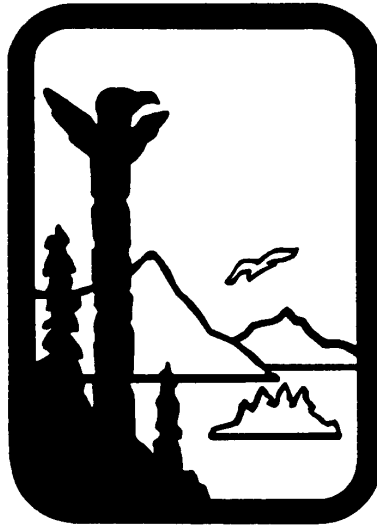


**Than**  
**ALASKA DEPARTMENT OF**  
**ENVIRONMENTAL CONSERVATION**



**Fairbanks North Star Borough PM2.5**  
**Serious Area 2020 Amendments State Implementation Plan**

**Quantitative Milestone Report**

**March 29, 2024**

**Mike Dunleavy, Governor**

**Emma Pokon, Commissioner**

# Fairbanks 2024 Quantitative Milestone Report

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# 1. SUMMARY

## 1.1 Introduction

Relevant Regulatory Actions –A portion of the Fairbanks North Star Borough (Borough or FNSB) that includes the cities of Fairbanks and North Pole as well as surrounding areas was classified as a Moderate PM<sub>2.5</sub> nonattainment area in November 2009\* for violation of the 24-hour average standard (35 µg/m<sup>3</sup>) enacted in 2006. The Alaska Department of Environmental Conservation (DEC) was given until December 2014 to prepare and submit a State Implementation Plan (SIP) that included a strategy to attain the PM<sub>2.5</sub> National Ambient Air Quality Standards (NAAQS) in the FNSB area. In compliance with U.S. Environmental Protection Agency (EPA) requirements, the Moderate Area SIP evaluated whether attainment could be demonstrated by December 31, 2015 or if not, explain why attainment by that date was impracticable. Emission inventories were prepared, control strategies were developed and evaluated, and air quality modeling was conducted under the Moderate SIP. This analysis led the State of Alaska to conclude that the level of emission reductions required to attain the PM<sub>2.5</sub> NAAQS could not be achieved by that December 2015 date. Thus, the Moderate SIP found that attainment of the 24-hour PM<sub>2.5</sub> standard by 2015 was impracticable.

As a result of the FNSB area's failure to attain the 24-hour PM<sub>2.5</sub> standard by 2015, the EPA reclassified† the area (effective June 9, 2017) as a Serious PM<sub>2.5</sub> nonattainment area, for which attainment by 2019 must be evaluated and a more stringent analysis of control measures conducted and tracked within the inventory.

On July 29, 2016, EPA also promulgated‡ the PM<sub>2.5</sub> Implementation Rule (subsequently referred to as the PM Rule) which interprets the statutory requirements that apply to PM<sub>2.5</sub> NAAQS nonattainment areas under subparts 1 and 4 of the nonattainment provisions of the CAA. These requirements govern both attainment plans and nonattainment new source review (NNSR) permitting programs and specify planning requirements that include:

- plan due dates, attainment dates and attainment date extension criteria;
- the process for determining control strategies, including Reasonably Available Control Measures/Reasonably Available Control Technology (RACM/RACT) for Moderate areas and Best Available Control Measures/Best Available Control

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\* Federal Register, Vol. 74, No. 218, November 13, 2009 (74 FR 58688).

† Federal Register, Vol. 82, No. 89, May 10, 2017 (82 FR 21711).

‡ Federal Register, Vol. 81, No. 164, August 24, 2016 (81 FR 58010).

Technology (BACM/BACT) and Most Stringent Measures (MSM) for Serious areas;

- guidelines for attainment demonstrations for areas that can attain by the statutory attainment date, and “impracticability” demonstrations for areas that cannot practicably attain by the statutory attainment date;
- Reasonable Further Progress (RFP) and quantitative milestones (QM) for demonstrating RFP; and
- contingency measures for areas that fail to meet RFP or fail to attain the NAAQS by the attainment date.

On September 8, 2017, EPA approved the FNSB PM<sub>2.5</sub> Moderate Area SIP (effective October 10, 2017) which was originally submitted by DEC in December 2014 (and included supplemental clarifying information). EPA found that the Moderate SIP met all statutory and regulatory requirements including those for base-year and projected emissions inventories as well as those associated with Reasonable Further Progress, Quantitative Milestone and Motor Vehicle Emission Budget (MVEB) requirements.

