

**ALASKA DEPARTMENT OF  
ENVIRONMENTAL CONSERVATION**



**Amendments to:**

**State Air Quality Control Plan**

**Vol. II: III.D.7.9**

**Attainment Demonstration – 2024 & 2029**

**Adopted**

November 19, 2019

**Michael J. Dunleavy, Governor**

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## 7.9 Attainment Demonstration – 2024 & 2029

Section 189 of the Clean Air Act<sup>1</sup> requires states with a Serious nonattainment area to meet the planning requirements contained in the Moderate Area Plan and, in addition, prepare an implementation plan which satisfies the following requirements:

*(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>2</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.

The regulation at 40 C.F.R. § 51.1003(b)(iv) states:

*(b) Nonattainment areas reclassified to Serious. (1) For any nonattainment area reclassified to Serious for a PM<sub>2.5</sub> NAAQS under § 51.1002(b), in addition to meeting the Moderate area attainment plan submission requirements set forth at § 51.1003(a), the state(s) shall submit a Serious area attainment plan that meets all of the following requirements:*

\* \* \*

*(iv) Attainment demonstration and modeling requirements set forth at § 51.1011 . . . .*

The regulation at 40 C.F.R. § 51.1004(a)(2)(ii) states:

*(ii) 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*

<sup>1</sup> CAA Part D, subpart 4, Section 189(b)(1)(A)

<sup>2</sup> 81 Fed. Reg. 58,010, 58,150.

*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). 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.*

The regulation at 40 C.F.R. § 51.1005(b)(1)(i) states, with regard to the attainment demonstration supporting a serious area attainment date extension request:

*(b) Nonattainment areas reclassified as Serious. (1) A state may apply for one attainment date extension not to exceed 5 years for a Serious nonattainment area if the following conditions are met:*

*(i) 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.....<sup>3</sup>*

The regulation at 40 C.F.R. § 51.1005(b)(2)(iii) states with regard to the attainment demonstration supporting a serious area attainment date extension request

*(2) At the time of application for an attainment date extension, the state shall submit to the EPA a Serious area attainment plan that meets the following requirements:*

*\* \* \**

*(iii) Attainment demonstration and modeling requirements set forth at §51.1011 that justify the state's conclusion under paragraph (b)(1)(i) of this section, and that demonstrate attainment as expeditiously as practicable;*

The regulation at 40 C.F.R. § 51.1011(b) states:

*(b) Nonattainment areas reclassified as Serious. The attainment demonstration due to the EPA as part of a Serious area attainment plan required under § 51.1003(b) or (c) shall 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.*

<sup>3</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 .

(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.

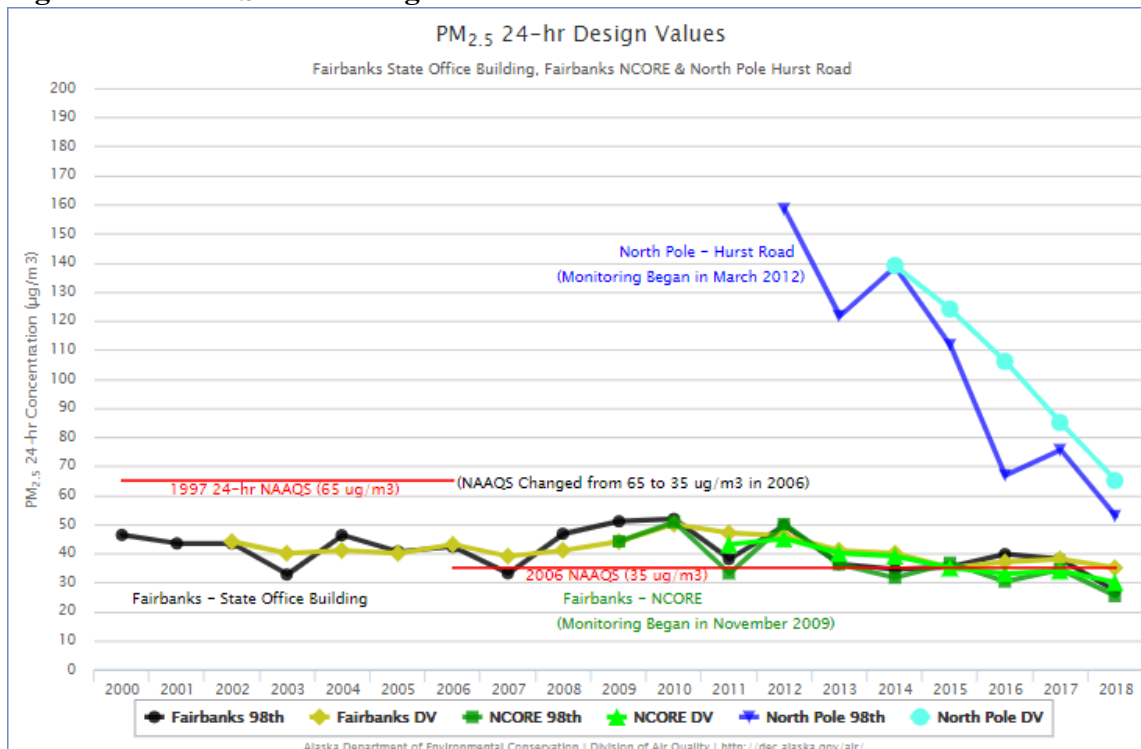
(3) The base year for the emissions inventories required for attainment demonstrations under this paragraph shall be one of the 3 years used for designations or another technically appropriate inventory year if justified by the state in the plan submission.

