

Alaska Department of Environmental Conservation



Amendments to: State Air Quality Control Plan

Vol. III: Appendix III.D.7.05

**{Appendix to Volume II. Analysis of Problems, Control Actions;
Section III. Area-wide Pollutant Control Program; D. Particulate
Matter; 7. Fairbanks North Star Borough PM_{2.5} Control Plan,
Serious Requirements}**

Adopted

November 19, 2019

**Michael J. Dunleavy
Governor**

**Jason W. Brune
Commissioner**

(This page serves as a placeholder for two-sided copying)

Appendix III.D.7.05

Contents

Alaska Department of Environmental Conservation, 2019 Annual Air Quality Monitoring Network Plan; June 28, 2019

Fairbanks North Star Borough Draft Air Quality Monitoring Plan 2017-2018

Air Quality Division

Air Monitoring
&
Quality Assurance
Program

555 Cordova St., 1st Floor
Anchorage, AK 99501

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

www.dec.alaska.gov/air/



2019 Annual Air Quality Monitoring Network Plan

Alaska Department of
Environmental Conservation

June 28, 2019



2019 Air Quality Monitoring Plan

TABLE OF CONTENTS

<i>Table of Contents</i>	2
<i>Table of Appendices</i>	3
<i>List of Tables</i>	4
<i>Executive Summary</i>	6
<i>1 Introduction</i>	7
<i>2 Air Quality Monitoring Priorities</i>	8
<i>3 State of Alaska Ambient Air Monitoring Network</i>	9
Minimum Monitoring Requirements	9
3.1.1 Lead.....	11
3.1.2 Appendix D & E Siting Forms	12
Current Monitoring Sites	13
Siting Criteria.....	14
3.1.3 Carbon Monoxide Sites.....	14
3.1.4 Particulate Matter (PM ₁₀ and PM _{2.5}) Sites	14
3.1.5 NCore Site.....	17
Monitoring Methods, Designation, and Sampling Frequency	17
<i>4 Network Modifications completed in 2018 and 2019</i>	33
PM _{2.5} Collocation.....	33
PM ₁₀ Collocation	33
Discontinuation of Palmer PM _{2.5} and PM ₁₀ monitoring	33
Discontinuation of Parkgate PM _{2.5} Monitoring.....	33
Discontinuation of SOB PM _{2.5} Monitoring.....	33
Speciation and PM _{2.5} collocation at Hurst Road.....	34
<i>5 Planned Network Modifications For 2020</i>	34



2019 Air Quality Monitoring Plan

TABLE OF APPENDICES

<i>Appendix A</i>	<i>Network Evaluation Forms</i>	<i>35</i>
<i>Appendix B</i>	<i>Summary of Monitoring Path & Siting Criteria Evaluation Forms</i>	<i>43</i>
<i>Appendix C</i>	<i>Additional Monitoring Projects</i>	<i>53</i>
<i>Appendix D</i>	<i>Improve Network</i>	<i>56</i>
<i>Appendix E</i>	<i>NAAQS Summary Tables</i>	<i>58</i>
<i>Appendix F</i>	<i>EPA Butte Siting Waiver</i>	<i>62</i>
<i>Appendix G</i>	<i>EPA Ozone Monitoring Waiver</i>	<i>65</i>
<i>Appendix H</i>	<i>EPA Lead Monitoring Waiver</i>	<i>67</i>
<i>Appendix I</i>	<i>EPA Approval for Shutdown of SOB Site and Relocation of Site to A Street</i>	<i>70</i>