On December 13, 2019, DEC submitted the Fairbanks PM<sub>2.5</sub> Serious Area SIP to EPA. Its key finding was that attainment by the statutorily required date of December 31, 2019 was not possible. As clarified in the PM Rule and in accordance with CAA section 189(d), Fairbanks was then required to submit a plan revision to EPA within 12 months of failing to attain by December 2019. This plan revision required annual reductions in PM<sub>2.5</sub> or precursor emissions within the area of not less than 5 percent of the amount of such emissions as reported in the most recent inventory prepared for Fairbanks.

On December 15, 2020, DEC submitted the 2020 Amendments Plan to the Serious Area SIP (or 2020 Amendments Plan) to EPA. It accounted for incorporation of more recent ambient monitoring data (from 2016 through 2019) and an associated 2019 Base Year into the attainment modeling analysis as required under the PM Rule for Serious nonattainment areas that fail to attain the NAAQS. This recent monitoring data showed steady decreases in ambient PM<sub>2.5</sub> concentrations that resulted in a significantly lower baseline “design value” in the nonattainment area than applied in the Serious SIP. Thus, the attainment analysis in the 2020 Amendments Plan was able to model attainment by December 31, 2024. Updated emission inventories and an updated RFP/QM analysis were also included in the 2020 Amendments Plan.

However, attainment modeling performed under that plan was hampered by the absence of speciated ambient PM<sub>2.5</sub> monitoring data from the Hurst Road monitor (the site that typically measures the highest PM<sub>2.5</sub> concentrations in the nonattainment area) and a more current modeling episode upon which to validate the air quality model and assess future attainment. In the 2020 Amendments Plan, DEC committed to and completed the development of a new attainment modeling platform based upon newly collected speciated ambient monitoring data at all three regulatory monitoring sites in the nonattainment area (NCore, A Street, and Hurst Road) and a new 74-day winter 2019-2020 modeling episode.

DEC is incorporating the results of the updated attainment analysis from the new modeling platform in a revised plan, the 2024 Amendment to the 189(d) Plan for the Fairbanks Area Serious Plan (subsequently referred to as the 2024 Amendment) that is expected to be released for public review in April 2024 and submitted to EPA in final form during Summer or Fall of 2024. The Base Year for the 2024 Amendment Plan is 2020. The attainment analysis supporting this plan found that the most expeditious attainment date is December 31, 2027. The delay in attainment relative to the 2020 Amendment Plan is the result of a more accurate and current modeling platform, including updated control emission inventories. Key updates in these emission inventories included:

1. Revised space heating emissions based on a new 2023 residential home heating survey; and
2. New point source emissions based directly on emission unit-level daily and hourly fuel usage for the 74-day 2019-2020 modeling episode.

Thus, the baseline and control emission inventories being used to support the attainment modeling under the 2024 Amendment Plan serves as the basis for this RFP report as explained below.

2024 Amendment Plan RFP Requirements – Section 189(c)(1) of the CAA requires PM implementation plans to include Quantitative Milestones which are to be achieved every 3 years until the area is re-designated attainment and which demonstrate reasonable further progress toward attainment by the applicable date. QM requirements for PM<sub>2.5</sub> for the 2024 Amendment Plan are given in 40 C.F.R. § 51.1013(a)(3) and 40 C.F.R. § 51.1013(a)(4). Based on the 2020 Base Year and 2027 Attainment Year reflected in this Plan, Table 1-1 lists the applicable RFP and QM analysis years.

**Table 1-1**  
**FNSB Reasonable Further Progress and Quantitative Milestone Analysis Years**

Base Year	Attainment Year	RFP and QM Analysis Years
2020	2027	2023, 2026, 2029

As required under 40 C.F.R. § 51.1013(b), not later than 90 days after the date on which a milestone applicable to a PM<sub>2.5</sub> nonattainment area occurs, each state in which all or part of such area is located shall submit to the EPA Administrator a milestone report that contains all of the following elements:

1. A certification by the Governor or Governor's designee that the attainment plan control strategy is being implemented consistent with the RFP plan, as described in the applicable attainment plan;
2. Technical support, including calculations, sufficient to document completion statistics for appropriate milestones and to demonstrate that the quantitative milestones have been satisfied and how the emissions reductions achieved to date compare to those required or scheduled to meet RFP; and,
3. A discussion of whether the area will attain the applicable PM<sub>2.5</sub> NAAQS by the projected attainment date for the area.

This RFP report (subsequently referred to as the 2024 RFP report) reflects the State of Alaska’s commitment to fulfilling these reporting requirements as they pertain to satisfying QM requirements for the progress toward attainment of the 2006 PM<sub>2.5</sub> NAAQS in the FNSB nonattainment area.

