# ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION

# Amendments to:

# State Air Quality Control Plan

# Vol. II: III.D.7.1

## Executive Summary

## Adopted

November 19, 2019

**Michael J. Dunleavy, Governor**

**Jason W. Brune, Commissioner**

## A note on the format and organization of this document.

**This document is organized and formatted to be consistent with the State of Alaska Air Quality Control Plan or SIP. The previously adopted Sections 5.01 – 5.14 encompassed the Fairbanks North Star Borough $PM_{2.5}$ Moderate Area Plan. Sections 7.01 – 7.15 have been updated to address the reclassification of the Fairbanks North Star Borough area from "Moderate" to "Serious" nonattainment area.**

# Alaska Air Quality Control Plan Volume II. Section III.D.7
# Fairbanks North Star Borough (FNSB)
# Fine Particulate Matter ($PM_{2.5}$) Serious Area Attainment Plan

## 7.1 Executive Summary

### 7.1.1 Overview

This executive summary is meant to provide the public an overview of the air quality plan or State Implementation Plan (SIP) for the Fairbanks North Star Borough (FNSB) fine particulate matter ($PM_{2.5}$) Serious nonattainment area. On September 8, 2017, the Environmental Protection Agency (EPA) approved the FNSB $PM_{2.5}$ Moderate Area SIP (Alaska Air Quality Control Plan Volume II. Section III.D.5), which was originally submitted on December 31, 2014, for meeting all statutory and regulatory requirements. However, the Moderate Area SIP was an impracticability SIP as it could not demonstrate attainment by the December 31, 2015 attainment date. Monitored values confirmed that the area did not meet attainment therefore, EPA reclassified the area as a Serious nonattainment area effective June 9, 2017. For "Serious" areas, under the statutory requirements laid out in Title I, Part D of the Clean Air Act (CAA) and 40 C.F.R. Part 51, Subpart Z, Section 51.1004 provisions, an attainment date shall be no later than 10 years from the original designation date.[1] Consequently, EPA requires the State to develop a new "Serious" SIP which must demonstrate attainment or impracticability by December 31, 2019.

This plan has been developed to address the requirements in the $PM_{2.5}$ Implementation Rule found in the August 24, 2016, Issue of the Federal Register (81 FR 58010), after EPA reclassified the FNSB from a "Moderate" to a "Serious" nonattainment area by law.[2] The following sections and their associated appendices provide detailed information on the local $PM_{2.5}$ pollution problem area, air monitoring data and network, emission sources and levels, control strategies, technical modeling, attainment demonstration proof, reasonable further progress (RFP) and quantitative milestones (QM), contingency measures, emergency episode plan, assurance of adequacy, and air quality conformity and motor vehicle emission budget. The plan also identifies the statutes, regulations, and ordinances that support the efforts to reduce air pollution in the community. Finally, the plan addresses the Serious area attainment impracticability by December 31, 2019. While many of these sections build and rely upon each other, readers will find that the plan contains some redundancies that are meant to assist in reviewing sections without having to refer back too frequently to other sections.

[1] Clean Air Act Part 51, Subpart Z, Section 51.1004(a)((2)
[2] Clean Air Act Section 188(b)(2)

This plan contains fifteen total sections and associated appendices as follows:

| | |
|---|---|
| 7.1 | Executive Summary |
| 7.2 | Background and Overview of $PM_{2.5}$ Rule |
| 7.3 | Nonattainment Boundary and Design Day Episode Selection |
| 7.4 | Ambient Air Quality and Trends |
| 7.5 | $PM_{2.5}$ Network and Monitoring Program |
| 7.6 | Emission Inventory Data |
| 7.7 | Control Strategies |
| 7.8 | Modeling |
| 7.9 | Attainment Demonstration |
| 7.10 | Reasonable Further Progress and Quantitative Milestones |
| 7.11 | Contingency Measures |
| 7.12 | Emergency Episode Plan |
| 7.13 | Assurance of Adequacy |
| 7.14 | Conformity and Motor Vehicle Emission Budget |
| 7.15 | Acronyms and Abbreviations |

## 7.1.2 Background on $PM_{2.5}$

The Clean Air Act (CAA) requires EPA to set air quality standards (40 C.F.R. Part 50) to protect the health and the welfare of the public and the environment. The law requires EPA to periodically review and update the standards to ensure that health and environmental protection are adequate based on the scientific justifications. EPA has set National Ambient Air Quality Standards (NAAQS) for six principal criteria pollutants and particulate matter (PM) is one of them.