2019 Air Quality Monitoring Plan

LIST OF TABLES

<i>Table 3-1: Alaska's Core Based Statistical Areas</i>	<i>10</i>
<i>Table 3-2: Minimum Monitoring Requirements for Alaskan CBSAs</i>	<i>11</i>
<i>Table 3-3: AQS Monitoring Sites as of May 2019</i>	<i>13</i>
<i>Table 3-4: CO Monitoring Sites in Anchorage and Fairbanks May 2019</i>	<i>14</i>
<i>Table 3-5: PM Monitoring Sites in Alaska as of May 2019</i>	<i>16</i>
<i>Table 3-6: NCore Gaseous¹ Monitoring and Meteorological Monitoring as of January 2019 in Alaska</i>	<i>17</i>
<i>Table 3-7: Anchorage MSA: AQS Codes January 2020</i>	<i>19</i>
<i>Table 3-8: FNSB monitors: AQS Codes as of May 2019</i>	<i>20</i>
<i>Table 3-9: Juneau μSA: AQS Codes as of January 2020</i>	<i>25</i>
<i>Table 3-10: Bethel: AQS Codes as of January 2020</i>	<i>25</i>
<i>Table 3-11: January 2020 Site Level Monitoring Objectives</i>	<i>26</i>
<i>Table 3-12: 2020 Anchorage MSA Instrument-Level Monitoring Purposes and AQS Monitoring Objective</i>	<i>27</i>
<i>Table 3-13: 2020 FNSB Instrument-Level Monitoring Purposes and AQS Monitoring Objective</i>	<i>28</i>
<i>Table 3-14: 2020 Juneau Instrument-Level Monitoring Purposes and AQS Monitoring Objective</i>	<i>31</i>
<i>Table 3-15: 2020 Bethel Instrument-Level Monitoring Purposes and AQS Monitoring Objective</i>	<i>31</i>
<i>Table 3-16: Monitors required by Nonattainment Area (NAA) or Limited Maintenance Plan (LMP)</i>	<i>32</i>
<i>Table 3-17: Collocations January 2020</i>	<i>32</i>
<i>Table A-1 PM_{2.5} Network Evaluation Form</i>	<i>36</i>
<i>Table A-2 PM₁₀ Network Evaluation Form</i>	<i>38</i>
<i>Table A-3 CO Site Evaluation Form</i>	<i>39</i>
<i>Table A-4 O₃ Network Evaluation Form</i>	<i>40</i>
<i>Table A-5 SO₂ Network Evaluation Form</i>	<i>41</i>
<i>Table A-6 NO₂ Network Evaluation Form</i>	<i>42</i>
<i>Table B-1 Summary of Appendix E Forms: PM_{2.5}, PM₁₀, & PM_{10-2.5}</i>	<i>44</i>



2019 Air Quality Monitoring Plan

<i>Table B-2 Summary of Appendix E Forms: CO</i>	<i>45</i>
<i>Table B-3 Summary of Appendix E Forms: O₃, SO₂, NO, NO_x, NO₂, and NO_y</i>	<i>46</i>
<i>Table B-4 Blank Part 58 Appendix E Form for PM</i>	<i>47</i>
<i>Table B-5 Blank Part 58 Appendix E Form for CO</i>	<i>48</i>
<i>Table B-6 Blank Part 58 Appendix E Form for O₃</i>	<i>49</i>
<i>Table B-7 Blank Part 58 Appendix E Form for SO₂</i>	<i>50</i>
<i>Table B-8 Blank Part 58 Appendix E Form for NO, NO_x, NO₂, and NO_y</i>	<i>51</i>
<i>Table B-9 Roadway ADT for CO, O₃, SO₂, and NO suite Part 58 Appendix E Forms</i>	<i>52</i>
<i>Table E-1 PM_{2.5} DV under local/actual conditions (µg/m³); exceedance exceptional event values not included</i>	<i>59</i>
<i>Table E-2 DV O₃ (ppb)</i>	<i>60</i>
<i>Table E-3 DV SO₂ (ppb)</i>	<i>60</i>
<i>Table E-4 DV NO₂ (ppb)</i>	<i>60</i>
<i>Table E-5 PM₁₀ DV under standard conditions (µg/m³); exceedance exceptional event values not included</i>	<i>61</i>



2019 Air Quality Monitoring Plan

EXECUTIVE SUMMARY

This 2019 Annual Monitoring Plan describes the Alaska air quality monitoring network under the Alaska Department of Environmental Conservation's (DEC) oversight and spells out anticipated changes to the network for the calendar year 2020.

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

The most significant changes to the network during 2019 will be:

- Shutdown of Palmer SPM PM₁₀ and PM_{2.5} site
- Shutdown of Fairbanks SOB PM_{2.5} site
- Establishment of Fairbanks A-Street SLAMS (max impact site)
- Addition of chemical speciation monitoring at North Pole Hurst Road site

There are no proposed changes to the network for 2020.