RFP Metric and Applicable Pollutants – Alaska has chosen to use EPA’s preferred metric: emission reductions achieved compared to projected emission reductions to track and report on RFP. As further explained within Section III.D.7-10 of the upcoming 2024 Amendment Plan, pollutants for which RFP must be reported for the Fairbanks PM<sub>2.5</sub> nonattainment area consist of directly emitted PM<sub>2.5</sub>, and precursor pollutants sulfur dioxide (SO<sub>2</sub>) and ammonia (NH<sub>3</sub>).

Control Measures Evaluated – The control measures for which RFP was evaluated under this report are listed in Table 1-2 along with the implementation/phase-in schedule for each measure by RFP year. This list of control measures corresponds to those being incorporated into the 2024 Amendment Plan for which emission benefits were quantified and thus represents a subset of the controls adopted as State of Alaska air quality regulations with the 2024 Amendment Plan under 18 AAC 50.\*

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\* <https://www.epa.gov/sites/production/files/2017-10/documents/sip-ak-approved-regulations-18-aac-50.pdf>



**Table 1-2  
Control Measure Implementation Schedule by Quantitative Milestone Year**

Measure Summary and ID	Start Year	Implementation Parameter	Phase-In Schedule by Year				Benefit Type
			2023	2026	2027	2029	
Borough Wood Stove Change Out Program (WSCO)	2010, On-going <sup>a</sup>	No. of Changeouts	3,576	5,078	5,628 <sup>a</sup>	5,937	Accumulative as funded
SFBA Episodic Curtailment Program (Curtailment) <sup>b</sup>	2016, On-going <sup>b</sup>	Compliance Rate	38%	38%	38%	38%	Recurrent
(Shift space heating from #2 to #1 oil (STF-12))	2023	Combined Penetration/ Compliance Rate	72%	95%	95%	95%	One-Time
Requires commercially sold wood to be dry before sale (STF-13)	2022	Combined Penetration/ Compliance Rate	40%	45%	50%	50%	One-Time
Removal of all uncertified devices & cordwood OHHs (STF-17)	2024	Combined Penetration/ Compliance Rate	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)	2020	Combined Penetration/ Compliance Rate	35%	35%	35%	35%	Accumulative
Removal of coal heaters (BACM-48)	2024	Combined Penetration/ Compliance Rate	n/a	25%	25%	25%	One-Time
Wood-fired devices may not be primary or only heating source (STF-22)	2020	Combined Penetration/ Compliance Rate	0%, 0% <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)	2020	Combined Penetration/ Compliance Rate	30%	50%	50%	50%	One-Time

<sup>a</sup> In the Serious Area Plan, WSCO counts were reported from 2013 forward. Under this Revised 2024 Amendment Plan, historical counts back to program start-up in July 2010 were also included.

<sup>b</sup> Includes lowering of alert stage thresholds from 25 µg/m<sup>3</sup> and 35 µg/m<sup>3</sup> to 20 µg/m<sup>3</sup> and 30 µg/m<sup>3</sup> for Stages 1 and 2, respectively, effective January 8, 2020 as adopted under State regulations.

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

n/a – Not applicable in years preceding start year

For each measure, Table 1-2 lists the start year (first full calendar year from planned implementation date), the parameter used to describe measure penetration or phase-in and their forecasted values in each QM year. (The projected 2027 attainment year in the 2024 Amendment Plan is also included.) For most measures listed in Table 1-2, the implementation parameter is the combined compliance and penetration rate forecasted for the measure in each applicable year. For the Wood Stove Change Out (WSCO) Program, which also included the Borough-funded Oil-To-Gas Conversion (OGC) Program, the implementation parameter listed is the expected number of change-outs.

Table 1-2 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.

## 1.2 RFP Findings

Emission Reduction Targets – Based on the control measures and implementation/phase-in schedule presented earlier in Table 1-2 projected emission reductions for each applicable pollutant in each calendar year were calculated and compared to targets in milestone years (2023, 2026 and 2029) to evaluate linear progress toward attainment. Table 1-3 shows calculated RFP/QM milestone year emission reduction targets based on linear progress towards attainment by 2027, along with 2020 Base Year and 2027 Attainment Year emissions for the nonattainment area.