Particulate pollution includes a complex mixture of both solid particles and liquid droplets found in the air. These particles come in different sizes and shapes; particulates less than 10 micrometers ($PM_{10}$) pose health concerns because they can be inhaled and cause respiratory problems. Particles less than 2.5 micrometers ($PM_{2.5}$) in size, also known as "fine particles," can lodge deeply into lungs and enter the bloodstream causing numerous health problems.

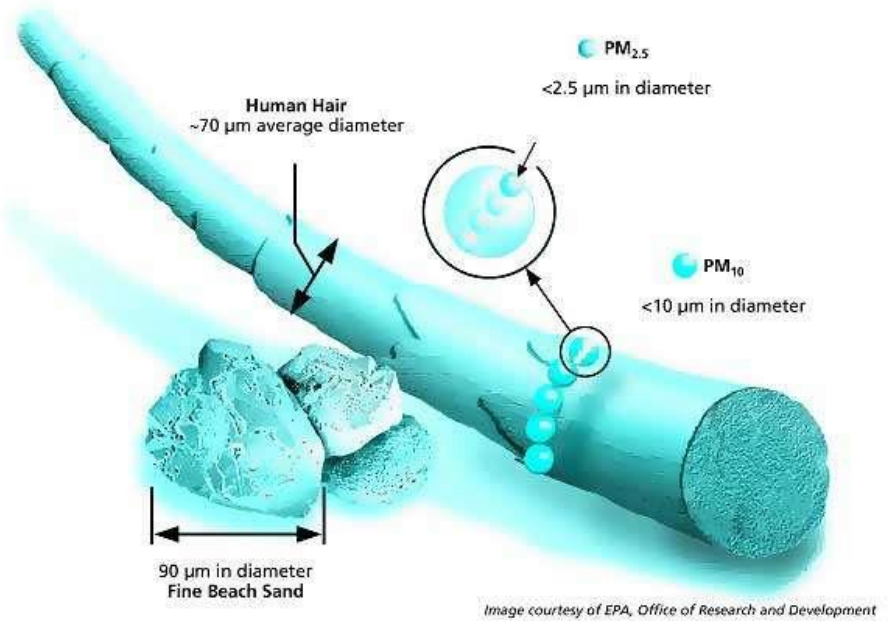


**Figure 7.1-1. Particle Size Comparison**

Health studies have shown a significant association between exposure to fine particles and premature mortality. Other important effects include aggravation of respiratory and cardiovascular disease (as indicated by increased hospital admissions, emergency room visits, absences from school or work, and restricted activity days), lung disease, decreased lung function, asthma attacks, and certain cardiovascular problems such as heart attacks and cardiac arrhythmia. Individuals particularly sensitive to fine particle exposure include older adults, people with heart and lung disease, and children.

Sources of fine particles include all types of combustion activities (motor vehicles, power plants, wood burning, etc.) and certain industrial processes. Particles with diameters between 2.5 and 10 micrometers are referred to as $PM_{10}$ or "coarse." Sources of coarse particles include crushing or grinding operations, and dust from paved or unpaved roads.

## 7.1.3 Designating the FNSB $PM_{2.5}$ Nonattainment Area

In 1997, EPA established the first annual and 24-hour National Ambient Air Quality Standard (NAAQS) for $PM_{2.5}$. In 2006, EPA strengthened the 24-hour ambient $PM_{2.5}$ standard from 65 micrograms per cubic meter ($\mu g/m^3$) to 35 $\mu g/m^3$. States were required to examine monitoring data collected within their communities and make designation recommendations based on the new standard by December 2007. Compliance with ambient air quality standards is based on the calculation of a “design value” for individual monitors consistent with the calculation of the applicable standard. For the 24-hour ambient $PM_{2.5}$ standard, the design value is calculated from the 3-year average of annual $98^{th}$ percentile values.