2019 Air Quality Monitoring Plan

1 INTRODUCTION

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

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

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

The annual monitoring network plan must be made available for public inspection for at least 30 days prior to submission to EPA. Any annual monitoring network plan that proposes SLAMS network modifications, including new monitoring sites, is subject to the approval of the EPA Regional Administrator, who shall provide opportunity for public comment and shall approve or disapprove the plan and schedule within 120 days. If the State or local agency has already provided a public comment opportunity on its plan and has made no changes subsequent to 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 2019 Annual Monitoring 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 2020. This plan shall include all required stations to be operational by January 1, 2020. 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, 2019.

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

1. The 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;



2019 Air Quality Monitoring Plan

6. The minimum monitoring requirements for spatial scale of representativeness for each monitor as defined in 40 CFR 58, Appendix D;
7. The minimum monitoring requirements for probe and monitoring path siting criteria as defined in 40 CFR 58, Appendix E;
8. The identification of any sites that are suitable and sites that are not suitable for comparison against the annual PM_{2.5} 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; and
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-PM₁₀ 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 U.S. Environmental Protection Agency (EPA) and promulgated the Clean Air Act (CAA). Title I of the CAA established National Ambient Air Quality Standards (NAAQS) to protect public health. NAAQS were developed for six *criteria pollutants*: particulate matter (PM), sulfur dioxide (SO₂), nitrogen dioxide (NO₂), carbon monoxide (CO), ozone (O₃), and lead (Pb). Particulate matter has two associated NAAQS: one for fine particulate matter less than 2.5 micrometers in aerodynamic diameter (PM_{2.5}) and one for coarse particulate matter less than 10 micrometers in aerodynamic diameter (PM₁₀). 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 737,483¹ residents in the state, about 54% of the overall population. The remainder of the population is distributed among the cities of Juneau and Fairbanks with populations of about 30,000-40,000 and many

¹ Population estimate data obtained from the 2018 US Census, <https://www.census.gov/quickfacts/ak>



2019 Air Quality Monitoring Plan

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 area of the state is approximately 665,384 square miles (1.7 million square kilometers)².

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; and
- Monitor in response to air quality concerns, as funding and staffing levels allow.

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

1. Fine particulate matter (PM_{2.5}) monitoring;
2. Coarse particulate matter (PM₁₀) monitoring;
3. Wildland fire monitoring (PM_{2.5});
4. Carbon monoxide (CO) monitoring;
5. Rural community and tribal village monitoring (primarily PM₁₀);
6. Lead (Pb) monitoring; and
7. Ozone (O₃) monitoring.

3 STATE OF ALASKA AMBIENT AIR MONITORING NETWORK

MINIMUM MONITORING REQUIREMENTS

Minimum monitoring requirements are based on several factors including pollutant levels 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 2013 Census data³. The four Core Based Statistical Areas (CBSA) include two

² <https://www.census.gov/geo/reference/state-area.html#n1>

³ https://www2.census.gov/geo/maps/metroarea/stcbsa_pg/Feb2013/cbsa2013_AK.pdf



2019 Air Quality Monitoring Plan

Metropolitan Statistical Areas (MSA) and two Micropolitan Areas (μ SA), see Table 3-1 below. 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 μ SA and the Ketchikan μ SA, which encompass the City and Borough of Juneau and the Ketchikan Gateway Borough, respectively.

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

Core Based Statistical Areas	Population*	Includes:	
Anchorage, MSA	399,148	Municipality of Anchorage	291,538
		Matanuska-Susitna Borough	107,610
Fairbanks, MSA	98,971		
Juneau, μSA	32,113		
Ketchikan, μSA	13,918		

*(based on 2018 Census Estimates, <https://www.census.gov/programs-surveys/popest.html>)

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 μ SA.

Monitoring in the Juneau μ 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 2000.

The Anchorage MSA triggered the PM_{10} monitoring requirement of 3-4 monitors based on four exceedances elevated concentrations in 2016 and 2018 (see Table E-5 in **Appendix E**). The exceedances result from high wind events that pick up dust from frozen, but not snow-covered, braided river beds. These high wind events occur semi-regularly in fall and occasionally in early spring. DEC has flagged the events in AQS and has amassed relevant supporting evidence for exceptional event waiver requests (EEWR). 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.