**Table 1-3  
Linear Milestone Year Emission Reduction Targets (tons/day)**

<b>Pollutant</b>	<b>Emissions (tons/day)</b>		<b>Reduction Targets (tons/day)</b>		
	<b>2020</b>	<b>2027</b>	<b>2023</b>	<b>2026</b>	<b>2029</b>
Direct PM <sub>2.5</sub>	2.947	1.744	<b>0.516</b>	<b>1.032</b>	<b>1.2047</b>
SO <sub>2</sub>	15.625	14.7687	<b>0.367</b>	<b>0.734</b>	<b>0.857</b>
NH <sub>3</sub>	0.285	0.309	<b>-0.010</b>	<b>-0.017</b>	<b>-0.024</b>

The linear emission reduction targets in each milestone year are highlighted in the rightmost columns of Table 1-3. Emissions and emission reductions reflect daily averages over the modeled nonattainment episode days for the 2019-2020 episode supporting the 2024 Amendment Plan.

The negative reductions for NH<sub>3</sub> reflect population growth-projected emission increases between 2020 and 2027 coupled with the fact that NH<sub>3</sub> emission benefits were not quantified from controls within the sectors evaluated given the uncertainty of underlying NH<sub>3</sub>-specific emission factors for key sources. In particular, NH<sub>3</sub> emission factors for wood-burning devices have a very high level of uncertainty. But comparisons between emission factors for wood-burning vs. heating oil or natural gas burning space heating devices indicate controls that shifting wood use to liquid and/or gaseous fueled devices provide significant reductions in NH<sub>3</sub> emissions, despite the uncertainty associated with wood burning devices. These emission factor comparisons supporting the 2024 Amendment Plan clearly demonstrate that the State’s control measures would be expected to provide NH<sub>3</sub> co-benefits at levels like those for PM<sub>2.5</sub> if quantified.

Calculated Emission Reductions – Based on the control measure phase-in schedule presented earlier in Table 1-2, projected emission reductions for each applicable pollutant in each milestone year were calculated and compared to their targets to provide an

updated evaluation of linear progress toward attainment. These comparisons are summarized in Table 1-4.

The target reductions shown in Table 1-4 are from Table 1-3. Achieved reductions were calculated for each milestone year based on individual measure projected implementation and phase-in. Achievement of linear progress in a given milestone year is indicated by a “Yes” or “No” in the “Linear Progress Met?” row for each pollutant.

As shown in the upper third of Table 1-4, direct PM<sub>2.5</sub> emission reductions achieved within the first two milestone years (2023 and 2026) are projected to slightly lag the trajectory of linear progress toward estimated attainment by 2027 (and through 2029). This results from several factors that include future increases in WSCO Program throughput and marshalling of State staffing to increase compliance for several measures over time.

**Table 1-4  
Projected Progress toward Linear Emission Reduction Targets (tons/day)**

<b>Pollutant</b>	<b>Metric</b>	<b>2023</b>	<b>2026</b>	<b>2027</b>	<b>2029</b>
Direct PM <sub>2.5</sub>	Target Reduction	0.516	1.032	<i>1.204</i>	1.204
	Achieved Reduction	0.474	1.007	<i>1.204</i>	1.323
	Linear Progress Met?	No	No	Yes	Yes
SO <sub>2</sub>	Target Reduction	0.367	0.734	<i>0.857</i>	0.857
	Achieved Reduction	0.802	0.947	<i>0.857</i>	0.676
	Linear Progress Met?	Yes	Yes	Yes	No
NH <sub>3</sub>	Target Reduction	-0.010	-0.021	<i>-0.024</i>	-0.024
	Achieved Reduction	-0.020	-0.024	<i>-0.024</i>	-0.028
	Linear Progress Met?	No	No	Yes	No

The middle portion of Table 1-4 indicates that progress toward attainment for secondary pollutant SO<sub>2</sub> is expected to be non-linear but includes early year (2023 and 2026) progress that significantly exceeds the linear progress trajectory. This non-linearity in control measure reductions for SO<sub>2</sub> is due to two causes. First, most of the measures designed to reduce direct PM<sub>2.5</sub> through removal, curtailment or replacement of solid-fuel devices trigger a shift in heating energy to higher SO<sub>2</sub> emitting heating oil. Second, decreases in SO<sub>2</sub> emissions reflected in Table 1-4 to offset these increases are the result of the SO<sub>2</sub>-specific measure STF-12 (Shift from #2 to #1 heating oil) which was implemented in September 2022.

Thus, control measure emission reductions for SO<sub>2</sub> exhibit stepwise rather than linear progress. The explanation above justifies this stepwise progress as required under 40 CFR 51.1012(4).