In 2009, EPA designated the Fairbanks North Star Borough (FNSB) nonattainment area boundary, as depicted in Figure 7.1-2, for the 24-hour $PM_{2.5}$ standard using measurements collected at the State Office Building (SOB) over the previous 3-year period, 2006 – 2008.[2,4]

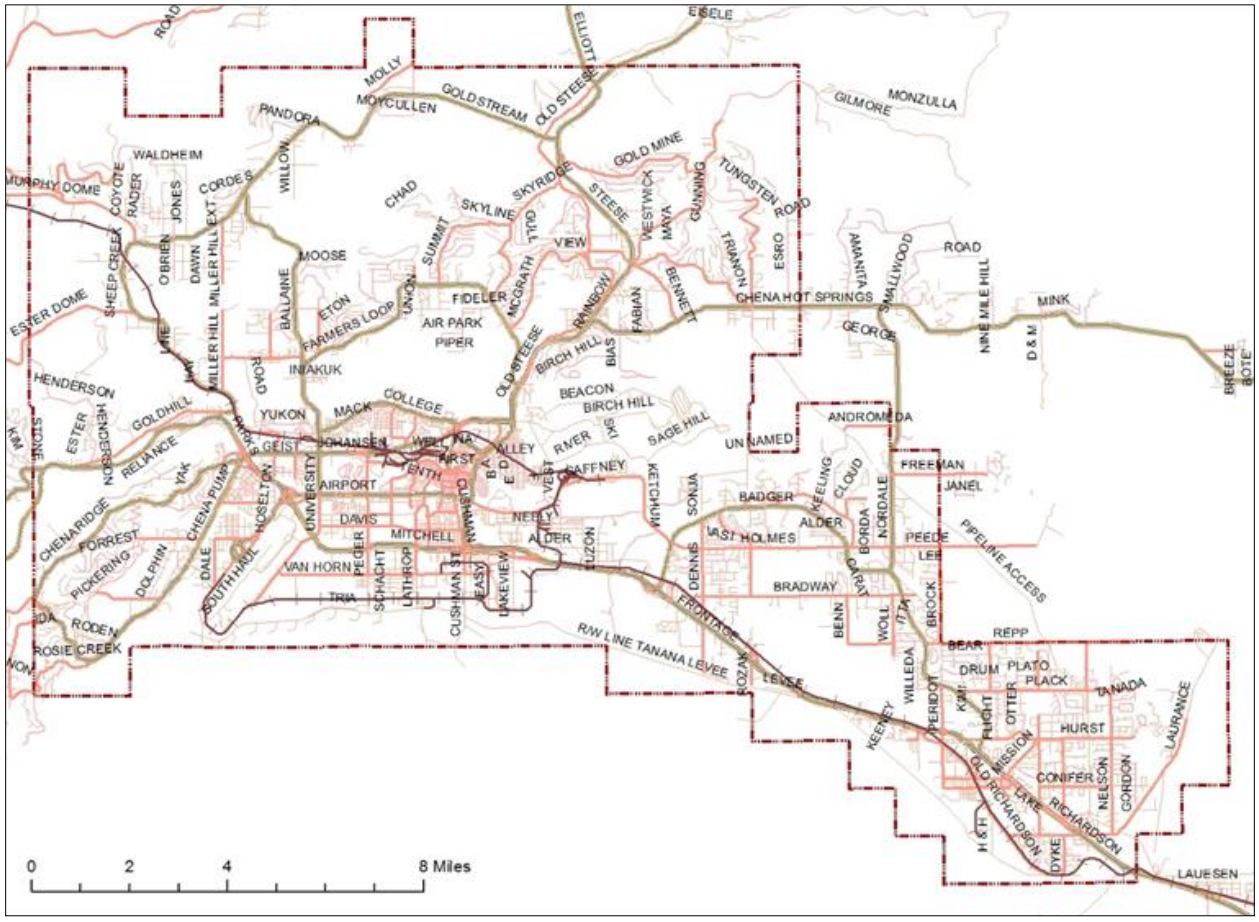


**Figure 7.1-2. FNSB $PM_{2.5}$ Nonattainment Boundary**

Collectively, the 98th percentile values from the State Office Building site from 2006-2008 produced a $PM_{2.5}$ design value of 41µg/m$^3$. Design values are updated each year, based on the previous 3-years of data. In 2014, the Hurst Road site, formerly known as the North Pole Fire Station, produced a design value of 139 µg/m$^3$ from three consecutive years' data. This new, higher, Hurst Road design value became the overall design value for the entire nonattainment area. Between 2014 and 2018, the Hurst Road design value has fallen to 65 µg/m$^3$. Table 7.1-1 shows the trend in 98th percentile values at the State of Office Building, National Core (NCore), North Pole Hurst Road and North Pole Elementary monitoring sites from 2012 to 2018.

[2] At that time, the State Office Building was the only FRM monitoring site with 3-years of $PM_{2.5}$ measurements.
[4] 74 FR 58690 dated November 13, 2009

**Table 7.1-1**
**Trend in 98th Percentile $PM_{2.5}$ Concentrations Recorded at Fairbanks and North Pole Monitoring Sites (FRM) 2011-2018**

| Site Name | Location | 98th Percentile (µg/m³) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
