

Air Quality Division

Air Monitoring  
&  
Quality Assurance  
Program

555 Cordova St., 1<sup>st</sup> Floor  
Anchorage, AK 99501

Phone: (907) 269-7577  
Fax: (907) 269-7508

[www.dec.alaska.gov/air/](http://www.dec.alaska.gov/air/)



2023

# Annual Air Quality Monitoring Network Plan

Alaska Department of  
Environmental Conservation

*Public Comment Draft*

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## LIST OF ACRONYMS

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 <sub>2</sub>	nitrogen dioxide
NO <sub>y</sub>	reactive nitrogen compounds
NWS	National Weather Service
m <sup>3</sup>	cubic meter
Mat-Su	Matanuska Susitna
MFC	mass flow controller
MOA	Municipality of Anchorage
MSA	metropolitan statistical area
µg	micrograms
µSA	micropolitan areas
O <sub>3</sub>	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 <sub>2.5</sub>	particulate matter with an aerodynamic diameter less than 2.5 micrometers
PM <sub>10</sub>	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 <sub>2</sub>	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 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 Alaska Department of Environmental Conservation only to operate the minimum regulatory required ambient monitoring network. Looking ahead, the Alaska Department of Environmental Conservation 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, PM<sub>10</sub> collocation using a Thermo Scientific Inc. Partisol 2000i was added to the Floyd Dryden State and Local Air Monitoring Stations site.
- **Trinity Church (Garden) Site:** On February 22, 2022, the PM<sub>2.5</sub> collocation monitor for the Met One BAM 1020 network was moved from the Harrison Ct (Butte) site to Garden site. The PM<sub>10</sub> federal reference method 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<sub>2.5</sub> and PM<sub>10</sub> Partisols were February 25<sup>th</sup>, 2022, and March 6<sup>th</sup>, 2022, respectively.
- **Sulfur Dioxide Sampling at Hurst Road Site:** On March 10, 2022, the Alaska Department of Environmental Conservation added a Thermo Scientific 43i Sulfur Dioxide monitor to the North Pole Hurst Rd site. The Hurst Road site is the maximum impact PM<sub>2.5</sub> monitoring site in the Fairbanks nonattainment area and houses a Chemical Speciation Network site. The SO<sub>2</sub> data will be helpful for interpreting the sulfate information gained from the speciation monitor.
- **State and Local Air Monitoring Stations Sampling Site Improvements Funded by The American Rescue Plan Direct Grant Award:** The Alaska Department of Environmental Conservation's American Rescue Plan Direct Awards will fund the following monitoring site improvements for the Alaska Department of Environmental Conservation State and Local Air Monitoring Stations network. The status is indicated in *bold italics*.
  - Replace aging Chemical Speciation Network samplers at the National Core Multi-Pollutant Monitoring Stations 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 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<sub>2.5</sub> State and Local Air Monitoring Stations relocation:** The Alaska Department of Environmental Conservation 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 Alaska Department of Environmental Conservation selected the Plant Material Center as the best substitution location. Pending Environmental Protection Agency approval, the Alaska Department of Environmental Conservation will prepare the Plant Material Center location for a permanent ambient monitoring site. The Alaska Department of Environmental Conservation plans to begin sampling at the location in time for an official January 1, 2024, sampling start for both continuous PM<sub>2.5</sub> and PM<sub>10</sub> monitoring.
- **Juneau Mendenhall Valley PM<sub>2.5</sub> State and Local Air Monitoring Stations Primary Sampler:** In summer 2021, the Alaska Department of Environmental Conservation purchased a Teledyne T640X PM<sub>2.5</sub> and PM<sub>10</sub> analyzer for the Floyd Dryden State and Local Air Monitoring Stations site in the Juneau Mendenhall Valley. Federal reference method collocation was established on October 1, 2021, for PM<sub>2.5</sub> and January 26, 2022, for PM<sub>10</sub>. Environmental Protection Agency Region 10 staff had voiced concern regarding the performance of the T640X for PM<sub>2.5</sub> in areas with a high woodsmoke component. The performance issues have been discussed with the manufacturer. Teledyne indicated that they are working on a correction factor and seemed to be actively engaged with the Environmental Protection Agency to resolve the issue. To ensure that the Alaska Department of Environmental Conservation does not underrepresent the PM<sub>2.5</sub> concentrations measured at the site, the Alaska Department of Environmental Conservation will designate the federal reference method as the primary samplers and collect samples every third day effective January 2024. The T640x will continue to provide PM<sub>2.5</sub> air quality index data used for public information and for the City and Borough of Juneau to call burn bans as needed. The Alaska Department of Environmental Conservation will continue to use the instrument as a PM<sub>10</sub> federal equivalent method, since PM<sub>10</sub> concentrations did not exceed 20 µg/m<sup>3</sup> over the past year and there is little risk of missing high pollution events.
- **A-Street Continuous Analyzer:** The Alaska Department of Environmental Conservation has been using non-federal reference method Met-One BAM 1020 PM<sub>2.5</sub> 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, the



Department of Environmental Conservation lost data during the winter months (Quarter 1 and Quarter 4) due to shuttle errors on the sequential federal reference method instrument. The federal reference method instruments malfunction periodically during cold weather when the pneumatics get too cold to perform properly. The Alaska Department of Environmental Conservation attempted to replace the federal reference method instrument in November 2022, but a new instrument could not be delivered until April 2023 because of supply chain issues at the manufacturer. The Alaska Department of Environmental Conservation 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, the Alaska Department of Environmental Conservation will operate the Met-One BAM 1020 at A-Street as a federal equivalent method sampler.

- **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. The Alaska Department of Environmental Conservation 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. The Alaska Department of Environmental Conservation 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 American Rescue Plan direct grant and competitive grant awards from the Environmental Protection Agency, the Alaska Department of Environmental Conservation received funds for 20 additional sensor pods. The Alaska Department of Environmental Conservation 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, the Alaska Department of Environmental Conservation conducted a sensor comparison study during the 2022/23 winter at the National Core Multi-Pollutant Monitoring Stations in Fairbanks to evaluate multiple sensor pods from different manufacturers. The Alaska Department of Environmental Conservation 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.



# 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<sub>2.5</sub> 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<sub>2.5</sub> 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<sub>10</sub> 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<sub>2</sub>), nitrogen dioxide (NO<sub>2</sub>), carbon monoxide (CO), ozone (O<sub>3</sub>), and lead (Pb). Particulate matter has two associated NAAQS: one for fine particulate matter less than 2.5 micrometers in aerodynamic diameter (PM<sub>2.5</sub>) and one for coarse particulate matter less than 10 micrometers in aerodynamic diameter (PM<sub>10</sub>). 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<sup>1</sup> 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

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<sup>1</sup> 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,anchorage municipalitycountyalaska,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)<sup>2</sup>.

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<sub>2.5</sub>) monitoring
2. Coarse particulate matter (PM<sub>10</sub>) monitoring
3. Wildland fire monitoring (PM<sub>2.5</sub>)
4. Carbon monoxide (CO) monitoring
5. Rural community and tribal village monitoring (primarily PM<sub>10</sub>)
6. Lead (Pb) monitoring
7. Ozone (O<sub>3</sub>) 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.

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<sup>2</sup> 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  $\mu$ SA and the Ketchikan  $\mu$ SA, which encompass the City and Borough of Juneau and the Ketchikan Gateway Borough, respectively.

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

<b>Core Based Statistical Areas</b>	<b>Population*</b>	<b>Includes:</b>	
<b>Anchorage, MSA</b>	400,470	Municipality of Anchorage	287,145
		Matanuska-Susitna Borough	113,325
<b>Fairbanks, MSA</b>	95,356		
<b>Juneau, <math>\mu</math>SA</b>	31,685		
<b>Ketchikan, <math>\mu</math>SA</b>	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,anchorage municipalitycountyalaska,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  $\mu$ SA.