Finally, progress for NH<sub>3</sub> is shown in the lower portion of Table 1-4 and indicates that linearly established targets will not be met until the forecasted 2027 attainment year. The

negative emission reductions for NH<sub>3</sub> shown in Table 1-4 (i.e., emission increases) are not due to control measure benefits. As noted earlier, control measure reductions were only quantified for direct PM<sub>2.5</sub> and SO<sub>2</sub> due to large uncertainty in NH<sub>3</sub> emission factors for key sources.

Graphical Comparisons – Figure 1-1 through compares the projected emissions and linear progress for NH<sub>3</sub>, albeit without quantifying NH<sub>3</sub> benefits from adopted control measures.

Figure 1-3 provide visual pictures of forecasted emission reduction progress for direct PM<sub>2.5</sub>, SO<sub>2</sub> and NH<sub>3</sub>, respectively between the 2020 base year, the 2027 attainment year, and the applicable 2023, 2026 and 2029 QM years. Projected controlled emissions from the 2024 Amendment Plan in each QM year are plotted in blue; the linear progress trajectory is shown as a dashed red line.

As shown in Figure 1-1, forecasted controlled PM<sub>2.5</sub> emissions are very close to the linear progress line in QM years 2023 and 2026. And PM<sub>2.5</sub> emissions in the 2029 QM year are forecasted to continue decreasing from 2027 attainment year levels.

**Figure 1-1  
Quantitative Milestone Analysis for PM<sub>2.5</sub>**

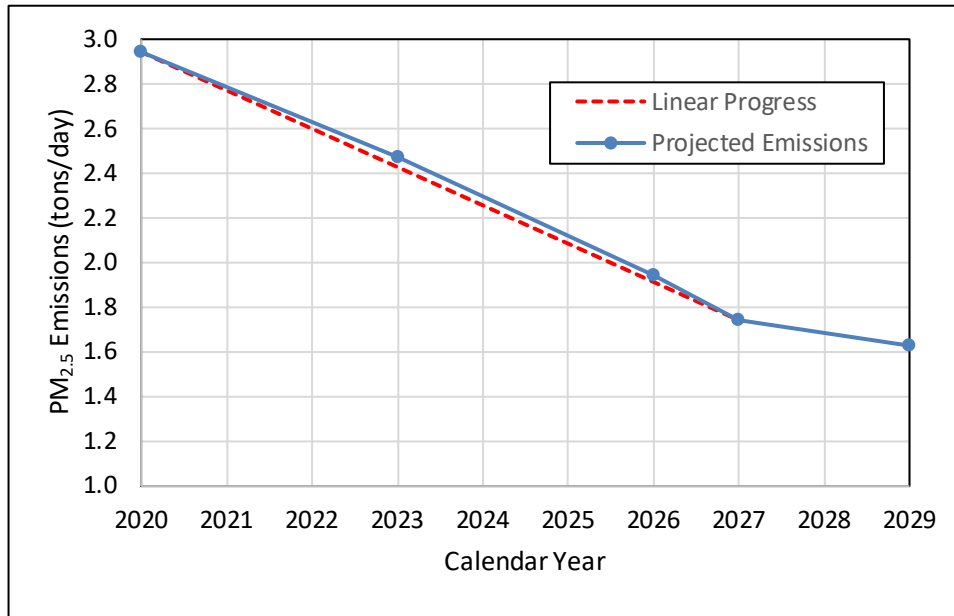
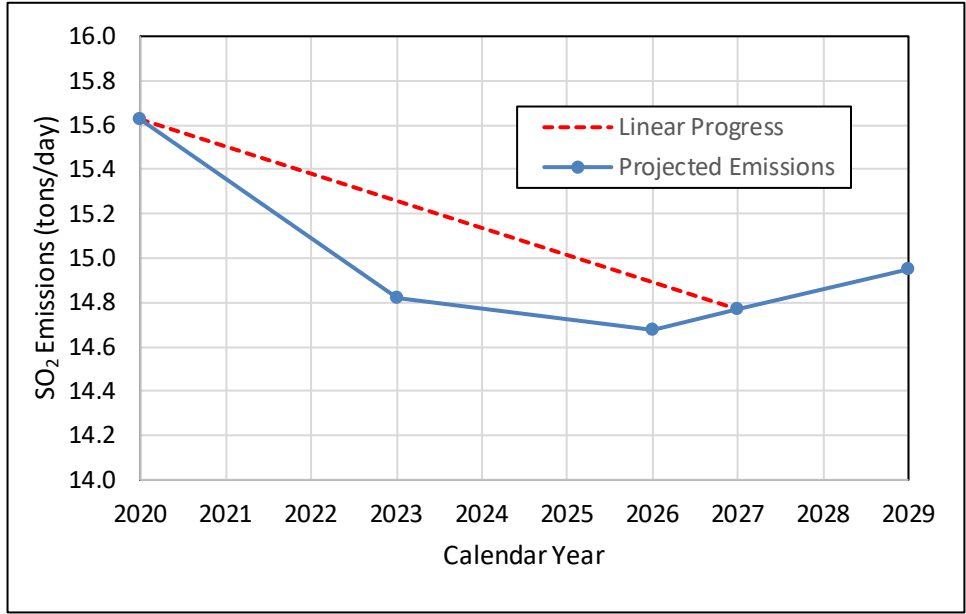


Figure 1-2 illustrates the stepwise progress toward 2024 attainment for SO<sub>2</sub> emissions in the nonattainment area.