2019 Air Quality Monitoring Plan

Based on a 2017 DV of $32 \mu\text{g}/\text{m}^3$, the minimum requirement for Anchorage MSA $\text{PM}_{2.5}$ monitoring was one site for the 2018 Annual Monitoring Plan. However based on a 2018 DV of $26 \mu\text{g}/\text{m}^3$, no $\text{PM}_{2.5}$ monitoring sites are required for this 2019 Annual Monitoring Plan. Currently, the Anchorage MSA $\text{PM}_{2.5}$ monitoring network of two sites exceeds the minimum requirements specified. The minimum requirement for $\text{PM}_{2.5}$ monitoring in the Fairbanks MSA is one monitoring site. The Fairbanks $\text{PM}_{2.5}$ monitor requirement is based on the elevated concentrations measured in Fairbanks and North Pole. DEC's Fairbanks $\text{PM}_{2.5}$ monitoring network exceeds this requirement because of its status as a serious nonattainment area.

Table 3-2: Minimum Monitoring Requirements for Alaskan CBSAs

Criteria Pollutant		SLAMS site requirement			
	Comments	Anchorage MSA	Fairbanks MSA	Juneau μSA	Ketchikan μSA
$\text{PM}_{2.5}$	Most recent 3 year design value $\geq 85\%$ of NAAQS	0	1	0	0
	Most recent 3 year design value $< 85\%$ of NAAQS	0	0	0	0
PM_{10}	Two monitoring sites based on PM_{10} Limited Maintenance Plans (Juneau and Eagle River)	3-4	0	0	0
Pb	Waiver for source oriented monitoring - see section 3.1.1	0	0	0	0
CO	Two monitoring sites based on CO Limited Maintenance Plans (Fairbanks and Anchorage); Fairbanks also meets NCore requirement	0	0	0	0
O_3	Most recent 3 year design value $\geq 85\%$ of NAAQS	0	0	0	0
	See EPA O_3 NAAQS waiver ¹	0 ¹	0	0	0
SO_2	NCore site requirement	0	0	0	0
NO_2	NCore site requirement	0	0	0	0

¹ EPA 5-Year Ozone NAAQS Monitoring Requirement Waiver: Appendix F or <http://dec.alaska.gov/media/10956/2017-air-monitoring-network-plan-ozone-waiver.pdf>

3.1.1 LEAD

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 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



2019 Air Quality Monitoring Plan

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. A copy of the EPA approval letter can be found at <https://dec.alaska.gov/media/10608/red-dog-mine-lead-monitoring-waiver-letter-epa-081116.pdf>.

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 2019 by DEC and are presented in **Appendix A**. 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 2019 by DEC and are summarized by MSA in **Appendix B**.



2019 Air Quality Monitoring Plan

CURRENT MONITORING SITES

DEC operates and maintains a number of 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 Air Quality System (AQS) database as of May 2019. NCore parameters measured are PM₁₀, PM_{2.5}, PM_{10-2.5}, CO, O₃, SO₂, NO₂, NO, NO_x, NO_y, CSN, and meteorological parameters.

Table 3-3: AQS Monitoring Sites as of May 2019

Site Name	Address	Latitude/Longitude ¹	AQS ID	Agency
Garden	3000 East 16 th Ave. Anchorage, AK	61.205861N 149.824602W	02-020-0018	DEC
Laurel	4335 Laurel St. Anchorage, AK	61.181312N 149.834083W	02-020-0045	DEC
Parkgate	11723 Old Glenn Hwy. Eagle River, AK	61.326700N 149.569707W	02-020-1004	DEC
State Office Building	675 Seventh Ave. Fairbanks, AK	64.840833N 147.723056W	02-090-0010	DEC
NCore	809 Pioneer Road Fairbanks, AK	64.845307N 147.72552W	02-090-0034	DEC
Hurst Road ²	3288 Hurst Rd. North Pole, AK	64.762973N 147.310297W	02-090-0035	DEC
A Street	397 Hamilton Ave Fairbanks, AK	64.84593 147.69327W	02-090-0040	DEC
Butte ³	Harrison Court Butte, AK	61.534100N 149.0351855W	02-170-0008	DEC
Palmer	South Gulkana St. Palmer, AK	61.599322N 149.103611W	02-170-0012	DEC
Bethel	370A 4 th Ave Bethel, AK	60.79583N 161.767W	02-050-0001	DEC
Floyd Dryden Middle School	3800 Mendenhall Loop Road Juneau, AK	58.388889N 134.565556W	02-110-0004	DEC

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

² Hurst Road is the new name for the North Pole Fire Station site. It was changed in 2018 at Fairbanks North Star Borough's request.

