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# 2023

# Annual Air Quality Monitoring Network Plan

## Alaska Department of Environmental Conservation

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| ALPACA | Alaska Pollution and Chemical Analysis |
| AMQA | Air Monitoring and Quality Assurance Program |
| ANP | annual network plan |
| AQI | air quality index |
| AQS | Air Quality Systems |
| ARP | The American Rescue Plan |
| BES | Butte Elementary School |
| CAA | Clean Air Act |
| CASTNET | Clean Air Status and Trends Network |
| CBJ | City & Borough of Juneau |
| CBSA | Core Base Statistical Area |
| Census | the Census Bureau |
| CFR | Code of Federal Regulations |
| CO | carbon monoxide |
| CSN | Chemical Speciation Network |
| DEC | Alaska Department of Environmental Conservation |
| DV | design value |
| EEWR | exceptional event waiver request |
| EPA | U.S. Environmental Protection Agency |
| FEM | Federal Equivalent Method |
| FNSB | Fairbanks North Star Borough |
| FRM | Federal Reference Method |
| HVAC | heating and ventilation air conditioning system |
| IMPROVE | Interagency Monitoring of Protected Environments |
| LC | local (actual) conditions of temperature and pressure |
| LMP | limited maintenance plan |
| LP-DOAS | long-path differential absorption spectroscopy |
| NAA | nonattainment area |
| NAAQS | National Ambient Air Quality Standards |
| NCore | National Core Multi-Pollutant Monitoring Stations |
| NO | nitric oxide |
| $NO_2$ | nitrogen dioxide |
| NOy | reactive nitrogen compounds |
| NWS | National Weather Service |
| $m^3$ | cubic meter |
| Mat-Su | Matanuska Susitna |
| MFC | mass flow controller |
| MOA | Municipality of Anchorage |
| MSA | metropolitan statistical area |
| µg | micrograms |
| µSA | micropolitan areas |
| $O_3$ | ozone |
| OMB | U.S. Office of Management and Budget |
| Pb | lead |
| Pb-TSP | lead total suspended particulate |

| | |
|---|---|
| PM | particulate matter |
| PMC | Plant Material Center |
| $PM_{2.5}$ | particulate matter with an aerodynamic diameter less than 2.5 micrometers |
| $PM_{10}$ | particulate matter with an aerodynamic diameter less than 10 micrometers |
| POC | parameter occurrence code |
| ppb | parts per billion |
| ppm | parts per million |
| RadNet | Radiation Monitoring Network |
| RH | relative humidity |
| S | scalar |
| SCC | sharp cut cyclone |
| SIP | State Implementation Plan |
| SLAMS | State and Local Air Monitoring Stations |
| $SO_2$ | sulfur dioxide |
| SPM | special purpose monitor |
| STD | standard conditions of temperature and pressure |
| V | vector |
| VPD | vehicles per day |
| VSCC | very sharp cut cyclone |
| WD | wind direction |
| WGS | World Geodetic System |
| WS | wind speed |

# EXECUTIVE SUMMARY

This 2023 Annual Monitoring Plan describes the Alaska air quality monitoring network under the Alaska Department of Environmental Conservation's (DEC) oversight and spells out anticipated changes to the network for the calendar year 2024.

Most of the air monitoring activities are focused on population centers and areas that have shown in the past to have air quality problems. Budget cuts over the past several years allow the DEC only to operate the minimum regulatory required ambient monitoring network. Looking ahead, DEC does not expect to expand the network during the next several years due to fiscal constraints.

The most significant changes to the network during 2022 and 2023 to date:

- **Floyd Dryden Site**: On January 21, 2022, a $PM_{10}$ collocation using a Thermo Scientific Inc. Partisol 2000i was added to the Floyd Dryden State and Local Air Monitoring Stations (SLAMS) site as a federal reference method (FRM). This was approved by the Environmental Protection Agency (EPA) Region 10 (R10) in the 2022 Annual Monitoring Network Plan (ANP) approval letter[1]. See 4.1.1 Floyd Dryden Site.
- **Trinity Church (Garden) Site**: On February 22, 2022, the $PM_{2.5}$ collocation monitor for the Met One BAM 1020 network was moved from the Harrison Ct (Butte) site to Garden site. The $PM_{10}$ FRM for the BAM 1020 network was moved from the Eagle River Parkgate site to the Anchorage Garden site on February 24, 2022. The first scheduled sample date for the $PM_{2.5}$ and $PM_{10}$ Partisols were February 25th, 2022, and March 6th, 2022, respectively. This was approved by EPA R10 in the 2022 ANP approval letter. See 4.1.2 Trinity Church (Garden) Site.
- **Sulfur Dioxide Sampling at Hurst Road Site**: On March 10, 2022, DEC added a Thermo Scientific 43i Sulfur Dioxide monitor to the North Pole Hurst Rd site. The Hurst Road site is the maximum impact $PM_{2.5}$ monitoring site in the Fairbanks nonattainment area and houses a Chemical Speciation Network (CSN) site. The $SO_2$ data will be helpful for interpreting the sulfate information gained from the speciation monitor. This was acknowledged in the 2022 ANP approval letter but establishing a special purpose monitor (SPM) does not require EPA approval per 50 CFR § 58.11 (c). See 4.2 Sulfur Dioxide Sampling at Hurst Road Site.
- **State and Local Air Monitoring Stations Sampling Site Improvements Funded by The American Rescue Plan Direct Grant Award**: DEC's American Rescue Plan (ARP) Direct Awards will fund the following monitoring site improvements for the DEC SLAMS network. The status is indicated in ***bold italics***. These upgrades were acknowledged in the 2022 ANP approval letter. See 4.4 SLAMS Sampling Site Improvements Funded by The American Rescue Plan Direct Grant Award.
    - Replace aging CSN samplers at the National Core Multi-Pollutant Monitoring Stations site, specifically the Met One Super SASS and URG 3000n. ***The URG instrument was***

[1] https://dec.alaska.gov/air/air-monitoring/monitoring-plans

***delivered, and the SASS is expected prior to July 2023. Both will be installed in the summer of 2023.***

- Upgrade the heating and ventilation air conditioning system for the A-Street site particulate matter sampling shelter. ***Staff are still requesting quotes.***
- Purchase a replacement particulate matter sampling shelter for the new Butte sampling site. ***Purchase is on hold until the sampling site relocation has been approved***.
- Purchase a replacement particulate matter sampling shelter for the Teledyne T640X sampler at the Juneau Mendenhall Valley sampling site. ***Staff are requesting quotes.***
- Purchase a Primary Flow Standard for mass flow controller calibrations. ***Instrument was ordered but is delayed due to a supplier facility relocation.***

Changes proposed for calendar year 2024 include:

- **Harrison Ct (Butte) $PM_{2.5}$ State and Local Air Monitoring Stations relocation:** DEC performed a saturation study in the Harrison Ct. (Butte) area to identify a suitable substitute site location during the winter of 2021/22. The study was initiated in response to planned construction in the area that may impact data collection at the current Butte site and in response to complaints from the neighboring property owners. After a year-long comparison between the three locations, the DEC selected the Plant Material Center (PMC) as the best substitution location. Pending EPA approval, DEC will prepare the PMC location for a permanent ambient monitoring site. The site has not been established, but the location is set back from the road at a significant distance, so DEC does not expect near-road impacts. DEC will complete siting documentation according to 40 CFR Appendix E to Part 58 before the site is finalized in the fall. DEC plans to begin sampling at the location in time for an official January 1, 2024, sampling start for both continuous $PM_{2.5}$ and $PM_{10}$ monitoring. See 5.1 Harrison Ct (Butte) $PM_{2.5}$ SLAMS relocation.
- **Juneau Mendenhall Valley $PM_{2.5}$ State and Local Air Monitoring Stations Primary Sampler:** In summer 2021, DEC purchased a Teledyne T640X $PM_{2.5}$ and $PM_{10}$ analyzer for the Floyd Dryden SLAMS site in the Juneau Mendenhall Valley. FRM collocation was established on October 1, 2021, for $PM_{2.5}$ and January 26, 2022, for $PM_{10}$. EPA R10 staff voiced concern regarding the performance of the T640X for $PM_{2.5}$ in areas with a high woodsmoke component. Teledyne issued an EPA approved T640X firmware update that includes an optional 'data alignment' (or correction factor); however, DEC will implement the firmware update without enabling the data alignment. To ensure that DEC does not underrepresent the $PM_{2.5}$ concentrations measured at the site, DEC will designate the $PM_{2.5}$ FRM as the SLAMS monitors, i.e., primary samplers, and collect samples every third day effective January 2024. The T640X $PM_{2.5}$ will be designated as an SPM and continue to provide $PM_{2.5}$ AQI data used for public information and for the City and Borough of Juneau to call burn bans as needed. DEC will continue to use the T640X instrument as a $PM_{10}$ FEM, since $PM_{10}$ concentration did not exceed 20 $\mu g/m^3$ over the past year and there is little risk of missing high pollution events. See 5.2 Juneau Mendenhall Valley $PM_{2.5}$ SLAMS Primary Sampler.

- **A-Street Continuous Analyzer:** DEC has been using non-FRM Met-One BAM 1020 $PM_{2.5}$ analyzers in the Fairbanks North Star Borough nonattainment area because the continuous analyzers showed a significant positive bias during very cold, high pollution events. In 2022, DEC lost data during the winter months (Quarter 1 and Quarter 4) due to shuttle errors on the sequential FRM instrument. The FRM instruments periodically malfunction during cold weather when the pneumatics get too cold to perform properly. DEC attempted to replace the FRM instrument in November 2022, but a new instrument could not be delivered until April 2023 because of supply chain issues at the manufacturer. DEC conducted a three-year analysis and focused on the winter quarters (Q1 and Q4), since that is the period of interest in the nonattainment area. The analysis showed the A-Street site is within the performance criteria for all four quarters; therefore, beginning in January 2024, DEC will operate the Met-One BAM 1020 at A-Street as a FEM sampler. 5.3 A-Street Continuous Analyzer.
- **Low-Cost Sensor Network:** While the current long-term monitoring network meets the regulatory requirement in terms of number of monitoring stations and monitored pollutants, it is confined to the population centers and does not adequately characterize conditions in outlying and rural communities. DEC currently owns 18 AQMesh sensor pods. These sensor pods will collect baseline air quality data, including particulate matter, sulfur dioxide, nitric oxide, nitrogen dioxide, and carbon monoxide. DEC selected 17 communities based on location, interest, and population density. The current proposed communities include Anchorage, Fairbanks, Homer, Juneau, Ketchikan, Kodiak, Kotzebue, Nome, Seward, Sitka, Skagway, Soldotna, and Unalaska/Dutch Harbor. Under the ARP direct grant and competitive grant awards from the EPA, DEC received funds for 20 additional sensor pods. DEC is in the process of hiring an additional staff person dedicated to this project and will reach out to communities this summer. Due to sensor performance issues, DEC conducted a sensor comparison study during the 2022/23 winter at the NCore site in Fairbanks to evaluate multiple sensor pods from different manufacturers. DEC is currently in the process of procuring additional low-cost sensors with the goal of installing all additional sensors by the end of October 2023. See 5.4 Low-Cost Sensor Network.

# 1 INTRODUCTION

The Code of Federal Regulations (CFR) Title 40 §58.10 requires each state agency to adopt and submit to the U.S. Environmental Protection Agency (EPA) Regional Administrator an annual monitoring network plan which shall provide for the establishment and maintenance of an air quality surveillance system that consists of a network made up of the following types of monitoring stations:

- State and local air monitoring stations (SLAMS), including monitors that are designated as:
  - Federal Reference Method (FRM), or
  - Federal Equivalent Method (FEM)
- National Core Multi-Pollutant Monitoring Stations (NCore)
- $PM_{2.5}$ Chemical Speciation Network (CSN), and
- Special Purpose Monitoring (SPM) stations

The plan shall include a statement of purpose for each monitor and evidence that siting and operation of each monitor meets the requirements of appendices A, C, D, and E of 40 CFR 58 where applicable.

The annual monitoring network plan must be made available for public inspection for at least 30 days prior to submission to EPA. Any annual monitoring network plan that proposes SLAMS network modifications, including new monitoring sites, is subject to the approval of the EPA Regional Administrator, who shall provide opportunity for public comment and shall approve or disapprove the plan and schedule within 120 days. If the State or local agency has already provided a public comment opportunity on its plan and has made no changes after that comment opportunity and has submitted the received comments together with the plan, then the Regional Administrator is not required to provide a separate opportunity for comment.

This 2023 Annual Monitoring Network Plan describes the Alaska air quality monitoring network under the State's oversight and spells out anticipated changes to the network for the calendar year 2023. This plan shall include all required stations to be operational by January 1, 2023. Specific locations for the required monitors shall be included in the annual network plan which is due to be submitted to the EPA Regional Administrator by July 1, 2023.

The annual monitoring network plan must contain the following information for each existing and proposed site:

1. The Air Quality System (AQS) site identification number
2. The location, including street address and geographical coordinates
3. The sampling and analysis method(s) for each measured parameter
4. The operating schedules for each monitor
5. Any proposals to remove or move a monitoring station within a period of 18 months following plan submittal

6. The minimum monitoring requirements for spatial scale of representativeness for each monitor as defined in 40 CFR 58, Appendix D
7. The minimum monitoring requirements for probe and monitoring path siting criteria as defined in 40 CFR 58, Appendix E
8. The identification of any sites that are suitable and sites that are not suitable for comparison against the annual $PM_{2.5}$ National Ambient Air Quality Standards (NAAQS) as described in 40 CFR 58.30
9. The Metropolitan Statistical Area, Core-Based Statistical Area, Combined Statistical Area, or other area represented by the monitor
10. The designation of any lead monitors as either source-oriented or non-source-oriented according to 40 CFR 58, Appendix D
11. Any source-oriented monitors for which a waiver has been requested or granted by the EPA Regional Administrator as allowed for under paragraph 4.5(a)(ii) of 40 CFR 58, Appendix D
12. Any source-oriented or non-source-oriented site for which a waiver has been requested or granted by the EPA Regional Administrator for the use of Pb-$PM_{10}$ monitoring in lieu of lead total suspended particulate (Pb-TSP) monitoring as allowed for under paragraph 2.10 of 40 CFR 58, Appendix C

# 2 AIR QUALITY MONITORING PRIORITIES

In 1970, the Congress of the United States created the EPA and promulgated the Clean Air Act (CAA). Title I of the CAA established NAAQS to protect public health. NAAQS were developed for six *criteria pollutants*: particulate matter (PM), sulfur dioxide ($SO_2$), nitrogen dioxide ($NO_2$), carbon monoxide (CO), ozone ($O_3$), and lead (Pb). Particulate matter has two associated NAAQS: one for fine particulate matter less than 2.5 micrometers in aerodynamic diameter ($PM_{2.5}$) and one for coarse particulate matter less than 10 micrometers in aerodynamic diameter ($PM_{10}$). Threshold limits established under the NAAQS to protect human health are known as primary standards. The primary health standards are to protect the most sensitive of the human population, including those people with existing respiratory or other chronic health conditions, children, and the elderly. Secondary standards established under the NAAQS are to protect the public welfare and the environment. Since promulgation of the original CAA, the EPA has continued to revise the NAAQS based on its assessment of national air quality trends and on current (and ongoing) health studies.

To protect public health and assess compliance with NAAQS, DEC established an air quality monitoring program. The State of Alaska has a large geographical area with a small population. Anchorage and the Matanuska-Susitna (Mat-Su) Valley have the bulk of the 733,583[2] residents in the state, about 55% of the overall population. The remainder of the population is distributed among the cities of Juneau and Fairbanks, both with populations of just over 30,000 residents, and

[2] Based on population estimates for July 1, 2022 obtained from the United States Census Bureau, https://www.census.gov/quickfacts/fact/table/juneaucityandboroughcountyalaska,fairbanksnorthstarboroughalaska,matanuskasusitnaboroughalaska,anchoragemunicipalitycountyalaska,AK/PST045222

many scattered and isolated small villages, most of which are off the road system and have populations ranging from 16 to 10,000 people. The total land area of the state is approximately 571,022 square miles (1.5 million square kilometers)[3].

In accordance with the National Monitoring Strategy, DEC plans air monitoring activities using the following criteria:

- Monitor in larger communities to cover the largest possible population exposure
- Monitor in designated smaller towns and villages that are representative of multiple communities in a region
- Monitor in response to air quality concerns, as funding and staffing levels allow

The Air Monitoring & Quality Assurance (AMQA) program of the DEC Air Quality Division has a relatively small staff of professionals who conduct the State's air quality assessment efforts. To enhance the quality of work performed statewide, DEC's staff works closely with the Municipality of Anchorage (MOA), the Fairbanks North Star Borough (FNSB), the Matanuska-Susitna Borough, the City & Borough of Juneau (CBJ), and environmental staff in other, smaller communities to assess air quality levels statewide. To continue to protect public health and the environment, air quality monitoring is focused on seven primary issues by descending priority:

1. Fine particulate matter ($PM_{2.5}$) monitoring
2. Coarse particulate matter ($PM_{10}$) monitoring
3. Wildland fire monitoring ($PM_{2.5}$)
4. Carbon monoxide (CO) monitoring
5. Rural community and tribal village monitoring (primarily $PM_{10}$)
6. Lead (Pb) monitoring
7. Ozone ($O_3$) monitoring

# 3 STATE OF ALASKA AMBIENT AIR MONITORING NETWORK

## *3.1 MINIMUM MONITORING REQUIREMENTS*

Minimum monitoring requirements are based on several factors including pollutant levels (see **Appendix A**) and populations in statistically defined metropolitan areas. The definitions for the statistical based metropolitan areas are provided by the US Office of Management and Budget (OMB) and the Census Bureau (Census).

Alaska has four statistical areas as designated by OMB in 2009 with updated boundaries based on the 2020 Census data (**Appendix B**). The four Core Based Statistical Areas (CBSA) include two Metropolitan Statistical Areas (MSA) and two Micropolitan Areas (μSA), see Table 3-1 below.

[3] Based on the land area coverage, as of 2020, obtained from the 2022 population estimate quick facts page from the United States Census Bureau, https://www.census.gov/quickfacts/fact/table/AK/PST045222

The two MSAs are the Anchorage MSA, which includes the entire Municipality of Anchorage and the entire Matanuska-Susitna Borough, and the Fairbanks MSA, which is comprised of the Fairbanks North Star Borough. The two Micropolitan Areas are the Juneau μSA and the Ketchikan μSA, which encompass the City and Borough of Juneau and the Ketchikan Gateway Borough, respectively.

**Table 3-1: Alaska's Core Based Statistical Areas**

| Core Based Statistical Areas | Population* | Includes: | |
|---|---|---|---|
| **Anchorage, MSA** | 400,470 | Municipality of Anchorage | 287,145 |
| | | Matanuska-Susitna Borough | 113,325 |
| **Fairbanks, MSA** | 95,356 | | |
| **Juneau, μSA** | 31,685 | | |
| **Ketchikan, μSA** | 13,741 | | |

*(based on population estimates for July 1, 2022 obtained from the United States Census Bureau)
https://www.census.gov/quickfacts/fact/table/ketchikangatewayboroughalaska,juneaucityandboroughcountyalaska,fairbanksnorthstarboroughalaska,matanuskasusitnaboroughalaska,anchoragemunicipalitycountyalaska,AK/PST045222

The minimum number of sites required for the Alaskan CBSAs for the six criteria pollutants are summarized for the Alaska network in Table 3-2. No monitoring is required for lead anywhere in the Alaskan CBSAs. No air quality monitoring sites are currently required for the Ketchikan μSA.

Monitoring in the Juneau μSA focuses on particulate matter monitoring. One monitoring site is required for $PM_{10}$ based on the $PM_{10}$ Limited Maintenance Plan. The Mendenhall Valley had been designated as a $PM_{10}$ non-attainment area and has met the standard since 1994. No $PM_{2.5}$ monitoring site is required; however, a single continuous $PM_{2.5}$ monitor is used to issue burn curtailments by the local government.