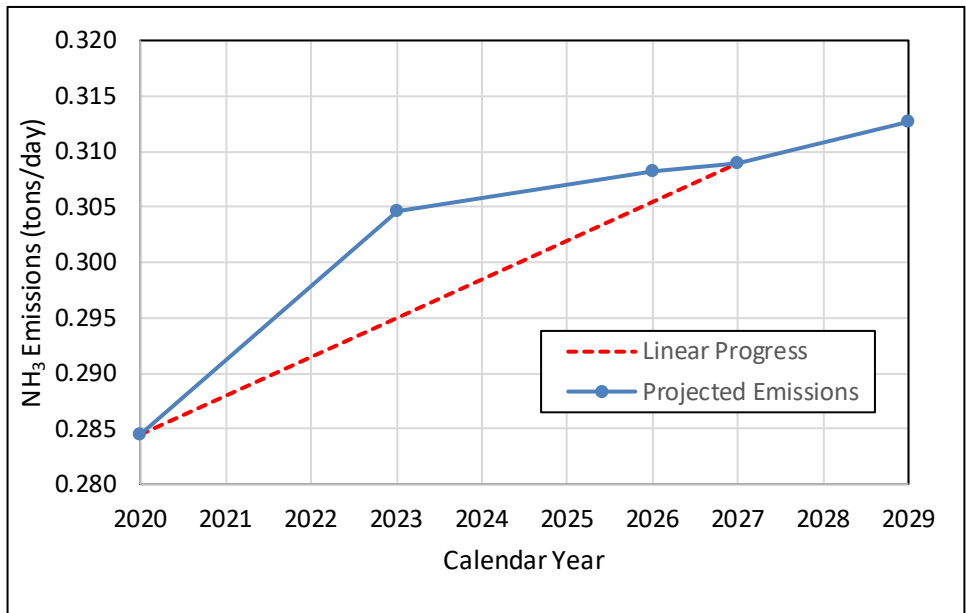
**Figure 1-2  
Quantitative Milestone Analysis for SO<sub>2</sub>**



Finally, compares the projected emissions and linear progress for NH<sub>3</sub>, albeit without quantifying NH<sub>3</sub> benefits from adopted control measures.

Figure 1-3 compares the projected emissions and linear progress for NH<sub>3</sub>, albeit without quantifying NH<sub>3</sub> benefits from adopted control measures.

**Figure 1-3  
Quantitative Milestone Analysis for NH<sub>3</sub>**



### 1.3 Organization of the Report

Following this summary section, the remainder of the report is organized in a manner consistent with the quantitative milestone requirements listed in 40 CFR § 51.1013(4)(b).

Section 2 contains a certification by the Governor's designee that the SIP control strategy is being implemented consistent with the RFP plan. Section 3 describes supporting technical calculations sufficient to document and demonstrate that the quantitative milestones have been satisfied. It also describes how the emissions reductions achieved to date compare to those required or scheduled to meet RFP. Section 4 provides a discussion of whether the area will attain the applicable PM<sub>2.5</sub> NAAQS by the projected attainment date for the area.

###

## 2. SIP CONTROL STRATEGY CERTIFICATION



THE STATE  
of **ALASKA**  
GOVERNOR BILL WALKER

### Department of Environmental Conservation

OFFICE OF THE COMMISSIONER

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March 29, 2024

Casey Sixkiller  
Regional Administrator  
U.S. EPA Region 10  
Regional Administrator's Office, Mail Code: RA-210  
1200 Sixth Avenue, Suite 900  
Seattle, WA 98101

Re: Fairbanks Quantitative Milestone Report

Dear Mr. Sixkiller:

The Alaska Department of Environmental Conservation (DEC) in accordance with the Clean Air Act (CAA) 189(c)(2) and 40 CFR 51.1013(b) is submitting the enclosed Quantitative Milestone Report for the Fairbanks North Star Borough's (FNSB) PM<sub>2.5</sub> nonattainment area. The State Implementation Plan (SIP) for the FNSB PM<sub>2.5</sub> nonattainment area identified specific milestones to be reached in 2023. The enclosed report verifies that the 2023 milestones have been met.