³ EPA has granted a siting requirement waiver for Butte: Appendix F or <https://dec.alaska.gov/media/16991/butte-site-siting-requirement-waiver-letter-epa-06032019.pdf>



2019 Air Quality Monitoring Plan

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 B** of this report. Monitoring site photos and location maps can be found at: <http://dec.alaska.gov/air/air-monitoring/monitoring-site-information/>.

3.1.3 CARBON MONOXIDE SITES

Carbon monoxide (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.

The following table (Table 3-4) lists the CO monitoring sites in Anchorage and Fairbanks.

Table 3-4: CO Monitoring Sites in Anchorage and Fairbanks May 2019

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 except for a tree 2.3 m from probe	7.6	Yes ¹
NCore 02-090-0034	Neighborhood	Not applicable	3	360 degrees unobstructed	70	>20 m

¹ One spruce tree 7.3m tall, 2.3 m to drip line

3.1.4 PARTICULATE MATTER (PM₁₀ AND PM_{2.5}) SITES

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

A sampler must have at least 2 meters separation from walls, parapets, penthouses, etc. A sampler must have unrestricted airflow for at least 270 degrees, or 180 degrees for street canyon sites. Obstructions must be a minimum distance away from the sampler with the separation



2019 Air Quality Monitoring Plan

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 B).



2019 Air Quality Monitoring Plan

Table 3-5: PM Monitoring Sites in Alaska as of May 2019

Site Name AQS Codes	Monitoring Scale PM ₁₀	Monitoring Scale PM _{2.5}	Height (meters)	Spacing from Obstructions (meters)	Spacing from Roadway (meters)	Traffic (VPD)	Trees within 10 meters?
Garden 02-020-0018	Neighborhood	Neighborhood	11	no obstructions	14	1275 Sunrise Dr. 2014 Airport Heights Dr.	no
Laurel 02-020-0045	Microscale	-	6.4	no obstructions	11	34,617 Tudor Rd	no
Parkgate 02-020-1004	Neighborhood	Neighborhood	10.4	no obstructions	44	12,511 Old Glenn Hwy	no
Butte 02-170-0008	Neighborhood	Neighborhood	4.7	no obstructions	150	Old Glenn Hwy, 5,891 ²	yes 5.5 m
Palmer 02-170-0012	Neighborhood	Neighborhood	4	no obstructions	>20	Unknown, probably < 51,000	no
A Street 02-090-0040	-	Neighborhood	4	no obstructions	5.8	1943 Hamilton Ave	no
State Office Building 02-090-0010	-	Neighborhood	7	no obstructions	20	3785 Barnette St	no
NCore 02-090-0034	Neighborhood	Neighborhood	4.5	no obstructions	70	4865 Philips Field Rd	no
Hurst Road 02-090-0035	-	Neighborhood	4.3	no obstructions	27 to Hurst Rd	4714 Hurst Rd	no
Floyd Dryden 02-110-0004	Neighborhood	Neighborhood	8	no obstructions	100	16,904 Glacier Hwy	no
Bethel ³ 02-050-0001	Neighborhood	Neighborhood	5	no obstructions	>30 to Fifth Ave	6340 Ridgecrest Dr.	no

¹ Average annual traffic count 2012-2017 traffic data accessed at:

<http://akdot.maps.arcgis.com/home/webmap/viewer.html?webmap=7c1e1029fdb64d7a86449d55ef05e21c&extent=-180,54.7188,-127.111,70.3005>

² 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).

