1.96</b>	<b>S1<sup>b</sup>: 1.85 S2<sup>b</sup>: 1.81</b>	<b>S1<sup>b</sup>: 1.95 S2<sup>b</sup>: 2.11</b>	<b>S1<sup>b</sup>: 1.88 S2<sup>b</sup>: 1.84</b>
n/a	Point Source fuel-based sulfur controls by 2029	n/a	1.39	n/a	3.34
<b>Combined Total, Point Sources</b>		<b>n/a</b>	<b>1.39</b>	<b>n/a</b>	<b>3.34</b>

<sup>a</sup> Emission reductions shown for each measure account for effects of overlap within the combined control package.

<sup>b</sup> S1 and S2 refer to benefits under Curtailment program Stage 1 (20 µg/m<sup>3</sup>) and Stage 2 (30 µg/m<sup>3</sup>) alert conditions.

n/a – Not Applicable.

The reductions shown in Table 7.9-5 for the 2020 Amendment are consistent with, but do not match those presented earlier in Table 7.9-4 for the Serious Plan for two reasons. First, the attainment analysis years are different: 2029 for the Serious Plan vs. 2023 and 2024 for the 2020 Amendment. Second, the baseline or “starting point” 2019 inventory was also revised under the 2020 Amendment as explained earlier in Section III.D.7.6.6.

The reductions in Table 7.9-5 for 2023 and 2024 reflect DEC’s projected most expeditious schedule for implementing and phasing in measure penetration and compliance and, integrated into the 2023 and 2024 attainment modeling inventories, provide the basis for evaluation of expeditious attainment, which is presented in the following sub-section.

Emission Reductions to Support 5% Annual Reduction Requirements – For Serious areas that fail to attain by the statutorily required attainment date (2019 for Fairbanks), EPA’s PM<sub>2.5</sub> Implementation Rule<sup>5</sup> (PM Rule) includes the additional requirement that the control strategy demonstrate that each year the area will achieve at least a 5 percent reduction in emissions of direct PM<sub>2.5</sub> or a 5 percent reduction in emissions of a PM<sub>2.5</sub> plan precursor based on the most recent emissions inventory for the area; and that the area will attain the standard as expeditiously as practicable. The requirements are contained in 40 C.F.R. §§ 51.1003(c) and 51.1010(c).

These reductions apply to directly emitted PM<sub>2.5</sub> and precursors of significance (SO<sub>2</sub> in Fairbanks) and are applied in an “either or” manner for applicable pollutants in each given year. The 5% emission reduction targets for each pollutant are calculated from total base year emissions within the nonattainment area (covering all inventories sources).

Table 7.9-6 demonstrates that the control strategy reductions under this 2020 Amendment fulfill these 5% annual reduction requirements. The upper half of Table 7.9-6 shows nonattainment area emissions and reduction requirement calculations for directly emitted PM<sub>2.5</sub>; similar emissions and reductions for SO<sub>2</sub> (the applicable precursor pollutant in Fairbanks) are presented in the lower half of Table 7.9-6.

Within each half of Table 7.9-6, nonattainment area emissions by source sector and totaled (tons/episode day) are presented for the 2019 Baseline and 2020-2024 Control inventories. Reductions from each prior year (in tons/episode day) are then presented below the inventory totals. As implied, the “Relative Reduction to 2019 (%)” row lists percentage reductions in total emissions relative to the 2019 Baseline inventory.

Below these are the rows that contain the calculations that demonstrate whether emission reductions for each pollutant are sufficient to achieve minimum 5% reductions for each year subsequent year beyond the baseline year (2019) until the year attainment is demonstrated (2024). The “5% Annual Reduction Target” row is the minimum required emission reduction in each year. For example, the annual reductions required for PM<sub>2.5</sub> of 0.159 tons/episode day were calculated by taking 5% of total 2019 base year emissions ( $3.173 \times 5\% = 0.159$ ). Below this, the “Reductions Required ...” row show the emission reductions needed in each year until the demonstrated attainment year based on this 5% per year from Baseline reduction requirement. The next row, “Reductions Achieved ...” lists the calculated emissions reductions in each year based on the State’s adopted control strategy and implementation schedule. Finally, the last row in each half of Table 7.9-6 indicates whether the reductions achieved equal or exceed the reductions required in each year from 2020 (the first year after the base year) to 2024 (the demonstrated attainment year).