| State Office Building | Fairbanks | 38.0 | 49.6 | 36.3 | 34.5 | 35.3 | 41.5 | 38.0 | 27.0 [a] |
| NCore | Fairbanks | 33.1 | 50.0 | 36.2 | 31.6 | 36.7 | 32.4 | 34.4 [a] | 25.3 [a] |
| Hurst Road[b] | North Pole | - | 158.4 | 121.6 | 138.5 | 111.6 | 66.8 | 75.5 | 52.8 |
| North Pole Elementary | North Pole | 20.6 | 68.1 | 47.2 | - | - | - | - | - |

a. Based on exclusion of proposed summertime wildland fire exceptional events in 2017 and 2018
b. Formerly North Pole Fire Station

Table 7.1-2 shows the 3-year design values calculated for the State Office Building site, NCore site, Hurst Road site, and North Pole Elementary site between 2011 and 2018.

**Table 7.1-2**
**Fairbanks and North Pole FRM 3-Year Design Values**

| | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
|---|---|---|---|---|---|---|---|---|
| State Office Building 3-yr DV | 47 | 46 | 41 | 40 | 35 | 37 | 38 | 35 [a] |
| NCore 3-yr DV | 43 | 45 | 40 | 39 | 35 | 33 | 34 [a] | 30 [a] |
| Hurst Road 3-yr DV | - | - | - | 139 | 124 | 106 | 85 | 65 |
| North Pole Elementary 3-yr DV | 63 | 47 | 45 | - | - | - | - | - |

[a] Dependent on EPA Approval of 2017 and 2018 Exceptional Events Waiver Requests

Figure 7.1-3 below displays the 98th percentile and 3-year design value statistics for the State Office Building site, NCore site, and Hurst Road site between 2000 and 2018.