(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.

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 is unable to demonstrate attainment by the applicable 2019 attainment date is shown in Figure 7.9-1 and Table 7.9-1. With the current 2017 and 2018 98<sup>th</sup> percentile concentrations of 75.5µg/m<sup>3</sup> and 52.8µg/m<sup>3</sup> and a hypothetical 2019 0µg/m<sup>3</sup> 98<sup>th</sup> percentile concentration at the Hurst Road air monitoring site in North Pole, the three-year design value would be unable to meet the 35µg/m<sup>3</sup> 24 hour PM<sub>2.5</sub> NAAQS and thus would not be able to show monitored attainment in 2019.

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.

**Figure 7.9-1 PM<sub>2.5</sub> 24-hr Design Value Trends**



**Table 7.9-1 PM<sub>2.5</sub> Monitoring Data Trend 2012-2018**

<b>Monitoring Site</b>	<b>Year</b>						
	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>
State Office Building 98 <sup>th</sup> Percentile	49.6	36.3	34.5	35.3	39.7	38.0	27.0
State Office Building Design Value	46	41	40	35	37	38	35
NCore 98 <sup>th</sup> Percentile	50.0	36.2	31.6	36.7	30.3	34.4	25.3
NCore Design Value	45	40	39	35	33	34	30
North Pole 98 <sup>th</sup> Percentile	158.4	121.6	138.5	111.6	66.8	75.5	52.8
North Pole Design Value			139	124	106	85	65

Therefore, in accordance with CAA Section 188(e), 40 C.F.R. §§ 51.1004(a)(2)(ii) and 51.1005(b), the state is requesting a five year extension of the attainment date to 2024. Presented within this chapter is a modeling demonstration of attainment in 2024 as required to support an extension request. However, that modeling assumes that all wood-burning within the nonattainment area ceases (i.e. 100% compliance with the Stage 2 curtailments except for those structures that qualify for a No Other Adequate Source of Heat (NOASH) waiver). Due to the sub-arctic conditions and high energy costs in the community, this approach to attainment by 2024 which relies on 100% compliance with burning requirements during air episodes is unrealistic and not practicable. In order to meet the requirements of 40 C.F.R. §§ 51.1003(b)(1)(iv), 51.1005(b)(2)(iii), and 51.1011(b)(1) and adequately prepare for the potential triggering of additional planning obligations under CAA Section 189(d), DEC has prepared an additional attainment demonstration that demonstrates that 2029 is the most expeditious attainment date practicable.

The latest three-year design value (Table 7.9-1) shows improvements in air quality that have not been a result of milder weather (see Section III.D.7.4.4) and are a significant decrease from the 5-year modeling design value required for this plan. With the inability to demonstrate attainment in 2019 and the uncertainty of an extension request approval for a 2024 attainment date, 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.

Therefore, an estimated attainment date of 2029 is identified based on the CAA 189(d) annual 5 percent reduction requirement, a 5-year modeling design value of 131  $\mu\text{g}/\text{m}^3$ , and control measures identified in Section III.D.7.7. The State believes that based on the current planning analyses, 2029 is a more realistic and the most expeditiously practicable attainment date for the area.

However, because a new 5% plan revision required under CAA 189(d) would include an updated modeling design value and a new base-year emission inventory as well as the BACM contained in this plan, the attainment date may advance to earlier than 2029.