³ Site is next to a gravel pad/road so EPA has granted a siting requirement waiver: Appendix F or <https://dec.alaska.gov/media/16991/butte-site-siting-requirement-waiver-letter-epa-06032019.pdf>



2019 Air Quality Monitoring Plan

3.1.5 NCore SITE

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

Table 3-6: NCore Gaseous¹ Monitoring and Meteorological Monitoring as of January 2019 in Alaska

Parameter Name	Monitoring Scale	Height (meters)	Spacing from Obstructions (meters)	Spacing from Roadway (meters)	Traffic (VPD)	Trees < 10 m?
NO _y , NO & diff	Neighborhood	3 ²	no obstructions	70	4865 ³	None
NO ₂ , NO _x & NO	Neighborhood	3	no obstructions	70	4865	None
O ₃	Neighborhood	3	75 m to 12 m building	70	4865	None
SO ₂ (1 hr & 5 min)	Neighborhood	3	no obstructions	70	4865	None
T _{amb} , WS & WD (2 m)	Microscale	2	no obstructions	70	4865	None
T _{amb} , WS & WD (10 m)	Microscale	10	no obstructions	70	4865	None
Relative Humidity	Neighborhood	4	no obstructions	70	4865	None
Barometric Pressure	Neighborhood	4	no obstructions	70	4865	None

¹ Excluding CO. For CO see Table 3-4.

² Probe height is 3 meters rather than the 10 meters recommended in order to remain below the unusually low winter inversion layer.

³ 2013-2017 Philips Field Road traffic data accessed at:

<http://akdot.maps.arcgis.com/home/webmap/viewer.html?webmap=7c1e1029fdb64d7a86449d55ef05e21c&extent=-180,54.7188,-127.111,70.3005>

MONITORING METHODS, DESIGNATION, AND SAMPLING FREQUENCY

Tables 3-7 to 3-17 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 3-17 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



2019 Air Quality Monitoring Plan

to be used, such as: for State & Local Air Monitoring Stations (SLAMS) to demonstrate NAAQS compliance, Special Purpose Monitoring sites (SPM) for general air quality assessments, and the Chemical Speciation Network (CSN) for atmospheric chemistry assessments. AQS parameter, method and units 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. PM₁₀, SO₂, 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. 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 SO₂ reading) or a near-real time basis (e.g. 1-hour PM_{2.5} reading from a beta attenuation monitor, a BAM). The equipment information column identifies on-site equipment (either a sampler or instrument) specific to the AQS parameter code.

Other monitoring sites operated by DEC to gather data related to rural road dust and wildland fires, but that are not submitted to the AQS database are discussed in **Appendix C**. The 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 D**.

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



2019 Air Quality Monitoring Plan

Table 3-7: Anchorage MSA: AQS Codes January 2020

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

Site Name/ Location/ AQS ID	Pollutant Parameter	Monitor Designation	Monitor Starting Date	AQS Parameter/ Occurrence Code	AQS Method Codes	Sample Frequency	Equipment
Garden Site/ Anchorage 02-020-0018	PM ₁₀ STD/ PM ₁₀ LC	SLAMS	1/1/2009 STD 01/1/2015 LC	81102-3/ 85101-3	122	Continuous	Met-One BAM 1020X
	PM _{2.5} LC	SLAMS	1/1/2009	88101-3	170	Continuous	Met-One BAM 1020X (VSCC)
	CO	SLAMS	1/1/1979	42101-1	554	Continuous	Thermo Scientific. Inst. Model 48i
Laurel/ Anchorage 02-020-0045	PM ₁₀ STD/ PM ₁₀ LC	SPM	5/28/2015	81102-3/ 85101-3	122	Continuous	Met-One BAM 1020X
Parkgate/ Eagle River 02-020-1004	PM ₁₀ STD/ PM ₁₀ LC	SLAMS	1/1/2009 STD 01/01/2015 LC	81102-3/ 85101-3	122	Continuous	Met-One BAM 1020X
	PM ₁₀ STD/ PM ₁₀ LC	SLAMS	7/31/2018	81102-3/ 85101-3	126	1/6	Thermo Scientific Partisol 2000i
Butte/ Matanuska- Susitna Valley 02-170-0008	PM ₁₀ STD/ PM ₁₀ LC	SPM	4/11/1998	81102-3/ 85101-3	122	Continuous	Met-One BAM 1020X Coarse
	PM _{2.5} LC	SLAMS	8/10/2011	88101-3	170	Continuous	Met-One BAM 1020X Coarse (VSCC)
Butte/ Matanuska- Susitna Valley 02-170-0008	PM _{2.5} LC	SLAMS	7/31/2018	88101-1	143	1/6	Thermo Scientific Partisol 2000i (VSCC)