CO monitoring is required in the Anchorage and Fairbanks MSAs based on the Limited Maintenance Plans for the MSAs. Both areas had been previously designated as non-attainment and have been able to lower their concentrations. Neither MSA has had a violation of the CO standard since 2001.

The Anchorage MSA triggered the $PM_{10}$ monitoring requirement of three to four monitors based on one exceedance in 2019 at the Mat-Su Butte site (see Table A-5 in **Appendix A)**. The exceedance resulted from a high wind event that prehended dust from frozen, but not snow-covered, braided riverbeds. In this area of the state, high wind events occur semi-regularly in fall and occasionally in early spring. The event was flagged in AQS by DEC and relevant supporting evidence for exceptional event waiver requests (EEWR) have been saved. As EPA and the State are currently focused on $PM_{2.5}$, DEC plans to prepare EEWRs for the events when EPA starts another $PM_{10}$ designation process and/or if EPA requests that DEC submit them for approval.

Based on a 2021 design value (DV) of 28 $\mu g/m^3$, no $PM_{2.5}$ monitoring sites are required for this 2023 Annual Monitoring Plan. Currently, the two sites in the Anchorage MSA $PM_{2.5}$ monitoring network exceed the minimum requirements. The minimum requirement for $PM_{2.5}$ monitoring in

the Fairbanks MSA is one monitoring site. The Fairbanks $PM_{2.5}$ monitor requirement is based on the elevated concentrations measured in Fairbanks and North Pole. The DEC's Fairbanks $PM_{2.5}$ monitoring network exceeds this requirement because of its status as a serious nonattainment area.

**Table 3-2: Minimum Monitoring Requirements for Alaskan CBSAs**

| **Criteria Pollutant** | | **SLAMS site requirement** | | | |
|---|---|---|---|---|---|
| Comments | | **Anchorage MSA** | **Fairbanks MSA** | **Juneau µSA** | **Ketchikan µSA** |
| **$PM_{2.5}$** | Most recent 3-year design value ≥ 85% of NAAQS | 0 | 1 | 0 | 0 |
| | Most recent 3-year design value < 85% of NAAQS | 0 | 0 | 0 | 0 |
| **$PM_{10}$** | Two monitoring sites based on $PM_{10}$ Limited Maintenance Plans (Juneau and Eagle River). Additional monitors required in Anchorage MSA based on pollution levels. | 3-4 | 0 | 0 | 0 |
| **Pb** | Waiver for source-oriented monitoring - see section 3.1.1 | 0 | 0 | 0 | 0 |
| **CO** | Two monitoring sites based on CO Limited Maintenance Plans (Fairbanks and Anchorage); Fairbanks also meets NCore requirement | 0 | 0 | 0 | 0 |
| **$O_3$** | Most recent 3-year design value ≥ 85% of NAAQS | 0 | 0 | 0 | 0 |
| | See EPA $O_3$ NAAQS waiver[1] | 0[1] | 0 | 0 | 0 |
| **$SO_2$** | NCore site requirement | 0 | 0 | 0 | 0 |
| **$NO_2$** | Requirement based on population numbers. Alaska does not meet the threshold requirement | 0 | 0 | 0 | 0 |

[1] EPA 5-Year Ozone NAAQS Monitoring Requirement Waiver (see or Appendix C, Waiver C-1)

### 3.1.1 Lead

Alaska does not meet the population thresholds for lead monitoring in any of the communities. DEC currently does not monitor for lead. DEC received a waiver from EPA for source-oriented monitoring as per 40 CFR 58 Appendix D, see 3.5.3 Lead Source Oriented Monitoring.

### 3.1.2 Appendix D & E Siting Forms

In 2014, EPA Region 10 provided network evaluation forms to determine compliance with design and minimum monitoring requirements for each of the criteria pollutants under 40 CFR 58 Appendix D. These evaluation forms were reviewed and updated, when necessary, in 2023 by DEC and are presented in **Appendix D.**

In 2014, EPA Region 10 provided siting evaluation forms to determine compliance with siting requirements for each of the criteria pollutants under 40 CFR 58 Appendix E. These site evaluation forms were reviewed and updated, when necessary, in 2023 by DEC and are summarized by MSA in **Appendix E.**

## *3.2 Current Monitoring Sites*

DEC operates and maintains several ambient air monitoring networks throughout Alaska. Table 3-3 provides the site name, address, geographic coordinates, and identification number for all the air monitoring sites for which data are submitted to the EPA AQS database as of May 2023. NCore parameters measured are $PM_{10}$, $PM_{2.5}$, $PM_{10-2.5}$, CO, $O_3$, $SO_2$, NOy, NO, $PM_{2.5}$ chemical speciation, and meteorological parameters. There are four sites that are collocated: Garden ($PM_{2.5}$ and $PM_{10}$), Hurst Rd. ($PM_{2.5}$), NCore ($PM_{10}$), and Floyd Dryden ($PM_{2.5}$ and $PM_{10}$), which are described further in Table 3-15. All the primary and secondary monitors are located within one to four meters of each other.

Table 3-3: AQS Monitoring Sites as of May 2023

| Site Name | Address | Latitude/Longitude[1] | AQS ID | Agency |
|---|---|---|---|---|
| Garden | 3000 East 16th Ave. Anchorage, AK | 61.205861 N 149.824602 W | 02-020-0018 | DEC |
| Laurel | 4335 Laurel St. Anchorage, AK | 61.181117 N 149.834003 W | 02-020-0045 | DEC |
| Parkgate | 11723 Old Glenn Hwy. Eagle River, AK | 61.326700 N 149.569707 W | 02-020-1004 | DEC |
| NCore | 809 Pioneer Road Fairbanks, AK | 64.845307 N 147.72552 W | 02-090-0034 | DEC |
| Hurst Road[2] | 3288 Hurst Rd. North Pole, AK | 64.762973 N 147.310297 W | 02-090-0035 | DEC |
| A Street | 397 Hamilton Ave Fairbanks, AK | 64.84593 N 147.69327 W | 02-090-0040 | DEC |
| Butte[3] | Harrison Court Butte, AK | 61.534100 N 149.0351855 W | 02-170-0008 | DEC |
| Floyd Dryden Middle School | 3800 Mendenhall Loop Road Juneau, AK | 58.388889 N 134.565556 W | 02-110-0004 | DEC |

[1] Coordinates for latitude and longitude are consistent with the World Geodetic System (WGS 84).
[2] Hurst Road is the new name for the North Pole Fire Station #3 site. It was changed in 2018 at Fairbanks North Star Borough's request.
[3] EPA has granted a siting requirement waiver for Butte: (see Section 3.5.2 or **Appendix C,** Waiver C-2)

## *3.3 SITING CRITERIA*

In 2014, EPA Region 10 provided site evaluation forms to determine compliance with 40 CFR 58 Appendix E requirements for monitoring path and siting criteria. These forms were distributed to the individual site operators for completion. Summaries of the site evaluation forms are presented in three tables – PM, CO and all other gaseous pollutants – in **Appendix E** of this report. Monitoring site photos and location maps can be found at: http://dec.alaska.gov/air/air-monitoring/monitoring-site-information/. The operation of each monitor complies with the requirements identified in 40 CFR 58 Appendix A. Moreover, all SPM sites are operated like SLAMS and therefore meet these requirements.

### 3.3.1 CARBON MONOXIDE SITES

CO inlet probes should be at least 1 meter away, both vertically and horizontally, from any supporting structure or wall. For micro-scale sites the probe height must be between 2.5 and 3.5 meters, whereas for other scale sites the probe must be between 3 and 15 meters high.

A probe must have unrestricted airflow for at least 270 degrees, or 180 degrees if it is located on the side of a building. Obstructions must be a minimum distance away equal to twice the distance by which the height of the obstruction exceeds the height of the probe. Trees should not be present between the dominant CO source or roadway and the inlet probe. Table 3-4 lists the CO monitoring sites in Anchorage and Fairbanks.

**Table 3-4: CO Monitoring Sites in Anchorage and Fairbanks as of May 2023**

| Site Name | Monitoring Scale | Probe Distance from Wall (meters) | Height (meters) | Unrestricted Air Flow | Spacing from Roadway (meters) | Trees |
|---|---|---|---|---|---|---|
| Garden 02-020-0018 | Neighborhood | 1 | 3 | 180 degrees unobstructed | 7.6 | Yes[1] |
| NCore 02-090-0034 | Neighborhood | Not applicable | 3 | 360 degrees unobstructed | 70 | 10 m |

[1] One spruce tree 7.6 m tall and 1.3 m from the building. It is roughly 2.7 m to the northeast of the CO probe

### 3.3.2 PARTICULATE MATTER ($PM_{10}$ AND $PM_{2.5}$) SITES

For micro-scale sites, particulate matter inlets must be between 2 and 7 meters from ground level. For other siting scales the probe must be between 2 and 15 meters high.

A sampler must have at least 2 meters separation from walls, parapets, penthouses, etc. A sampler must have unrestricted airflow for at least 270 degrees, or 180 degrees for street canyon sites. Obstructions must be a minimum distance away from the sampler with the separation equal to twice the distance by which the height of the obstruction exceeds the height of the sampler inlet.

Micro-scale sampler inlets must be located between 5 and 15 meters from the nearest traffic lane for traffic corridor sites, and between 2 and 10 meters for street canyon sites. The minimum separation distance between the probe and nearest traffic lane for middle, neighborhood, or urban scale sites depends upon the number of vehicles per day (VPD) that use the roadway according to a table in Appendix E of 40 CFR 58. Table 3-5 lists all PM monitoring sites in Alaska and how they fit the siting criteria from Appendix E of 40 CFR 58 (also see **Appendix E**).

Table 3-5: PM Monitoring Sites in Alaska as of May 2023

| Site Name AQS Codes | Monitoring Scale $PM_{10}$ | Monitoring Scale $PM_{2.5}$ | Height (meters) | Spacing from Obstructions (meters) | Spacing from Roadway (meters) | Traffic (VPD) | Trees within 10 meters? |
|---|---|---|---|---|---|---|---|
| Garden 02-020-0018 | Neighborhood | Neighborhood | 11 | no obstructions | 14 | 720 Sunrise Dr 1,260 Airport Heights Dr. | no |
| Laurel 02-020-0045 | Microscale | - | 6.4 | no obstructions | 11 | 29,200 Tudor Rd | no |
| Parkgate 02-020-1004 | Neighborhood | Neighborhood | 10.4 | no obstructions | 44 | 13,000 Old Glenn Hwy | no |
| Butte[2] 02-170-0008 | Neighborhood | Neighborhood | 4.7 | no obstructions | 150 | 3,090[3], Old Glenn Hwy | yes 5.4 m |
| A Street 02-090-0040 | - | Neighborhood | 4.3 | no obstructions | 5.8[4] | 1,540[5] Hamilton Ave 4,160 Farewell Ave | no |
| NCore 02-090-0034 | Neighborhood | Neighborhood | 4.5 | no obstructions | 70 | 4,640 Philips Field Rd 940 Driveway St | no |
| Hurst Road 02-090-0035 | - | Neighborhood | 4.7 | no obstructions | 21 | 3,430 Hurst Rd | no |
| Floyd Dryden 02-110-0004 | Neighborhood | Neighborhood | 10 | no obstructions | 100 | 16,100 Mio-Mendenhall Loop Road | no |

[1] Average annual traffic count 2021 traffic data accessed at: http://dot.alaska.gov/stwdplng/transdata/traffic_AADT_map.shtml
[2] Site is next to a gravel pad/road so EPA has granted a siting requirement waiver (see Section 3.5.2 or **Appendix C**, Waiver C-2)
[3] McKechnie Loop has only local neighborhood traffic and the site is at the end of a gravel cul-de-sac on Harrison Court (with three houses)
[4] Site is <10m from adjacent A-Street, a paved, low traffic neighborhood street, remainder of site grass covered
[5]Traffic count is listed for Hamilton Ave and Farewell Ave to be consistent with prior ANP reporting. However, the streets to the north and south of A-Street, Craig Ave and Eureka Ave respectively, have traffic counts of 90 and 100. See Section 3.5.4.

### 3.3.3 NCore Site

The NCore site pollutant monitors listed in Table 3-6 are representative at a neighborhood scale. Meteorological monitoring is representative at a neighborhood scale. Table 3-6 also lists additional relevant siting information.

Table 3-6: NCore Gaseous[1] Monitoring and Meteorological Monitoring as of May 2023 in Alaska

| Parameter Name | Monitoring Scale | Height (meters) | Spacing from Obstructions (meters) | Spacing from Roadway (meters) | Traffic (VPD) | Trees < 10 m? |
|---|---|---|---|---|---|---|
| NOy, NO & DIF | Neighborhood | 3[2] | no obstructions | 70 | 4640[3] | None |
| $O_3$ | Neighborhood | 3 | no obstructions | 70 | 4640 | None |
| $SO_2$ (1 hr & 5 min) | Neighborhood | 3 | no obstructions | 70 | 4640 | None |
| $T_{amb}$, WS, & WD | Neighborhood | 3 | no obstructions | 70 | 4640 | None |
| $T_{amb}$, WS, & WD | Neighborhood | 10 | no obstructions | 70 | 4640 | None |
| Relative Humidity | Neighborhood | 3 | no obstructions | 70 | 4640 | None |

[1] Excluding CO. For CO see Table 3-4.
[2] Probe height is 3 meters rather than the 10 meters recommended to remain below the unusually low winter inversion layer.
[3] 2021 Philips Field Rd traffic data accessed at: http://dot.alaska.gov/stwdplng/transdata/traffic_AADT_map.shtml

## 3.4 *Monitoring Methods, Designation, and Sampling Frequency*

Tables 3-7 to Table 3-15 present information for current sites (and monitors) used in coding the data submitted by DEC to the AQS database. The information provided in Tables 3-7 to 3-15 for each monitoring site includes pollutant parameter name, monitor designation, the AQS parameter codes and parameter occurrence codes (POC), the AQS method code, the frequency of sampling, and the instrumentation used. The monitor designation states the purpose for which the data are to be used, such as: for SLAMS to demonstrate NAAQS compliance, SPM for general air quality assessments, and the CSN for atmospheric chemistry assessments. AQS parameter, method and unit codes are specific to the pollutant, instrumentation, and sampling equipment used, and how the concentration units are expressed in either local conditions or corrected to standard conditions for temperature and pressure. The 5-digit parameter code identifies the parameter being measured e.g. $PM_{10}$, $SO_2$, or wind speed. The 1-digit POC code is the parameter occurrence code. As suggested by Region 10 EPA, DEC uses the POC to indicate whether the sampler or instrument is (1) a primary data source, or (2) a secondary data source such as a collocated sampler, or (3) that an instrument is measuring on a continuous basis. However, the NCore site is coded differently, with the secondary $PM_{10}$ sampler assigned a POC 1 designation since it is part of a coarse pair. The AQS method code provides information specific to the analytical technique used for the pollutant determination such as instrumental analysis using chemiluminescence for nitric oxide or

gravimetric analysis for particulate. The notation presented in the sample frequency indicates how often the pollutant concentration is determined. For example, "1/6" indicates that one sample is collected every sixth day according to the national EPA air monitoring schedule. Continuous indicates that an instrument is continuously analyzing a sample stream providing a pollutant concentration on a real-time basis (e.g. 1-min $SO_2$ reading) or a near-real time basis (e.g. 1-hour $PM_{2.5}$ reading from a beta attenuation monitor, a BAM). The equipment information column identifies on-site equipment (either a sampler or instrument) specific to the AQS parameter code.

Other monitoring sites operated by DEC to gather data related to rural road dust and wildland fires, but that are not submitted to the AQS database are discussed in **Appendix F**. The Interagency Monitoring of Protected Environments (IMPROVE) monitoring sites operated in Alaska under the federal program to characterize and protect scenic visibility around National Parks and designated wilderness areas are described in **Appendix G**.

A summary of pollutant concentration data calculated as NAAQS design values, maxima, or as averages are presented in **Appendix A**.

Table 3-7: Anchorage MSA: AQS Codes May 2023

| Site Name/ Location/ AQS ID | Pollutant Parameter | Monitor Designation | Monitor Starting Date | AQS Parameter/ Occurrence Code | AQS Method Codes | Sample Frequency | Equipment |
|---|---|---|---|---|---|---|---|
| Garden/ Anchorage 02-020-0018 | $PM_{10STD}$/ $PM_{10LC}$ | SLAMS | 1/1/2009 STD 1/1/2015 LC | 81102-3/ 85101-3 | 122 | Continuous | Met One BAM 1020 - FEM |
| | $PM_{10STD}$/ $PM_{10LC}$ | SLAMS | 2/24/2022 | 81102-2/ 85101-2 | 126 | 1/6 | Thermo Scientific Partisol 2000i - FRM |
| | $PM_{2.5LC}$ | SLAMS | 1/1/2009 | 88101-3 | 170 | Continuous | Met One BAM 1020 (VSCC) FEM |
| | $PM_{2.5LC}$ | SLAMS | 2/22/2022 | 88101-2 | 143 | 1/6 | Thermo Scientific Partisol 2000i (VSCC) - FRM |
| | CO | SLAMS | 1/1/1979 | 42101-1 | 554 | Continuous | Thermo Scientific Model 48i-TLE - FRM |
| Laurel/ Anchorage 02-020-0045 | $PM_{10STD}$/ $PM_{10LC}$ | SPM | 5/28/2015 | 81102-3/ 85101-3 | 122 | Continuous | Met One BAM 1020 - FEM |
| Parkgate/ Eagle River 02-020-1004 | $PM_{10STD}$/ $PM_{10LC}$ | SLAMS | 1/1/2009 STD 1/1/2015 LC | 81102-3/ 85101-3 | 122 | Continuous | Met One BAM 1020 - FEM |
| Butte/ Matanuska-Susitna Valley 02-170-0008 | $PM_{10STD}$/ $PM_{10LC}$ | SPM | 8/10/2011 STD 4/11/1998 LC | 81102-3/ 85101-3 | 122 | Continuous | Met One BAM 1020 - FEM |
| | $PM_{2.5LC}$ | SLAMS | 8/11/2011 | 88101-3 | 170 | Continuous | Met One BAM 1020 (VSCC) - FEM |

STD = standard conditions of temperature and pressure; LC = local (actual) conditions of temperature and pressure

Table 3-8: FNSB Monitors: AQS Codes as of May 2023

| Site Name/Location | Pollutant Parameter | Monitor Designation | AQS Monitor Starting Date | AQS Parameter - Occurrence Code | AQS Method Codes | Sample Frequency | Equipment |
|---|---|---|---|---|---|---|---|
| NCore/ Fairbanks 02-090-0034 | $PM_{10STD}$/ $PM_{10LC}$ | NCORE | 2/15/2011 | 81102-3/ 85101-3 | 122 | Continuous | Met One BAM 1020 FEM |
| | $PM_{2.5LC}$ | SPM | 2/15/2011 | 88501-3 88502-3 | 731 | Continuous | Met One BAM 1020 (SCC) non-FEM |
| | $PM_{10STD}$/ $PM_{10LC}$ collocate | NCORE | 11/10/2012 | 81102-1/ 85101-1 | 126 | 1/3 | Thermo Scientific Partisol 2000i-FRM[1] |
| | $PM_{2.5LC}$ | NCORE | 11/4/2009 | 88101-1 | 145 | 1/1 | Thermo Scientific Sequential Partisol 2025i (VSCC)-FRM |
| | $PM_{2.5LC}$ | NCORE | 5/8/2013 | 88101-2 | 143 | 1/3 | Thermo Scientific Partisol 2000i (VSCC)-FRM |
| | $PM_{10LC}$ - $PM_{2.5LC}$ | NCORE | 2/15/2011 | 86101-1 | 175 | 1/3 | Paired Thermo Scientific Partisol 2000i's |
| | CO | NCORE | 8/1/2011 | 42101-1 | 593 | Continuous | Teledyne T300U-FRM |
| | $SO_2$ (1-hr)/ $SO_2$ (5-min) | NCORE | 8/1/2011/ 8/18/2011 | 42401-1/ 42401-2 | 560 | Continuous | Thermo Scientific 43iQ-TL-FEM |
| | $NO_Y$ | NCORE | 10/5/2012 | 42600-1 | 699 | Continuous | Teledyne T-200U-NOy |
| | NO | NCORE | 10/5/2012 | 42601-2 | 699 | Continuous | Teledyne T-200U-NOy |