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<sup>5</sup> 81 Fed. Reg. 58010 (Aug. 24, 2016).

As shown in Table 7.9-6, minimum 5% per year reductions are achieved in each year from 2020-2024 for either direct PM<sub>2.5</sub> or applicable precursor SO<sub>2</sub>, fulfilling the requirements of Section VII.D.3 of the PM Rule.

**Table 7.9-5  
Nonattainment Area Emissions (2019-2024) and  
Achievement of 5% Annual Reduction Requirements**

Source Sector	PM <sub>2.5</sub> Emissions (tons/episode day)					
	2019	2020	2021	2022	2023	2024
Point	0.568	0.583	0.600	0.607	0.611	0.615
Area, Space Heating	1.909	1.556	1.377	1.086	0.889	0.740
Area, Other	0.224	0.227	0.230	0.233	0.237	0.240
Mobile, On-Road	0.216	0.203	0.191	0.181	0.173	0.163
Mobile, Non-Road	0.256	0.247	0.244	0.241	0.238	0.236
<b>TOTALS</b>	<b>3.173</b>	<b>2.815</b>	<b>2.641</b>	<b>2.348</b>	<b>2.147</b>	<b>1.993</b>
<b>Reduction from Prior Year:</b>	n/a	<b>0.358</b>	<b>0.175</b>	<b>0.293</b>	<b>0.200</b>	<b>0.154</b>
<b>Relative Reduction to 2019 (%):</b>	n/a	<b>11.3%</b>	<b>16.8%</b>	<b>26.0%</b>	<b>32.3%</b>	<b>37.2%</b>
<b>5% Annual Reduction Target, PM<sub>2.5</sub>:</b>	<b>0.159</b>					
<b>Reductions Required, PM<sub>2.5</sub>:</b>	n/a	<b>0.159</b>	<b>0.317</b>	<b>0.476</b>	<b>0.635</b>	<b>0.793</b>
<b>Reductions Achieved, PM<sub>2.5</sub>:</b>	n/a	<b>0.358</b>	<b>0.533</b>	<b>0.826</b>	<b>1.026</b>	<b>1.180</b>
<b>PM<sub>2.5</sub> Target Met?</b>	n/a	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>
Source Sector	SO <sub>2</sub> Emissions (tons/episode day)					
	2019	2020	2021	2022	2023	2024
Point	5.684	5.827	4.765	4.825	4.728	2.814
Area, Space Heating	3.881	3.977	4.109	4.172	2.278	2.269
Area, Other	0.028	0.028	0.029	0.029	0.030	0.030
Mobile, On-Road	0.007	0.007	0.007	0.007	0.007	0.007
Mobile, Non-Road	5.409	5.443	5.478	5.514	5.550	5.586
<b>TOTALS</b>	<b>15.009</b>	<b>15.283</b>	<b>14.389</b>	<b>14.546</b>	<b>12.592</b>	<b>10.706</b>
<b>Reduction from Prior Year:</b>	n/a	<b>-0.273</b>	<b>0.894</b>	<b>-0.158</b>	<b>1.954</b>	<b>1.886</b>
<b>Relative Reduction to 2019 (%):</b>	n/a	<b>-1.8%</b>	<b>4.1%</b>	<b>3.1%</b>	<b>16.1%</b>	<b>28.7%</b>
<b>5% Annual Reduction Target, SO<sub>2</sub>:</b>	<b>0.750</b>					
<b>Reductions Required, SO<sub>2</sub>:</b>	n/a	<b>0.750</b>	<b>1.501</b>	<b>2.251</b>	<b>3.002</b>	<b>3.752</b>
<b>Reductions Achieved, SO<sub>2</sub>:</b>	n/a	<b>-0.273</b>	<b>0.621</b>	<b>0.463</b>	<b>2.417</b>	<b>4.303</b>
<b>SO<sub>2</sub> Target Met?</b>	n/a	<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>Yes</b>

n/a – Not Applicable

### 7.9.2.3 Emission Reductions – 2024 Amendments Plan

Emissions Reductions to Support Attainment Analysis – Under the 2024 Amendments, emission inventories for calendar years 2026 and 2027 were used to support the attainment modeling contained in this revised plan. Table 7.9-7 presents the PM<sub>2.5</sub> and SO<sub>2</sub> emission reductions for each measure in the State’s control strategy package for which benefits were quantified. Individual measure reductions and combined reductions are shown in a manner similar to those presented earlier in Table 7.9-4 and Table 7.9-5. Again, reductions were quantified only for PM<sub>2.5</sub> and SO<sub>2</sub> and overlapping effects of individual measures were accounted for to avoid double-counting of emission benefits.