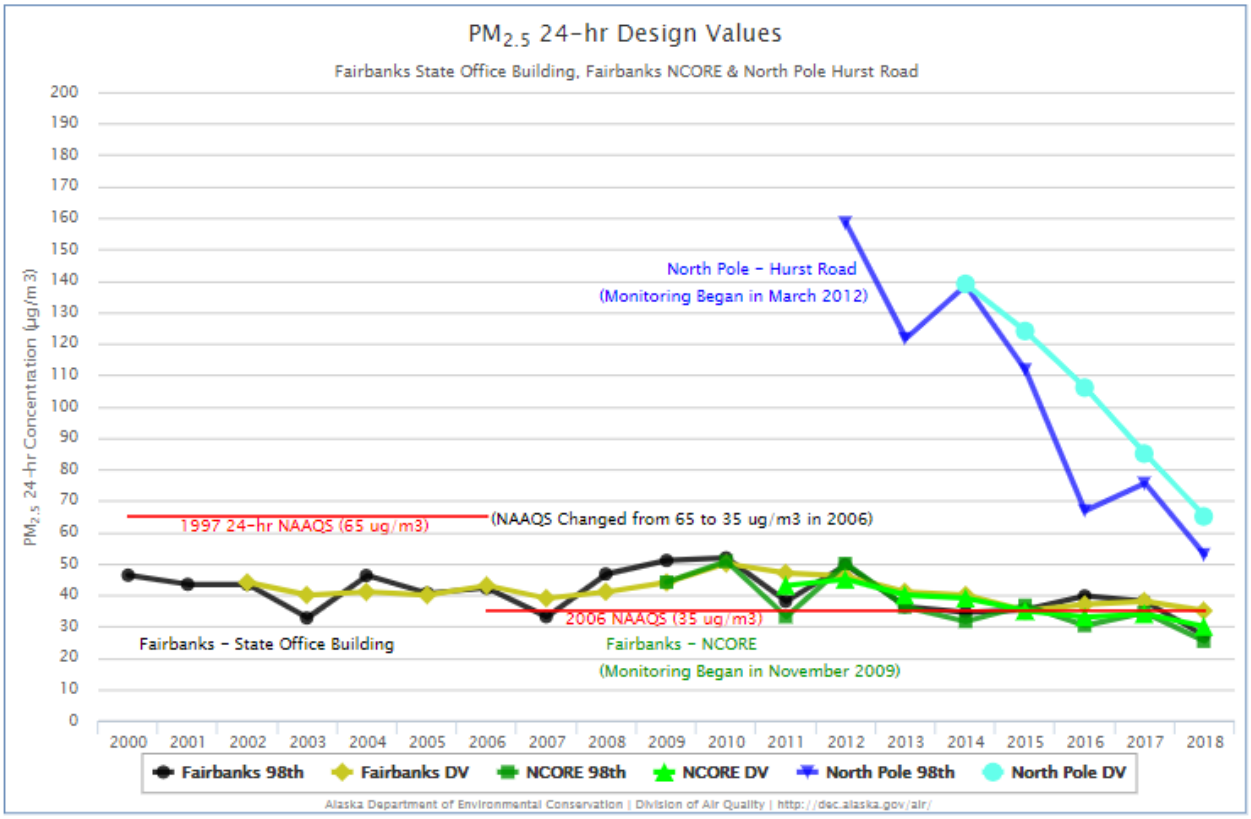


**Figure 7.1-3 FNSB $PM_{2.5}$ Nonattainment Area Design Value and 98th Percentile 24-hr $PM_{2.5}$ Concentrations 2000-2018**

## 7.1.4 Developing an Air Quality Attainment Plan

The CAA generally requires states to submit an air quality attainment plan or State Implementation Plan (SIP) within three years following a designation of nonattainment. In April 2007, EPA promulgated a detailed implementation rule for $PM_{2.5}$ nonattainment areas and in March 2012 issued additional guidance. Alaska's effective date of designation as a nonattainment area was December 14, 2009. Alaska's original due date for the SIP under Subpart 1 was December 14, 2012. On January 4, 2013, the DC Circuit Court ruled that the Clean Air Act requires implementation of the $PM_{2.5}$ NAAQS under Clean Air Act Part D, Subpart 4 (Sections 188-190) rather than implementation under Subpart 1. On June 2, 2014, EPA published a rule that identified those States in nonattainment for $PM_{2.5}$ as "Moderate" areas and proposed a new due date of December 31, 2014 for submittal of moderate nonattainment area Subpart 4 SIPs to EPA. Under the new subpart 4 "Moderate" area designation, the SIP was expected to demonstrate using air quality modeling that attainment was possible or impracticable by December 31, 2015.