Monitoring in the Juneau  $\mu$ SA 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 preheated 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  $28 \mu\text{g}/\text{m}^3$ , 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<sub>2.5</sub> monitor requirement is based on the elevated concentrations measured in Fairbanks and North Pole. The DEC's Fairbanks PM<sub>2.5</sub> 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			
		Anchorage MSA	Fairbanks MSA	Juneau μSA	Ketchikan μSA
<b>PM<sub>2.5</sub></b>	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
<b>PM<sub>10</sub></b>	Two monitoring sites based on PM <sub>10</sub> Limited Maintenance Plans (Juneau and Eagle River). Additional monitors required in Anchorage MSA based on pollution levels.	3-4	0	0	0
<b>Pb</b>	Waiver for source-oriented monitoring - see section 3.1.1	0	0	0	0
<b>CO</b>	Two monitoring sites based on CO Limited Maintenance Plans (Fairbanks and Anchorage); Fairbanks also meets NCore requirement	0	0	0	0
<b>O<sub>3</sub></b>	Most recent 3-year design value ≥ 85% of NAAQS	0	0	0	0
	See EPA O <sub>3</sub> NAAQS waiver <sup>1</sup>	0 <sup>1</sup>	0	0	0
<b>SO<sub>2</sub></b>	NCore site requirement	0	0	0	0
<b>NO<sub>2</sub></b>	Requirement based on population numbers. Alaska does not meet the threshold requirement	0	0	0	0

<sup>1</sup> 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<sub>10</sub>, PM<sub>2.5</sub>, PM<sub>10-2.5</sub>, CO, O<sub>3</sub>, SO<sub>2</sub>, NO<sub>y</sub>, NO, PM<sub>2.5</sub> chemical speciation, and meteorological parameters. There are four sites that are collocated: Garden (PM<sub>2.5</sub> and PM<sub>10</sub>), Hurst Rd. (PM<sub>2.5</sub>), NCore (PM<sub>10</sub>), and Floyd Dryden (PM<sub>2.5</sub> and PM<sub>10</sub>), 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 <sup>1</sup>	AQS ID	Agency
Garden	3000 East 16 <sup>th</sup> 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 <sup>2</sup>	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 <sup>3</sup>	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

<sup>1</sup> Coordinates for latitude and longitude are consistent with the World Geodetic System (WGS 84).

<sup>2</sup> 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.

<sup>3</sup> 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 <sup>1</sup>
NCore 02-090-0034	Neighborhood	Not applicable	3	360 degrees unobstructed	70	10 m

<sup>1</sup>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<sub>10</sub> AND PM<sub>2.5</sub>) 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 <sub>10</sub>	Monitoring Scale PM <sub>2.5</sub>	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 <sup>2</sup> 02-170-0008	Neighborhood	Neighborhood	4.7	no obstructions	150	3,090 <sup>3</sup> , Old Glenn Hwy	yes 5.4 m
A Street 02-090-0040	-	Neighborhood	4.3	no obstructions	5.8 <sup>4</sup>	1,540 <sup>5</sup> 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

<sup>1</sup> Average annual traffic count 2021 traffic data accessed at: [http://dot.alaska.gov/stwdplng/transdata/traffic\\_AADT\\_map.shtml](http://dot.alaska.gov/stwdplng/transdata/traffic_AADT_map.shtml)

<sup>2</sup> 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)

<sup>3</sup> 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)

<sup>4</sup> Site is <10m from adjacent A-Street, a paved, low traffic neighborhood street, remainder of site grass covered

<sup>5</sup> 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 N CORE 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<sup>1</sup> 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 <sup>2</sup>	no obstructions	70	4640 <sup>3</sup>	None
O <sub>3</sub>	Neighborhood	3	no obstructions	70	4640	None
SO <sub>2</sub> (1 hr & 5 min)	Neighborhood	3	no obstructions	70	4640	None
T <sub>amb</sub> , WS, & WD	Neighborhood	3	no obstructions	70	4640	None
T <sub>amb</sub> , WS, & WD	Neighborhood	10	no obstructions	70	4640	None
Relative Humidity	Neighborhood	3	no obstructions	70	4640	None

<sup>1</sup> Excluding CO. For CO see Table 3-4.

<sup>2</sup> Probe height is 3 meters rather than the 10 meters recommended to remain below the unusually low winter inversion layer.

<sup>3</sup> 2021 Philips Field Rd traffic data accessed at: [http://dot.alaska.gov/stwdplng/transdata/traffic\\_AADT\\_map.shtml](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<sub>10</sub>, SO<sub>2</sub>, 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<sub>10</sub> 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<sub>2</sub> reading) or a near-real time basis (e.g. 1-hour PM<sub>2.5</sub> 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 <sub>10</sub> STD/ PM <sub>10</sub> LC	SLAMS	1/1/2009 STD 1/1/2015 LC	81102-3/ 85101-3	122	Continuous	Met One BAM 1020 - FEM
	PM <sub>10</sub> STD/ PM <sub>10</sub> LC	SPM	2/24/2022	81102-2/ 85101-2	126	1/6	Thermo Scientific Partisol 2000i - FRM
	PM <sub>2.5</sub> LC	SLAMS	1/1/2009	88101-3	170	Continuous	Met One BAM 1020 (VSCC) FEM
	PM <sub>2.5</sub> LC	SPM	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 <sub>10</sub> STD/ PM <sub>10</sub> LC	SPM	5/28/2015	81102-3/ 85101-3	122	Continuous	Met One BAM 1020 - FEM
Parkgate/ Eagle River 02-020-1004	PM <sub>10</sub> STD/ PM <sub>10</sub> LC	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 <sub>10</sub> STD/ PM <sub>10</sub> LC	SPM	8/10/2011 STD 4/11/1998 LC	81102-3/ 85101-3	122	Continuous	Met One BAM 1020 - FEM
	PM <sub>2.5</sub> LC	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 <sub>10</sub> STD/ PM <sub>10</sub> LC	NCORE	2/15/2011	81102-3/ 85101-3	122	Continuous	Met One BAM 1020 FEM
	PM <sub>2.5</sub> LC	SPM	2/15/2011	88501-3 88502-3	731	Continuous	Met One BAM 1020 (SCC) non-FEM
	PM <sub>10</sub> STD/ PM <sub>10</sub> LC collocate	NCORE	11/10/2012	81102-1/ 85101-1	126	1/3	Thermo Scientific Partisol 2000i-FRM <sup>1</sup>
	PM <sub>2.5</sub> LC	NCORE	11/4/2009	88101-1	145	1/1	Thermo Scientific Sequential Partisol 2025i (VSCC)-FRM
	PM <sub>2.5</sub> LC	NCORE	5/8/2013	88101-2	143	1/3	Thermo Scientific Partisol 2000i (VSCC)- FRM
	PM <sub>10</sub> LC - PM <sub>2.5</sub> LC	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 <sub>2</sub> (1-hr)/ SO <sub>2</sub> (5-min)	NCORE	8/1/2011/ 8/18/2011	42401-1/ 42401-2	560	Continuous	Thermo Scientific 43iQ- TL-FEM
	NO <sub>y</sub>	NCORE	10/5/2012	42600-1	699	Continuous	Teledyne T-200U-NO <sub>y</sub>
	NO	NCORE	10/5/2012	42601-2	699	Continuous	Teledyne T-200U-NO <sub>y</sub>

<sup>1</sup> The NCore sites have a PM Coarse (PM<sub>10</sub>LC - PM<sub>2.5</sub>LC) measurement requirement. As the PM<sub>2.5</sub> BAM is non-FEM, DEC is operating PM<sub>2.5</sub> and PM<sub>10</sub> 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 <sub>y</sub> -NO	NCORE	10/5/2012	42612-1	699	Continuous	Teledyne T-200U-NO <sub>y</sub>
	O <sub>3</sub>	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 <sub>2.5LC</sub> Speciation	NCORE/CSN	1/1/2015	Multiple <sup>1</sup>	Multiple <sup>1</sup>	1/3	URG 3000N
	PM <sub>2.5LC</sub> Speciation	NCORE/CSN	1/1/2015	Multiple <sup>1</sup>	Multiple <sup>1</sup>	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 <sub>2.5LC</sub>	SLAMS	7/15/2019	88101-1	145	1/1	Thermo Scientific Sequential Partisol 2025i (VSCC)-FRM
	PM <sub>2.5LC</sub>	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 <sub>2.5LC</sub>	SLAMS	3/1/2012	88101-1	145	1/1	Thermo Scientific Sequential Partisol 2025i (VSCC)-FRM
	PM <sub>2.5LC</sub> 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 <sub>2</sub> (1-hr)/ SO <sub>2</sub> (5-min)	SLAMS	3/10/2022/ 3/10/2022	42401-1/ 42401-2	560	Continuous	Thermo Scientific 43i- TL-FEM
	PM <sub>2.5LC</sub>	SPM	3/1/2012	88501-3 88502-3	731	Continuous	Met One BAM 1020 (SCC) non- FEM
	PM <sub>2.5LC</sub> Speciation	CSN	8/1/2019	Multiple <sup>1</sup>	Multiple <sup>1</sup>	1/3	URG 3000N
	PM <sub>2.5LC</sub> Speciation	CSN	8/1/2019	Multiple <sup>1</sup>	Multiple <sup>1</sup>	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 <sup>2</sup> (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