**Table 7.9-6  
Projected 2026 and 2027 Emission Reductions for Post-2020 Control Measures under  
2024 Amendments Expeditious Attainment Analysis**

Measure ID	Measure Summary	Emission Reductions <sup>a</sup> (tons/episodic day)			
		2026		2027	
		PM <sub>2.5</sub>	SO <sub>2</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>
WSCO	<i>Borough Wood Stove Change Out Program, reflecting future change outs using currently available funding</i>	0.91	0.09	1.09	0.11
Curtailement	Solid Fuel Burning Application Episodic Curtailement Program, reflects enhanced compliance by future attainment date	S1 <sup>b</sup> : 0.02 S2 <sup>b</sup> : 0.12	S1 <sup>b</sup> : -0.00 S2 <sup>b</sup> : -0.02	S1 <sup>b</sup> : 0.02 S2 <sup>b</sup> : 0.12	S1 <sup>b</sup> : -0.00 S2 <sup>b</sup> : -0.02
STF-12, BACM 51	Shift residential and commercial space heating from #2 to #1 oil	0.02	1.73	0.02	1.73
STF-13, Modified BACM 31, 32	Required commercially sold wood to be dry before sale	0.06	<0.01	0.06	<0.01
STF-17b, 18 BACM 16, 17, R6, R10	Removal of all uncertified device and cordwood outdoor hydronic heaters	0.26	-0.01	0.25	-0.01
BACM R8, R9, R16, R17 Modified, R5 Modified	Requires 2.0 g/hr (stoves/inserts) and 0.10 lb/mmBTU certified emission rates for new of re-conveyed wood devices	0.08	<0.01	0.09	<0.01
BACM 48, 49	Removal of coal heaters	<0.01	<0.01	<0.01	<0.01
STF-22, 31 BACM 3, 24	Wood-fired devices may not be primary or only heating source	0.03	<-0.01	0.03	<-0.01
STF-23, 24, 26, 27 BACM 25, 27	NOASH/Exemption requirements	<0.01	<0.01	<0.01	<0.01
<b>Combined Total, Area Space Heating (accounting for measure overlap)</b>		<b>S1<sup>b</sup>: 1.05 S2<sup>b</sup>: 1.18</b>	<b>S1<sup>b</sup>: 1.78 S2<sup>b</sup>: 1.77</b>	<b>S1<sup>b</sup>: 1.24 S2<sup>b</sup>: 1.37</b>	<b>S1<sup>b</sup>: 1.81 S2<sup>b</sup>: 1.80</b>

<sup>a</sup> Emission reductions shown for each measure account for effects of overlap within the combined control package.

<sup>b</sup> S1 and S2 refer to benefits under Curtailement program Stage 1 (20 µg/m<sup>3</sup>) and Stage 2 (30 µg/m<sup>3</sup>) alert conditions.  
n/a – Not Applicable.

As explained in Section III.D.7.9.9.2, the reductions shown in Table 7.9-7 for the 2024 Amendment are consistent with, but do not match those presented earlier in Table 7.9-4 for the Serious Plan in Section III.D.7.9.1.1 and Section III.D.7.9.1.2 for the 2020 Amendments for two reasons. First, the attainment analysis years are different: 2029 for the Serious Plan and 2023 and 2024 for the 2020 Amendment vs. 2026 and 2027 for the 2024 Amendment. Second, the baseline or “starting point” 2020 inventory was also revised under the 2024 Amendment relative to the earlier plan baseline inventories as explained earlier in Section III.D.7.6.9.