[1] The NCore sites have a PM Coarse ($PM_{10LC}$ - $PM_{2.5LC}$) measurement requirement. As the $PM_{2.5}$ BAM is non-FEM, DEC is operating $PM_{2.5}$ and $PM_{10}$ 2000i-FRM samplers on a 1/3 schedule to calculate PM Coarse.

| Site Name/Location | Pollutant Parameter | Monitor Designation | AQS Monitor Starting Date | AQS Parameter - Occurrence Code | AQS Method Codes | Sample Frequency | Equipment |
|---|---|---|---|---|---|---|---|
| NCore/ Fairbanks 02-090-0034 | $NO_Y$-NO | NCORE | 10/5/2012 | 42612-1 | 699 | Continuous | Teledyne T-200U-NOy |
| | $O_3$ | NCORE | 8/1/2011 | 44201-1 | 047 | Continuous | Thermo Scientific 49iQ-TL-FEM |
| | WD**(V) 10 m | NCORE | 4/5/2011 | 61104-1 | 068 | Continuous | RM Young Ultrasonic Anemometer |
| | WD (V) 3 m | NCORE | 4/5/2011 | 61104-2 | 068 | Continuous | RM Young Ultrasonic Anemometer |
| | WS (V) 10 m | NCORE | 4/5/2011 | 61103-1 | 068 | Continuous | RM Young Ultrasonic Anemometer |
| | WS (V) 3 m | NCORE | 4/5/2011 | 61103-2 | 068 | Continuous | RM Young Ultrasonic Anemometer |
| | RH | NCORE | 11/4/2013 | 62201-1 | 061 | Continuous | Met One Relative Humidity Sensor |
| | Ambient Temp 3 m | NCORE | 4/1/2011 | 62101-2 | 040 | Continuous | Met One T-200 RTD Sensor |
| | Ambient Temp 10 m | NCORE | 4/1/2011 | 62101-1 | 040 | Continuous | Met One T-200 RTD Sensor |
| | $PM_{2.5LC}$ Speciation | NCORE/CSN | 1/1/2015 | Multiple[1] | Multiple[1] | 1/3 | URG 3000N |
| | $PM_{2.5LC}$ Speciation | NCORE/CSN | 1/1/2015 | Multiple[1] | Multiple[1] | 1/3 | Met One Super SASS |

| Site Name/Location | Pollutant Parameter | Monitor Designation | AQS Monitor Starting Date | AQS Parameter - Occurrence Code | AQS Method Codes | Sample Frequency | Equipment |
|---|---|---|---|---|---|---|---|
| A Street/ Fairbanks 02-090-0040 | $PM_{2.5LC}$ | SLAMS | 7/15/2019 | 88101-1 | 145 | 1/1 | Thermo Scientific Sequential Partisol 2025i (VSCC)-FRM |
| | $PM_{2.5LC}$ | SPM | 11/29/2018 | 88501-3 88502-3 | 731 | Continuous | Met One BAM 1020 (SCC) non-FEM |
| | Ambient Temp 3 m | SPM | 10/1/2019 | 62101-2 | 040 | Continuous | Met One T-200 RTD Sensor |
| | Ambient Temp 10 m | SPM | 10/1/2019 | 62101-1 | 040 | Continuous | Met One T-200 RTD Sensor |
| | WD** (V) 3 m | SPM | 10/1/2019 | 61104-2 | 068 | Continuous | RM Young Ultrasonic Anemometer |
| | WS (V) 3 m | SPM | 10/1/2019 | 61103-2 | 068 | Continuous | RM Young Ultrasonic Anemometer |
| | WD (V) 10 m | SPM | 10/1/2019 | 61104-1 | 068 | Continuous | RM Young Ultrasonic Anemometer |
| | WS (V) 10 m | SPM | 10/1/2019 | 61103-1 | 068 | Continuous | RM Young Ultrasonic Anemometer |
| Hurst Road/ North Pole 02-090-0035 | $PM_{2.5LC}$ | SLAMS | 3/1/2012 | 88101-1 | 145 | 1/1 | Thermo Scientific Sequential Partisol 2025i (VSCC)-FRM |
| | $PM_{2.5LC}$ collocate | SLAMS | 7/18/2019 | 88101-2 | 145 | 1/3 | Thermo Scientific Sequential Partisol 2025i (VSCC) |

| Site Name/Location | Pollutant Parameter | Monitor Designation | AQS Monitor Starting Date | AQS Parameter - Occurrence Code | AQS Method Codes | Sample Frequency | Equipment |
|---|---|---|---|---|---|---|---|
| Hurst Road/ North Pole 02-090-0035 | $SO_2$ (1-hr)/ $SO_2$ (5-min) | SPM | 3/10/2022/ 3/10/2022 | 42401-1/ 42401-2 | 560 | Continuous | Thermo Scientific 43i-TL-FEM |
| | $PM_{2.5LC}$ | SPM | 3/1/2012 | 88501-3 88502-3 | 731 | Continuous | Met One BAM 1020 (SCC) non-FEM |
| | $PM_{2.5LC}$ Speciation | CSN | 8/1/2019 | Multiple[1] | Multiple[1] | 1/3 | URG 3000N |
| | $PM_{2.5LC}$ Speciation | CSN | 8/1/2019 | Multiple[1] | Multiple[1] | 1/3 | Met One Super SASS |
| | Ambient Temp 23 m | SPM | 9/24/2019 | 62101-3 | 040 | Continuous | Met One T-200 RTD Sensor |
| | Ambient Temp 10 m | SPM | 9/24/2019 | 62101-1 | 040 | Continuous | Met One T-200 RTD Sensor |
| | Ambient Temp 3 m | SPM | 9/24/2019 | 62101-2 | 040 | Continuous | Met One T-200 RTD Sensor |
| | WD[2] (V) 23 m | SPM | 9/24/2019 | 61104-3 | 068 | Continuous | Met One Ultrasonic Anemometer |
| | WS (V) 23 m | SPM | 9/24/2019 | 61103-3 | 068 | Continuous | Met One Ultrasonic Anemometer |
| | WD (V) 10 m | SPM | 9/24/2019 | 61104-1 | 068 | Continuous | Met One Ultrasonic Anemometer |
| | WS (V) 10 m | SPM | 9/24/2019 | 61103-1 | 068 | Continuous | Met One Ultrasonic Anemometer |

| Site Name/Location | Pollutant Parameter | Monitor Designation | AQS Monitor Starting Date | AQS Parameter - Occurrence Code | AQS Method Codes | Sample Frequency | Equipment |
|---|---|---|---|---|---|---|---|
| | WD (V) 3 m | SPM | 9/24/2019 | 61104-2 | 068 | Continuous | Met One Ultrasonic Anemometer |
| | WS (V) 3 m | SPM | 9/24/2019 | 61103-2 | 068 | Continuous | Met One Ultrasonic Anemometer |

[1] Multiple AQS codes are used to identify individual chemical species
[2] Meteorological parameters (WS and WD) also measured in scalar

**Table 3-9: Juneau µSA: AQS Codes as of May 2023**

| Site Name/Location | Pollutant Parameter | Monitor Designation | Monitor Starting Date | AQS Parameter and Occurrence Code | AQS Method Codes | Sample Frequency | Equipment |
|---|---|---|---|---|---|---|---|
| Floyd Dryden Middle School/ Juneau 02-110-0004 | $PM_{2.5LC}$ | SLAMS | 6/23/2021 | 88101-3 | 236 | Continuous | Teledyne T640X - FEM |
| | $PM_{2.5LC}$ | SPM | 9/28/2021 | 88101-2 | 143 | 1/6 | Thermo Scientific Partisol 2000i (VSCC) - FRM |
| | $PM_{10STD}$/ $PM_{10LC}$ | SLAMS | 6/23/2021 | 81102-3/ 85101-3 | 239 | Continuous | Teledyne T640X - FEM |
| | $PM_{10STD}$/ $PM_{10LC}$ | SPM | 1/21/2022 | 81102-2/ 85101-2 | 126 | 1/6 | Thermo Scientific Partisol 2000i - FRM |

Table 3-10: May 2023 Site Level Monitoring Objectives

| Site Name | AQS ID | Pollutant(s) | Monitoring Objectives<br>40 CFR Part 58 App D 1.1.1 |
|---|---|---|---|
| Garden | 02-020-0018 | $PM_{10}/PM_{2.5}$/CO | (b) Typical concentrations (population density based)<br>(d) General background concentration levels |
| Laurel | 02-020-0045 | $PM_{10}$ | (a) Highest concentrations expected in area<br>(c) Impact of significant sources/source categories |
| Parkgate | 02-020-1004 | $PM_{10}$ | (b) Typical concentrations (population density based)<br>(d) General background concentration levels |
| NCore | 02-090-0034 | $PM_{10}/PM_{2.5}/PM_{10\text{-}2.5}$/CO/ $SO_2/O_3$/ NO/NOy/Speciation | (b) Typical concentrations (population density based)<br>(d) General background concentration levels |
| Hurst Road | 02-090-0035 | $PM_{2.5}$/ $SO_2$/Speciation | (a) Highest concentrations expected in area<br>(c) Impact of significant sources/source categories |
| A Street | 02-090-0040 | $PM_{2.5}$ | (a) Highest concentrations expected in area<br>(c) Impact of significant sources/source categories |
| Butte | 02-170-0008 | $PM_{10}/PM_{2.5}$ | (a) Highest concentrations expected in area<br>(c) Impact of significant sources/source categories |
| Floyd Dryden Middle School | 02-110-0004 | $PM_{10}/PM_{2.5}$ | (b) Typical concentrations (population density based)<br>(d) General background concentration levels |

Table 3-11: 2023 Anchorage MSA Instrument-Level Monitoring Purposes and AQS Monitoring Objective

| Site Name/ Location/ AQS ID | Pollutant Parameter | AQS Parameter/ Occurrence Code | AQS Monitoring Objective | Monitoring Purpose(s) |
|---|---|---|---|---|
| Garden/ Anchorage 02-020-0018 | $PM_{10STD}$/$PM_{10LC}$ | 81102-3/85101-3 | Population exposure | -Provide timely air pollution information<br>-Determine ambient air quality standard compliance |
| | $PM_{10STD}$/ $PM_{10LC}$ collocated | 81102-2/85101-2 | Population exposure | -Determine ambient air quality standard compliance |
| | $PM_{2.5LC}$ | 88101-3 | Population exposure | -Provide timely air pollution information<br>-Determine ambient air quality standard compliance |
| | $PM_{2.5LC}$ collocated | 88101-2 | Population exposure | -Determine ambient air quality standard compliance |
| | CO | 42101-1 | Population exposure | -Provide timely air pollution information<br>-Determine ambient air quality standard compliance |
| Laurel/ Anchorage 02-020-0045 | $PM_{10STD}$/$PM_{10LC}$ | 81102-3/85101-3 | Source Oriented Highest Concentration | -Provide timely air pollution information<br>-Determine ambient air quality standard compliance |
| Parkgate/ Eagle River 02-020-1004 | $PM_{10STD}$/$PM_{10LC}$ | 81102-3/85101-3 | Population exposure | -Provide timely air pollution information<br>-Determine ambient air quality standard compliance |
| Butte/ Mat-Su Valley 02-170-0008 | $PM_{10STD}$/$PM_{10LC}$ | 81102-3/85101-3 | Population exposure | -Provide timely air pollution information<br>-Determine ambient air quality standard compliance |
| | $PM_{2.5LC}$ | 88101-3 | Population exposure Highest Concentration | -Provide timely air pollution information<br>-Determine ambient air quality standard compliance |

Table 3-12: 2023 FNSB Instrument-Level Monitoring Purposes and AQS Monitoring Objective

| Site Name/ Location/ AQS ID | Pollutant Parameter | AQS Parameter/ Occurrence Code | AQS Monitoring Objective | Monitoring Purpose(s) |
|---|---|---|---|---|
| NCore/ Fairbanks 02-090-0034 | $PM_{10STD}$/ $PM_{10LC}$ | 81102-3/ 85101-3 | Population exposure | -Provide timely air pollution information<br>- Determine ambient air quality standard compliance<br>-Support air pollution research studies |
| | $PM_{2.5LC}$ | 88101-3 | Population exposure | -Provide timely air pollution information<br>-Support air pollution research studies |
| | $PM_{2.5LC}$ | 88101-1/2 | Population exposure | -Determine ambient air quality standard compliance<br>-Support air pollution research studies |
| | $PM_{10LC}$ - $PM_{2.5LC}$ | 86101-1 | Population exposure | -Determine ambient air quality standard compliance<br>-Support air pollution research studies |
| | CO | 42101-1 | Population exposure | -Provide timely air pollution information<br>-Determine ambient air quality standard compliance<br>-Support air pollution research studies |
| | $SO_2$ (1-hr) | 42401-1 | Population exposure | -Provide timely air pollution information<br>-Determine ambient air quality standard compliance<br>-Support air pollution research studies |
| | $SO_2$ (5-min) | 42401-2 | Population exposure | -Determine ambient air quality standard compliance<br>-Support air pollution research studies |
| | $NO_Y$ | 42600-1 | Population exposure | -Support air pollution research studies |

| Site Name/ Location/ AQS ID | Pollutant Parameter | AQS Parameter/ Occurrence Code | AQS Monitoring Objective | Monitoring Purpose(s) |
|---|---|---|---|---|
| NCore/ Fairbanks 02-090-0034 | NO | 42601-2 | Population exposure | -Support air pollution research studies |
| | $NO_Y$-NO | 42612-1 | Population exposure | -Support air pollution research studies |
| | $O_3$ | 44201-1 | Population exposure | -Provide timely air pollution information<br>-Determine ambient air quality standard compliance<br>-Support air pollution research studies |
| | WD | 61104-1 | Population exposure | -Provide timely air pollution information<br>-Support air pollution research studies |
| | WS | 61103-1 | Population exposure | -Provide timely air pollution information<br>-Support air pollution research studies |
| | BP | 64101-1 | Population exposure | -Provide timely air pollution information.<br>-Support air pollution research studies |
| | RH | 62201-1 | Population exposure | -Provide timely air pollution information.<br>-Support air pollution research studies |
| | Ambient Temp 3 m | 62101-2 | Population exposure | -Provide timely air pollution information.<br>-Support air pollution research studies |

| Site Name/ Location/ AQS ID | Pollutant Parameter | AQS Parameter/ Occurrence Code | AQS Monitoring Objective | Monitoring Purpose(s) |
|---|---|---|---|---|
| NCore/ Fairbanks 02-090-0034 | Ambient Temp 10 m | 62101-1 | Population exposure | -Provide timely air pollution information.<br>-Support air pollution research studies |
| | $PM_{2.5LC}$ Speciation | Multiple* | Population exposure | -Support air pollution research studies<br>-part of CSN |
| | $PM_{2.5LC}$ | 88101-1 | Population exposure | -Determine ambient air quality standard compliance |
| | $PM_{2.5LC}$ | 88501-3/88502-3 | Population exposure | -Provide timely air pollution information |
| | $PM_{2.5LC}$ collocated | 88101-2 | Population exposure | -Determine ambient air quality standard compliance |
| A Street/ Fairbanks 02-090-0040 | $PM_{2.5LC}$ | 88101-1 | Population exposure Highest Concentration | -Determine ambient air quality standard compliance |
| | $PM_{2.5LC}$ | 88501-3/88502-3 | Population exposure | -Provide timely air pollution information |
| | Ambient Temp 3 & 10 m | 62101-2,1 | Population exposure | -Provide timely air pollution information |
| | WD 3 & 10 m | 61104-2,1 | Population exposure | -Provide timely air pollution information |
| | WS 3 & 10 m | 61103-2,1 | Population exposure | -Provide timely air pollution information |
| Hurst/ North Pole 02-090-0035 | $PM_{2.5LC}$ | 88101-1 | Population exposure Highest Concentration | -Determine ambient air quality standard compliance |

| Site Name/ Location/ AQS ID | Pollutant Parameter | AQS Parameter/ Occurrence Code | AQS Monitoring Objective | Monitoring Purpose(s) |
|---|---|---|---|---|
| Hurst/ North Pole 02-090-0035 | $PM_{2.5LC}$ | 88501-3/88502-3 | Population exposure | -Provide timely air pollution information |
| | $PM_{2.5LC}$ collocated | 88101-2 | Population exposure | -Determine ambient air quality standard compliance |
| | $PM_{2.5LC}$ Speciation | Multiple* | Population exposure | -Support air pollution research studies<br>-part of CSN |
| | $SO_2$ (1-hr) | 42401-1 | Population exposure | -Provide timely air pollution information<br>-Determine ambient air quality standard compliance<br>-Support air pollution research studies |
| | $SO_2$ (5-min) | 42401-2 | Population exposure | -Determine ambient air quality standard compliance<br>-Support air pollution research studies |
| | Ambient Temp 3, 10, & 23 m | 62101-2,1,3 | Population exposure | -Provide timely air pollution information |
| | WD 3, 10, & 23 m | 61104-2,1,3 | Population exposure | -Provide timely air pollution information |
| | WS 3, 10, & 23 m | 61103-2,1,3 | Population exposure | -Provide timely air pollution information |

Table 3-13: 2023 Juneau Instrument-Level Monitoring Purposes and AQS Monitoring Objective

| Site Name/ Location/ AQS ID | Pollutant Parameter | AQS Parameter/ Occurrence Code | AQS Monitoring Objective | Monitoring Purpose(s) |
|---|---|---|---|---|
| Floyd Dryden Middle School/ Juneau 02-110-0004 | $PM_{10STD}$/ $PM_{10LC}$ | 81102-3/ 85101-3 | Population exposure | -Provide timely air pollution information<br>- Determine ambient air quality standard compliance<br>-Support air pollution research studies |
| | $PM_{10STD}$/ $PM_{10LC}$ collocated | 81102-2/ 85101-2 | Population exposure | -Determine ambient air quality standard compliance |
| | $PM_{2.5LC}$ | 88101-3 | Population exposure | -Provide timely air pollution information<br>-Determine ambient air quality standard compliance |
| | $PM_{2.5LC}$ collocated | 88101-2 | Population exposure | -Determine ambient air quality standard compliance |

Table 3-14: Monitors required by Nonattainment Area (NAA) or Limited Maintenance Plan (LMP)

| MSA or µMSA | Site Name/ Location/ | AQS ID | Pollutant Parameter | AQS Parameter/ Occurrence Code | Required by NAA or LMP? |
|---|---|---|---|---|---|
| Fairbanks MSA | Hurst Road/North Pole | 02-090-0035 | $PM_{2.5LC}$ | 88101-1 | Fairbanks $PM_{2.5}$ NAA |
| | NCore/Fairbanks | 02-090-0034 | CO | 42101-1 | Fairbanks CO LMP |
| Anchorage MSA | Garden/Anchorage | 02-020-0018 | CO | 42101-1 | Anchorage CO LMP |
| | Parkgate/Eagle River | 02-020-1004 | $PM_{10STD}$ | 81102-3 | Eagle River $PM_{10}$ LMP |
| Juneau µMSA | Floyd Dryden Middle School/ Juneau | 02-110-0004 | $PM_{10STD}$ | 81102-3 | Juneau $PM_{10}$ LMP |

Table 3-15: 2023 Collocations

| Site Name/ Location/ AQS ID | Pollutant Parameter | AQS Parameter/ Occurrence Code | AQS Method Code | Equipment | Primary or Secondary |
|---|---|---|---|---|---|
| Garden/ Anchorage 02-020-0018 | $PM_{2.5LC}$ | 88101-3 | 170 | Met-One BAM 1020 | Primary |
| | $PM_{2.5LC}$ collocate | 88101-2 | 143 | Thermo Scientific Partisol 2000i | Secondary |
| | $PM_{10STD}$ | 81102-3/ 85101-3 | 122 | Met-One BAM 1020 | Primary |
| | $PM_{10STD}$ collocate | 81102-2/ 85101-2 | 126 | Thermo Scientific Partisol 2000i | Secondary |
| Hurst Road/ North Pole 02-090-0035 | $PM_{2.5LC}$ | 88101-1 | 145 | Thermo Scientific Partisol 2025i | Primary |
| | $PM_{2.5LC}$ collocate | 88101-2 | 145 | Thermo Scientific Partisol 2025i | Secondary |
| NCore/ Fairbanks 02-090-0034 | $PM_{10STD}$ | 81102-3/ 85101-3 | 122 | Met-One BAM 1020 | Primary |
| | $PM_{10STD}$ collocate | 81102-1/ 85101-1 | 126 | Thermo Scientific Partisol 2000i | Secondary |
| Floyd Dryden Middle School/Juneau 02-110-0004 | $PM_{2.5LC}$ | 88101-3 | 236 | Teledyne T640X | Primary |
| | $PM_{2.5LC}$ collocate | 88101-2 | 143 | Thermo Scientific Partisol 2000i | Secondary |
| | $PM_{10STD}$ | 81102-3/ 85101-3 | 239 | Teledyne T640X | Primary |
| | $PM_{10STD}$ collocate | 81102-2/ 85101-2 | 126 | Thermo Scientific Partisol 2000i | Secondary |

## 3.5 MONITORING WAIVERS

### 3.5.1 ANCHORAGE MSA OZONE MONITORING

On October 15th 2018, EPA waived the ozone monitoring requirements for the Anchorage MSA. The population of the MSA triggered a monitoring requirement, but previous ozone measurements in several areas of the MSA showed ozone concentrations well below 80% of the NAAQS. This current waiver is valid through 2023, **Appendix C** (Waiver C-1) and DEC is requesting an extension of the waiver for an additional 5-year period.