Jason Olds is available to respond to any questions your staff might have or provide any additional information they might need. He can be reached at (907) 465-5109. As always, I would be pleased to discuss any of this with you.

Sincerely,

A handwritten signature in black ink that reads "EPok".

Emma Pokon  
Commissioner

cc via email: Krishna Viswanathan, EPA Region 10  
Debra Suzuki, EPA Region 10  
Matt Jentgen, EPA Region 10  
Jason Olds, DEC  
Nick Czamecki, DEC

### 3. SUPPORTING CALCULATIONS

This section of the report discusses the data, assumptions and methods used to calculate emission benefits attributed to each analyzed control measure. In the context of the RFP demonstration, control measures discussed in this section refer to DEC and Borough control measures/programs that were already adopted and implemented under the preceding Serious Plan and 2020 Amendment Plan. The control measure reductions presented in this section are based on updated estimates of measure-specific compliance and penetration rates developed in support of the 2024 Amendment Plan.

Detailed calculation methods, supporting assumptions, and data for the control measures for which emission benefits were quantified are presented by reference within the previously submitted 2020 Amendments Plan as follows:

- Section III.D.7.6.8 – Provides a discussion of the control measures and activity data and methods used to estimate emission reductions in the 2024 attainment year.
- Section III.D.7.9.2.2 – Contains summaries of calculated emission reductions by individual control measure/program and combined “packaged” benefits (that avoid double counting of benefits where measures overlap) for attainment year 2024 and 2023 (the year used to evaluate expeditious attainment).
- Appendix III.D.7.6 – Spreadsheets included with this Emission Inventory appendix that provide documented step-by-step calculation of the PM<sub>2.5</sub> and SO<sub>2</sub> emission benefits from each of the measures (and the methodology to account for measure overlap) in each year from 2020 through 2029.

For this 2024 Quantitative Milestone report, the calculated emission reductions are consistent with methodologies employed in developing control inventories under earlier Serious and 2020 Amendment Plans. As noted above, the key difference relative to the reductions in the 2020 Amendment Plan are the result of updated data and projections of control measure compliance and penetration that are discussed in the following subsection.

#### 3.1 Control Measure Benefit Calculations

Control Measures Analyzed and Implementation/Penetration Schedules – As shown earlier in Table 1-2, the increases in phase-in percentages shown by inventory year generally reflect improvements in compliance and/or accumulative 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 1-2 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 of infrared camera to enhance enforcement under 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%. A similar study is being 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 requires 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 have 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 1-2,

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 a new 2023 Home Heating survey supporting the 2024 Amendment Plan, 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 1-2. 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 reflects 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 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 1-2, 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 1-2 for this measure reflect projected penetration rates 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.

MOVES Model Version – Effective September 12, 2023\*, EPA released a new version of its MOVES mobile source vehicle emissions model, MOVES4 for use in SIP and

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\* Federal Register, Vol. 88, No. 175, Tuesday, September 12, 2023

conformity applications. The prior version, MOVES3 was used to develop the emission inventories, attainment modeling and quantitative milestone targets in the 2024 Amendment Plan since the development of these plan elements preceded the release of MOVES4. DEC has continued to use MOVES3 to represent mobile source emissions for this RFP report to maintain consistency with the milestone emission targets established in the 2024 Amendment Plan, which are based on that version of the model.

### 3.2 Summary of Emission Reductions

Table 3-1 presents the projected PM<sub>2.5</sub> emission benefits associated with the updated control measure analysis reflected in this RFP report by measure and milestone year (including the 2027 attainment year). Table 3-2 presents a similar summary for SO<sub>2</sub> emission benefits. (Red negative numbers reflect emission increases for specific measures. These are the result of measures like the STF-22 that tend to shift space heating energy use from wood to heating oil, which has higher SO<sub>2</sub> per unit energy.)

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 3-1 and Table 3-2 also properly account for measure overlap within the combined control package (eliminating double counting of benefits).