The reductions in Table 7.9-7 for 2026 and 2027 reflect DEC’s projected most expeditious schedule for implementing and phasing in measure penetration and compliance and, integrated into the 2026 and 2027 attainment modeling inventories, provide the basis for evaluation of expeditious attainment, which is presented in the following sub-section.

Emission Reductions to Support 5% Annual Reduction Requirements – For Serious areas that fail to attain by the statutorily required attainment date (2019 for Fairbanks), EPA’s PM<sub>2.5</sub> Implementation Rule<sup>6</sup> (PM Rule) include the additional requirement that the control strategy demonstrate that each year the area will achieve at least a 5 percent reduction in emissions of direct PM<sub>2.5</sub> or a 5 percent reduction in emissions of a PM<sub>2.5</sub> plan precursor based on the most recent emissions inventory for the area; and that the area will attain the standard as expeditiously as practicable. The requirements are contained in 40 C.F.R. §§ 51.1003(c) and 51.1010(c).

These reductions apply to directly emitted PM<sub>2.5</sub> and precursors of significance (SO<sub>2</sub> in Fairbanks) and are applied in an “either or” manner for applicable pollutants in each given year. The 5% emission reduction targets for each pollutant are calculated from total base year emissions within the nonattainment area (covering all inventories sources).

Table 7.9-8 demonstrates that the control strategy reductions under this 2024 Amendment fulfill these 5% annual reduction requirements. The upper half of Table 7.9-8 shows nonattainment area emissions and reduction requirement calculations for directly emitted PM<sub>2.5</sub>; similar emissions and reductions for SO<sub>2</sub> (the applicable precursor pollutant in Fairbanks) are presented in the lower half of Table 7.9-8.

Within each half of Table 7.9-8, nonattainment area emissions by source sector and totaled (tons/episode day) are presented for the 2020 Baseline and 2021-2027 Control inventories. Reductions from each prior year (in tons/episode day) are then presented below the inventory totals. As implied, the “Relative Reduction to 2020 (%)” row lists percentage reductions in total emissions relative to the 2020 Baseline inventory.

Below these are the rows that contain the calculations that demonstrate whether emission reductions for each pollutant are sufficient to achieve minimum 5% reductions for each subsequent year beyond the baseline year (2020) until the year attainment is demonstrated (2027). The “5% Annual Reduction Target” row is the minimum required emission reduction in each year. For example, the annual reductions required for PM<sub>2.5</sub> of 0.147 tons/episode day were calculated by taking 5% of total 2020 base year emissions ( $2.950 \times 5\% = 0.147$ ). Below this, the “Reductions Required ...” row shows the emission reductions needed in each year until the demonstrated attainment year based on this 5% per year from Baseline reduction requirement. The next row, “Reductions Achieved ...” lists the calculated emissions reductions in each year based on the State’s adopted control strategy and implementation schedule. Finally, the last row in each half of Table 7.9-8 indicates whether the reductions achieved equal or exceed the reductions required in each year from 2020 (the first year after the base year) to 2027 (the demonstrated attainment year).

As shown in Table 7.9-8, minimum 5% per year reductions are achieved in each year from 2021-2027 for either direct PM<sub>2.5</sub> or applicable precursor SO<sub>2</sub>, fulfilling the requirements of Section VII.D.3 of the PM Rule.

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<sup>6</sup> 81 Fed Reg. 58010 (Aug. 24, 2016).