DEC believes that there is a continued low likelihood of ozone exceedances in the Anchorage MSA. Data collected prior to 2018 indicate max concentrations fall below 80% of the NAAQS, and data collected in other areas support that continuing trend. The U.S. National Park Service operates a Clean Air Status and Trends Network (CASTNET) Ozone monitoring site at Denali National Park which provides information on natural background level ozone concentrations. Data records for the FNSB NCore site also provide information of the ozone background levels. These are summarized below in Table 3-16. All values for the past 5 years are below 80% of the NAAQS. In a historical comparison to the Anchorage MSA sites, CASTNET recorded higher values for every year. Because the Anchorage MSA site is historically lower than the ozone background concentrations, this indicates that South Central Alaska does not experience net ozone production, rather ozone scavenging due to local pollution.

**Table 3-16: Ozone 4th Maximum Concentration in PPB**

| Location | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|
| Denali (CASTNET) | 53 | 53 | 51 | 53 | 55 |
| Fairbanks NCore | 41 | 47 | 43 | 46 | 55 |

With the low likelihood of an Anchorage MSA ozone exceedance and values consistently below 80% of the NAAQS, DEC formally requests that EPA approve the renewal of the Anchorage MSA ozone monitoring waiver.

### 3.5.2 HARRISON CT (BUTTE) SITING

DEC requested EPA waive requirements under 40 CFR 58 Appendix E, mainly in regard to several spruce trees that have grown up on the adjacent private property. EPA granted the waiver on June 4th, 2019 and can be found in **Appendix C** (Waiver C-2).

### 3.5.3 LEAD SOURCE ORIENTED MONITORING

To meet source-oriented lead monitoring requirements and after consultation with EPA, DEC decided to pursue a modeling demonstration to show that lead concentrations at the ambient boundary of the Red Dog Mine meet the new lead standard. On August 11, 2016, EPA approved

the State of Alaska's first waiver request for lead monitoring at the Red Dog Mine based on the results of dispersion modeling. The results of the modeling showed that the maximum ambient air 3-month rolling average lead concentration at the mine boundary did not exceed 50 percent of the lead NAAQS. Pursuant to 40 CFR Part 58 Appendix D, section 4.5(a)(ii), this waiver must be renewed every 5 years as part of the Alaska 5-year Air Monitoring Network Assessment. DEC submitted an updated waiver request to EPA on June 12, 2020. The waiver request included a new modeling analysis performed by Teck Alaska Inc., the operator of the Red Dog Mine, which was reviewed and approved by DEC. EPA approved the waiver request on December 7, 2021. The EPA approval letter can be found in **Appendix C** (Waiver C-3).

### 3.5.4 A-Street Siting Waiver Request

The A-Street SLAMS station is sited in a neighborhood community on the east side of Fairbanks. Selected primarily due to its proximity to a residential neighborhood with a moderate level of solid fuel home heating and its identity as a $PM_{2.5}$ hotspot, the location allows for a suitable Fairbanks Air Quality Zone maximum impact site. The added benefit of a location on school district property allows for long-term site stability and protection of a sensitive population. With the objective of placing the monitoring station as close as possible to the residential area (See Figure 1), and not negatively impacting schoolyard activities, the site was placed at less than the 10-meter recommended siting distance from the A-Street roadway (3 meters to the edge of the sidewalk and start of the paved roadway shoulder.)

As this site is primarily concerned with quantifying the impacts of emissions from solid fuel burning within the community, PM from the nearby roadway is not expected to have significant impact as traffic at the site is minimal. Traffic values for A-Street are not currently available, but Alaska Department of Transportation traffic data[4] is available for the streets to the north and south of the station (see Figure 1)and indicate daily traffic counts of 100 or less. The direct PM impacts from the adjacent paved roadway are minimal when considering siting criteria as opposed to area wide impacts. Additionally, this data was collected prior to the post COVID-19 permanent closure of the school, and traffic is likely to have decreased on surrounding streets.

DEC formally requests that EPA approve this siting waiver request for the A- Street SLAMS $PM_{2.5}$ monitoring site regarding the proximity to the nearby roadway of less than 10 meters.

[4] https://alaskatrafficdata.drakewell.com/publicmultinodemap.asp

Figure 1: A-Street Monitoring Site Location


### 3.5.5 NCore Reactive Oxides of Nitrogen Monitoring Waiver Request

The Fairbanks NCore monitoring station is currently measuring $NO_y$ at the same inlet height as other site gaseous instruments (~4m). DEC is seeking a formal waiver approval to continue monitoring at this height, rather than the NCore specified 10m inlet height. There are two primary reasons DEC requests to monitor at the lower elevation, one being the desire to measure alongside the other gaseous NAAQS pollutants beneath strong wintertime inversions that trap pollutants close to the ground level. The other being that the dark, extreme cold, and snow-covered surroundings prevent photochemistry from occurring, with most airshed $NO_y$ being equal to $NO_x$. Analysis performed during the Alaskan Layered Pollution and Chemical Analysis (ALPACA) study using DEC's $NO_y/NO_x$ NCore data shows a strong correlation between $NO_y$ and $NO_x$ during the winter seasons between 2016 and 2019, with an $R^2$ of 0.99. Furthermore, during the 2022 ALPACA study, a winter comparison was made between in-situ $NO_2$ measurements at 3 meters above ground level and 12-17 meters above ground level using long-path differential absorption

spectroscopy (LP-DOAS). These measurements showed an $R^2$ of 0.944 despite differing measurement technologies and without a true collocation. The analysis indicates that the strength of the correlations coupled with the strong linear regression between $NO_y$ and $NO_x$ at the NCore site show a well-mixed canopy at monitoring levels. Long dark winters with snow-and ice-covered ground also minimize the reactions of the small amount of reactive NO species that are present and reduces the need for measuring at higher levels. See excerpt provided by ALPACA researchers below.

**Fairbanks nitrogen oxide observations related to ALPACA study**

*Bill Simpson, UAF, 4 May 2023, (wrsimpson@alaska.edu) +1 907 474 7235*
*In collaboration with Jochen Stutz, UCLA, Tjarda Roberts, CNR France, Meeta Cesler-Maloney, UAF*

Alaska Department of Environmental Conservation (ADEC) asked about what we have been finding about nitrogen oxides in the Alaskan Layered Pollution And Chemical Analysis (ALPACA) study (https://alpaca.community.uaf.edu/). ALPACA was a large field study in Fairbanks carried out in Jan-Feb 2022. Specifically, ADEC asked us what we were finding about the vertical distribution of nitrogen oxides and the degree to which nitrogen oxides were further oxidized from NOx (NO+NO2) to more oxidized reactive nitrogen compounds (for example nitric acid), which are members of the reactive nitrogen family, NOy.

The UCLA group, in collaboration with UAF measured NO2 using long-path differential absorption spectroscopy (LP-DOAS), which remotely senses NO2 by its UV absorption spectrum over long paths. In this case, we considered the path from the LP-DOAS base in the Lacey Street Parking Garage to the Nordale Elementary school, which sampled between 17 and 12m above ground level over a 1.15km one-way path. We compared those measurements to an in-situ NO2 instrument (Thermo 42C), which we calibrate with reference gas standards and validate by cross comparison to ADEC NCore measurements. Our NO2 was at the CTC building in a parking lot at 707 7th Avenue. Meeta Cesler Maloney was the principal instrument operator. For this analysis, Tjarda Roberts also got historical data from the EPA data mart on NOy and NOx at NCore.

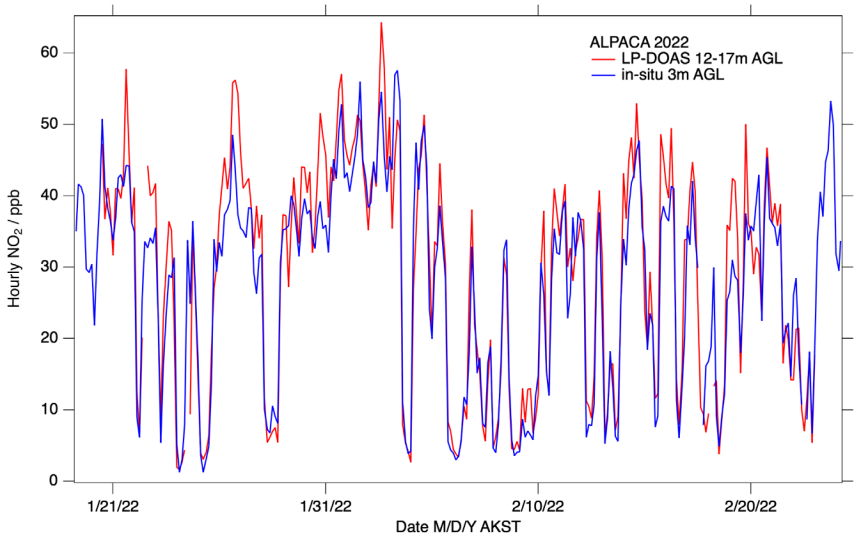



Figure 1: NO2 during ALPACA-2022 measured in-situ at 3m AGL and on the lowest LP-DOAS path (12-17m AGL).

Figure 1 shows the LP-DOAS and in-situ NO2 mixing ratios agree quite well. Figure 2 shows a correlation plot between these species, which has near unity slope and high correlation coefficient. Despite not being exactly co-located, these two downtown measurements agree quite well.

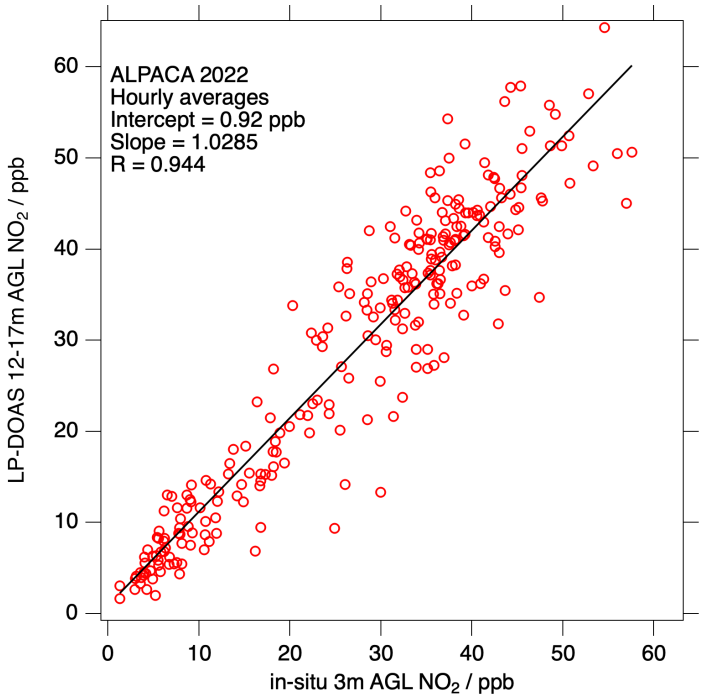



Figure 2: Correlation between LP-DOAS NO2 slightly aloft (12-17m) and surface (3m) NO2.

Figures 1 and 2 demonstrate that NO2 is fairly well mixed between the surface and ~15m altitude. We interpret this agreement as indicating that there is an "urban canopy", where obstructions (trees, buildings) cause some stirring of the atmosphere leading to a semi-mixed layer. Many NOx sources are also warm because they result from combustion processes, potentially leading to some mixing. An urban heat island effect and cars driving around may also act to stir this layer. Overall, these observations seem to indicate that there would not be a large difference if an inlet were placed at 3m or 10m AGL in this airshed.

The LP-DOAS only detects NO2, while NOx (=NO+NO2) is often a more conserved pollution tracer. NOx can be further oxidized to other species in the bigger family NOy – reactive nitrogen, which adds NOx + nitric acid, particulate nitrate, NO3, etc. We were interested in how far NOx is oxidized in Fairbanks, so Tjarda Roberts plotted NOy versus NOx. If NOy contains no further species than NOx, one expects a 1:1 line, which is very close to the data shown in Figure 3. Therefore, we find that the nitrogen oxides are fairly "fresh" in Fairbanks during the winter and NOy is very close to NOx.

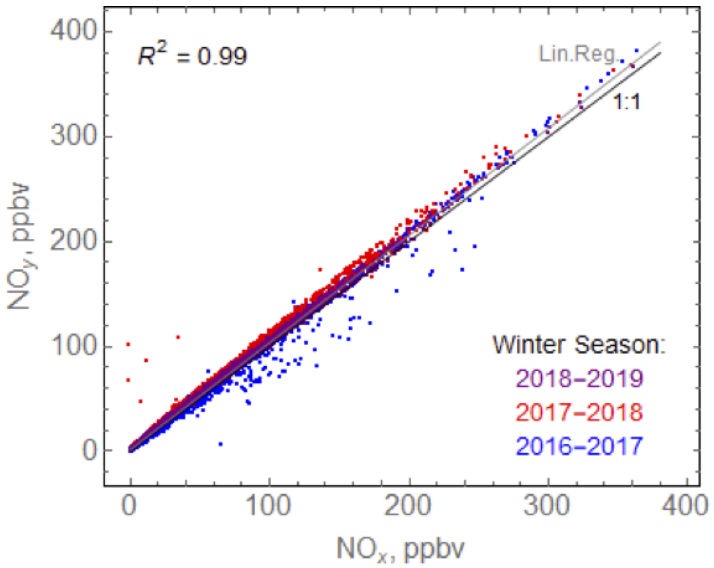



Figure 3: NOy vs NOx for Fairbanks based upon ADEC/EPA NCore data from three winter periods.

From these observations, we find that if one measures NOy or NOx during Fairbanks winter, one will get very similar results. We also find that NO2 appears to be well mixed most of the time in the lowest 15m, so sampling either from the top of a 10m tower or rooftop (3m) should give little difference.

Based on this information, DEC formally requests a waiver of the NCore $NO_y$ 10-meter inlet height and allow continued monitoring at 4 meters. Additionally, due to the strong correlation between $NO_y$ and $NO_x$ and mixing between ground level and 15 meters, DEC also requests to substitute the $NO_y$ monitoring requirement for $NO_x$ monitoring. $NO_x$ monitoring, in addition to measuring NO2 as a NAAQS, is much less prone to data loss and instrument malfunction with fewer components to leak or fail. The $NO_x$ data collected at the site would be more useful to the local public and since the Alaska NCore site is not part of the contiguous trends network, would not impact the network.

# 4 NETWORK MODIFICATIONS COMPLETED IN 2022

## *4.1 PARTICULATE MATTER COLLOCATION*

### 4.1.1 FLOYD DRYDEN SITE

On January 21, 2022, $PM_{10}$ collocation was added to the Floyd Dryden SLAMS site. The FRM is a Thermo Scientific Inc. Partisol 2000i, which will provide precision data for the FEM Teledyne API T640X analyzer.

### 4.1.2 TRINITY CHURCH (GARDEN) SITE

On February 22, 2022, the $PM_{2.5}$ collocation monitor for the Met One BAM 1020 network was moved from the Harrison Ct (Butte) site to Anchorage Trinity Church (Garden) site. The change was made since the Butte site will eventually be moved and to save staff driving time for filter changes on the FRM. The $PM_{10}$ FRM for the BAM 1020 network was moved from the Eagle River Parkgate site to the Anchorage Garden site on February 24, 2022. This change was made to coordinate filter changes more efficiently and to restart precision monitoring at the Garden site to evaluate the FEM monitors, which had not been done in many years at the Anchorage site. The first scheduled sample date for the PM2.5 and PM10 Partisols were February 25th, 2022 and March 6th, 2022, respectively.

## *4.2 SULFUR DIOXIDE SAMPLING AT HURST ROAD SITE*

On March 10, 2022, DEC added a Thermo Scientific 43i Sulfur Dioxide monitor to the North Pole Hurst Rd site. The Hurst Road site is the maximum impact $PM_{2.5}$ monitoring site in the Fairbanks nonattainment area and houses a CSN site. The $SO_2$ data will be helpful for interpreting the sulfate information gained from the speciation monitor.

## *4.3 HARRISON CT SITE STUDY*

DEC concluded collocation monitoring efforts between the Harrison Court (Butte) monitoring site and two candidate locations (Plant Materials Center & Butte Elementary School) in February of 2023. The candidates were selected based on results from a saturation study conducted in the Butte area of the Matanuska Borough during the winter of 2021/2022. DEC began collocation sampling with continuous FEM monitors for $PM_{2.5}$ at both locations for comparison against the SLAMS site in December of 2021. Results were discussed with EPA Region 10 staff and the decision was made to relocate the site to the Plant Materials Center. Those plans are included below in the Planned Network Modifications for 2023.

## *4.4 SLAMS SAMPLING SITE IMPROVEMENTS FUNDED BY THE AMERICAN RESCUE PLAN DIRECT GRANT AWARD*

The American Rescue Plan (ARP) provides funding for EPA to address health outcome disparities from pollution and the COVID-19 pandemic, including $50 million for activities authorized under

the Clean Air Act. DEC's American Rescue Plan Direct Awards will fund the following monitoring site improvements for the DEC SLAMS network. The status is indicated in ***bold italics***.

- Replace aging Chemical Speciation Network samplers at the NCore site, specifically the Met One Super SASS and URG 3000n. ***The URG instrument was delivered, and the SASS is expected prior to July 2023. Both will be installed in the summer of 2023.***
- Upgrade the heating and ventilation air conditioning system (HVAC) for the A-Street site particulate matter sampling shelter. ***Staff are still requesting quotes.***
- Purchase a replacement particulate matter sampling shelter for the new Butte sampling site. ***Purchase is on hold until the sampling site relocation has been approved***.
- Purchase a replacement particulate matter sampling shelter for the Teledyne T640X sampler at the Juneau Mendenhall Valley sampling site. ***Staff are requesting quotes.***
- Purchase a Primary Flow Standard for mass flow controller (MFC) calibrations. ***Instrument was ordered but is delayed due to a supplier facility relocation.***

While these site improvements will allow for more stable site operations and improve data quality and completeness, none of these items are adding monitoring sites or samplers or will result in changes to the data in AQS.