### 7.9.1. Attainment Demonstration – 2024 Extension Year Date

The 2024 “No Wood” Control scenario was developed using methodologies and data sources consistent with those described earlier in the Emission Inventory section of the Serious SIP

(Section III.D.7.6). The 2019 Control inventory described in Section III.D.7.6.4 was modified to evaluate attainment by 2024 in support of an extension request. These modifications included the following elements:

- Projected Activity Growth (2019-2024) – Source activity for all sectors (Point, Area-Space Heat, Area-Other, On-Road Mobile, Non-Road Mobile) was projected to grow from 2019 to 2024. Sector-specific growth factors and sources described earlier in Section III.D.7.6.3 were applied to forecast source activity from 2019 to 2024. Within the nonattainment area these annualized 2019-2024 growth rates ranged from 1.4% to 1.7% per year.<sup>4</sup> These growth rates are above the long-term socio-economic growth forecasts for the Fairbanks North Star Borough and account for increases in population and employment associated with the Eielson F-35 deployment.
- Federal Control Program Effects – EPA’s MOVES2014b model was executed for calendar year 2024 (including fleet growth) to account for on-going effects of the federal motor vehicle, non-road and fuel control programs.
- Elimination of Episodic Residential Wood-Burning Emissions – The 2024 No Wood Control scenario simulates the cessation/elimination of all residential wood burning during episodic conditions except from NOASH households, estimated to be up to 4% of nonattainment area households based on Fairbanks Home Heating Survey data collected during 2011-2015. The loss of heating energy from wood burning was assumed to be replaced with equivalent energy from expanded use of heating oil and accounted for greater heating efficiency from residential oil devices than wood burning devices.

As noted, full cessation of residential wood burning during air quality episodes may not be achievable by 2024, although recent trends in ambient monitoring data, in particular in North Pole as shown earlier in Table 7.9-1 suggest significant strides are being made in reducing emissions during episodic conditions.

Table 7.9-2 presents a summary of the resulting emission inventories by source sector for the 2024 No Wood Control scenario. Tabulations are given for both the modeling inventory (over the entire Grid 3 domain) and the planning inventory (covering the nonattainment area). As shown, wood burning emissions within the Space Heating Area Source sector are no longer the dominant source category under this scenario.

<sup>4</sup> Aircraft activity growth at Eielson Air Force Base, located just outside the nonattainment area, was well above these rates and within this five-year period was associated with full phase-in of F-35 fighter jet deployment as reported earlier in Section 7.6.3.

**Table 7.9-2  
2024 No Wood Control Episode Average Daily Emissions (tons/day) by Source Sector**

Source Sector	Modeling Inventory Grid 3 Domain Emissions (tons/day)					Planning Inventory NA Area Emissions (tons/day)				
	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	0.91	11.65	7.93	0.10	0.021	0.90	11.52	7.72	0.10	0.021
Area, Space Heating	0.34	2.81	5.44	0.74	0.056	0.30	2.63	4.99	0.66	0.053
Area, Space Heat, Wood	0.12	0.02	0.00	0.44	0.005	0.11	0.02	0.00	0.40	0.004
Area, Space Heat, Oil	0.09	2.56	5.29	0.15	0.005	0.09	2.39	4.85	0.14	0.005
Area, Space Heat, Coal	0.11	0.06	0.13	0.14	0.017	0.10	0.06	0.11	0.12	0.015
Area, Space Heat, Other	0.01	0.17	0.02	0.01	0.029	0.01	0.17	0.02	0.01	0.029
Area, Other	0.26	2.01	0.04	2.71	0.053	0.25	1.97	0.04	2.58	0.052
On-Road Mobile	0.12	2.16	0.04	3.54	0.064	0.10	1.75	0.04	2.95	0.051
Non-Road Mobile	0.59	2.75	17.14	6.67	0.003	0.28	1.16	10.53	0.61	0.000
<b>TOTALS</b>	<b>2.22</b>	<b>21.39</b>	<b>30.59</b>	<b>13.75</b>	<b>0.197</b>	<b>1.83</b>	<b>19.03</b>	<b>23.31</b>	<b>6.90</b>	<b>0.177</b>

For reference, Table 7.9-3 provides a comparison of sector-specific and total emission changes between the 2024 No Wood inventory and the 2019 Control inventory that was presented earlier in Section III.D.7.6. As seen in Table 7.9-3, wood burning is almost fully eliminated under the 2024 No Wood scenario, reflecting burning only in NOASH households.