**Table 7.9-7  
Nonattainment Area Emissions (2020-2027) and  
Achievement of 5% Annual Reduction Requirements**

Source Sector	PM <sub>2.5</sub> Emissions (tons/episode day)							
	2020	2021	2022	2023	2024	2025	2026	2027
Point	0.579	0.596	0.603	0.607	0.612	0.616	0.620	0.624
Area, Space Heating	1.974	1.743	1.578	1.480	1.333	1.144	0.939	0.739
Area, Other	0.114	0.116	0.118	0.119	0.121	0.123	0.124	0.126
Mobile, On-Road	0.074	0.066	0.066	0.062	0.059	0.056	0.054	0.052
Mobile, Aircraft	0.119	0.119	0.120	0.121	0.121	0.123	0.124	0.125
Mobile, Non-Road (less aircraft)	0.090	0.088	0.086	0.083	0.081	0.077	0.077	0.077
<b>TOTALS</b>	<b>2.950</b>	<b>2.728</b>	<b>2.570</b>	<b>2.473</b>	<b>2.326</b>	<b>2.139</b>	<b>1.938</b>	<b>1.742</b>
<b>Reduction from Prior Year:</b>	n/a	<b>0.221</b>	<b>0.158</b>	<b>0.097</b>	<b>0.147</b>	<b>0.188</b>	<b>0.201</b>	<b>0.196</b>
<b>Relative Reduction to 2020 (%):</b>	n/a	<b>7.5%</b>	<b>12.9%</b>	<b>16.2%</b>	<b>21.1%</b>	<b>27.5%</b>	<b>34.3%</b>	<b>40.9%</b>
<b>5%/Yr Reduction Target, PM<sub>2.5</sub>:</b>	<b>0.147</b>							
<b>Reductions Required, PM<sub>2.5</sub>:</b>	n/a	<b>0.147</b>	<b>0.295</b>	<b>0.442</b>	<b>0.590</b>	<b>0.737</b>	<b>0.885</b>	<b>1.032</b>
<b>Reductions Achieved, PM<sub>2.5</sub>:</b>	n/a	<b>0.220</b>	<b>0.377</b>	<b>0.474</b>	<b>0.618</b>	<b>0.806</b>	<b>1.007</b>	<b>1.203</b>
<b>PM<sub>2.5</sub> Target Met?</b>	n/a	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>
Source Sector	SO <sub>2</sub> Emissions (tons/episode day)							
	2020	2021	2022	2023	2024	2025	2026	2027
Point	6.627	6.820	6.905	6.952	7.000	7.050	7.098	7.145
Area, Space Heating	3.606	3.714	3.729	2.375	1.967	1.970	1.976	1.980
Area, Other	0.028	0.029	0.029	0.030	0.030	0.031	0.031	0.031
Mobile, On-Road	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
Mobile, Aircraft	5.441	5.476	5.511	5.547	5.547	5.620	5.658	5.695
Mobile, Non-Road (less aircraft)	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
<b>TOTALS</b>	<b>15.707</b>	<b>16.044</b>	<b>16.181</b>	<b>14.909</b>	<b>14.550</b>	<b>14.676</b>	<b>14.766</b>	<b>14.857</b>
<b>Reduction from Prior Year:</b>	n/a	<b>-0.337</b>	<b>-0.136</b>	<b>1.272</b>	<b>0.359</b>	<b>-0.127</b>	<b>-0.090</b>	<b>-0.090</b>
<b>Relative Reduction to 2020 (%):</b>	n/a	<b>-2.1%</b>	<b>-3.0%</b>	<b>5.1%</b>	<b>7.4%</b>	<b>6.6%</b>	<b>6.0%</b>	<b>5.4%</b>
<b>5%/Yr Redectiønn Target, SO<sub>2</sub>:</b>	<b>0.785</b>							
<b>Reductions Required, SO<sub>2</sub>:</b>	n/a	<b>0.785</b>	<b>1.571</b>	<b>2.356</b>	<b>3.141</b>	<b>3.927</b>	<b>4.712</b>	<b>5.497</b>
<b>Reductions Achieved, SO<sub>2</sub>:</b>	n/a	<b>-0.337</b>	<b>-0.474</b>	<b>0.798</b>	<b>1.158</b>	<b>1.031</b>	<b>0.941</b>	<b>0.850</b>
<b>SO<sub>2</sub> Target Met?</b>	n/a	<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>
<b>Overall Target Met?</b>	n/a	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>

n/a – Not Applicable

### 7.9.3 Expeditious Attainment Evaluation and Demonstration

As described earlier in Section III.D.7.9.1, episodic modeling inventories were developed for calendar years 2027 and then 2026 and input to the CMAQ gridded air quality model to: (1) demonstrate modeled attainment in 2027, and (2) evaluate whether modeled attainment could be advanced any earlier based on the State's control strategy and most expeditious measure implementation schedule.