# 5 PLANNED NETWORK MODIFICATIONS FOR 2023

## 5.1 HARRISON CT (BUTTE) $PM_{2.5}$ SLAMS RELOCATION

DEC performed a saturation study in the Harrison Ct. (Butte) area to identify a suitable substitute site location during the winter of 2021/22. The study was initiated in response to planned construction in the area that may impact data collection at the current Butte site and in response to complaints from the neighboring property owners. Two locations were identified for further investigation: the Butte Elementary School (BES) and the Alaska Plant Materials Center (PMC). DEC conducted sampling for $PM_{2.5}$ at both locations from December of 2021 through February 2022.

During the comparison study the sites reported valid data in excess of 374 days. Only one exceedance was recorded at the Butte site during this period. All other daily averages were in the good to moderate range. See Table 5-1.

**Table 5-1: AQI Comparison of the Study Sites**

| AQI Category | Days in each AQI Category | | |
|---|---|---|---|
| | Butte | PMC | BES |
| Good | 358 | 357 | 397 |
| Moderate | 40 | 17 | 15 |
| Unhealthy for Sensitive Groups | 1 | 0 | 0 |
| Unhealthy | 0 | 0 | 0 |
| Very Unhealthy | 0 | 0 | 0 |
| Hazardous | 0 | 0 | 0 |
| Total valid days | 399 | 374 | 412 |

Correlating the two sites to the Butte site yielded a higher coefficient of determination for the PMC to Butte comparison ($r^2 = 0.71$), than for the BES to Butte site correlation ($r^2 = 0.44$). Stronger correlations are observed during known periods of elevated concentrations such as wildfires or during winter inversions.

While the Butte site reported an exceedance, there are instances when the study monitors read much higher than the Butte monitor (e.g., PMC: 11/29/23, BES: 4/30/22). DEC assumes the proximity to a few homes with wood heat is mostly responsible for recorded elevated values.

DEC considered the Butte Elementary School as a potential site representative of a vulnerable population and one that could promote educational outreach; however, the lower correlation and difficulty of finding an appropriate location to meet all the siting requirements present too large of a risk for relocating the Anchorage MSA maximum impact site to the school. The PMC site showed a better correlation to the current Butte site. Also, siting criteria could be met while keeping to the proximity of neighborhood housing. Therefore, DEC recommends the S. Harrison Ct. Butte SLAMS site be relocated approximately 1.7 miles to the southwest at the Plant Material Center (PMC) located at 5310 Bodenburg Spur Rd, Palmer AK 99645, see Figure 2. The PMC is a 270-

acre plot of land operated by the Alaska Department of Natural Resource's Division of Agriculture and is located approximately 1.8 miles to the southwest of the current S. Harrison Ct. site. The new location will be situated on a grassy field and greater than 10 meters away from any buildings, 30 meters from the nearest tree, see Figure 3. There are two green houses to the north of the site, a seed storage facility to the east, and farmland to the south and west. The site is accessible via an adjacent gravel road that is traveled at low speeds (< 10 mph) by PMC employees. The road is maintained by PMC year-round and all power on the site is on a generator backup to maintain seed growing conditions in the event of a power outage. The SLAMS will be integrated into the generator backup.

**Figure 2: Google Earth® Image of the Study Sites**

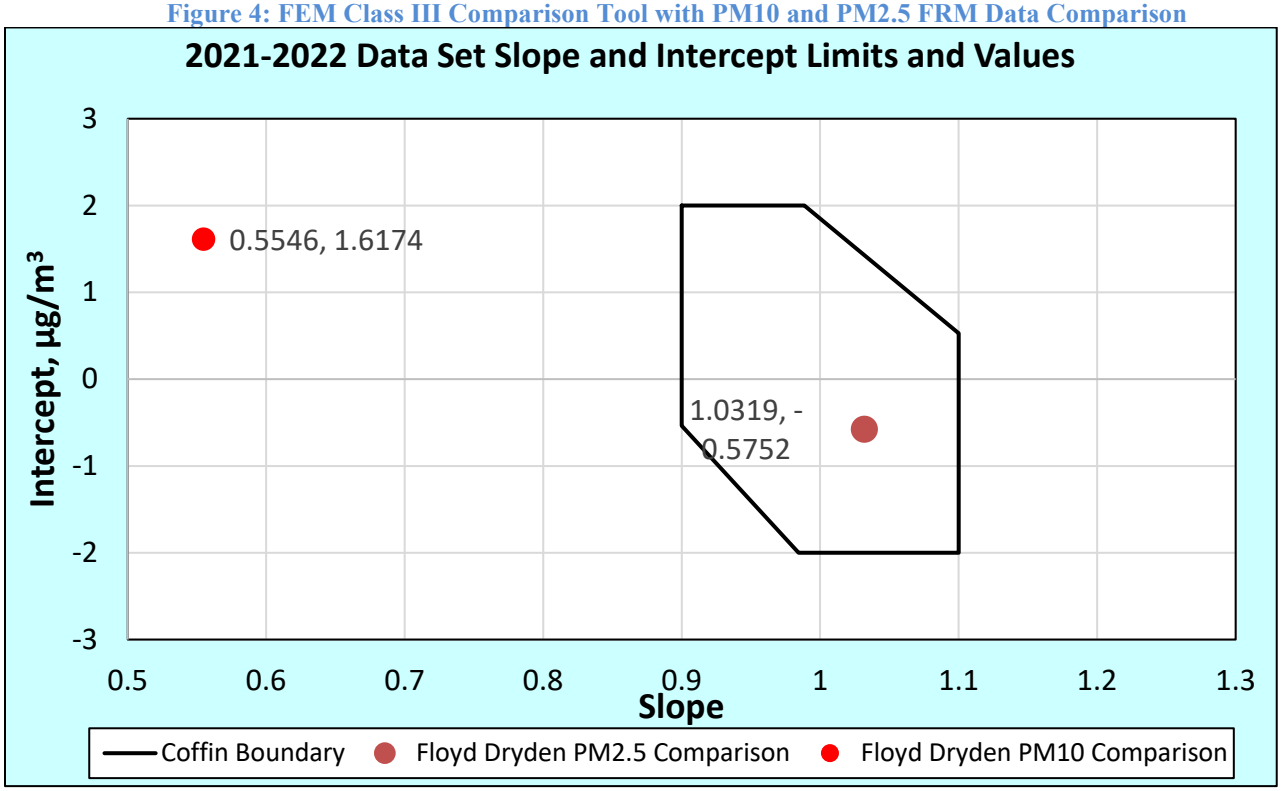
Figure 3: Satellite image showing proposed PMC site

Pending EPA approval, DEC will prepare the Plant Material Center location for a permanent ambient monitoring site and purchase a new sampling shelter. The site has not been established, but the location is set back from the road at a significant distance, so DEC does not expect near-road impacts. DEC will complete siting documentation according to 40 CFR Appendix E to Part 58 before the site is finalized in the fall. DEC will begin sampling at the location in time for an official January 1, 2024, sampling start for both continuous $PM_{2.5}$ and $PM_{10}$ monitoring.

### *5.2 Juneau Mendenhall Valley $PM_{2.5}$ SLAMS Primary Sampler*

In summer 2021, DEC purchased a Teledyne T640X $PM_{2.5}$ and $PM_{10}$ analyzer for the Floyd Dryden SLAMS site in the Juneau Mendenhall Valley. FRM collocation was established on October 1, 2021, for $PM_{2.5}$ and January 26, 2022, for $PM_{10}$. EPA Region 10 staff had voiced concern regarding the performance of the T640X for $PM_{2.5}$ in areas with a high woodsmoke component. DEC used EPA's FEM comparison tool to assess the performance of the instrument compared to the FRM. When the entire sampling period was compared the T640X meets the FEM class III performance criteria for $PM_{2.5}$, while it failed for $PM_{10}$, see Figure 4.

Figure 4: FEM Class III Comparison Tool with PM10 and PM2.5 FRM Data Comparison




A closer look at the periods before and after a firmware update in June 2022, provided a much different result for $PM_{2.5}$. The data collected prior to June 2022 shows a positive bias with a slope of 1.31, far outside the acceptable criteria. The data collected since the firmware update shows a negative bias, with a slope of 0.87 equally outside the acceptance criteria. $PM_{10}$ shows similar performance issue, with biases outside the criteria (pre firmware update slope of 1.28 and post update 0.64).

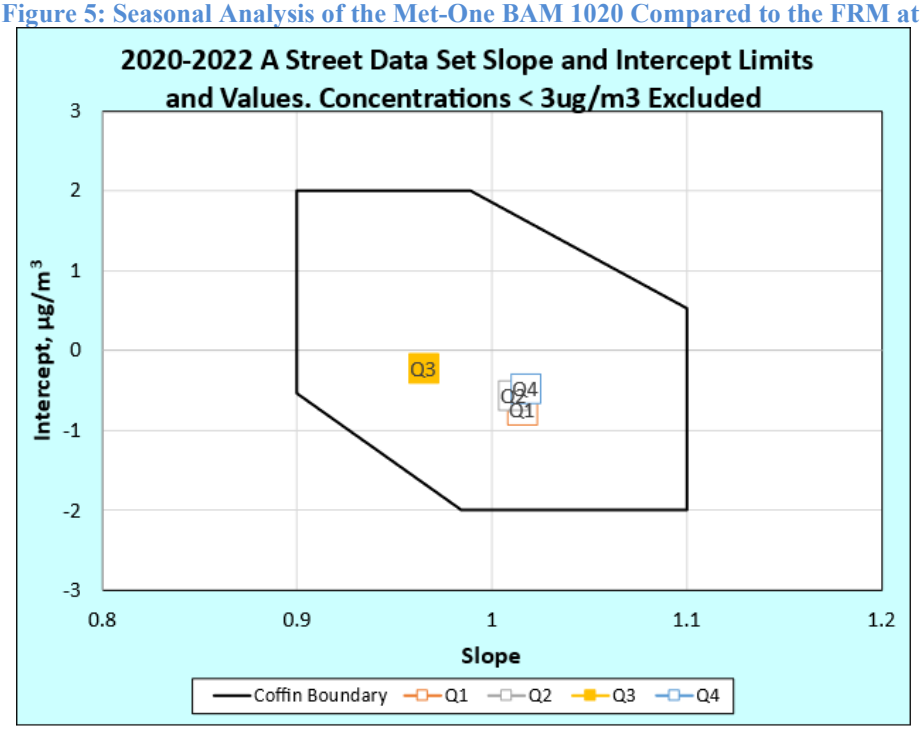
The performance issues have been discussed with the manufacturer. Teledyne issued an EPA approved T640X firmware update that includes an optional 'data alignment' (or correction factor); however, DEC will implement the firmware update without enabling the data alignment. To ensure that DEC does not underrepresent the $PM_{2.5}$ concentrations measured at the site, DEC will designate the $PM_{2.5}$ FRM as the SLAMS monitors, i.e., primary samplers, and collect samples every third day effective January 2024. The T640X $PM_{2.5}$ will be designated as an SPM and continue to provide $PM_{2.5}$ AQI data used for public information and for the City and Borough of Juneau to call burn bans as needed. DEC will continue to use the T640X instrument as a $PM_{10}$ FEM, since $PM_{10}$ concentration did not exceed 20 $\mu g/m^3$ over the past year and there is little risk of missing high pollution events.

## 5.3 A-Street Continuous Analyzer

DEC has been using non-FEM Met-One BAM 1020 $PM_{2.5}$ analyzers in the FNSB nonattainment area, because the continuous analyzers showed a significant positive bias during very cold, high pollution events. DEC uses a Sharp Cut Cyclone (SCC) instead of the Very Sharp Cut Cyclone (VSCC) required for a FEM. A-Street is the only site that does not have a back-up sampler that can be used to substitute data, should the primary sampler malfunction. In 2022, DEC lost data during the winter months (Quarter 1 and Quarter 4) due to shuttle errors on the sequential FRM. The FRM instruments malfunction periodically during cold weather when the pneumatics get too cold to perform properly. DEC attempted to replace the FRM in November 2022, but a new instrument could not be delivered until April 2023, because of supply chain issues at the manufacturer.

DEC reports the non-FEM data to AQS and annually compares the data to the FRM data. In recent years the annual correlation between the BAM 1020 and the FRM have been within the acceptable performance criteria for a Class III FEM. DEC conducted a three-year analysis and focused on the winter quarters (Q1 and Q4), since that is the period of interest in the nonattainment area. The analysis showed that for the A-Street site all four quarters are withing the performance criteria, see Figure 5, while for the NCore and Hurst Rd site the winter quarters do not meet the Class III FEM criteria.

Figure 5: Seasonal Analysis of the Met-One BAM 1020 Compared to the FRM at A-Street




Beginning in January 2024, DEC will replace the SCC with a VSCC in the Met-One BAM 1020 at A-Street to make it a FEM sampler and use it as a back-up to the FRM.

## *5.4 LOW-COST SENSOR NETWORK*

While the current long term monitoring network meets the regulatory requirement in terms of number of monitoring stations and monitored pollutants, it is confined to the population centers and does not adequately characterize conditions in outlying and rural communities.
Advances in sampling technology allowed for the development and commercial sale of smaller, portable, and cheaper sensors. This new low-cost sensor technology provides DEC the opportunity to expand monitoring into areas across the state that previously were cost prohibitive.

After state funds were made available in 2019 to purchase sampling equipment for use in port communities, DEC conducted a search for multi-pollutant sampling pods and finally purchased eight AQMesh sensor pods. These pods were designated for use in Southeast and Southcentral Alaska port communities. Late in 2020, DEC was able to use carry-over grant funding to purchase ten additional sensor pods, for a total of 18 sensors.

The sensor pods will collect baseline air quality data, including PM, $SO_2$, NO, $NO_2$ and CO. DEC selected 17 communities based on location, interest, and population density. The current proposed communities include Anchorage, Fairbanks, Homer, Juneau, Ketchikan, Kodiak, Kotzebue, Nome, Seward, Sitka, Skagway, Soldotna, and Unalaska/Dutch Harbor. DEC started installation of the AQMesh sensor pods in nine communities during the summer of 2021. Installations were limited during the fall of 2021 through the spring of 2022 due to travel restrictions during COVID and the cold winter months. DEC anticipates setting up the remaining eight sensors, plus a QA sensor, by the end of October 2022.

Under the ARP direct grant award from EPA, DEC will receive funds for 12 additional sensor pods. DEC also received a competitive ARP grant which includes an additional 8 sensor pods. DEC has identified an additional 20 communities for expansion of the sensor pod network to provide AQI information across underserved communities across the state. Due to sensor performance issues DEC conducted a sensor comparison study during the 2022/23 winter at the NCore sites to evaluate multiple sensor pods from different manufacturers. DEC is currently in the process of procuring with the goal of installing all additional sensors by the end of October 2023.

# Appendix A **NAAQS Summary Tables**

### Table A-1: PM2.5 DV Under Local/Actual Conditions (µg/m3)

Exceedance exceptional event values not included. Some values in this table have been calculated by DEC to exclude exceptional events. The numbers in the parentheses are reported from the AQS Design Value report (AMP 480) and include these exceptional events.

| $PM_{2.5}$ Monitoring Sites | AQS Site ID | 98th Percentile | | | Weighted Annual Mean | | | 2022 Design Value | |
|---|---|---|---|---|---|---|---|---|---|
| | | 2022 | 2021 | 2020 | 2022 | 2021 | 2020 | 24-hour | Annual |
| Garden/ Anchorage | 02-020-0018 | 24 | 18.7 | 22.2 | 4.9 | 6.0 | 5.9 | 22 | 5.6 |
| Butte/ Matanuska-Susitna Valley | 02-170-0008 | 29.6 | 21.2 | 24 | 6.5 | 4.4 | 4.6 | 25* | 5.2* |
| NCore Site/ Fairbanks | 02-090-0034 | 29.1 (76.3) | 27.5 | 26.6 | 6.7 (11.3) | 8.0 | 7.2 | 28 (44) | 7.3 (8.8) |
| Hurst Rd/ North Pole | 02-090-0035 | 51.2 (72.5) | 65.5 | 71.4 | 8.3 (12.7) | 11.8 | 12.1 | 63 (70) | 10.7 (12.2) |
| A Street/Fairbanks | 02-090-0040 | N/A** | 29.6*** | 36.1 | 9.5 (13.9)*** | 12*** | 8.3 | N/A*** | N/A*** |
| Floyd Dryden/Juneau | 02-110-0004 | 23 | 17.1 | 17.2 | 5.3 | 4.7 | 4.8 | 19 | 4.9 |

*Quarters 1-3 (Q1-Q3) for 2022 at the Butte site met the completeness criteria with percent completeness of 96% or greater; however, Butte's Q4 did not meet the 75% criteria with only 61% completeness. Using the maximum value substitution test (PM2.5 24-hour standard: 40 CFR Part 50 Appendix N, §4.2 (c) (i), and PM2.5 annual standard 40 CFR Part 50 Part 50 Appendix N, § 4.1 (c) (ii)), the max value of Q4 (29.6 µg/$m^3$) for all days with <75% daily data capture, the 24-hr DV is 25 µg/$m^3$ and the Annual DV is 5.2 µg/$m^3$.
**Annual values did not meet data completeness criteria and may change due to data substitution requirements.
*** Annual values did not meet data completeness criteria

Table A-2: DV $O_3$ (ppb)

| $O_3$ Monitoring Sites | Site ID | 2022 | | | 2021 | | | 2020 | | | 3-Years | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Valid Days | Percent Complete | 4th Max | Valid Days | Percent Complete | 4th Max | Valid Days | Percent Complete | 4th Max | Percent Complete | Design Value |
| NCore/Fairbanks | 02-090-0034 | 350 | 96 | 0.055 | 279 | 76 | 0.046 | 178 | 49 | 0.043* | 74 | 0.048 |

* Does not meet completeness criteria

Table A-3: DV $SO_2$ (ppb)

| $SO_2$ Monitoring Sites | Site ID | 2022 | | 2021 | | 2020 | | 3-yrs Design Value |
|---|---|---|---|---|---|---|---|---|
| | | 99th Percentile | Completed Quarters | 99th Percentile | Completed Quarters | 99th Percentile | Completed Quarters | |
| NCore/Fairbanks | 02-090-0034 | 32.8 | 4 | 33 | 4 | 30 | 4 | 32 |
| Hurst Rd/Fairbanks | 02-090-0035 | 8.1* | 3 | N/A | N/A | N/A | N/A | N/A |

* Does not meet completeness criteria

Table A-4: DV CO (ppm)

| CO Monitoring Sites | Site ID | 2022 | | | 2021 | | | 2020 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Exceed-ances | 1st Max 8-hr | 2nd Max 8-hr | Exceed-ances | 1st Max 8-hr | 2nd Max 8-hr | Exceed-ances | 1st Max 8-hr | 2nd Max 8-hr |
| NCore/Fairbanks | 02-090-0034 | 0 | 2.8 | 2.5 | 0 | 1.8 | 1.5 | 0 | 1.9 | 1.7 |
| Garden/Anchorage | 02-020-0018 | 0 | 2.5 | 2.4 | 0 | 2.2 | 2.2 | 0 | 3.2 | 3.0 |