**Table 7.9-3  
Relative Change (%) in Episode Average Daily Emissions (tons/day) by Source Sector,  
2024 No Wood vs. 2019 Control Inventory**

Source Sector	Modeling Inventory Change in Grid 3 Domain Emissions (%)					Planning Inventory Change in NA Area Emissions (%)				
	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	-86%	+7%	+30%	-92%	-61%	-86%	+8%	+29%	-92%	-60%
Area, Space Heat, Wood	-95%	-95%	-97%	-95%	-95%	-94%	-95%	-97%	-95%	-95%
Area, Space Heat, Oil	+34%	+32%	+36%	+34%	+38%	+32%	+30%	+34%	+32%	+31%
Area, Space Heat, Coal	+24%	+10%	+21%	+10%	+9%	+26%	+9%	+22%	+10%	+9%
Area, Space Heat, Other	+3%	+0%	+2%	+0%	+0%	+3%	+0%	+2%	+0%	+0%
Area, Other	+24%	+701%	+146%	+11%	+7%	+24%	+701%	+145%	+10%	+7%
On-Road Mobile	-35%	-7%	+458%	-2%	+33%	-32%	-4%	+469%	+3%	+34%
Non-Road Mobile	+13%	+10%	+12%	+1%	+17%	+14%	-4%	-1%	+50%	+0%
<b>TOTALS</b>	<b>-47%</b>	<b>+16%</b>	<b>+14%</b>	<b>-38%</b>	<b>-26%</b>	<b>-48%</b>	<b>+16%</b>	<b>+8%</b>	<b>-52%</b>	<b>-26%</b>

Modeling results for no wood burning, Table 7.9-4 shows the future design value for 2024 at the four monitored grid cells. The design value calculations are based on a 5-year modeling design value from 2011 to 2015 and the details of the calculations are in the SIP Modeling chapter, Section III.D.7.8. The gridded model outputs for 2013 and 2019 are detailed in the Modeling chapter. The emissions inventory was updated to reflect 100% compliance with no wood burning on violation day control (except in NOASH households).

**Table 7.9-4. 2024 FDV for Attainment Demonstration, 2019 Projected Baseline and Control Scenario Calculated and a 2013 Base Year**

	<b>NPHurst</b> Future Design Value ( $\mu\text{g}/\text{m}^3$ )	<b>NPE</b> Future Design Value ( $\mu\text{g}/\text{m}^3$ )	<b>NCORE</b> Future Design Value ( $\mu\text{g}/\text{m}^3$ )	<b>SOB</b> Future Design Value ( $\mu\text{g}/\text{m}^3$ )
2013 Base Year	131.63	45.3	37.96	38.93
2019 Control	104.16	36.42	28.87	29.57
2024 Attainment	23.72	17.01	17.08	17.65

### 7.9.2. Attainment Demonstration – 2029 Expeditious Alternative Date

As an adjunct to the 2024 No Wood scenario used to support the State’s extension request that was described in the preceding sub-section, an additional analysis was conducted to evaluate and project the most expeditious alternative attainment date using more supported projections of future controls beyond 2019. Instead, this analysis incorporated estimated emission benefits from the combined measures in the package of post-2019 regulations Alaska plans to adopt with this Serious Area SIP that are described in Section III.D.7.7.

This analysis still utilized the 5-year modeling design value of  $131 \mu\text{g}/\text{m}^3$  based on 2011-2015 regulatory monitoring data. However, in addition to modeling the earliest expeditious alternative attainment date based on this design value, it also included an inventory evaluation consistent with the requirements of a 5-Percent SIP that will be required to satisfy Clean Air Act Section 189(d) requirements for which the Fairbanks North Star Borough nonattainment area will be subject to for failing to attain the  $\text{PM}_{2.5}$  National Ambient Air Quality Standards (NAAQS) by 2019. The purpose of this element is to not only establish and model an alternative attainment date beyond the 2024 planning horizon of the Serious SIP, but to also ensure controls being adopted to meet that future date fulfill upcoming 5-Percent Plan requirements.

As explained further in this sub-section, Alaska currently projects calendar year 2029 as the most expeditious alternative attainment date due to measure implementation/penetration. This required the 2019 Control Inventory presented in Section III.D.7.6 to be projected to 2029 (to represent source activity changes) and then incorporate emission reductions reflecting on-going penetration of existing programs as well as new control measures being adopted by the state and implemented after 2019. These elements are discussed below.