Table 7.9-9 summarizes modeling (entire modeling domain) and planning (nonattainment area) emissions (in tons/day, averaged over the historical attainment modeling episodes for the 2027 Control inventory. It incorporates the control measure specific PM<sub>2.5</sub> and SO<sub>2</sub> emission

reductions for appropriate source sectors shown earlier in Table 7.9-7. Within the inventory and modeling workflows, these emission reductions are applied at the detailed Source Classification Code (SCC) level.

**Table 7.9-8**  
**2027 Control Episode Average Daily Emissions (tons/day) by Source Sector**

Source Sector	<i>Modeling Inventory</i> <i>Grid 3 Domain Emissions (tons/day)</i>					<i>Planning Inventory</i> <i>NA Area Emissions (tons/day)</i>				
	PM <sub>2.5</sub>	NO <sub>x</sub>	SO <sub>2</sub>	VOC	NH <sub>3</sub>	PM <sub>2.5</sub>	NO <sub>x</sub>	SO <sub>2</sub>	VOC	NH <sub>3</sub>
Point Sources	0.62	14.60	7.15	0.04	0.095	0.62	14.60	7.15	0.04	0.095
Area, Space Heating	0.99	2.50	2.28	8.56	0.133	0.74	2.34	1.98	8.01	0.124
Area, Space Heat, Wood	0.94	0.34	0.06	8.43	0.090	0.70	0.28	0.04	7.90	0.081
Area, Space Heat, Oil	0.03	1.95	2.20	0.11	0.004	0.02	1.83	1.91	0.10	0.004
Area, Space Heat, Coal	0.00	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.00	0.000
Area, Space Heat, Other	0.02	0.22	0.02	0.01	0.039	0.02	0.22	0.02	0.01	0.039
Area, Other	0.20	1.36	0.74	2.53	0.056	0.13	0.40	0.03	2.33	0.051
Mobile, On-Road	0.07	0.95	0.00	1.39	0.060	0.05	0.65	0.00	1.08	0.038
Mobile, Aircraft	0.21	0.70	8.99	0.33	0.000	0.12	0.45	5.70	0.17	0.000
Mobile, Non-Road less aircraft	0.10	0.88	0.00	2.75	0.002	0.08	0.32	0.00	2.22	0.002
<b>TOTALS</b>	<b>2.20</b>	<b>20.99</b>	<b>19.16</b>	<b>15.59</b>	<b>0.346</b>	<b>1.74</b>	<b>18.75</b>	<b>14.86</b>	<b>13.85</b>	<b>0.310</b>

For context, Table 7.9-10 provides a comparison of sector-specific and total emission changes between these 2027 Control and 2020 Baseline inventories that was presented earlier in Section III.D.7.6.9.8 and Section III.D.7.6.10.2, respectively. As seen in Table 7.9-10, PM<sub>2.5</sub> and SO<sub>2</sub> emissions from space heating in the nonattainment area are reduced by 63% and 45%, respectively in 2027 relative to 2020. Overall, across all source sectors 2027 PM<sub>2.5</sub> emission reductions within the nonattainment area are 41%, while SO<sub>2</sub> reductions are 5% relative to the 2020 Baseline.

**Table 7.9-9**  
**Relative Change (%) in Episode Average Daily Emissions (tons/day) by Source Sector, 2027 Control vs. 2020 Baseline Inventory**

Source Sector	<i>Modeling Inventory</i> <i>Change in Grid 3 Domain Emissions (%)</i>					<i>Planning Inventory</i> <i>Change in NA Area Emissions (%)</i>				
	PM <sub>2.5</sub>	NO <sub>x</sub>	SO <sub>2</sub>	VOC	NH <sub>3</sub>	PM <sub>2.5</sub>	NO <sub>x</sub>	SO <sub>2</sub>	VOC	NH <sub>3</sub>
Point Sources	+8%	+8%	+8%	+8%	+8%	+8%	+8%	+8%	+8%	+8%
Area, Space Heating	-54%	+8%	-42%	+20%	+14%	-63%	+8%	-45%	+20%	+13%
Area, Space Heat, Wood	-54%	+23%	+13%	+20%	+22%	-63%	+23%	+13%	+21%	+22%
Area, Space Heat, Oil	-60%	+6%	-43%	+6%	+6%	-65%	+7%	-46%	+6%	+3%
Area, Space Heat, Coal	-60%	+0%	-36%	+4%	+0%	-61%	+0%	-40%	+9%	+0%
Area, Space Heat, Other	-1%	-0%	-1%	+0%	+0%	-2%	+0%	+1%	+0%	+0%
Area, Other	+10%	+10%	+10%	+10%	+10%	+10%	+10%	+10%	+10%	+10%
Mobile, On-Road	-31%	-47%	-9%	-25%	-5%	-30%	-45%	-9%	-24%	-4%
Mobile, Aircraft	+10%	+8%	+9%	+8%	+0%	+5%	+3%	+5%	+7%	+0%
Mobile, Non-Road less aircraft	-14%	+5%	+0%	-17%	+1%	-14%	+12%	+0%	-16%	+3%
<b>TOTALS</b>	<b>-34%</b>	<b>+3%</b>	<b>-2%</b>	<b>+4%</b>	<b>+8%</b>	<b>-41%</b>	<b>+4%</b>	<b>-5%</b>	<b>+6%</b>	<b>+9%</b>