## Table A-5: $PM_{10}$ DV Under Standard Conditions (µg/m$^3$)

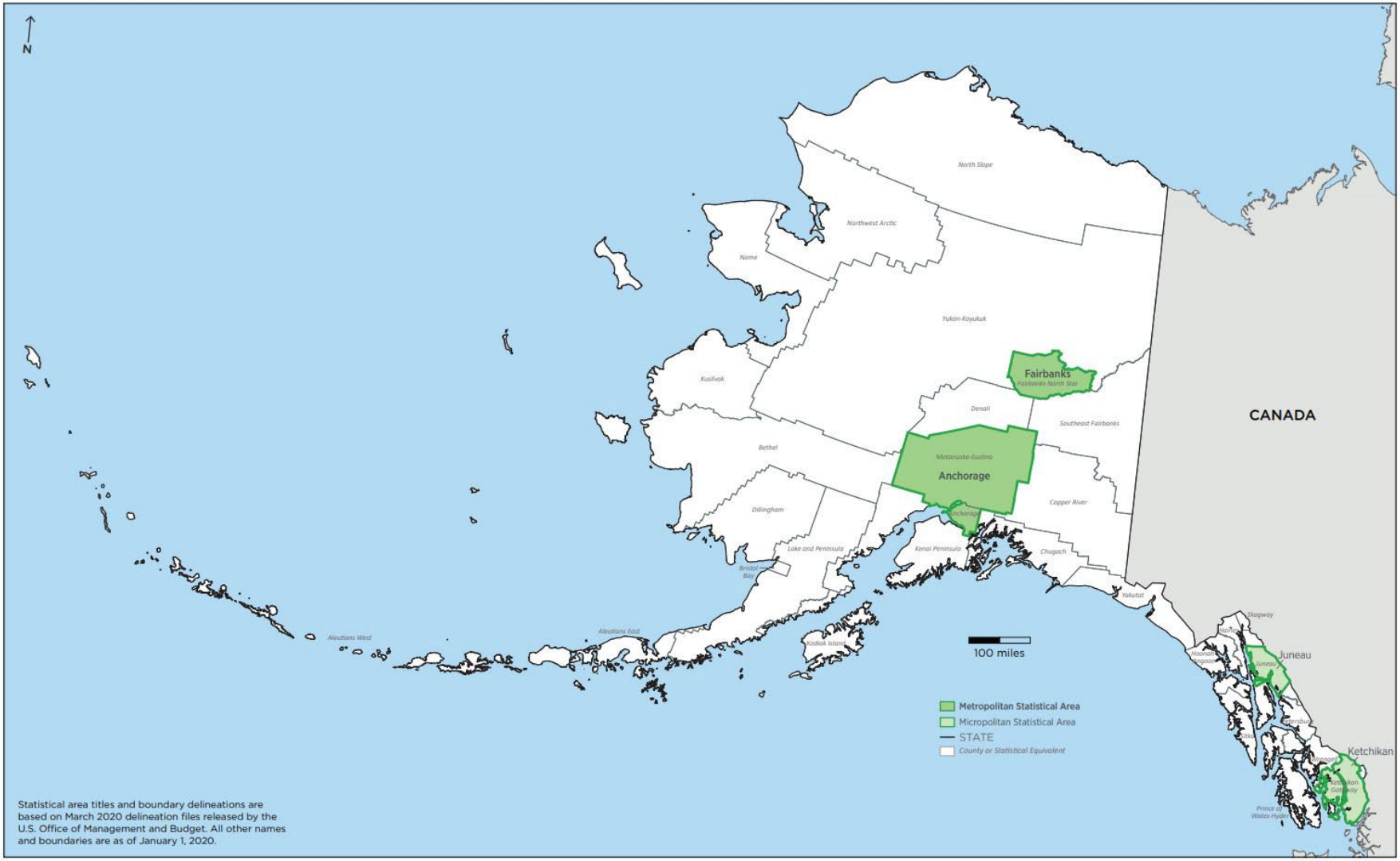
Exceedance exceptional event values not included

| $PM_{10}$ Monitoring Sites | Site ID | 2022 | | | 2021 | | | 2020 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Exceed-ances | 1st Max 24-hr | 2nd Max 24-hr | Exceed-ances | 1st Max 24-hr | 2nd Max 24-hr | Exceed-ances | 1st Max 24-hr | 2nd Max 24-hr |
| Garden/ Anchorage | 02-020-0018 | 0 | 40 | 32 | 0 | 49 | 47 | 0 | 43 | 42 |
| Laurel/Anchorage | 02-020-0045 | 0 | 103 | 101 | 0 | 108 | 97 | 0 | 80 | 77 |
| Parkgate/Anchorage | 02-020-1004 | 0 | 77 | 65 | 0 | 125 | 66 | 0 | 56 | 45 |
| NCore/ Fairbanks | 02-090-0034 | 0 | 117 | 94 | 0 | 70 | 57 | 0 | 55 | 43 |
| Butte/ Matanuska-Susitna Valley | 02-170-0008 | 0 | 90 | 76 | 0 | 92 | 75 | 0 | 84 | 77 |
| Floyd Dryden Middle School/Juneau | 02-110-0004 | 0 | 55 | 16 | 0 | 28 | 25 | 0 | 35 | 34 |

# Appendix B **Map of Alaska's Core Based Statistical Areas (CBSA)**

## Alaska: 2020 Core Based Statistical Areas and Counties

Formatted for tabloid printing (11x17)




U.S. Census Bureau, Population Division


# Appendix C **Waivers**

## Waiver C-1: EPA 5-Year Ozone NAAQS Monitoring Requirement Waiver

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue, Suite 155
Seattle, WA 98101-3140

OFFICE OF
AIR AND WASTE

OCT 15 2018

ADEC AIR QUALITY RECEIVED OCT 18 2018 ANCHORAGE

Ms. Barbara Trost
Air Quality Division
Air Monitoring & Quality Assurance Program
Alaska Department of Environmental Conservation
555 Cordova Street
Anchorage, Alaska 99501-2617

Dear Ms. Trost:

In our August 2, 2018 response to your 2017 Annual Monitoring Network Plan, Region 10 indicated approval of a waiver to discontinue ozone monitoring in the Anchorage Metropolitan Statistical Area and stated a formal approval would follow in a separate correspondence. This correspondence is our formal approval for waiving ozone monitoring requirements for the Anchorage MSA for five years (2019 through 2023). For future Annual Monitoring Network Plans, please enclose a copy of this waiver as an appendix to the ANP.

In considering your waiver request, Region 10 examined the available historic monitoring data produced by ADEC for the Anchorage MSA as well as factoring in the resources constraints you have identified. Region 10 examined the data available in AQS and past Annual Network Plans and found that Alaska has monitored in four separate areas in the Anchorage MSA since ozone monitoring commenced in 2010 (Anchorage, Eagle River, Wasilla, and Palmer). There have been no exceedances of the ozone standard. Additionally, we did not observe any concentrations at or above 80 percent of the NAAQS. Given ADEC's resource constraints and a low likelihood of ozone exceedances in the Anchorage MSA, we are supporting your waiver request.

If ADEC would like to continue to not operate an ozone monitor in the Anchorage MSA after 2023, ADEC should resubmit a request for renewal of the waiver. The EPA reserves the right to reinstate ozone monitoring requirements in the MSA sooner than five years should a future need arise (e.g., changes in air quality, monitor regulation changes, or revisions to the NAAQS).

If you have any questions regarding this correspondence, please contact me at (206) 553-2970 or Doug Jager at (206) 553-2961.

Sincerely,

Gina Bonifacino
Acting Manager, Air Planning Unit

## Waiver C-2: Siting Requirement Waiver for Butte

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue, Suite 155
Seattle, WA 98101-3123

AIR & RADIATION DIVISION

JUN - 4 2019

Ms. Barbara Trost
Air Quality Division
Air Monitoring & Quality Assurance Program
Alaska Department of Environmental Conservation
555 Cordova Street
Anchorage, Alaska 99501-2617

Dear Ms. Trost:

This letter is in response to your May 14, 2019, correspondence requesting that the siting requirements specified in 40 CFR Part 58, Appendix E be waived for the existing Butte ambient air monitoring station (AQS ID: 02-170-0008). Such waivers may be approved pursuant to Appendix E upon a demonstration that either (1) the site can be demonstrated to be as representative of the monitoring area as it would be if the siting criteria were being met, or (2) the monitor or probe cannot reasonably be located so as to meet the siting criteria because of physical constraints (e.g., inability to locate the required type of site the necessary distance from roadways or obstructions). My staff have completed the review of the information provided in your request. In considering your waiver request, Region 10 examined the information you provided in the correspondence to us and the available historic monitoring data produced by ADEC for this monitoring station.

Region 10 agrees with your assessment that the spacing from roadways requirement, as specified in 40 CFR Part 58, Appendix E §6, is met for the Butte air monitoring station. The vehicle traffic at this location is minimal and sufficiently offset from the ambient air monitoring station such that the requirements of Table E-1 of Appendix E to Part 58 are satisfied. Region 10 acknowledges the uniqueness of this monitoring station's position on the Harrison Court cul-de-sac. EPA is affirming through this correspondence that the Butte air monitoring station (AQS ID: 02-170-0008) meets the regulatory requirements of 40 CFR Part 58, Appendix E §6 and as such ADEC does not require a waiver from EPA for this requirement.

The measurements provided in your request documenting the distances between the probe inlets for the Butte monitoring station to the driplines of the nearby trees demonstrate that the requirement for spacing monitoring inlets away from trees found in 40 CFR Part 58, Appendix E §5 is not met and a monitoring waiver is needed for this ambient air monitoring station. Region 10 agrees with your assessment that the probe inlets are not so obstructed as to change the representativeness of the $PM_{10}$ and $PM_{2.5}$ measurements at this ambient air monitoring station. As such, Region 10 approves a waiver from the 40 CFR Part 58, Appendix E §5 siting requirements for this site. This waiver is in effect for five years from the date of this letter.

Due to the proximity of the trees to the probe inlets and siting conditions that will continue to degrade due to tree growth, Region 10 encourages ADEC to remedy the siting conditions if possible through limb trimming or tree removal if possible. If the trees cannot be trimmed or removed, ADEC should begin investigating an alternate ambient air monitoring station that is

representative of this maximum concentration site. DEC can request a renewal of this waiver at the end of the 5-year period based on the siting conditions at that time, but Region 10 encourages ADEC to either remedy the siting conditions at this location or find a replacement ambient air monitoring site within the timeframe of this waiver. If you have any questions regarding this correspondence, please contact me at (206) 553-0985 or Doug Jager at (206) 553-2961.

Sincerely,

Debra Suzuki

Debra Suzuki, Chief
Air Planning, State/Tribal Coordination Branch

## Waiver C-3: Red Dog Mine Lead Monitoring Waiver

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**
**REGION 10**
1200 Sixth Avenue, Suite 155
Seattle, WA 98101

AIR & RADIATION DIVISION

December 7, 2021

Alice Edwards, Director
Division of Air Quality
Alaska Department of Environmental Conservation
P.O. Box 111800
Juneau, AK 99811

Dear Ms. Edwards,

In your letter dated November 4, 2021, Alaska Department of Environmental Conservation (ADEC) Air Quality Division provided an updated request for a waiver of the lead (Pb) monitoring requirements at the Red Dog Mine. By this letter, Region 10 approves a waiver for lead monitoring at the Red Dog Mine. ADEC's waiver request was based on the results of dispersion modeling conducted by Teck Alaska Inc. (Teck), which were reviewed and approved by ADEC. The request was an update to the initial waiver request submitted June 12, 2020. The Red Dog Mine is a source of lead emissions exceeding 0.5 tons per year, which requires lead monitoring as specified in 40 C.F.R. Part 58, Appendix D, section 4.5(a). The lead emissions from Red Dog Mine were reported as 1.2 tons in the 2017 National Emissions Inventory, and 10.1 tons in the 2014 National Emissions Inventory.

According to 40 C.F.R. Part 58, Appendix D, section 4.5(a)(ii), the Regional Administrator may waive the requirement for lead source monitoring if the state can demonstrate that the source will not contribute to a maximum lead concentration in ambient air in excess of 50 percent of the lead National Ambient Air Quality Standards (NAAQS). A 5-year waiver for the lead monitoring requirement for Red Dog Mine was approved on August 11, 2016. The current waiver renewal request was timed to be in sync with the 5-year Air Monitoring Network Assessment, but the approval was delayed. The modeling approach and protocol for the Red Dog Mine conducted by Teck were consistent with the EPA's guidance, and were approved by the EPA. The results of this modeling demonstrates that the maximum ambient 3-month rolling average lead concentration at the mine does not exceed 50 percent of the lead NAAQS. This satisfies the requirement of remaining below 50 percent of the NAAQS, and, therefore, I approve a waiver for lead monitoring at the Red Dog Mine.

Pursuant to 40 C.F.R. Part 58, Appendix D, section 4.5(a)(ii), this waiver must be renewed every 5 years as part of the Alaska 5-year Air Monitoring Network Assessment. Therefore, if ADEC elects to renew the lead source-monitoring waiver, a formal written request to renew the lead source-monitoring waiver must demonstrate that the site conditions for which the previous modeling was conducted are still applicable. If site conditions have changed such that the previous modeling is no longer appropriate, then ADEC must update the modeling based on the current conditions.

This approval and existence of this lead source-monitoring waiver for the Red Dog Mine should be identified in the next ADEC Annual Ambient Air Monitoring Network Plan submitted to the EPA, after public review and comment, and shall be identified in all future Alaska Annual Ambient Air Monitoring Network Plans and the Alaska 5-year Air Monitoring Network Assessment Reports submitted to the EPA.

If you have any questions on the subject, please have your staff contact Sarah Waldo at (206) 553-1949 or waldo.sarah@epa.gov.

Sincerely,

DEBRA SUZUKI
Digitally signed by DEBRA SUZUKI
Date: 2021.12.07 20:20:32 -08'00'

Debra Suzuki, Manager
Air Planning, State/Tribal Coordination Branch

# Appendix D **Network Evaluation Forms**

## Table D-1: $PM_{2.5}$ Network Evaluation Form

| PART 58 APPENDIX D NETWORK EVALUATION FORM FOR PM2.5 | | | | |
|---|---|---|---|---|
| **STATE:** ALASKA **AGENCY:** DEPARTMENT OF ENVIRONMENTAL CONSERVATION **AQS AGENCY CODE:** 02<br>**EVALUATION DATE**: 5/10/2023 **EVALUATOR:** T.BORGFELDT | | | | |
| APPLICABLE SECTION | REQUIREMENT | CRITERIA MET? | | |
| | | YES | NO | N/A |
| 4.7.1(a) | States, and where applicable local agencies must operate the minimum number of required $PM_{2.5}$ SLAMS sites listed in Table D-5 of this appendix. Use the form below and Table D-5 to verify if each of your MSAs have the appropriate number of SLAMS FRM/FEM/ARM samplers. | ✓ | | |
| 4.7.1(b) | Each required SLAMS FRM/FEM/ARM monitoring stations or sites must be sited to represent area-wide air quality in the given MSA (typically neighborhood or urban spatial scale, though micro-or middle-scale okay if it represents many such locations throughout the MSA). | ✓ | | |
| 4.7.1(b)(1) | At least one SLAMS FRM/FEM/ARM monitoring station is to be sited at neighborhood or larger scale in an area of expected maximum concentration for each MSA where monitoring is required by 4.7.1(a). | ✓ | | |
| 4.7.1(b)(2) | For CBSAs with a population of 1,000,000 or more persons, at least one FRM/FEM/ARM $PM_{2.5}$ monitor is to be collocated at a near-road $NO_2$ station. | | | ✓ |
| 4.7.1(b)(3) | For MSAs with additional required SLAMS sites, a FRM/FEM/ARM monitoring station is to be sited in an area of poor air quality. | ✓ | | |
| 4.7.2 | Each State must operate continuous $PM_{2.5}$ analyzers equal to at least one-half (round up) the minimum required sites listed in Table D-5 of this appendix. At least one required continuous analyzer in each MSA must be collocated with one of the required FRM/FEM/ARM monitors, unless at least one of the required FRM/FEM/ARM monitors is itself a continuous FEM or ARM monitor, in which case no collocation requirement applies. | ✓ | | |
| 4.7.3 | Each State shall install and operate at least one $PM_{2.5}$ site to monitor for regional background and at least one $PM_{2.5}$ site to monitor regional transport (note locations in comment field). Non-reference PM2.5 monitors such as IMPROVE can be used to meet this requirement. | ✓ | | |
| 4.7.4 | Each State shall continue to conduct chemical speciation monitoring and analyses at sites designated to be part of the $PM_{2.5}$ Speciation Trends Network (STN). | ✓ | | |
| Comments: | | | | |

| MSA Description[1] | MSA population [2,3] | Design Value for years 2020-2022 24-hr/Annual Avg. µg/m$^3$ | Minimum required number of PM2.5 SLAMS FRM/FEM/ARM sites (from Table D-5) | Present number of PM2.5 SLAMS FRM/FEM/ARM sites in MSA | Present number of continuous PM2.5 FEM/ARM analyzers in MSA | Present number of continuous PM2.5 STN analyzers in MSA |
|---|---|---|---|---|---|---|
| Anchorage MSA | 400,470 | | | | | |
| *Municipality of Anchorage* | 287,145 | | 0 | 1 | 1 | 0 |
| Garden Site | | 28/6.4 | SLAMS/FRM & FEM | 1 | 1 | 0 |
| *Matanuska-Susitna Valley Borough* | 113,325 | | 1 | 0 | 1 | 0 |
| Butte Site | | 24/5.2 | SLAMS/FEM | 0 | 1 | 0 |
| Fairbanks North Star Borough MSA | 95,356 | | 1 | 5 | 3* | 2 speciation |
| A Street | | 33**/9.6** | SPM/FRM | 1 | 1* | 0 |
| NCore Site | | 38/7.9 | NCore/FRM | 2 | 1* | 1 speciation |
| Hurst Rd | | 72/11.8 | SPM/ FRM | 2 | 1* | 1 speciation |
| City and Borough of Juneau µSA | 31,685 | | 0 | 1 | 1 | 0 |
| Floyd Dryden Site | | 20/5.4 | SLAMS/FEM & FRM | 1 | 1 | 0 |

[1]see https://www.census.gov/geographies/reference-files/time-series/demo/metro-micro/delineation-files.html

[2]Minimum monitoring requirements apply to the metropolitan statistical area (MSA). CBSA includes both MSAs and micropolitan statistical areas.

[3]Population based on population estimates for July 1, 2022 obtained from the United States Census Bureau, https://www.census.gov/quickfacts/fact/table/juneaucityandboroughcountyalaska,fairbanksnorthstarboroughalaska,matanuskasusitnaboroughalaska,anchoragemunicipalitycountyalaska,AK/PST045222

*MetOne BAM w/ SCC; per discussion with EPA VSCC cyclone removed

** Did not meet minimum sampling requirements.

Table D-5 of Appendix D to Part 58 – PM2.5 Minimum Monitoring Requirements

| MSA population[1, 2] | Most recent 3-year design value ≥85% of any PM2.5 NAAQS[3] | Most recent 3-year design value <85% of any PM2.5 NAAQS[3, 4] |
|---|---|---|
| >1 million | 3 | 2 |
| 500K to 1 million | 2 | 1 |
| 50K to <500K[5] | 1 | 0 |

[1]Minimum monitoring requirements apply to the Metropolitan statistical area (MSA).
[2]Population based on latest available census figures. https://www.census.gov/
[3]The $PM_{2.5}$ National Ambient Air Quality Standards (NAAQS) levels and forms are defined in 40 CFR part 50.
[4]These minimum monitoring requirements apply in the absence of a design value.
[5]Metropolitan statistical areas (MSA) must contain an urbanized area of 50,000 or more population.

## Table D-2: $PM_{10}$ Network Evaluation Form

PART 58 APPENDIX D NETWORK EVALUATION FORM FOR PM10

**STATE:** ALASKA **AGENCY:** DEPARTMENT OF ENVIRONMENTAL CONSERVATION **AQS AGENCY CODE:** 02

**EVALUATION DATE**: 5/10/2023 **EVALUATOR:** T.BORGFELDT

| APPLICABLE SECTION | REQUIREMENT | CRITERIA MET? | | |
|---|---|---|---|---|
| | | YES | NO | N/A |
| 4.6(a) | Table D-4 indicates the approximate number of permanent stations required in MSAs to characterize national and regional PM10 air quality trends and geographical patterns. Use the form below and Table D-4 to verify if your PM10 network has the appropriate number of samplers. | ✓ | | |

Comments: All of the site locations are based on historical agreements among the EPA, DEC and (where applicable) local agencies.