<sup>1</sup> Multiple AQS codes are used to identify individual chemical species

<sup>2</sup> Meteorological parameters (WS and WD) also measured in scalar

**Table 3-9: Juneau  $\mu$ SA: 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 <sub>2.5LC</sub>	SLAMS	6/23/2021	88101-3	236	Continuous	Teledyne T640X - FEM
	PM <sub>2.5LC</sub>	SPM	9/28/2021	88101-2	143	1/6	Thermo Scientific Partisol 2000i (VSCC) - FRM
	PM <sub>10STD</sub> / PM <sub>10LC</sub>	SLAMS	6/23/2021	81102-3/ 85101-3	239	Continuous	Teledyne T640X - FEM
	PM <sub>10STD</sub> / PM <sub>10LC</sub>	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 40 CFR Part 58 App D 1.1.1
Garden	02-020-0018	PM <sub>10</sub> /PM <sub>2.5</sub> /CO	(b) Typical concentrations (population density based) (d) General background concentration levels
Laurel	02-020-0045	PM <sub>10</sub>	(a) Highest concentrations expected in area (c) Impact of significant sources/source categories
Parkgate	02-020-1004	PM <sub>10</sub>	(b) Typical concentrations (population density based) (d) General background concentration levels
NCore	02-090-0034	PM <sub>10</sub> /PM <sub>2.5</sub> /PM <sub>10-2.5</sub> /CO/ SO <sub>2</sub> /O <sub>3</sub> / NO/NO <sub>y</sub> /Speciation	(b) Typical concentrations (population density based) (d) General background concentration levels
Hurst Road	02-090-0035	PM <sub>2.5</sub> / SO <sub>2</sub> /Speciation	(a) Highest concentrations expected in area (c) Impact of significant sources/source categories
A Street	02-090-0040	PM <sub>2.5</sub>	(a) Highest concentrations expected in area (c) Impact of significant sources/source categories
Butte	02-170-0008	PM <sub>10</sub> /PM <sub>2.5</sub>	(a) Highest concentrations expected in area (c) Impact of significant sources/source categories
Floyd Dryden Middle School	02-110-0004	PM <sub>10</sub> /PM <sub>2.5</sub>	(b) Typical concentrations (population density based) (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 <sub>10</sub> STD/PM <sub>10</sub> LC	81102-3/85101-3	Population exposure	-Provide timely air pollution information -Determine ambient air quality standard compliance
	PM <sub>10</sub> STD/ PM <sub>10</sub> LC collocated	81102-2/85101-2	Population exposure	-Determine ambient air quality standard compliance
	PM <sub>2.5</sub> LC	88101-3	Population exposure	-Provide timely air pollution information -Determine ambient air quality standard compliance
	PM <sub>2.5</sub> LC collocated	88101-2	Population exposure	-Determine ambient air quality standard compliance
	CO	42101-1	Population exposure	-Provide timely air pollution information -Determine ambient air quality standard compliance
Laurel/ Anchorage 02-020-0045	PM <sub>10</sub> STD/PM <sub>10</sub> LC	81102-3/85101-3	Source Oriented Highest Concentration	-Provide timely air pollution information -Determine ambient air quality standard compliance
Parkgate/ Eagle River 02-020-1004	PM <sub>10</sub> STD/PM <sub>10</sub> LC	81102-3/85101-3	Population exposure	-Provide timely air pollution information -Determine ambient air quality standard compliance
Butte/ Mat-Su Valley 02-170-0008	PM <sub>10</sub> STD/PM <sub>10</sub> LC	81102-3/85101-3	Population exposure	-Provide timely air pollution information -Determine ambient air quality standard compliance
	PM <sub>2.5</sub> LC	88101-3	Population exposure Highest Concentration	-Provide timely air pollution information -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 <sub>10</sub> STD/ PM <sub>10</sub> LC	81102-3/ 85101-3	Population exposure	-Provide timely air pollution information - Determine ambient air quality standard compliance -Support air pollution research studies
	PM <sub>2.5</sub> LC	88101-3	Population exposure	-Provide timely air pollution information -Support air pollution research studies
	PM <sub>2.5</sub> LC	88101-1/2	Population exposure	-Determine ambient air quality standard compliance -Support air pollution research studies
	PM <sub>10</sub> LC - PM <sub>2.5</sub> LC	86101-1	Population exposure	-Determine ambient air quality standard compliance -Support air pollution research studies
	CO	42101-1	Population exposure	-Provide timely air pollution information -Determine ambient air quality standard compliance -Support air pollution research studies
	SO <sub>2</sub> (1-hr)	42401-1	Population exposure	-Provide timely air pollution information -Determine ambient air quality standard compliance -Support air pollution research studies
	SO <sub>2</sub> (5-min)	42401-2	Population exposure	-Determine ambient air quality standard compliance -Support air pollution research studies
	NO <sub>y</sub>	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 <sub>y</sub> -NO	42612-1	Population exposure	-Support air pollution research studies
	O <sub>3</sub>	44201-1	Population exposure	-Provide timely air pollution information -Determine ambient air quality standard compliance -Support air pollution research studies
	WD	61104-1	Population exposure	-Provide timely air pollution information -Support air pollution research studies
	WS	61103-1	Population exposure	-Provide timely air pollution information -Support air pollution research studies
	BP	64101-1	Population exposure	-Provide timely air pollution information. -Support air pollution research studies
	RH	62201-1	Population exposure	-Provide timely air pollution information. -Support air pollution research studies
	Ambient Temp 3 m	62101-2	Population exposure	-Provide timely air pollution information. -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. -Support air pollution research studies
	PM <sub>2.5LC</sub> Speciation	Multiple*	Population exposure	-Support air pollution research studies -part of CSN
	PM <sub>2.5LC</sub>	88101-1	Population exposure	-Determine ambient air quality standard compliance
	PM <sub>2.5LC</sub>	88501-3/88502-3	Population exposure	-Provide timely air pollution information
	PM <sub>2.5LC</sub> collocated	88101-2	Population exposure	-Determine ambient air quality standard compliance
A Street/ Fairbanks 02-090-0040	PM <sub>2.5LC</sub>	88101-1	Population exposure Highest Concentration	-Determine ambient air quality standard compliance
	PM <sub>2.5LC</sub>	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 <sub>2.5LC</sub>	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 <sub>2.5</sub> LC	88501-3/88502-3	Population exposure	-Provide timely air pollution information
	PM <sub>2.5</sub> LC collocated	88101-2	Population exposure	-Determine ambient air quality standard compliance
	PM <sub>2.5</sub> LC Speciation	Multiple*	Population exposure	-Support air pollution research studies -part of CSN
	SO <sub>2</sub> (1-hr)	42401-1	Population exposure	-Provide timely air pollution information -Determine ambient air quality standard compliance -Support air pollution research studies
	SO <sub>2</sub> (5-min)	42401-2	Population exposure	-Determine ambient air quality standard compliance -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 <sub>10</sub> STD/ PM <sub>10</sub> LC	81102-3/ 85101-3	Population exposure	-Provide timely air pollution information - Determine ambient air quality standard compliance -Support air pollution research studies
	PM <sub>10</sub> STD/ PM <sub>10</sub> LC collocated	81102-2/ 85101-2	Population exposure	-Determine ambient air quality standard compliance
	PM <sub>2.5</sub> LC	88101-3	Population exposure	-Provide timely air pollution information -Determine ambient air quality standard compliance
	PM <sub>2.5</sub> LC 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 $\mu$ MSA	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 <sub>2.5</sub> LC	88101-1	Fairbanks PM <sub>2.5</sub> 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 <sub>10</sub> STD	81102-3	Eagle River PM <sub>10</sub> LMP
Juneau $\mu$ MSA	Floyd Dryden Middle School/ Juneau	02-110-0004	PM <sub>10</sub> STD	81102-3	Juneau PM <sub>10</sub> 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 <sub>2.5</sub> LC	88101-3	170	Met-One BAM 1020	Primary
	PM <sub>2.5</sub> LC collocate	88101-2	143	Thermo Scientific Partisol 2000i	Secondary
	PM <sub>10</sub> STD	81102-3/ 85101-3	122	Met-One BAM 1020	Primary
	PM <sub>10</sub> STD collocate	81102-2/ 85101-2	126	Thermo Scientific Partisol 2000i	Secondary
Hurst Road/ North Pole 02-090-0035	PM <sub>2.5</sub> LC	88101-1	145	Thermo Scientific Partisol 2025i	Primary
	PM <sub>2.5</sub> LC collocate	88101-2	145	Thermo Scientific Partisol 2025i	Secondary
NCore/ Fairbanks 02-090-0034	PM <sub>10</sub> STD	81102-3/ 85101-3	122	Met-One BAM 1020	Primary
	PM <sub>10</sub> STD collocate	81102-1/ 85101-1	126	Thermo Scientific Partisol 2000i	Secondary
Floyd Dryden Middle School/Juneau 02-110-0004	PM <sub>2.5</sub> LC	88101-3	236	Teledyne T640X	Primary
	PM <sub>2.5</sub> LC collocate	88101-2	143	Thermo Scientific Partisol 2000i	Secondary
	PM <sub>10</sub> STD	81102-3/ 85101-3	239	Teledyne T640X	Primary
	PM <sub>10</sub> STD collocate	81102-2/ 85101-2	126	Thermo Scientific Partisol 2000i	Secondary