Post-2019 Source Activity Growth – Source Activity growth rates used to project 2019 Control inventory emissions to 2029 were generally based on the 2019-2024 annualized growth rates (extended to 2029) by source sector presented in Table 7.6-11 of Section III.D.7.6. with the following exceptions:



- *Space Heating* – Although source activity growth after 2024 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 2024. 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 current (2019) price of heating oil is just under \$3/gallon. Based on regional energy price forecasts developed by the Energy Information Administration (EIA) the projected Fairbanks North Star Borough heating oil price in 2024 was \$3.86/gallon, significantly above the current price. This incorporates over a 10% increase in wood use between 2019 and 2024. Given the difficulty in reliably forecasting long-term energy prices this effect was capped after 2024. In other words, 2029 space heating emissions reflect a 10% increase in wood use over 2019 levels assuming oil prices at \$3.86/gallon in 2029.
- *Aircraft* – Aircraft activity at Eielson Air Force Base was assumed to remain constant after 2024. Since the increase in forecasted flights between 2019 and 2024 at Eielson is solely due to the deployment of an F-35 fighter jet squadron over this period, no further increase in flights after 2024 is expected.

Beyond these activity growth projections, the effects of the federal mobile source and fuel control programs in projecting mobile source emissions to 2029 was accounted for using EPA's MOVES2014b vehicle emissions model.

Control Measure Benefits - Table 7.9-5 lists the state and local control measures for which emission benefits were quantified<sup>5</sup> and included in the alternative attainment date analysis. The Borough's Wood Stove Change Out (WSCO) Program is highlighted in gray italics at the top of Table 7.9-5 to indicate that although it is not part of the State's post-2019 control measure package, it continues to provide benefits from change outs projected through 2023 based on currently available funding. The column labeled "Start Year" in Table 7.9-5 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 7.9-5 below the WSCO Program highlighted in tan reflect State measures for which benefits were quantified and included in the alternative attainment date 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 cross-walk to proposed State regulation sections.

<sup>5</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.

**Table 7.9-5**  
**List of Alternative Attainment Date Quantified Control Measures**

Source Sector	Measure ID	Measure Summary	Start Year
Area, Space Heat	<i>WSCO</i>	<i>Borough Wood Stove Change Out Program, reflecting future change outs using currently available funding<sup>a</sup></i>	<i>On-going, thru 2023</i>
	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 R9, R15, 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
Area, Space Heat	n/a	IGU-projected natural gas expansion through 2029	2020
Point	n/a	Fuel-based sulfur controls by 2029	2029

<sup>a</sup> Reflects WSCO program funding through 2017 EPA Targeted Air Shed (TAS) Grant.

Finally, the analysis also included forecasted emission benefits based on current Interior Gas Utility (IGU) projections of expansion of natural gas availability and use by 2029 as well as benefits from preliminary forecasts of fuel switch-based sulfur reductions within the point source sector, also by 2029.

Because of the current uncertainty regarding the timing and penetration of natural gas and fuel switching within the point source sector, 2029 was set as the year for which alternative attainment was assessed. The State plans to re-evaluate the most expeditious alternative attainment date based on updated forecasts for these elements under a possible 5-Percent SIP.

Table 7.9-6 provides further details on the phase-in percentage estimated for each control measure by 2029. Except where noted, this phase-in percentage reflects a combined compliance and penetration rate for each measure.

**Table 7.9-6  
Control Measure Benefit Phase-In Forecast in 2029**

Source Sector	Measure Summary	2029 Phase-In Percentage (%)	Benefit Type
Area, Space Heat	<i>Borough Wood Stove Change Out Program</i>	<i>Not applicable<sup>a</sup></i>	<i>Accumulative as funded</i>
	SFBA Episodic Curtailment Program <sup>b</sup>	50% Compliance	Recurrent
	Shift space heating from #2 to #1 oil	100%	One-Time
	Requires commercially-sold wood to be dry before sale	100%	One-Time
	Removal of all uncertified devices & cordwood OHHs	100%	One-Time
	2.0 g/hr and 0.10 lb/mmBTU certified emission rates for new or re-conveyed wood devices	100%	Accumulative
	Removal of coal heaters	80%	One-Time
	Wood-fired devices may not be primary or only heating source	Existing units: 80% New construction: 100%	Partially Accumulative
	NOASH/Exemption requirements	100%	One-Time
Area, Space Heat	IGU-projected natural gas expansion through 2029	17.2% household conversion rate	One-Time
Point	Fuel-based sulfur controls by 2029	100% at specific facilities	One-Time

<sup>a</sup> WSCO program benefits are on-going and reflect validated device change-outs/conversions recorded by the Borough and projected forward based on currently-secured funding.