One exceedance on May 7, 2019 at the Butte site caused the entire Anchorage MSA to be categorized as high concentration. DEC qualified the exceedance day data as RJ (high winds). These one day could be the basis for a 2019 EEWR should EPA request DEC or EPA start another $PM_{10}$ designation process. Thus DEC assumes that medium concentration is applicable when these exceptional events are excluded from the compliance calculations (**Appendix A**, Table A-5 with assumed EEWRs).

| MSA Description[1] | MSA population[2, 3] | Minimum required number of $PM_{10}$ stations (from Table D-4) | Present number of $PM_{10}$ stations in MSA |
|---|---|---|---|
| Anchorage MSA (includes Mat-Su Borough) | 400,470 | 3-4 (high conc)/1-2 (med conc; high winds EE exceedances removed) | 4 (SLAMS [1 collocated], 1 SPM) |
| Fairbanks North Star Borough MSA | 95,356 | 0 (low conc) | 1 (NCore, collocated) |
| City and Borough of Juneau µSA | 31,685 | 0 (low conc) | 1 (SLAMS/LMP, collocated) |

[1]see http://www2.census.gov/econ/susb/data/msa_codes_2007_to_2011.txt

[2]Minimum monitoring requirements apply to the Metropolitan statistical area (MSA). CBSA includes both MSAs and micropolitan statistical areas.

[3]Population based on population estimates for July 1, 2022obtained from the United States Census Bureau, https://www.census.gov/quickfacts/fact/table/juneaucityandboroughcountyalaska,fairbanksnorthstarboroughalaska,matanuskasusitnaboroughalaska,anchoragemunicipalitycountyalaska,AK/PST045222

| Table D-4 of Appendix D to Part 58 – PM10 Minimum Monitoring Requirements | | | |
|---|---|---|---|
| MSA population[1, 2] | High concentration[2] | Medium concentration[3] | Low concentration[4 5] |
| >1 million | 6-10 | 4-8 | 2-4 |
| 500K to 1 million | 4-8 | 2-4 | 1-2 |
| 250K to 500K | 3-4 | 1-2 | 0-1 |
| 100K to 250K | 1-2 | 0-1 | 0 |

[1]Selection of urban areas and actual numbers of stations per area will be jointly determined by EPA and the State agency.

[2]High concentration areas are those for which ambient PM10 data show ambient concentrations exceeding the PM10 NAAQS by 20 percent or more.

[3]Medium concentration areas are those for which ambient PM10 data show ambient concentrations exceeding 80 percent of the PM10 NAAQS.

[4]Low concentration areas are those for which ambient PM10 data show ambient concentrations less than 80 percent of the PM10 NAAQS.

[5]These minimum monitoring requirements apply in the absence of a design value.

**Table D-3: CO Site Evaluation Form**

| PART 58 APPENDIX D SITE EVALUATION FORM FOR CARBON MONOXIDE (CO) | | | | | |
|---|---|---|---|---|---|
| **STATE:** ALASKA **AGENCY:** DEPARTMENT OF ENVIRONMENTAL CONSERVATION **AQS AGENCY CODE:** 02<br>**EVALUATION DATE**: 5/10/2023 **EVALUATOR:** T. BORGFELDT | | | | | |
| APPLICABLE SECTION | REQUIREMENT | OBSERVED | CRITERIA MET? | | |
| | | | YES | NO | N/A |
| 4.2.1(a) | One CO monitor is required to operate collocated with one required near-road $NO_2$ monitor in CBSAs having a population of 1,000,000 or more persons. If a CBSA has more than one required near-road $NO_2$ monitor, only one CO monitor is required to be collocated with a near-road $NO_2$ monitor within that CBSA. | | | | ✓ |
| 4.2.2(a) | Has the EPA Regional Administrator required additional CO monitoring stations above the minimum number of monitors required in 4.2.1? If so, note location in comment field. | | ✓ | | |
| Comments: The State of Alaska has no CBSA with a population of 1,000,000. Therefore, there are no near-road collocated sites for CO and $NO_2$. The Garden Site (AQS ID 02-020-0018) is the single CO site currently operating in the Municipality of Anchorage for Limited Maintenance Plan compliance. A single CO SLAMS monitor operated for Limited Maintenance Plan compliance in the Fairbanks North Star Borough at the Old Post Office Building site (AQS 02-090-0002) until 4/30/2014. Since then the Fairbanks North Star Borough multi-pollutant NCore site (02-090-0034) currently is the single CO site for compliance with NCore requirements and for Limited Maintenance Plan compliance in Fairbanks. | | | | | |

| MSA Description[1] | CBSA population[2, 3] | Minimum required number of SLAMS CO sites | Present number of SLAMS CO sites in MSA |
|---|---|---|---|
| Combined Municipality of Anchorage and Matanuska-Susitna Borough | 400,470 | 0 | 1* |
| Fairbanks North Star Borough | 95,356 | 0 | 1* |

[1]see http://www2.census.gov/econ/susb/data/msa_codes_2007_to_2011.txt

[2]Minimum monitoring requirements apply to the Metropolitan statistical area (MSA). CBSA includes both MSAs and micropolitan statistical areas.

[3]Population based on population estimates for July 1, 2022 obtained from the United States Census Bureau, https://www.census.gov/quickfacts/fact/table/fairbanksnorthstarboroughalaska,matanuskasusitnaboroughalaska,anchoragemunicipalitycountyalaska,AK/PST045222* Monitoring sites in both MSAs satisfy their respective CO Limited Maintenance Plans requirements

## Table D-4: $O_3$ Network Evaluation Form

| PART 58 APPENDIX D NETWORK EVALUATION FORM FOR OZONE ($O_3$) | | | | |
|---|---|---|---|---|
| **STATE:** ALASKA **AGENCY:** DEPARTMENT OF ENVIRONMENTAL CONSERVATION **AQS AGENCY CODE:** 02<br>**EVALUATION DATE**: 5/10/2023 **EVALUATOR:** T. BORGFELDT | | | | |
| APPLICABLE SECTION | REQUIREMENT | CRITERIA MET? | | |
| | | YES | NO | N/A |
| 4.1(b) | At least one $O_3$ site for each MSA, or CSA if multiple MSAs are involved, must be designed to record the maximum concentration (note location in comment field). | | ✓ | |
| 4.1(c) | The appropriate spatial scales for $O_3$ sites are neighborhood, urban, and regional (note deviations in comment field). | ✓ | | |
| 4.1(f) | Confirm that the monitoring agency consulted with EPA R10 when siting the maximum O3 concentration site. | ✓ | | |
| 4.1(i) | $O_3$ is being monitored at SLAMS monitoring sites during the "ozone season" as specified in Table D-3 of Appendix D to Part 58. | ✓ | | |
| Comments: DEC received an EPA 5-Year Ozone NAAQS Monitoring Requirement Waiver for the Anchorage MSA: **Appendix C** (Waiver C-1) Palmer $O_3$ was discontinued at the end of ozone season 2018. An ozone monitoring site was established in the Fairbanks North Star Borough at the multi-pollutant NCore site (AQS 02-090-0034) in August 2011 and has been operated year-round since then. | | | | |

| MSA Description[1] | MSA population [2,3] | Minimum required number of SLAMS $O_3$ sites (from Table D-2) | Present number of SLAMS O3 sites in CBSA | |
|---|---|---|---|---|
| Combined Municipality of Anchorage and Matanuska-Susitna Valley Borough (MSAs) | 400,470 | 1 | 0 | See EPA ozone waiver link* |
| Fairbanks North Star Borough | 95,356 | 0 | 1** | NCore Site |

[1]see http://www2.census.gov/econ/susb/data/msa_codes_2007_to_2011.txt

[2]Minimum monitoring requirements apply to the Metropolitan statistical area (MSA). CBSA includes both MSAs and micropolitan statistical areas.

[3]Population based on population estimates for July 1, 2022 obtained from the United States Census Bureau, https://www.census.gov/quickfacts/fact/table/fairbanksnorthstarboroughalaska,matanuskasusitnaboroughalaska,anchoragemunicipalitycountyalaska,AK/PST045222

* DEC received a EPA 5-Year Ozone NAAQS Monitoring Requirement Waiver for the Anchorage MSA. (**Appendix C**, Waiver C-1)

** Fulfills State of Alaska NCore requirement

| Table D-2 of Appendix D to Part 58 - SLAMS $O_3$ Monitoring Minimum Requirements | | |
|---|---|---|
| MSA population[1, 2] | Most recent 3-year design value concentrations ≥85% of any $O_3$ NAAQS[3] | Most recent 3-year design value concentrations <85% of any $O_3$ NAAQS[3, 4] |
| >10 million | 4 | 2 |
| 4-10 million | 3 | 1 |
| 350,000-<4 million | 2 | 1 |
| 50,000-<350,000[5] | 1 | 0 |

[1]Minimum monitoring requirements apply to the Metropolitan statistical area (MSA). CBSA includes both MSAs and micropolitan statistical areas.
[2]Population based on latest available census estimates.
[3]The ozone (O3) National Ambient Air Quality Standards (NAAQS) levels and forms are defined in 40 CFR part 50.
[4]These minimum monitoring requirements apply in the absence of a design value.
[5]Metropolitan statistical areas (MSA) must contain an urbanized area of 50,000 or more population.

| Table D-3 of Appendix D to Part 58—Ozone Monitoring Season by State | | |
|---|---|---|
| State | Begin month | End Month |
| Alaska | April | October |
| Idaho | May | September |
| Oregon | May | September |
| Washington | May | September |

## Table D-5: $SO_2$ Network Evaluation Form

| PART 58 APPENDIX D NETWORK EVALUATION FORM FOR SULFUR DIOXIDE ($SO_2$) | | | | |
|---|---|---|---|---|
| **STATE:** ALASKA **AGENCY:** DEPARTMENT OF ENVIRONMENTAL CONSERVATION **AQS AGENCY CODE:** 02<br>**EVALUATION DATE**: 5/10/2023 **EVALUATOR:** T. BORGFELDT | | | | |
| APPLICABLE SECTION | REQUIREMENT | CRITERIA MET? | | |
| | | YES | NO | N/A |
| 4.4.1 | State and, where appropriate, local agencies must operate a minimum number of required $SO_2$ monitoring sites (based on PWEI calculation specified in 4.4.2 – use Table 1 and 2 below to determine minimum requirement for each CBSA) | ✓ | | |
| 4.4.2(a)(1) | Is the monitor sited within the boundaries of the parent CBSA and is it one of the following site types: population exposure, highest concentration, source impacts, general background, or regional transport? | | | ✓ |
| 4.4.3(a) | Has the EPA Regional Administrator required additional $SO_2$ monitoring stations above the minimum number of monitors required in 4.4.2? If so, note location in comment field. | | ✓ | |
| 4.4.5(a) | Is your agency counting an existing SO2 monitor at an NCore site in a CBSA with a minimum monitoring requirement? | | | ✓ |
| Comments: As evident from the calculations shown below, the State of Alaska has no CBSAs which require $SO_2$ monitoring. One of the operating $SO_2$ monitors is located at the multi-pollutant NCore site in the Fairbanks North Star Borough operated for compliance with NCore site requirements. The other $SO_2$ analyzer was added to the Hurst Road site in 2021. This data will be helpful for interpreting the sulfate information gained from the speciation monitor at this site. | | | | |

Table 1.

| CBSA Description[1] | CBSA population[2, 3] | total amount of $SO_2$ in tons per year emitted within the CBSA (from 2017 NEI[4]) | PWEI (population x total emissions ÷ 1,000,000) | Minimum required number of $SO_2$ monitors in CBSA (see Table 2 below) | Present number of $SO_2$ monitors in CBSA |
|---|---|---|---|---|---|
| Anchorage Municipality | 287,145 | 394.2 | 114 | 0 | 0 |
| Matanuska-Susitna Borough | 113,325 | 160.4 | 18 | 0 | 0 |
| Fairbanks North Star Borough | 95,356 | 2,356.0 | 225 | 0 | 2* |
| Juneau City and Borough | 31,685 | 101.5 | 3 | 0 | 0 |
| Ketchikan Gateway Borough | 13,741 | 62.9 | 1 | 0 | 0 |

[1]See http://www2.census.gov/econ/susb/data/msa_codes_2007_to_2011.txt
[2]Minimum monitoring requirements apply to the Metropolitan statistical area (MSA). CBSA includes both MSAs and micropolitan statistical areas.
[3]Based on population estimates for July 1, 2022 obtained from the United States Census Bureau, U.S. Census Bureau QuickFacts: Ketchikan Gateway Borough, Alaska; Juneau City and Borough (County), Alaska; Fairbanks North Star Borough, Alaska; Matanuska-Susitna Borough, Alaska; Anchorage Municipality (County), Alaska; Alaska
[4]see https://www.epa.gov/air-emissions-inventories/2017-national-emissions-inventory-nei-data
*One monitor present to satisfy NCore requirement

Table 2. Minimum $SO_2$ Monitoring Requirements (Section 4.4.2 of App D to Part 58)

| PWEI (Population weighted Emission Index) Value | Required number of $SO_2$ monitors |
|---|---|
| >= 1,000,000 | 3 |
| >= 100,000 but < 1,000,000 | 2 |
| >= 5,000 but < 100,000 | 1 |

## Table D-6: $NO_2$ Network Evaluation Form

| PART 58 APPENDIX D NETWORK EVALUATION FORM FOR NITROGEN DIOXIDE ($NO_2$) | | | | |
|---|---|---|---|---|
| **STATE:** ALASKA **AGENCY:** DEPARTMENT OF ENVIRONMENTAL CONSERVATION **AQS AGENCY CODE:** 02<br>**EVALUATION DATE**: 5/10/2023 **EVALUATOR:** T.BORGFELDT | | | | |
| APPLICABLE SECTION | REQUIREMENT | CRITERIA MET? | | |
| | | YES | NO | N/A |
| 4.3.2(a) | Near-road NO2 Monitors: One microscale near-road $NO_2$ monitoring station in each CBSA with a population of 1,000,000 or more persons. | | | ✓ |
| 4.3.2(a) | Near-road NO2 Monitors: An additional near-road $NO_2$monitoring station is required for any CBSA with a population of 2,500,000 persons, or in any CBSA with a population of 500,000 or more persons that has one or more roadway segments with 250,000 or greater AADT count. | | | ✓ |
| 4.3.2(b) | Near-road NO2 Monitors: Measurements at required near-road $NO_2$ monitor sites utilizing chemiluminescence FRMs must include at a minimum: NO, $NO_2$, and $NO_X$ | | | ✓ |
| 4.3.3(a) | Area-wide NO2 Monitoring: One monitoring station in each CBSA with a population of 1,000,000 or more persons to monitor a location of expected highest $NO_2$ concentrations representing the neighborhood or larger spatial scales. | | | ✓ |
| Comments: The State of Alaska has no CBSA with a population of 1,000,000. The Fairbanks North Star Borough is currently analyzing for NO, NOy, and Difference, which satisfies the NCore requirement for NO2. | | | | |

Table 1

| CBSA Description[1] | CBSA population[2, 3] | Required number of Near-road $NO_2$ sites | Present number of Near-road $NO_2$ sites | Required number of Area-wide $NO_2$ sites | Present number of Area-wide $NO_2$ sites |
|---|---|---|---|---|---|
| Combines Municipality of Anchorage and Matanuska-Susitna Valley Borough (MSA) | 400,470 | 0 | 0 | 0 | 0 |
| Fairbanks North Star Borough (MSA) | 95,356 | 0 | 0 | 0 | 0* |
| City and Borough of Juneau (µSA) | 31,685 | 0 | 0 | 0 | 0 |

[1]see http://www2.census.gov/econ/susb/data/msa_codes_2007_to_2011.txt

[2]Minimum monitoring requirements apply to the Metropolitan statistical area (MSA). CBSA includes both MSAs and micropolitan statistical areas.

[3]Based on population estimates for July 1, 2022 obtained from the United States Census Bureau, https://www.census.gov/quickfacts/fact/table/juneaucityandboroughcountyalaska,fairbanksnorthstarboroughalaska,matanuskasusitnaboroughalaska,anchoragemunicipalitycountyalaska,AK/PST045222

*NCore site requirement is satisfied with NOy monitoring

# Appendix E **Summary of Monitoring Path & Siting Criteria Evaluation Forms**

## Table E-1: Summary of Appendix E Forms: $PM_{2.5}$, $PM_{10}$, & $PM_{10-2.5}$

| | Garden | Parkgate | Laurel* | Butte | Hurst Road | A Street | NCore | Floyd Dryden |
|---|---|---|---|---|---|---|---|---|
| Parameter(s) | $PM_{2.5}$ & $PM_{10}$ | $PM_{10}$ | $PM_{10}$ | $PM_{2.5}$ & $PM_{10}$ | $PM_{2.5}$ | $PM_{2.5}$ | $PM_{2.5}$, $PM_{10}$ & $PM_{10-2.5}$ | $PM_{2.5}$ & $PM_{10}$ |
| Address | 3000 E 16th Ave, Anchorage | 11723 Old Glenn Hwy, Eagle River | 4335 Laurel St, Anchorage | Harrison Ct, Butte | 3288 Hurst Rd, North Pole | 397 Hamilton Ave, Fairbanks | 809 Pioneer Rd, Fairbanks | 3800 Mendenhall Loop Rd., Juneau |
| AQS ID | 02-020-0018 | 02-020-1004 | 02-020-0045 | 02-170-0008 | 02-090-0035 | 02-090-0040 | 02-090-0034 | 02-110-0004 |
| 2. HORIZONTAL AND VERTICAL PLACEMENT | Criteria met, 11 m | Criteria met, 10 m | Criteria met, 6 m | Criteria met, 4 m | Criteria met, 4 m | Criteria met, 4 m | Criteria met, 4 m | Criteria met, 7 m |
| 3. SPACING FROM MINOR SOURCES (a) | Criteria met, chimney 3.8 m away | Criteria met, paved parking lot >10 m away | Criteria met, max impact site, winter graveled streets | Criteria **not** met, gravel cul-de-sac** | Criteria met | Criteria met, near a school and a neighborhood | Criteria met, ~ 260 m to Aurora Wood Processing[1], ~400 m to power plant[2] | Criteria met, ~15 to kitchen vent, ~20 m to furnace flue |
| 4. SPACING FROM OBSTRUCTIONS (a) | Criteria met, unrestricted | Criteria met, unrestricted | Criteria met, unrestricted | Criteria met, unrestricted | Criteria met, unrestricted | Criteria met, unrestricted | Criteria met, unrestricted | Criteria met, unrestricted |
| 4. SPACING FROM OBSTRUCTIONS (b) | Criteria met, unrestricted | Criteria met, unrestricted | Criteria met, unrestricted | Criteria met, unrestricted | Criteria met, unrestricted | Criteria met, unrestricted | Criteria met, unrestricted | Criteria met, ~8 m to Hi-Vol RadNet Monitor |
| 5. SPACING FROM TREES (a) | Criteria met, >10 m | Criteria met, >10 m | Criteria met, >20 m | Criteria **not** met, 5.4 m** | Criteria met, >10 m | Criteria met, >10 m | Criteria met, >10 m | Criteria met, >20 m |
| 5. SPACING FROM TREES (c)* | NA | NA | Criteria met | NA | NA | NA | NA | NA |
| 6. SPACING FROM ROADWAYS | Criteria met, >10 m to road | Criteria met, >25 m to paved roads | Criteria met, 11 m to road, maximum exposure site | Criteria met, >100 m to road | Criteria met, >20 m to road | Criteria **not** met, <10 m to road[+] | Criteria met, 10 m to road | Criteria met, ~100 m to road |
| Changes that might compromise siting? | No | No | No | No | No | No | No | No |

*Laurel is the only microscale site in Alaska's PM network
** See Butte siting waiver (Section 3.5.2 and **Appendix C**, Waiver C-2)
[+]This site is located on a low-volume roadway that is paved and covered with snow and ice for six months of the year
[1]Aurora Energy Solutions is a wood processing and kiln drying operation which began approximately in 2020.
[2] Coal power plant stack emits emissions above and outside of ground-surface monitoring. No observed bias upon the collection of Air Quality data.