### 3.5 MONITORING WAIVERS

#### 3.5.1 ANCHORAGE MSA OZONE MONITORING

On October 15<sup>th</sup> 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 4<sup>th</sup>, 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<sub>2.5</sub> 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<sup>3</sup> 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<sub>2.5</sub> monitoring site regarding the proximity to the nearby roadway of less than 10 meters.

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<sup>3</sup> <https://alaskatraficdata.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  $\text{NO}_y$  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  $\text{NO}_y$  being equal to  $\text{NO}_x$ . Analysis performed during the Alaskan Layered Pollution and Chemical Analysis (ALPACA) study using DEC's  $\text{NO}_y/\text{NO}_x$  NCore data shows a strong correlation between  $\text{NO}_y$  and  $\text{NO}_x$  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  $\text{NO}_2$  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  $\text{NO}_y$  and  $\text{NO}_x$  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](mailto: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  $\text{NO}_x$  ( $\text{NO}+\text{NO}_2$ ) to more oxidized reactive nitrogen compounds (for example nitric acid), which are members of the reactive nitrogen family,  $\text{NO}_y$ .

The UCLA group, in collaboration with UAF measured  $\text{NO}_2$  using long-path differential absorption spectroscopy (LP-DOAS), which remotely senses  $\text{NO}_2$  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  $\text{NO}_2$  instrument (Thermo 42C), which we calibrate with reference gas standards and validate by cross comparison to ADEC NCore measurements. Our  $\text{NO}_2$  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  $\text{NO}_y$  and  $\text{NO}_x$  at NCore.

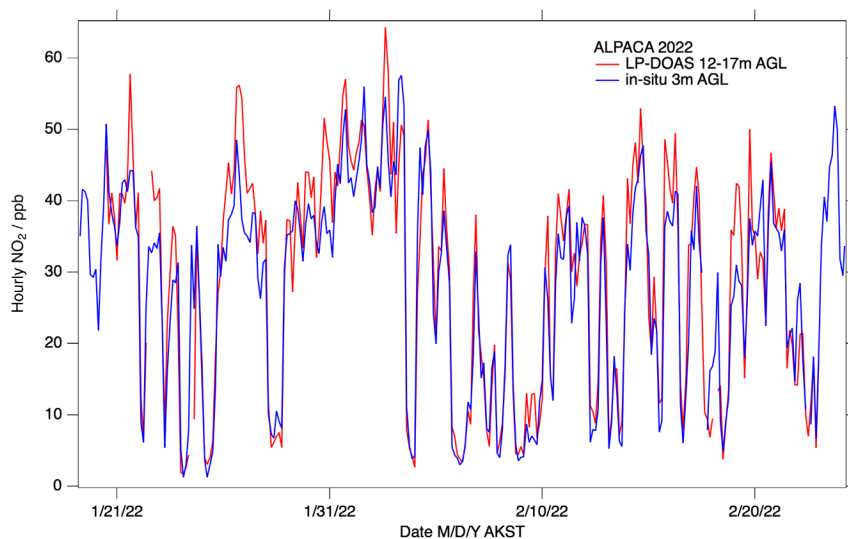


Figure 1:  $\text{NO}_2$  during ALPACA-2022 measured in-situ at 3m AGL and on the lowest LP-DOAS path (12-17m AGL).

Figure 1 shows the LP-DOAS and in-situ  $\text{NO}_2$  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 collocated, these two downtown measurements agree quite well.

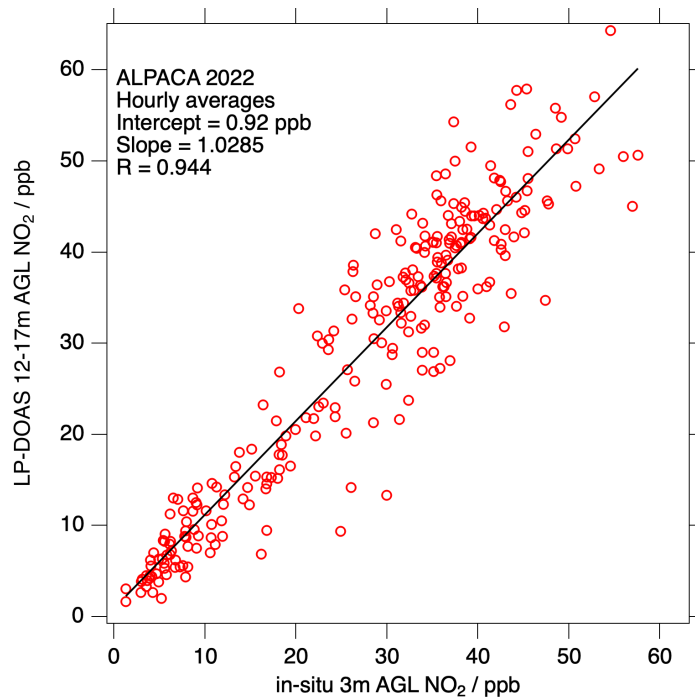


Figure 2: Correlation between LP-DOAS NO<sub>2</sub> slightly aloft (12-17m) and surface (3m) NO<sub>2</sub>.

Figures 1 and 2 demonstrate that NO<sub>2</sub> 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 NO<sub>x</sub> 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 NO<sub>2</sub>, while NO<sub>x</sub> (=NO+NO<sub>2</sub>) is often a more conserved pollution tracer. NO<sub>x</sub> can be further oxidized to other species in the bigger family NO<sub>y</sub> – reactive nitrogen, which adds NO<sub>x</sub> + nitric acid, particulate nitrate, NO<sub>3</sub>, etc. We were interested in how far NO<sub>x</sub> is oxidized in Fairbanks, so Tjarda Roberts plotted NO<sub>y</sub> versus NO<sub>x</sub>. If NO<sub>y</sub> contains no further species than NO<sub>x</sub>, 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 NO<sub>y</sub> is very close to NO<sub>x</sub>.