Table 7.9-11 and Table 7.9-12 present similar emission summaries for the 2026 Control inventory and its emission changes relative to the 2020 Baseline inventory, respectively. Comparing these tables to Table 7.9-9 and Table 7.9-10 shows that forecasted nonattainment area PM<sub>2.5</sub> emission reductions in 2026 (across all source sectors) are 34% and track toward, but are below, those projected in 2027 as the measures in the State's control strategy have another year to phase in. (SO<sub>2</sub> reductions in 2026 and 2027 are similar relative to 2020.)

**Table 7.9-10**  
**2026 Control Episode Average Daily Emissions (tons/day) by Source Sector**

Source Sector	<i>Modeling Inventory</i> <i>Grid 3 Domain Emissions (tons/day)</i>					<i>Planning Inventory</i> <i>NA Area Emissions (tons/day)</i>				
	PM <sub>2.5</sub>	NO <sub>x</sub>	SO <sub>2</sub>	VOC	NH <sub>3</sub>	PM <sub>2.5</sub>	NO <sub>x</sub>	SO <sub>2</sub>	VOC	NH <sub>3</sub>
Point Sources	0.62	14.50	7.10	0.04	0.095	0.62	14.50	7.10	0.04	0.095
Area, Space Heating	1.19	2.49	2.27	8.60	0.133	0.94	2.32	1.98	8.05	0.124
Area, Space Heat, Wood	1.15	0.34	0.06	8.48	0.090	0.90	0.29	0.05	7.94	0.082
Area, Space Heat, Oil	0.03	1.93	2.19	0.11	0.004	0.03	1.82	1.91	0.10	0.004
Area, Space Heat, Coal	0.00	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.00	0.000
Area, Space Heat, Other	0.02	0.22	0.02	0.01	0.039	0.02	0.22	0.02	0.01	0.039
Area, Other	0.20	1.34	0.73	2.50	0.055	0.12	0.39	0.03	2.30	0.051
Mobile, On-Road	0.07	1.00	0.00	1.44	0.060	0.05	0.69	0.00	1.12	0.038
Mobile, Aircraft	0.21	0.70	8.95	0.33	0.000	0.12	0.45	5.66	0.16	0.000
Mobile, Non-Road less aircraft	0.10	0.88	0.00	2.76	0.002	0.08	0.32	0.00	2.22	0.002
<b>TOTALS</b>	<b>2.40</b>	<b>20.92</b>	<b>19.05</b>	<b>15.66</b>	<b>0.345</b>	<b>1.94</b>	<b>18.66</b>	<b>14.77</b>	<b>13.91</b>	<b>0.309</b>

**Table 7.9-11**  
**Relative Change (%) in Episode Average Daily Emissions (tons/day) by Source Sector, 2026 Control vs. 2020 Baseline Inventory**