**Table 3-1  
PM<sub>2.5</sub> Emission Reductions from Post-2020 Control Measures by Milestone Year**

<b>Measure Summary and ID</b>	<b>Emission Reductions<sup>a</sup> (tons/episodic day)</b>			
	<b>2023</b>	<b>2026</b>	<b>2027</b>	<b>2029</b>
Borough Wood Stove Change Out Program (WSCO)	0.34	0.91	1.09	1.22
SFBA Episodic Curtailment Program (Curtailment) <sup>b</sup>	S1 <sup>b</sup> : 0.02 S2 <sup>b</sup> : 0.12	S1 <sup>b</sup> : 0.02 S2 <sup>b</sup> : 0.12	S1 <sup>b</sup> : 0.02 S2 <sup>b</sup> : 0.12	S1 <sup>b</sup> : 0.02 S2 <sup>b</sup> : 0.12
(Shift space heating from #2 to #1 oil (STF-12))	0.01	0.02	0.02	0.02
Requires commercially sold wood to be dry before sale (STF-13)	0.06	0.06	0.06	0.06
Removal of all uncertified devices & cordwood OHHs (STF-17)	0.30	0.26	0.25	0.25
2.0 g/hr and 0.10 lb/mmBTU certified emission rates for new or re-conveyed wood devices (BACM-R8)	0.05	0.08	0.09	0.12
Removal of coal heaters (BACM-48)	n/a	<0.01	<0.01	<0.01
Wood-fired devices may not be primary or only heating source (STF-22)	<0.01	0.03	0.03	0.04
NOASH/Exemption requirements (STF-23)	<0.01	<0.01	<0.01	<0.01
<b>Combined Total, Area Space Heating (accounting for measure overlap)</b>	<b>S1<sup>b</sup>: 0.45 S2<sup>b</sup>: 0.58</b>	<b>S1<sup>b</sup>: 1.05 S2<sup>b</sup>: 1.17</b>	<b>S1<sup>b</sup>: 1.24 S2<sup>b</sup>: 1.37</b>	<b>S1<sup>b</sup>: 1.39 S2<sup>b</sup>: 1.52</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.

**Table 3-2**  
**SO<sub>2</sub> Emission Reductions from Post-2020 Control Measures by Milestone Year**

Measure Summary and ID	Emission Reductions <sup>a</sup> (tons/episodic day)			
	2023	2026	2027	2029
Borough Wood Stove Change Out Program (WSCO)	0.03	0.09	0.11	0.15
SFBA Episodic Curtailment Program (Curtailment) <sup>b</sup>	S1 <sup>b</sup> : -0.00 S2 <sup>b</sup> : -0.02	S1 <sup>b</sup> : -0.00 S2 <sup>b</sup> : -0.02	S1 <sup>b</sup> : -0.00 S2 <sup>b</sup> : -0.02	S1 <sup>b</sup> : -0.00 S2 <sup>b</sup> : -0.02
(Shift space heating from #2 to #1 oil (STF-12)	1.32	1.73	1.73	1.74
Requires commercially sold wood to be dry before sale (STF-13)	<0.01	<0.01	<0.01	<0.01
Removal of all uncertified devices & cordwood OHHs (STF-17)	-0.01	-0.01	-0.01	-0.01
2.0 g/hr and 0.10 lb/mmBTU certified emission rates for new or re-conveyed wood devices (BACM-R8)	<0.01	<0.01	<0.01	<0.01
Removal of coal heaters (BACM-48)	n/a	<0.01	<0.01	<0.01
Wood-fired devices may not be primary or only heating source (STF-22)	<0.01	<-0.01	<-0.01	<-0.01
NOASH/Exemption requirements (STF-23)	<0.01	<0.01	<0.01	<0.01
<b>Combined Total, Area Space Heating (accounting for measure overlap)</b>	<b>S1<sup>b</sup>: 1.31 S2<sup>b</sup>: 1.30</b>	<b>S1<sup>b</sup>: 1.78 S2<sup>b</sup>: 1.77</b>	<b>S1<sup>b</sup>: 1.81 S2<sup>b</sup>: 1.80</b>	<b>S1<sup>b</sup>: 1.85 S2<sup>b</sup>: 1.84</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.

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#### 4. ATTAINMENT FINDINGS

As required in 40 CFR 51.1013(4)(b)(3) the quantitative milestone report must include a discussion of whether the area will attain the applicable PM<sub>2.5</sub> NAAQS by the projected attainment date for that area. Pursuant to this requirement, DEC finds that the Fairbanks Serious PM<sub>2.5</sub> nonattainment area is projected to attain the 24-hour PM<sub>2.5</sub> NAAQS by December 31, 2027. This is the projected attainment date in the upcoming 2024 Amendment Plan and is based on a new, more rigorous modeling platform and more current emission inventories than the preceding 2020 Amendment Plan and Serious Plan.

As demonstrated earlier in this report, emission inventory projections based on control measures evaluated under the 2024 Amendment Plan show that reasonable further progress toward that attainment date is being achieved.

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