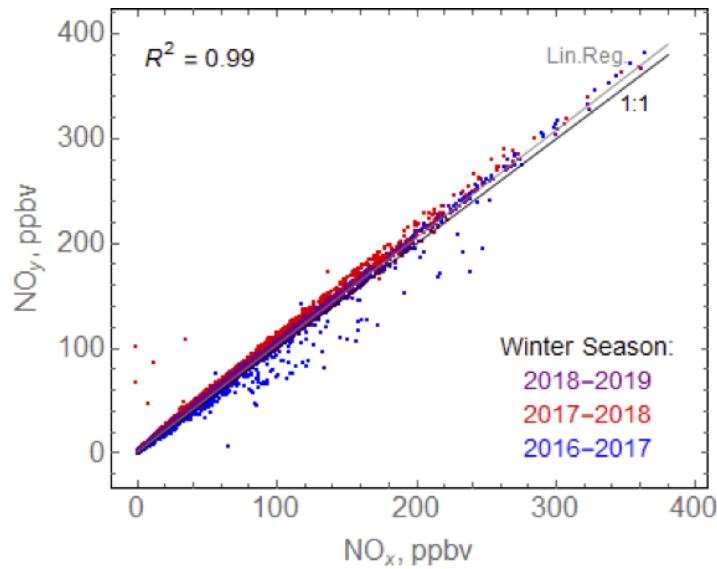


Figure 3: NO<sub>y</sub> vs NO<sub>x</sub> for Fairbanks based upon ADEC/EPA NCore data from three winter periods.

From these observations, we find that if one measures NO<sub>y</sub> or NO<sub>x</sub> during Fairbanks winter, one will get very similar results. We also find that NO<sub>2</sub> 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<sub>y</sub> 10-meter inlet height and allow continued monitoring at 4 meters. Additionally, due to the strong correlation between NO<sub>y</sub> and NO<sub>x</sub> and mixing between ground level and 15 meters, DEC also requests to substitute the NO<sub>y</sub> monitoring requirement for NO<sub>x</sub> monitoring. NO<sub>x</sub> monitoring, in addition to measuring NO<sub>2</sub> as a NAAQS, is much less prone to data loss and instrument malfunction with fewer components to leak or fail. The NO<sub>x</sub> 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<sub>10</sub> 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<sub>2.5</sub> 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<sub>10</sub> 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 PM<sub>2.5</sub> and PM<sub>10</sub> Partisols were February 25<sup>th</sup>, 2022 and March 6<sup>th</sup>, 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<sub>2.5</sub> monitoring site in the Fairbanks nonattainment area and houses a CSN site. The SO<sub>2</sub> 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<sub>2.5</sub> 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<sub>2.5</sub> 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<sub>2.5</sub> 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 Bodenbug Spur Rd, Palmer AK 99645, see Figure 2.



Figure 2: Google Earth® Image of the Study Sites



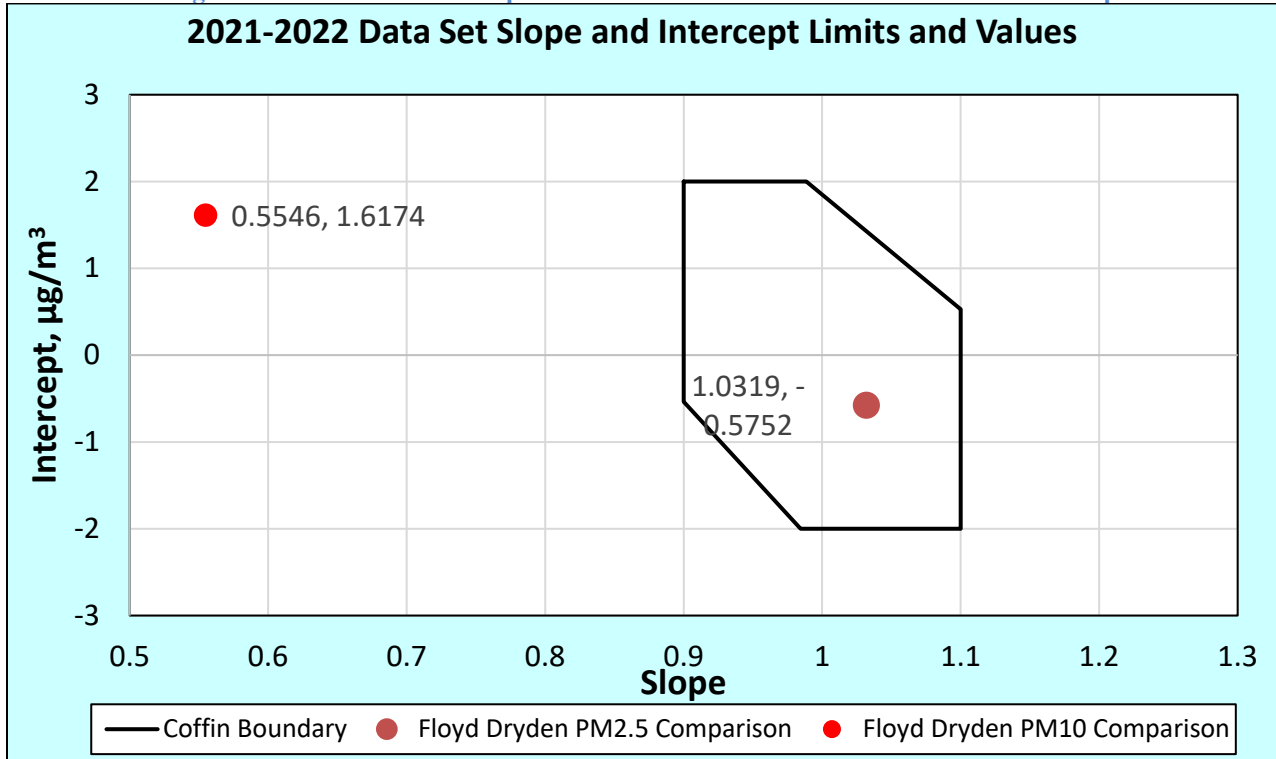
Pending EPA approval, DEC will prepare the Plant Material Center location for a permanent ambient monitoring site and purchase a new sampling shelter. DEC will begin sampling at the location in time for an official January 1, 2024, sampling start for both continuous PM<sub>2.5</sub> and PM<sub>10</sub> monitoring.

## 5.2 JUNEAU MENDENHALL VALLEY PM<sub>2.5</sub> SLAMS PRIMARY SAMPLER

In summer 2021, DEC purchased a Teledyne T640X PM<sub>2.5</sub> and PM<sub>10</sub> analyzer for the Floyd Dryden SLAMS site in the Juneau Mendenhall Valley. FRM collocation was established on October 1, 2021, for PM<sub>2.5</sub> and January 26, 2022, for PM<sub>10</sub>. EPA Region 10 staff had voiced concern regarding the performance of the T640X for PM<sub>2.5</sub> 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<sub>2.5</sub>, while it failed for PM<sub>10</sub>, see Figure 3.



Figure 3: 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<sub>2.5</sub>. 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<sub>10</sub> 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 indicated that they are working on a correction factor and seemed to be actively engaged with EPA to resolve the issue. Since instrument otherwise operates reliably, DEC decided to wait until a correction factor is made available to determine if the instrument needs to be replaced. To ensure that DEC does not underrepresent the PM<sub>2.5</sub> concentrations measured at the site, DEC will designate the FRM as the primary samplers and collect samples every third day effective January 2024. The T640x will continue to provide PM<sub>2.5</sub> 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 instrument as a PM<sub>10</sub> FEM, since PM<sub>10</sub> concentration did not exceed 20  $\mu\text{g}/\text{m}^3$  over the past year and there is little risk of missing high pollution events.