Source Sector	<i>Modeling Inventory</i> <i>Change in Grid 3 Domain Emissions (%)</i>					<i>Planning Inventory</i> <i>Change in NA Area Emissions (%)</i>				
	PM <sub>2.5</sub>	NO <sub>x</sub>	SO <sub>2</sub>	VOC	NH <sub>3</sub>	PM <sub>2.5</sub>	NO <sub>x</sub>	SO <sub>2</sub>	VOC	NH <sub>3</sub>
Point Sources	+7%	+7%	+7%	+7%	+7%	+7%	+7%	+7%	+7%	+7%
Area, Space Heating	-45%	+7%	-43%	+20%	+14%	-52%	+7%	-45%	+21%	+14%
Area, Space Heat, Wood	-45%	+24%	+15%	+21%	+22%	-53%	+24%	+15%	+21%	+22%
Area, Space Heat, Oil	-55%	+6%	-44%	+5%	+3%	-60%	+6%	-46%	+5%	+3%
Area, Space Heat, Coal	-55%	+0%	-36%	+4%	+0%	-56%	+0%	-40%	+9%	+0%
Area, Space Heat, Other	-1%	-0%	-1%	+0%	+0%	-2%	+0%	+1%	+0%	+0%
Area, Other	+9%	+9%	+9%	+9%	+9%	+9%	+9%	+9%	+9%	+9%
Mobile, On-Road	-28%	-43%	-8%	-23%	-4%	-27%	-42%	-7%	-21%	-4%
Mobile, Aircraft	+10%	+7%	+8%	+8%	+0%	+4%	+3%	+4%	+6%	+0%
Mobile, Non-Road less aircraft	-14%	+4%	+0%	-17%	+0%	-14%	+11%	+0%	-16%	+2%
<b>TOTALS</b>	<b>-28%</b>	<b>+3%</b>	<b>-2%</b>	<b>+5%</b>	<b>+8%</b>	<b>-34%</b>	<b>+4%</b>	<b>-6%</b>	<b>+7%</b>	<b>+8%</b>

Beyond these emission inventory comparisons, Table 7.9-13 summarizes the resulting attainment modeling conducted for the 2020 Baseline and 2026 and 2027 Control inventories that were used to evaluate and determine the most expeditious modeled attainment date. Modeled design values

for each year/scenario are shown for the grid cells corresponding to the currently operating monitors in the nonattainment area: (1) the Hurst Road monitor in North Pole; (2) the NCORE monitor just across the Chena River from downtown Fairbanks; and (3) the A Street monitor located just northeast of downtown Fairbanks.

**Table 7.9-12  
Modeled Expeditious Attainment Summary**

Fairbanks NAA Monitor	Base Year 2020 5 -year modeling DV(2017-2021) (ug/m3)	Future 5– year modeling DV 2027 PM 2.5 (ug/m3)	Expeditious Attainment not possible 2026 PM 2.5 (ug/m3)
Hurst Road	64.9	31.9	38.1
NCORE	27.7	18.4	19.8
A Street	34.8	22.7	24.5

As shown in Table 7.9-13, modeled design values at all three monitors are below the 35  $\mu\text{g}/\text{m}^3$  24-hour  $\text{PM}_{2.5}$  NAAQS in 2027. The modeled design value at the controlling Hurst Road monitor is 31.9  $\mu\text{g}/\text{m}^3$ , over 3  $\mu\text{g}/\text{m}^3$  below the NAAQS (which provides a “buffer” to account for concentrations in unmonitored grid cells across the nonattainment area). Modeled 2027 design values at the other two monitors near downtown Fairbanks are well below the NAAQS as shown in Table 7.9-13. In the rightmost column of Table 7.9-13, modeled design values for 2026 are presented. The modeled 2026 design value for the Hurst Road monitor is 38.1  $\mu\text{g}/\text{m}^3$ , which exceeds the 35  $\mu\text{g}/\text{m}^3$  NAAQS by over 3  $\mu\text{g}/\text{m}^3$ .

And as explained earlier in Section 7.9.1.2, even if emission controls were applied for precursor pollutants within applicable source sectors for which precursor significance determinations have been made, the reduction in secondary  $\text{PM}_{2.5}$  from such controls would not be sufficient to advance attainment sooner than 2027.

Therefore, this air quality modeling-based evaluation demonstrates that 2027 is the most expeditious attainment date forecasted for the Fairbanks  $\text{PM}_{2.5}$  nonattainment area based on currently available data and complies with 40 C.F.R. § 51.1004(a)(3) requirements to demonstrate attainment “as expeditiously as practicable.”