<sup>b</sup> 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.

As shown in Table 7.9-6, this phase-in percentage is generally estimated to be at or close to 100%, reflecting the number of years between initial implementation and the projected 2029 attainment year. By 2029, the compliance rate for the Curtailment program is forecasted to increase from 30% in 2019 to 50%, reflecting increased awareness and on-going operating efficiencies. The estimated 17.2% conversion of additional residences in the nonattainment area to natural gas by 2029 is based on latest available projections from the Interior Gas Utility (IGU). Beyond these 2029 phase-in percentages, Section III.D.7.10 provides further projections of measure penetration at three-year Reasonable Further Progress (RFP) intervals.

Table 7.9-6 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 the measure 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.

Table 7.9-7 presents the projected calendar year 2029  $\text{PM}_{2.5}$  and  $\text{SO}_2$  emission benefits associated with each of the measures/programs listed in Table 7.9-5 and phase-in/penetration rates shown in Table 7.9-6. (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.

**Table 7.9-7**  
**Projected 2029 Emission Reductions for Post-2019 Control Measures under Alternative Attainment Date Analysis**

Measure ID	Measure Summary	Emission Reductions <sup>a</sup> (tons/episodic day)	
		PM <sub>2.5</sub>	SO <sub>2</sub>
<i>WSCO</i>	<i>Borough Wood Stove Change Out Program, reflecting future change outs using currently available funding</i>	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 R9, R15, 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</b> <b>S2<sup>b</sup>: 2.73</b>	<b>S1<sup>b</sup>: 2.33</b> <b>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 individual measure account for effects of overlap within the combined control measure 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.

Combined measure benefits shown at the bottom of Table 7.9-7 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 is included in the electronic appendix to this SIP section.

Modeling results for the 2029 Alternative Attainment Date analysis scenario are presented in Table 7.9-8, which shows modeled future design values for 2029 at the four monitored grid cells.

The design value calculations are based on a 5-year modeling design value from 2011 to 2015 and the details of the calculations are in the SIP Modeling chapter, Section III.D.7.8. The gridded model outputs for 2013 and 2019 are detailed in the Modeling chapter. The emissions inventory was updated to reflect combined Point Source and Space Heating Area Source emission reductions reflected in Table 7.9-7.

**Table 7.9-8. 2029 FDV for Expeditious Alternative Attainment Demonstration, Projected Baseline and Control Scenario Calculated and a 2013 Base year**

	NPFS Future Design Value ( $\mu\text{g}/\text{m}^3$ )	NPE Future Design Value ( $\mu\text{g}/\text{m}^3$ )	NCORE Future Design Value ( $\mu\text{g}/\text{m}^3$ )	SOB Future Design Value ( $\mu\text{g}/\text{m}^3$ )
2013 Base Year	131.63	45.3	37.96	38.93
2019 Control	104.16	36.42	28.87	29.57
2029 Expeditious Attainment	33.87	17.16	18.86	19.41

The 2029 model run in Table 7.9-8 shows expeditious attainment at all four monitoring sites.

### 7.9.3. Future Attainment Demonstrations

While the attainment demonstrations described above meet the requirements of CAA Sections 188(e) and 189(b)(1)(A), as well as 40 C.F.R. §§ 51.1005, and 51.1011, we anticipate future attainment demonstrations would be more accurate with an updated model that better accounts for the Hurst Road monitor in North Pole. As detailed in Section III.D.7.8 Modeling, the 2008 episodes are based on the State Office Building monitor, and while model performance meets requirements for that monitor, there is poor performance at the Hurst Road site. It is hoped that an updated model will result in better model performance and provide for a more accurate projection of an attainment date.

Therefore, it is anticipated that during the winter of 2019-2020, DEC will begin to collect data with the goal of updating the monitored speciation data and meteorological data with new WRF episodes for the area. This effort will take a number of years to collect the data, develop the episodes in negotiation with EPA, configure and QA/QC the model. Therefore, it is anticipated that a 5 percent plan will need to be updated to reflect this new model a few years after the 5 percent plan is submitted.