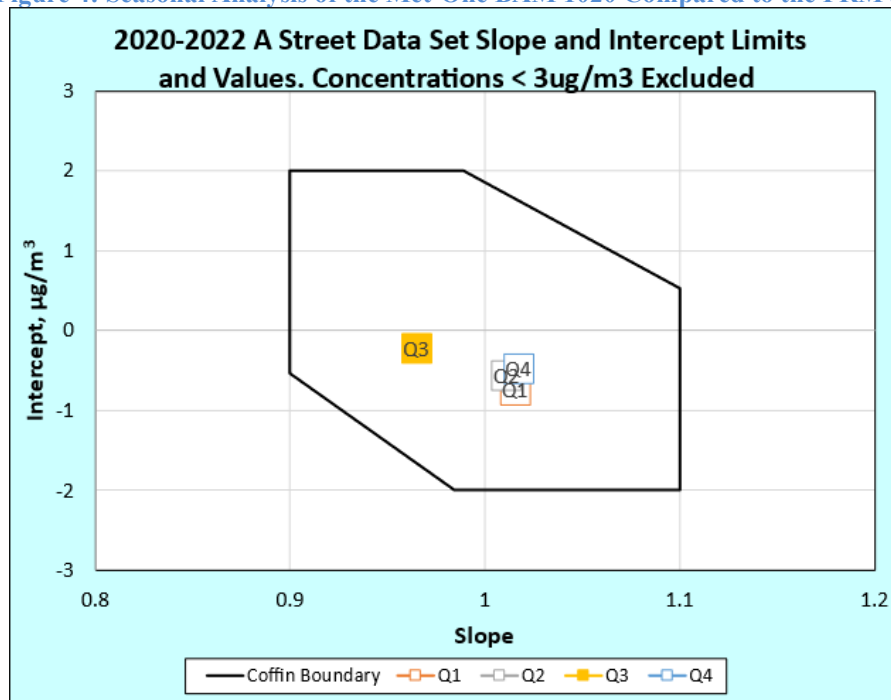


### 5.3 A-STREET CONTINUOUS ANALYZER

DEC has been using non-FEM Met-One BAM 1020 PM<sub>2.5</sub> 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 within the performance criteria, see Figure 4, while for the NCore and Hurst Rd site the winter quarters do not meet the Class III FEM criteria.

Figure 4: 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<sub>2</sub>, NO, NO<sub>2</sub> 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: PM<sub>2.5</sub> DV Under Local/Actual Conditions (µg/m<sup>3</sup>)**

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 <sub>2.5</sub> Monitoring Sites	AQS Site ID	98 <sup>th</sup> 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	27.7 (43.5)	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	62.7 (69.8)	10.7 (12.2)
A Street/Fairbanks	02-090-0040	48.6 (84.2)**	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	19.1	4.9

\* Annual values did not meet data completeness criteria

\*\* Annual values did not meet data completeness criteria and may change due to data substitution requirements.



Table A-2: DV O<sub>3</sub> (ppb)

O <sub>3</sub> Monitoring Sites	Site ID	2022			2021			2020			3-Years	
		Valid Days	Percent Complete	4 <sup>th</sup> Max	Valid Days	Percent Complete	4 <sup>th</sup> Max	Valid Days	Percent Complete	4 <sup>th</sup> 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<sub>2</sub> (ppb)

SO <sub>2</sub> Monitoring Sites	Site ID	2022		2021		2020		3-yrs Design Value
		99 <sup>th</sup> Percentile	Completed Quarters	99 <sup>th</sup> Percentile	Completed Quarters	99 <sup>th</sup> 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	1 <sup>st</sup> Max 8-hr	2 <sup>nd</sup> Max 8-hr	Exceed-ances	1 <sup>st</sup> Max 8-hr	2 <sup>nd</sup> Max 8-hr	Exceed-ances	1 <sup>st</sup> Max 8-hr	2 <sup>nd</sup> 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<sub>10</sub> DV Under Standard Conditions (µg/m<sup>3</sup>)**

Exceedance exceptional event values not included

PM <sub>10</sub> Monitoring Sites	Site ID	2022			2021			2020		
		Exceed-ances	1 <sup>st</sup> Max 24-hr	2 <sup>nd</sup> Max 24-hr	Exceed-ances	1 <sup>st</sup> Max 24-hr	2 <sup>nd</sup> Max 24-hr	Exceed-ances	1 <sup>st</sup> Max 24-hr	2 <sup>nd</sup> 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

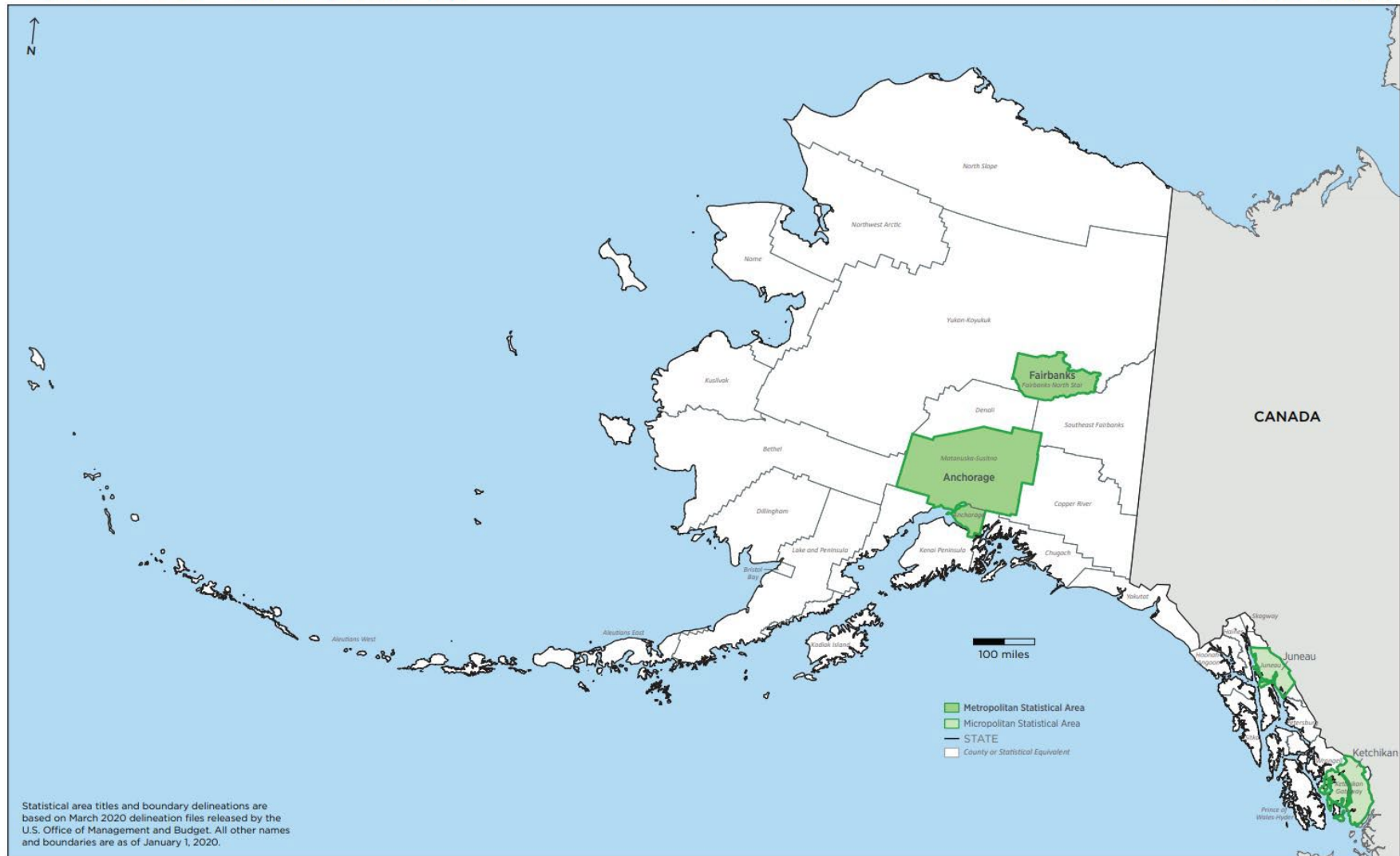


## **Appendix B Map of Alaska's Core Based Statistical Areas (CBSA)**



### Alaska: 2020 Core Based Statistical Areas and Counties

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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



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,

[Handwritten signature]

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<sub>10</sub> and PM<sub>2.5</sub> 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,

A handwritten signature in blue ink that reads "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](mailto: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<sub>2.5</sub> Network Evaluation Form**

PART 58 APPENDIX D NETWORK EVALUATION FORM FOR PM <sub>2.5</sub>				
STATE: <u>ALASKA</u> AGENCY: <u>DEPARTMENT OF ENVIRONMENTAL CONSERVATION</u> AQS AGENCY CODE: <u>02</u>				
EVALUATION DATE: <u>5/10/2023</u> EVALUATOR: <u>T.BORGFELDT</u>				
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 <sub>2.5</sub> 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 <sub>2.5</sub> monitor is to be collocated at a near-road NO <sub>2</sub> 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 <sub>2.5</sub> 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 <sub>2.5</sub> site to monitor for regional background and at least one PM <sub>2.5</sub> site to monitor regional transport (note locations in comment field). Non-reference PM <sub>2.5</sub> 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 <sub>2.5</sub> Speciation Trends Network (STN).	✓		
Comments:				



MSA Description <sup>1</sup>	MSA population <sup>2,3</sup>	Design Value for years 2020-2022 24-hr/Annual Avg. µg/m <sup>3</sup>	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					
<i>Municipality of Anchorage</i>	287,145		0	1	1	0
Garden Site		28/6.4	SLAMS/FRM & FEM	1	1	0
<i>Matanuska-Susitna Valley Borough</i>	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

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

<sup>2</sup>Minimum monitoring requirements apply to the metropolitan statistical area (MSA). CBSA includes both MSAs and micropolitan statistical areas.