However, as a result of the failure of the State to demonstrate the attainment of the 24-hour $PM_{2.5}$ NAAQS in FNSB by December, 31, 2015, EPA re-classified the nonattainment area from "Moderate" to "Serious" effective June 9, 2017. Under 40 C.F.R. § 51.1002(b), States that are reclassified from "Moderate" to "Serious" nonattainment area are required to develop and

implement a Serious SIP which, in addition to meeting the Moderate area attainment plan requirements set forth in 40 C.F.R. § 51.1003(a), must also meet the following requirements:

- Base year emissions inventory requirement set forth at 40 C.F.R. § 51.1008(b)(1);
- Attainment projected emissions inventory requirements set forth at 40 C.F.R. § 51.1008(b)(2);
- Serious area attainment plan control strategy requirements set forth at 40 C.F.R. § 51.1010;
- Attainment demonstration and modeling requirements set forth at 40 C.F.R. § 51.1011;
- Reasonable Further Progress (RFP) requirements set forth at 40 C.F.R. § 51.1012;
- Quantitative Milestone (QM) requirements set forth at 40 C.F.R. § 51.1013;
- Contingency measure requirements set forth at 40 C.F.R. § 51.1014; and,
- Nonattainment new source review plan requirements pursuant to 40 C.F.R. § 51.165.

Under 40 C.F.R. § 51.1010, a Serious nonattainment area shall identify, adopt, and implement best available control measures (BACM) and best available control technology (BACT) on sources producing direct $PM_{2.5}$ emissions and precursors emissions within the nonattainment area. As set forth at 40 C.F.R. § 51.1011(b), a serious nonattainment area shall use air quality modeling to demonstrate that the area will attain the $PM_{2.5}$ NAAQS as expeditiously as practicable with the implementation of all the control measures but no later than the end of the $10^{th}$ calendar year after the effective date of the designation of the area. As such, the reclassification of the FNSB Nonattainment area from "Moderate" to "Serious" requires the State to develop a Serious SIP that demonstrates attainment or impracticability by December 31, 2019.

For the Moderate Area SIP, the FNSB was delegated as the air quality planning authority. The Borough developed and submitted their local air quality plans to the Alaska Department of Environmental Conservation (DEC) for adoption and inclusion in the SIP. The citizen initiative (Prop 4) that was passed by the FNSB voters on October 2, 2018, removed the authority of the Borough to regulate wood stoves and other wood and coal heating devices. On October 25, 2018, DEC formally took the responsibility of calling air quality alerts, communicating alerts, and enforcing compliance in the FNSB nonattainment area. Given the loss of local authority for regulating solid fuel heating sources, DEC continues to coordinate with the FNSB but has taken responsibility for developing and finalizing the Serious SIP.

States are required to develop and implement SIPs in accordance with the CAA, which is enforced through the EPA. Alaska's State Air Quality Control Plan contains all the required SIPs for Alaska and is incorporated by reference into state regulations at 18 AAC 50.030. The Serious SIP contains narrative overviews, background information, control strategies, technical modeling, data analyses, attainment demonstration proof, RFP, QMs, contingency measures, emergency episode plan, assurance of adequacy, and air quality conformity and motor vehicle emission budget in accordance with the Final $PM_{2.5}$ Implementation Rule.

This $PM_{2.5}$ Serious plan describes how the State of Alaska in collaboration with other agencies will meet the federal requirements to control and reduce $PM_{2.5}$ pollution in the FNSB nonattainment area. It describes how the State of Alaska and FNSB will identify and implement air pollution control measures to achieve lower emissions of fine particulate matter ($PM_{2.5}$), as

well as those of its precursors: nitrogen oxides ($NO_X$), sulfur oxides ($SO_X$), volatile organic compounds (VOCs), and ammonia. The plan also describes how the State and FNSB will work to educate the community on using cleaner burning and more efficient home heating units.

Developing an air quality plan to address fine particulate matter is a multi-step process. The goal is to develop a plan that addresses the problem, reflects the local situation, and has BACM, BACT, and contingency measures in accordance with 40 C.F.R. § 51.1010. Planning steps include:

- Characterizing the air pollution problem using technical tools and analyzing data. This step includes:
    - Monitoring Studies
    - Assessing Emissions
    - Modeling Impacts
- Evaluating options to reduce air pollution and develop the plan. The Clean Air Act requires emission reductions that are permanent and enforceable.
    - Identify and evaluate programs that can reduce pollutant emissions.
    - Adopt BACM and BACT
    - Model attainment demonstration, show RFP and QMs
    - Develop regulations to ensure permanent reductions.
    - Consider contingency measures that will be triggered if the nonattainment area fails to meet the RFP requirements, the QMs in the plan or attainment of the $PM_{2.5}$ NAAQS by the attainment date.
- Adopting the local plan into state regulations and transmitting it to EPA for approval.
    - The State writes the regulations and provides additional opportunities for public notice, comment, and hearing.
    - Once the state regulatory process is complete, DEC transmits the plan to EPA for approval
- EPA taking action on the plan to make it federally enforceable.
    - EPA reviews the plan to insure it is complete and meets all requirements of the Clean Air Act.
    - EPA issues a federal register notice of their action, takes public comment, and finalizes their decision.