## Table E-2: Summary of Appendix E Forms: CO

| | Garden | NCore |
|---|---|---|
| Parameter(s) | CO | CO |
| Address | 3000 E 16th Ave, Anchorage | 809 Pioneer Rd, Fairbanks |
| AQS ID | 02-020-0018 | 02-090-0034 |
| 2. HORIZONTAL AND VERTICAL PLACEMENT | Criteria met, 2.6 m | Criteria met, 3 m |
| 3. SPACING FROM MINOR SOURCES | Criteria met, residential | Criteria met, ~260 m to Aurora Wood Processing[2], ~400 m to coal power plant[3] |
| 4. SPACING FROM OBSTRUCTIONS (a) | Criteria met, no obstacles | Criteria met, no obstacles |
| 4. SPACING FROM OBSTRUCTIONS (b) | Criteria met, 180° | Criteria met, unrestricted |
| 5. SPACING FROM TREES (a) | Criteria met, although there is a tree 2.7 m NE of probe, but airflow is still available around and through the tree | Criteria met |
| 5. SPACING FROM TREES (c) | NA | NA |
| 6. SPACING FROM ROADWAYS | NA, Neighborhood scale but 7.6 m from roadway[1] | NA, Neighborhood scale but 85 m from roadway |
| 9. PROBE MATERIAL & RESIDENCE TIME (a) | FEP Teflon | Glass w/ FEP sample lines |
| 9. PROBE MATERIAL & RESIDENCE TIME (c) | Criteria met, < 20 seconds | Criteria met, < 20 seconds |
| Changes that might compromise siting? | No | No |

[1]This site was originally set up as a microscale site by the Municipality of Anchorage which would require the close (<10 m) proximity to the road.
[2]Aurora Energy Solutions is a wood processing and kiln drying operation which began in approximately 2020.
[3]Coal power plant stack emits emissions above and outside of ground-surface monitoring.

## Table E-3: Summary of Appendix E Forms: $O_3$, $SO_2$, NO, Diff, and $NO_y$

| | NCore | | | Hurst Road |
|---|---|---|---|---|
| Parameter(s) | $O_3$ | $SO_2$ | NO, Diff, & $NO_y$ | $SO_2$ |
| AQS ID | 02-090-0034 | | | 02-090-0035 |
| Address | 809 Pioneer Rd, Fairbanks | | | 3288 Hurst Rd, North Pole |
| 2. HORIZONTAL AND VERTICAL PLACEMENT | Criteria met, 3 m | Criteria met, 3 m | Criteria met, 3 m | Criteria met, 3 m |
| 3. SPACING FROM MINOR SOURCES | Criteria met, ~ 260 m to Aurora Wood Processing[1], ~400 m to power plant[2] | Criteria met, ~ 260 m to Aurora Wood Processing[1], ~400 m to power plant[2] | Criteria met, ~ 260 m to Aurora Wood Processing[1], ~400 m to power plant[2] | Criteria met |
| 3. SPACING FROM MINOR SOURCES (b) | Criteria met, no furnaces/flues | | | |
| 4. SPACING FROM OBSTRUCTIONS (a) | Criteria met, no obstacles | Criteria met, no obstacles | Criteria met, no obstacles | Criteria met, no obstacles |
| 4. SPACING FROM OBSTRUCTIONS (b) | Criteria met, unrestricted 360° airflow | Criteria met, unrestricted 360° airflow | Criteria met, unrestricted 360° airflow | Criteria met, unrestricted 360° airflow |
| 4. SPACING FROM OBSTRUCTIONS (d) | | | NA | |
| 5. SPACING FROM TREES (a) | Criteria met, >10 m | Criteria met, > 10 m | Criteria met, >10 m | Criteria met, >10 m |
| 5. SPACING FROM TREES (c) | NA | NA | NA | NA |
| 6. SPACING FROM ROADWAYS | Criteria met, >10 m to road | NA | Criteria met, >10 m to road | |
| 9. PROBE MATERIAL & RESIDENCE TIME (a) | Borosilicate glass w/ FEP Teflon sample lines | Borosilicate glass w/ FEP Teflon sample lines | Borosilicate glass w/ FEP Teflon sample lines | FEP Teflon sample lines |
| 9. PROBE MATERIAL & RESIDENCE TIME (c) | < 5 seconds | < 5 seconds | < 20 seconds | Not an NCore site, < 20 seconds |
| Changes that might compromise siting? | No | No | No | No |

[1]Aurora Energy Solutions is a wood processing and kiln drying operation which began approximately in 2020.
[2] Coal power plant stack emits emissions above and outside of ground-surface monitoring. No observed bias upon the collection of Air Quality data.

**Table E-4: Blank Part 58 Appendix E Form for PM**

| PART 58 APPENDIX E SITE EVALUATION FORM FOR PM2.5, PM10, PM10-2.5, and Pb | | | | | |
|---|---|---|---|---|---|
| SITE NAME: | SITE ADDRESS: | | | | |
| AQS ID: | EVALUATION DATE: | EVALUATOR: | | | |
| APPLICABLE SECTION | REQUIREMENT | OBSERVED | CRITERIA MET? | | |
| | | | YES | NO | N/A |
| 2. HORIZONTAL AND VERTICAL PLACEMENT | 2-15 meters above ground level for neighborhood or larger spatial scale, 2-7 meters for microscale spatial scale sites and middle spatial scale $PM_{10-2.5}$ sties. 1 meter vertically or horizontally away from any supporting structure, walls, *etc.,* and away from dusty or dirty areas. If located near the side of a building or wall, then locate on the windward side relative to the prevailing wind direction during the season of highest concentration potential. | . | | | |
| 3. SPACING FROM MINOR SOURCES | (a) For neighborhood or larger spatial scales avoid placing the monitor near local, minor sources. The source plume should not be allowed to inappropriately impact the air quality data collected at a site. Particulate matter sites should not be located in an unpaved area unless there is vegetative ground cover year-round. | | | | |
| 4. SPACING FROM OBSTRUCTIONS | (a) To avoid scavenging, the inlet must have unrestricted airflow and be located away from obstacles. The separation distance must be at least twice the height that the obstacle protrudes above the probe inlet. | | | | |
| | (b) The inlet must have unrestricted airflow in an arc of at least 180 degrees. This arc must include the predominant wind direction for the season of greatest pollutant concentration potential. For particle sampling, a minimum of 2 meters of separation from walls, parapets, and structures is required for rooftop site placement. | | | | |
| 5. SPACING FROM TREES | (a) To reduce possible interference the inlet must be at least 10 meters or further from the drip line of trees. | | | | |
| | (c) No trees should be between source and probe inlet for microscale sites. | | | | |
| 6. SPACING FROM ROADWAYS | Spacing from roadways is dependent on the spatial scale and ADT count. See section 6.3(b) and figure E-1 for specific requirements. | | | | |
| Are there any changes that might compromise original siting criteria? | | | | | |
| Other Comments: | | | | | |

**Table E-5: Blank Part 58 Appendix E Form for CO**

| PART 58 APPENDIX E SITE EVALUATION FORM FOR CO | | | | | |
|---|---|---|---|---|---|
| SITE NAME: | SITE ADDRESS: | | | | |
| AQS ID: | EVALUATION DATE: | | EVALUATOR: | | |
| APPLICABLE SECTION | REQUIREMENT | OBSERVED | CRITERIA MET? | | |
| | | | YES | NO | N/A |
| 2. HORIZONTAL AND VERTICAL PLACEMENT | For neighborhood or larger spatial scale sites the probe must be located 2-15 meters above ground level and must be at least 1 meter vertically or horizontally away from any supporting structure, walls, *etc.,* and away from dusty or dirty areas. If located near the side of a building or wall, then locate on the windward side relative to the prevailing wind direction during the season of highest concentration potential. | | | | |
| 3. SPACING FROM MINOR SOURCES | (a) For neighborhood scale avoid placing the monitor probe inlet near local, minor sources. The source plume should not be allowed to inappropriately impact the air quality data collected at a site. | | | | |
| 4. SPACING FROM OBSTRUCTIONS | (a) To avoid scavenging, the probe inlet must have unrestricted airflow and be located away from obstacles. The separation distance must be at least twice the height that the obstacle protrudes above the probe inlet (exception is street canyon or source-oriented sites where buildings and other structures are unavoidable). | | | | |
| | (b) The probe inlet must have unrestricted airflow in an arc of at least 180 degrees. This arc must include the predominant wind direction for the season of greatest pollutant concentration potential. | | | | |
| 5. SPACING FROM TREES | (a) To reduce possible interference the probe inlet must be at least 10 meters or further from the drip line of trees. | | | | |
| | (c) No trees should be between source and probe inlet for microscale sites. | | | | |
| 6. SPACING FROM ROADWAYS | 2. (b) Microscale CO monitor probes in downtown areas or urban street canyon locations shall be located a minimum distance of 2 meters and a maximum distance of 10 meters from the edge of the nearest traffic lane. | | | | |
| | 2. (c) Microscale CO monitor inlet probes in downtown areas or urban street canyon locations shall be located at least 10 meters from an intersection and preferably at a midblock location. | | | | |
| 9. PROBE MATERIAL & RESIDENCE TIME | (a) Sampling train material must be FEP Teflon or borosilicate glass (e.g., Pyrex) for reactive gases. | | | | |
| | (c) Sampling probes for reactive gas monitors at NCore must have a sample residence time less than 20 seconds. | | | | |
| Are there any changes that might compromise original siting criteria? If so, provide detail in comment section. | | | | | |
| Other Comments: | | | | | |

[1] Distance from the edge of the nearest traffic lane. The distance for intermediate traffic counts should be interpolated from the table values based on the actual traffic count.

**Table E-6: Blank Part 58 Appendix E Form for $O_3$**

| PART 58 APPENDIX E SITE EVALUATION FORM FOR O3 | | | | | |
|---|---|---|---|---|---|
| SITE NAME: | SITE ADDRESS: | | | | |
| AQS ID: | EVALUATION DATE: | | EVALUATOR: | | |
| APPLICABLE SECTION | REQUIREMENT | OBSERVED | CRITERIA MET? | | |
| | | | YES | NO | N/A |
| 2. HORIZONTAL AND VERTICAL PLACEMENT | 2-15 meters above ground level. 1 meter vertically or horizontally away from any supporting structure, walls, *etc.,* and away from dusty or dirty areas. If located near the side of a building or wall, then locate on the windward side relative to the prevailing wind direction during the season of highest concentration potential. | | | | |
| 3. SPACING FROM MINOR SOURCES | (a) For neighborhood scale avoid placing the monitor probe inlet near local, minor sources. The source plume should not be allowed to inappropriately impact the air quality data collected at a site. | | | | |
| | (b) To minimize scavenging effects, the probe inlet must be away from furnace or incineration flues or other minor sources of $SO_2$ or NO. | | | | |
| 4. SPACING FROM OBSTRUCTIONS | (a) To avoid scavenging, the probe inlet must have unrestricted airflow and be located away from obstacles. The separation distance must be at least twice the height that the obstacle protrudes above the probe inlet. | | | | |
| | (b) The probe inlet must have unrestricted airflow in an arc of at least 180 degrees. This arc must include the predominant wind direction for the season of greatest pollutant concentration potential. | | | | |
| 5. SPACING FROM TREES | (a) To reduce possible interference the probe inlet must be at least 10 meters or further from the drip line of trees. | | | | |
| | (c) No trees should be between source and probe inlet for microscale sites. | | | | |
| 6. SPACING FROM ROADWAYS | See spacing requirements table below | | | | |
| 9. PROBE MATERIAL & RESIDENCE TIME | (a) Sampling train material must be FEP Teflon or borosilicate glass (e.g., Pyrex). | | | | |
| | (c) Sampling probes for reactive gas monitors at NCore must have a sample residence time less than 20 seconds. | | | | |
| Are there any changes that might compromise original siting criteria? If so, provide detail in comment section. | | | | | |
| Other Comments: | | | | | |

[1]Distance from the edge of the nearest traffic lane. The distance for intermediate traffic counts should be interpolated from the table values based on the actual traffic count.

[2]Applicable for ozone monitors whose placement has not already been approved as of December 18, 2006.

## Table E-7: Blank Part 58 Appendix E Form for $SO_2$

| PART 58 APPENDIX E SITE EVALUATION FORM FOR SO2 | | | | | |
|---|---|---|---|---|---|
| SITE NAME: | SITE ADDRESS: | | | | |
| AQS ID: | EVALUATION DATE: | EVALUATOR: | | | |
| APPLICABLE SECTION | REQUIREMENT | OBSERVED | CRITERIA MET? | | |
| | | | YES | NO | N/A |
| 2. HORIZONTAL AND VERTICAL PLACEMENT | 2-15 meters above ground level. 1 meter vertically or horizontally away from any supporting structure, walls, *etc.*, and away from dusty or dirty areas. If located near the side of a building or wall, then locate on the windward side relative to the prevailing wind direction during the season of highest concentration potential. | | | | |
| 3. SPACING FROM MINOR SOURCES | (a) For neighborhood scale avoid placing the monitor probe inlet near local, minor sources. The source plume should not be allowed to inappropriately impact the air quality data collected at a site. | | | | |
| 4. SPACING FROM OBSTRUCTIONS | (a) To avoid scavenging, the probe inlet must have unrestricted airflow and be located away from obstacles. The separation distance must be at least twice the height that the obstacle protrudes above the probe inlet. | | | | |
| | (b) The probe inlet must have unrestricted airflow in an arc of at least 180 degrees. This arc must include the predominant wind direction for the season of greatest pollutant concentration potential. | | | | |
| 5. SPACING FROM TREES | (a) To reduce possible interference the probe inlet must be at least 10 meters or further from the drip line of trees. | | | | |
| | (c) No trees should be between source and probe inlet for microscale sites. | | | | |
| 6. SPACING FROM ROADWAYS | There are no roadway spacing requirements for SO2. | | | | |
| 9. PROBE MATERIAL & RESIDENCE TIME | (a) Sampling train material must be FEP Teflon or borosilicate glass (e.g., Pyrex). | | | | |
| | (c) Sampling probes for reactive gas monitors at NCore must have a sample residence time less than 20 seconds. | | | | |
| Are there any changes that might compromise original siting criteria? If so, provide detail in comment section. | | | | | |
| Other Comments: | | | | | |

### Table E-8: Blank Part 58 Appendix E Form for NO, NOx, $NO_2$, and $NO_y$

| PART 58 APPENDIX E SITE EVALUATION FORM FOR NO, NOx, NO2, and NOy | | | | | |
|---|---|---|---|---|---|
| SITE NAME: | SITE ADDRESS: | | | | |
| AQS ID: | EVALUATION DATE: | EVALUATOR: | | | |
| APPLICABLE SECTION | REQUIREMENT | OBSERVED | CRITERIA MET? | | |
| | | | YES | NO | N/A |
| 2. HORIZONTAL AND VERTICAL PLACEMENT | For neighborhood or larger spatial scale sites the probe must be located 2-15 meters above ground level and must be at least 1 meter vertically or horizontally away from any supporting structure, walls, *etc.,* and away from dusty or dirty areas. Microscale near-road $NO_2$ monitoring sites are required to have sampler inlets between 2 and 7 meters above ground level. If located near the side of a building or wall, then locate the sampler probe on the windward side relative to the prevailing wind direction during the season of highest concentration potential. | | | | |
| 3. SPACING FROM MINOR SOURCES | (a) For neighborhood scale and larger avoid placing the monitor probe inlet near local, minor sources. The source plume should not be allowed to inappropriately impact the air quality data collected at a site. | | | | |
| 4. SPACING FROM OBSTRUCTIONS | (a) To avoid scavenging, the probe inlet must have unrestricted airflow and be located away from obstacles. The separation distance must be at least twice the height that the obstacle protrudes above the probe inlet. | | | | |
| | (b) The probe inlet must have unrestricted airflow in an arc of at least 180 degrees. This arc must include the predominant wind direction for the season of greatest pollutant concentration potential. | | | | |
| | (d) For near-road $NO_2$ monitoring stations, the monitor probe shall have an unobstructed air flow, where no obstacles exist at or above the height of the monitor probe, between the monitor probe and the outside nearest edge of the traffic lanes of the target road segment. | | | | |
| 5. SPACING FROM TREES | (a) To reduce possible interference the probe inlet must be at least 10 meters or further from the drip line of trees. | | | | |
| | (c) No trees should be between source and probe inlet for microscale sites. | | | | |
| 6. SPACING FROM ROADWAYS | See spacing requirements table below | | | | |
| 9. PROBE MATERIAL & RESIDENCE TIME | (a) Sampling train material must be FEP Teflon or borosilicate glass (e.g., Pyrex). | | | | |
| | (c) Sampling probes for reactive gas monitors at NCore and at $NO_2$ sites must have a sample residence time less than 20 seconds. | | | | |
| Are there any changes that might compromise original siting criteria? If so, provide detail in comment section. | | | | | |
| Other Comments: | | | | | |

### Table E-9: Roadway ADT for CO, $O_3$, $SO_2$, and NO suite Part 58 Appendix E Forms

| Roadway average daily traffic, vehicles per day | Minimum distance[1] (meters) |
|---|---|
| ≤10,000 | 10 |
| 15,000 | 25 |
| 20,000 | 45 |
| 30,000 | 80 |
| 40,000 | 115 |
| 50,000 | 135 |
| ≥60,000 | 150 |

# Appendix F **Additional Monitoring Projects**

## SMOKE MONITORING FOR AIR QUALITY ADVISORIES

Smoke from wildland fires can affect large areas and impact air quality in regions both close to and far away from the burning fire. Almost every summer, large areas of the state are impacted by smoke from wildland fires, with air quality degrading into the very unhealthy to hazardous range. The DEC assists the Alaska Fire Service in assessing air quality impacts in areas affected by wildland fires and provides information needed to protect public health. Specifically, the DEC Air Quality Division uses two separate methods to assess air quality impacts and issue air quality advisories statewide: monitoring data (if available) and visibility information. During 2024 wildland fire season DEC will partner with other agencies to expand the network of low-cost sensors, as necessary. In addition, the DEC meteorologist or air quality staff, with assistance from the National Weather Service (NWS), will use meteorological and air monitoring data to forecast smoke movement and predict where air quality impacts might occur.

## VOLCANIC ASH MONITORING

In the event of an active volcano eruption, DEC will cooperate with the Alaska Volcano Observatory on volcanic ash monitoring. The DEC meteorologist will use a $PM_{10}$ Met One E-BAM with an AIRSIS communication system to review data in near real time and issue air quality advisories for affected areas during volcanic eruptions.

## RADIATION MONITORING

The state has three radiation monitoring network sites (RadNet) located in Anchorage, Fairbanks, and Juneau. The RadNet monitor in Anchorage was moved from the Alaska State Public Health Laboratory (5455 Doctor M.L.K. Jr. Ave.) to the Garden site (3000 E 16$^{th}$ Ave.) on August 30, 2021 and operation of the site shifted from the Alaska Department of Health and Social Services to the DEC Air Quality Division. Currently, DEC operates the RadNet equipment at all three sites.

# Appendix G **Improve Network**

The Alaska Regional Haze State Implementation Plan (SIP) includes a monitoring plan for measuring, estimating, and characterizing air quality and visibility impairment at Alaska's four Class I areas. The haze species concentrations are measured as part of the IMPROVE monitoring network deployed throughout the United States. Alaska uses four IMPROVE monitoring stations representing three of the four Class I Areas. Three of these areas (Denali National Park and Preserve, Simeonof and Tuxedni National Wildlife Refuges) have monitors deployed specifically in response to Regional Haze Rule requirements. There is no air monitoring being conducted at the Bering Sea Wilderness Area due to its remote location.

Monitoring site information and additional Regional Haze information are available at DEC's Regional Haze website, http://dec.alaska.gov/air/anpms/regional-haze. Monitoring data and additional information for the Alaskan IMPROVE sites are available from the EPA website, http://vista.cira.colostate.edu/improve.