<sup>3</sup>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.

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

<sup>1</sup>Minimum monitoring requirements apply to the Metropolitan statistical area (MSA).

<sup>2</sup>Population based on latest available census figures. <https://www.census.gov/>

<sup>3</sup>The PM<sub>2.5</sub> National Ambient Air Quality Standards (NAAQS) levels and forms are defined in 40 CFR part 50.

<sup>4</sup>These minimum monitoring requirements apply in the absence of a design value.

<sup>5</sup>Metropolitan statistical areas (MSA) must contain an urbanized area of 50,000 or more population.



Table D-2: PM<sub>10</sub> Network Evaluation Form

PART 58 APPENDIX D NETWORK EVALUATION FORM FOR PM <sub>10</sub>				
STATE: <u>ALASKA</u> AGENCY: <u>DEPARTMENT OF ENVIRONMENTAL CONSERVATION</u> AQS AGENCY CODE: <u>02</u>				
EVALUATION DATE: <u>5/10/2023</u> EVALUATOR: <u>T.BORGFELDT</u>				
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 PM <sub>10</sub> air quality trends and geographical patterns. Use the form below and Table D-4 to verify if your PM <sub>10</sub> network has the appropriate number of samplers.	✓		
<p>Comments: All of the site locations are based on historical agreements among the EPA, DEC and (where applicable) local agencies.</p> <p>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<sub>10</sub> designation process. Thus DEC assumes that medium concentration is applicable when these exceptional events are excluded from the compliance calculations (<b>Appendix A</b>, Table A-5 with assumed EEWRs).</p>				

MSA Description <sup>1</sup>	MSA population <sup>2,3</sup>	Minimum required number of PM <sub>10</sub> stations (from Table D-4)	Present number of PM <sub>10</sub> 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)

<sup>1</sup>see [http://www2.census.gov/econ/susb/data/msa\\_codes\\_2007\\_to\\_2011.txt](http://www2.census.gov/econ/susb/data/msa_codes_2007_to_2011.txt)

<sup>2</sup>Minimum monitoring requirements apply to the Metropolitan statistical area (MSA). CBSA includes both MSAs and micropolitan statistical areas.

<sup>3</sup>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.matanuskasunitnaboroughalaska.anchoragemunicipalitycountyalaska.AK/PST045222>





Table D-4 of Appendix D to Part 58 – PM10 Minimum Monitoring Requirements

MSA population <sup>1, 2</sup>	High concentration <sup>2</sup>	Medium concentration <sup>3</sup>	Low concentration <sup>4 5</sup>
>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

<sup>1</sup>Selection of urban areas and actual numbers of stations per area will be jointly determined by EPA and the State agency.

<sup>2</sup>High concentration areas are those for which ambient PM10 data show ambient concentrations exceeding the PM10 NAAQS by 20 percent or more.

<sup>3</sup>Medium concentration areas are those for which ambient PM10 data show ambient concentrations exceeding 80 percent of the PM10 NAAQS.

<sup>4</sup>Low concentration areas are those for which ambient PM10 data show ambient concentrations less than 80 percent of the PM10 NAAQS.

<sup>5</sup>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: <u>ALASKA</u> AGENCY: <u>DEPARTMENT OF ENVIRONMENTAL CONSERVATION</u> AQS AGENCY CODE: <u>02</u>					
EVALUATION DATE: <u>5/10/2023</u> EVALUATOR: <u>T. BORGFELDT</u>					
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 <sub>2</sub> monitor in CBSAs having a population of 1,000,000 or more persons. If a CBSA has more than one required near-road NO <sub>2</sub> monitor, only one CO monitor is required to be collocated with a near-road NO <sub>2</sub> 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<sub>2</sub>. 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 <sup>1</sup>	CBSA population <sup>2, 3</sup>	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*

<sup>1</sup>see [http://www2.census.gov/econ/susb/data/msa\\_codes\\_2007\\_to\\_2011.txt](http://www2.census.gov/econ/susb/data/msa_codes_2007_to_2011.txt)

<sup>2</sup>Minimum monitoring requirements apply to the Metropolitan statistical area (MSA). CBSA includes both MSAs and micropolitan statistical areas.

<sup>3</sup>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,anchorageunicipalitycountyalaska,AK/PST045222>\* Monitoring sites in both MSAs satisfy their respective CO Limited Maintenance Plans requirements



**Table D-4: O<sub>3</sub> Network Evaluation Form**

PART 58 APPENDIX D NETWORK EVALUATION FORM FOR OZONE (O <sub>3</sub> )				
STATE: <u>ALASKA</u> AGENCY: <u>DEPARTMENT OF ENVIRONMENTAL CONSERVATION</u> AQS AGENCY CODE: <u>02</u>				
EVALUATION DATE: <u>5/10/2023</u> EVALUATOR: <u>T. BORGFELDT</u>				
APPLICABLE SECTION	REQUIREMENT	CRITERIA MET?		
		YES	NO	N/A
4.1(b)	At least one O <sub>3</sub> 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 <sub>3</sub> 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 O <sub>3</sub> concentration site.	✓		
4.1(i)	O <sub>3</sub> 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: <b>Appendix C</b> (Waiver C-1) Palmer O <sub>3</sub> 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 <sup>1</sup>	MSA population <sup>2,3</sup>	Minimum required number of SLAMS O <sub>3</sub> sites (from Table D-2)	Present number of SLAMS O <sub>3</sub> 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
<sup>1</sup> see <a href="http://www2.census.gov/econ/susb/data/msa_codes_2007_to_2011.txt">http://www2.census.gov/econ/susb/data/msa_codes_2007_to_2011.txt</a> <sup>2</sup> Minimum monitoring requirements apply to the Metropolitan statistical area (MSA). CBSA includes both MSAs and micropolitan statistical areas. <sup>3</sup> Population based on population estimates for July 1, 2022 obtained from the United States Census Bureau, <a href="https://www.census.gov/quickfacts/fact/table/fairbanksnorthstarboroughalaska,matanuskasusitnaboroughalaska,anchorage municipalityalaska.AK/PST045222">https://www.census.gov/quickfacts/fact/table/fairbanksnorthstarboroughalaska,matanuskasusitnaboroughalaska,anchorage municipalityalaska.AK/PST045222</a> * DEC received a EPA 5-Year Ozone NAAQS Monitoring Requirement Waiver for the Anchorage MSA. ( <b>Appendix C</b> , Waiver C-1) ** Fulfills State of Alaska NCore requirement				



Table D-2 of Appendix D to Part 58 - SLAMS O<sub>3</sub> Monitoring Minimum Requirements

MSA population <sup>1, 2</sup>	Most recent 3-year design value concentrations $\geq 85\%$ of any O <sub>3</sub> NAAQS <sup>3</sup>	Most recent 3-year design value concentrations $< 85\%$ of any O <sub>3</sub> NAAQS <sup>3, 4</sup>
>10 million	4	2
4-10 million	3	1
350,000-<4 million	2	1
50,000-<350,000 <sup>5</sup>	1	0

<sup>1</sup>Minimum monitoring requirements apply to the Metropolitan statistical area (MSA). CBSA includes both MSAs and micropolitan statistical areas.

<sup>2</sup>Population based on latest available census estimates.

<sup>3</sup>The ozone (O<sub>3</sub>) National Ambient Air Quality Standards (NAAQS) levels and forms are defined in 40 CFR part 50.