DEC, FNSB, and EPA Region 10 engaged cooperatively in discussions throughout the development of the Serious SIP for the nonattainment area. The objective of this early and ongoing dialogue was to help ensure the Serious SIP meets federal requirements and can be processed efficiently by EPA.

## 7.1.5 Analysis Framework for the Plan

Extensive effort was devoted to the development of a technical analysis framework for the Serious SIP. This included selection of representative conditions causing elevated $PM_{2.5}$ concentrations, the definition of a modeling domain that accounts for the meteorological and emission contributions impacting monitors located within the nonattainment area, the collection

of activity data and emission factors that support the development of a representative emission inventory. Key components of the analysis framework include:

- Two multi-day episodes in 2008 were selected to represent days leading up to high concentrations, design day conditions, and days that exceed design day conditions. These episodes (January 23 – February 10 and November 2 -17) provide a reasonable baseline for analyzing controls to see what impact they have on reducing emissions to levels below the standard.

- Estimates of hourly meteorological conditions and emissions were developed for 201 x 201, 1.33 km grid cells that encompassed a modeling domain substantially larger than the nonattainment area for each of the multi-day episodes. The meteorological estimates were held constant for each analysis year. Emission estimates for individual source categories were developed to account for changes in activity (e.g., miles traveled, fuel mix and use, distribution of combustion devices, etc.) between the 2013 baseline (which was based on historical activity) and future analysis years based on latest available socio-economic projections that include Eielson Air Force Base-associated growth. Emission estimates in each analysis year were prepared for baseline/projected baseline conditions (which account for the effects of natural turnover in vehicles, growth and the effects of controls in place). Emission estimates were also prepared to account for the effects of additional controls implemented since EPA approval of the Moderate Area SIP or slated for adopted with this Serious Area Plan.

- The EPA approved Community Multiscale Air Quality (CMAQ) Modeling System was used to assess the impact of changes in baseline and controlled emissions on progress towards attainment.

- Emission estimates for each of the analysis years were based on controls that were fully implemented by the beginning of that year. For example, emission estimates for 2019 were based on the control measures and activity changes that were in place at the end of 2018. This is a conservative approach that only counts for the benefits achieved by the start of the analysis year; it provides no benefit for control measures implemented or extended in the analysis year.

### 7.1.6 Reducing $PM_{2.5}$ Air Pollution

Pursuant to the requirements in 40 C.F.R. § 51.1010, the FNSB $PM_{2.5}$ Serious Nonattainment Area SIP should contain the analysis of the control strategies by source categories. The contol strategies must include BACM and BACT, as well as the RFP and QMs to track the implementation of the control measures and the resultant emisssions reductions. During the period 2008 through 2019, a number of programs were implemented at the local and state levels to encourage changes in behavior that produce emission reductions. The plan discusses these efforts and their emission reduction benefits by 2019 as well as additional emission reduction measures that are planned for beyond 2019. Measures already in place from the Moderate SIP will continue and this Serious SIP incorporates additional measures including:

- Solid fuel burning curtailments (ie. burn bans) continue but will be called at lower concentrations. Waiver program is available and described in the Episode Plan (Section III.D.7.12).
- Only Diesel fuel #1 will be allowed for use in space heating in the nonattainment area starting in 2022.
- Dry wood only may be sold in the nonattainment area unless a seller and buyer meet certain requirements related to the sale of logs 8 feet in length.
- No new outdoor solid fuel hydronic heaters sold or installed unless they are pellet fueled.
- Stricter emission requirements for new wood fired heating devices.
- All uncertified solid fuel heating devices must be removed either prior to December 2024 or when homes are sold or leased. They may be replaced with new devices.
- Data submission requirements for used oil burners, charbroilers, and incinerators.
- Emission control requirements for coffee roasters.
- Major industrial (point) sources will be controlled as determined throught the Best Available Control Technology (BACT) process.
- Solid fuel heating device registration requirements under certain programs.
- EPA certified devices that are older than 25 years to be removed or replaced by December 2024 has been included as a contingency measure.