<sup>4</sup>These minimum monitoring requirements apply in the absence of a design value.

<sup>5</sup>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<sub>2</sub> Network Evaluation Form**

PART 58 APPENDIX D NETWORK EVALUATION FORM FOR SULFUR DIOXIDE (SO <sub>2</sub> )				
STATE: <u>ALASKA</u> AGENCY: <u>DEPARTMENT OF ENVIRONMENTAL CONSERVATION</u> AQS AGENCY CODE: <u>02</u>				
EVALUATION DATE: <u>5/10/2023</u> EVALUATOR: <u>T. BORGFELDT</u>				
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 <sub>2</sub> 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 <sub>2</sub> 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 SO <sub>2</sub> 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<sub>2</sub> monitoring. One of the operating SO<sub>2</sub> 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<sub>2</sub> 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 <sup>1</sup>	CBSA population <sup>2,3</sup>	total amount of SO <sub>2</sub> in tons per year emitted within the CBSA (from 2017 NEI <sup>4</sup> )	PWEI (population x total emissions ÷ 1,000,000)	Minimum required number of SO <sub>2</sub> monitors in CBSA (see Table 2 below)	Present number of SO <sub>2</sub> 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

<sup>1</sup>See [http://www2.census.gov/econ/susb/data/msa\\_codes\\_2007\\_to\\_2011.txt](http://www2.census.gov/econ/susb/data/msa_codes_2007_to_2011.txt)  
<sup>2</sup>Minimum monitoring requirements apply to the Metropolitan statistical area (MSA). CBSA includes both MSAs and micropolitan statistical areas.  
<sup>3</sup>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](https://www.census.gov/quickfacts/)  
<sup>4</sup>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<sub>2</sub> Monitoring Requirements (Section 4.4.2 of App D to Part 58)

PWEI (Population weighted Emission Index) Value	Required number of SO <sub>2</sub> monitors
≥ 1,000,000	3
≥ 100,000 but < 1,000,000	2
≥ 5,000 but < 100,000	1



Table D-6: NO<sub>2</sub> Network Evaluation Form

PART 58 APPENDIX D NETWORK EVALUATION FORM FOR NITROGEN DIOXIDE (NO <sub>2</sub> )				
STATE: <u>ALASKA</u> AGENCY: <u>DEPARTMENT OF ENVIRONMENTAL CONSERVATION</u> AQS AGENCY CODE: <u>02</u>				
EVALUATION DATE: <u>5/10/2023</u> EVALUATOR: <u>T.BORGFELDT</u>				
APPLICABLE SECTION	REQUIREMENT	CRITERIA MET?		
		YES	NO	N/A
4.3.2(a)	Near-road NO <sub>2</sub> Monitors: One microscale near-road NO <sub>2</sub> monitoring station in each CBSA with a population of 1,000,000 or more persons.			✓
4.3.2(a)	Near-road NO <sub>2</sub> Monitors: An additional near-road NO <sub>2</sub> 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 NO <sub>2</sub> Monitors: Measurements at required near-road NO <sub>2</sub> monitor sites utilizing chemiluminescence FRMs must include at a minimum: NO, NO <sub>2</sub> , and NO <sub>x</sub>			✓
4.3.3(a)	Area-wide NO <sub>2</sub> 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 <sub>2</sub> 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, NO <sub>y</sub> , and Difference, which satisfies the NCore requirement for NO <sub>2</sub> .				

CBSA Description <sup>1</sup>	CBSA population <sup>2,3</sup>	Required number of Near-road NO <sub>2</sub> sites	Present number of Near-road NO <sub>2</sub> sites	Required number of Area-wide NO <sub>2</sub> sites	Present number of Area-wide NO <sub>2</sub> 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

<sup>1</sup>see [http://www2.census.gov/econ/susb/data/msa\\_codes\\_2007\\_to\\_2011.txt](http://www2.census.gov/econ/susb/data/msa_codes_2007_to_2011.txt)

<sup>2</sup>Minimum monitoring requirements apply to the Metropolitan statistical area (MSA). CBSA includes both MSAs and micropolitan statistical areas.

<sup>3</sup>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,anchoragecityandboroughcountyalaska,AK/PST045222>

\*NCore site requirement is satisfied with NO<sub>y</sub> monitoring



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



Table E-1: Summary of Appendix E Forms: PM<sub>2.5</sub>, PM<sub>10</sub>, & PM<sub>10-2.5</sub>

	Garden	Parkgate	Laurel*	Butte	Hurst Road	A Street	NCore	Floyd Dryden
Parameter(s)	PM <sub>2.5</sub> & PM <sub>10</sub>	PM <sub>10</sub>	PM <sub>10</sub>	PM <sub>2.5</sub> & PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>2.5</sub>	PM <sub>2.5</sub> , PM <sub>10</sub> & PM <sub>10-2.5</sub>	PM <sub>2.5</sub> & PM <sub>10</sub>
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 <b>not</b> met, gravel cul-de-sac**	Criteria met	Criteria met, near a school and a neighborhood	Criteria met, ~260 m to Aurora Wood Processing <sup>1</sup> , ~400 m to power plant <sup>2</sup>	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 <b>not</b> 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 <b>not</b> met, <10 m to road <sup>+</sup>	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)

<sup>†</sup>This site is located on a low-volume roadway that is paved and covered with snow and ice for six months of the year

<sup>1</sup>Aurora Energy Solutions is a wood processing and kiln drying operation which began approximately in 2020.

<sup>2</sup> 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 <sup>2</sup> , ~400 m to coal power plant <sup>3</sup>
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 <sup>1</sup>	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

<sup>1</sup>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.

<sup>2</sup>Aurora Energy Solutions is a wood processing and kiln drying operation which began in approximately 2020.

<sup>3</sup>Coal power plant stack emits emissions above and outside of ground-surface monitoring.



**Table E-3: Summary of Appendix E Forms: O<sub>3</sub>, SO<sub>2</sub>, NO, Diff, and NO<sub>y</sub>**

Parameter(s)	NCore			Hurst Road
	O <sub>3</sub>	SO <sub>2</sub>	NO, Diff, & NO <sub>y</sub>	SO <sub>2</sub>
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 <sup>1</sup> , ~400 m to power plant <sup>2</sup>	Criteria met, ~ 260 m to Aurora Wood Processing <sup>1</sup> , ~400 m to power plant <sup>2</sup>	Criteria met, ~ 260 m to Aurora Wood Processing <sup>1</sup> , ~400 m to power plant <sup>2</sup>	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

<sup>1</sup>Aurora Energy Solutions is a wood processing and kiln drying operation which began approximately in 2020.

<sup>2</sup> 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 PM <sub>2.5</sub> , PM <sub>10</sub> , PM <sub>10-2.5</sub> , and Pb					
SITE NAME:		SITE ADDRESS:			
AQ5 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 <sub>10-2.5</sub> sites. 1 meter vertically or horizontally away from any supporting structure, walls, <i>etc.</i> , 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, <i>etc.</i> , 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:					

<sup>1</sup> 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<sub>3</sub>

PART 58 APPENDIX E SITE EVALUATION FORM FOR O <sub>3</sub>					
SITE NAME:		SITE ADDRESS:			
AQ5 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, <i>etc.</i> , 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 <sub>2</sub> 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:					

<sup>1</sup>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.

<sup>2</sup>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<sub>2</sub>

PART 58 APPENDIX E SITE EVALUATION FORM FOR SO <sub>2</sub>					
SITE NAME:		SITE ADDRESS:			
AQ5 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, <i>etc.</i> , 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 SO <sub>2</sub> .				
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, NO<sub>x</sub>, NO<sub>2</sub>, and NO<sub>y</sub>

PART 58 APPENDIX E SITE EVALUATION FORM FOR NO, NO <sub>x</sub> , NO <sub>2</sub> , and NO <sub>y</sub>					
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, <i>etc.</i> , and away from dusty or dirty areas. Microscale near-road NO <sub>2</sub> 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 <sub>2</sub> 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 <sub>2</sub> 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<sub>3</sub>, SO<sub>2</sub>, and NO suite Part 58 Appendix E Forms**

Roadway average daily traffic, vehicles per day	Minimum distance <sup>1</sup> (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<sub>10</sub> 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<sup>th</sup> 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>.