These programs are discussed in greater detail in Sections III.D.7.7 and III.D.7.11. Section III.D.7.7 discusses all the control measures identified, implemented, planned, and underway within the nonattainment area. Section III.D.7.11 is focused on the contingency measures that are planned beyond 2019 that show additional progress towards expeditious attainment.

### 7.1.7 Findings and Demonstrating Attainment

The analysis framework described in Section III.D.7.9 was used to quantify the impact of changing trends in activity and controls on emissions and concentrations in future years. The key findings of that analysis are that it is not possible to demonstrate attainment by the December 31, 2019 federal attainment deadline.

Current control measures are insufficient to reduce emissions to levels needed to demonstrate attainment, particularly in the North Pole Control Zone of the nonattainment area by the December 31, 2019 deadline. The combined benefit of the control programs model a 2019 concentration of 104.16 $\mu g/m^3$ at the Hurst Road site. While this value represents a substantial reduction from the 131.63 $\mu g/m^3$ baseline design value, it falls far short of attaining the 35$\mu g/m^3$ standard. Thus, this plan shows that it is impossible to demonstrate attainment by December 31, 2019.

The plan further details an analysis of the benefits of implementing additional control measures that are planned for, and measures that will continue, after 2019. These measures include the implementation of numerous new control measures (e.g., new state emission standards for wood burning appliances, a dry wood program, and requiring the switch to a lower sulfur diesel fuel). Together with the continuing measures already underway, these measures are projected to reduce Hurst Road concentrations to 33.87 $\mu g/m^3$ in 2029. 2029, at this time, is the most expeditious attainment date.

## 7.1.8. Serious Area Attainment Date Extension Request

Due to the inability of the FNSB nonattainment area to demonstrate attainment by the statutory date, December 31, 2019, the State of Alaska, in accordance with the provisions in 40 C.F.R. § 51.1005(b)(5), applies for a 5-year extension request for the area in this SIP as allowed under 40 C.F.R. § 51.1004(a)(2)(ii). The extension request must be submitted with the Serious SIP by the statutory due date as required by the provisions in 40 C.F.R. § 51.1003(b)(1)(iii). In accordance with the provisions in 40 C.F.R. § 51.1005(b)(1), this SIP includes all the best available control measures (BACM) that were not previously submitted, and a most stringent measure (MSM) that can be implemented by December 2023. However, due to the uncertainty of an extension of the attainment date, DEC is also initiating efforts to develop a 5% plan that could be submitted to EPA by December 2020.

## 7.1.9. The Public Review Process

Addressing air pollution problems can be challenging for communities. For any air quality plan to be successful, it must be accepted and implemented by the community as a whole. For this reason, it was critically important that the Borough, State, and EPA receive feedback and input from the public on this air quality plan.

Prior to regulatory adoption of these SIP revisions, DEC held a public comment period from May 10, 2019 through July 26, 2019 including an open house for the public on the evening of June 25, 2019 and two public hearings in Fairbanks on June 26, 2019, one in the afternoon and one in the evening, to take oral testimony on the proposal. This process provided a forum for the public to comment on the air quality plan prior to its adoption at the state level and submission to EPA. During the public comment period, DEC staff also attended a number of meetings within the community to provide an overview of the regulations and SIP revisions and respond to questions on the proposals. DEC did not take formal testimony at these external meetings. DEC posted questions and responses in writing to all oral questions received during the hearings and all written questions received from the public at least 10 days prior to the end of the public comment period to assist the public in formulating their comments on the proposal.

EPA will also hold a public comment period when it has prepared its proposed action on the submitted air quality plan to gather further feedback from the public. This will provide additional opportunity for the community and public to provide input on the local air quality plan.