2019 Air Quality Monitoring Plan

Table 3-8: FNSB monitors: AQS Codes as of May 2019

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

Site Name/Location	Pollutant Parameter	Monitor Designation	AQS Monitor Starting Date	AQS Parameter and Occurrence Code	AQS Method Codes	Sample Frequency	Equipment
NCore/ Fairbanks 02-090-0034	PM ₁₀ STD/ PM ₁₀ LC	NCORE	2/15/2011	81102-3/ 85101-3	122	Continuous	Met-One BAM 1020X Coarse
	PM _{2.5} LC	NCORE	2/15/2011	88501-3	731	Continuous	Met-One BAM 1020X Coarse (SCC)
	PM ₁₀ STD/ PM ₁₀ LC collocate	NCORE	11/10/2012	81102-1/ 85101-1	126	1/3	Thermo Scientific Partisol 2000i
	PM _{2.5} LC	NCORE	11/4/2009	88101-1	145	1/1	Thermo Scientific Sequential Partisol 2025i (VSCC)
	PM _{2.5} LC	NCORE	5/8/2013	88101-2	143	1/3	Thermo Scientific Partisol 2000i (VSCC)
	PM ₁₀ LC - PM _{2.5} LC	NCORE	2/15/2011	86101-1	175/176	1/3	paired Thermo Scientific Partisols 2000i
	CO	NCORE	8/1/2011	42101-1	554	Continuous	Thermo Scientific 48i-TLE



2019 Air Quality Monitoring Plan

Site Name/Location	Pollutant Parameter	Monitor Designation	AQS Monitor Starting Date	AQS Parameter and Occurrence Code	AQS Method Codes	Sample Frequency	Equipment
NCore/ Fairbanks 02-090-0034	SO ₂ (1-hr)	NCORE	8/1/2011	42401-1	560	Continuous	Thermo Scientific 43i-TLE
	SO ₂ (5-min)	NCORE	8/18/2011	42401-2	560	Continuous	Thermo Scientific 43i-TLE
	NO _y	NCORE	01/01/2013 10/5/2012 AQS	42600-1	674	Continuous	Thermo Scientific 42iY-TLE
	NO	NCORE	10/5/2012	42601-2	574	Continuous	Thermo Scientific 42iY-TLE
	NO _y -NO	NCORE	10/5/2012	42612-1	674	Continuous	Thermo Scientific 42iY-TLE
	NO _x	NCORE	7/1/2014	42603-1	574	Continuous	Thermo Scientific 42i-TL
	NO	NCORE	3/1/2014 10/5/2012	42601-1	574	Continuous	Thermo Scientific 42i-TLE
	NO ₂	NCORE	3/1/2014	42602-1	574	Continuous	Thermo Scientific 42i-TLE
	O ₃	NCORE	8/1/2011	44201-1	87	Continuous	Teledyne API 400E
	WD ¹ 10 m	NCORE	4/5/2011	61104-1	061	Continuous	Met-One Sonic Anemometer
	WS ¹ 10 m	NCORE	4/5/2011	61103-2	061	Continuous	Met-One Sonic Anemometer



2019 Air Quality Monitoring Plan

Site Name/Location	Pollutant Parameter	Monitor Designation	AQS Monitor Starting Date	AQS Parameter and Occurrence Code	AQS Method Codes	Sample Frequency	Equipment
NCore/ Fairbanks 02-090-0034	BP	NCORE	4/5/2011	64101-1	014	Continuous	Met-One BAM 1020X Barometer
	RH	NCORE	11/4/2013	62201	061	Continuous	Met-One BAM 1020X Relative Humidity Sensor
	Ambient Temp @ 2 m	NCORE	4/1/2011	62101-2	061	Continuous	Met-One Temp Sensor
	Ambient Temp @ 10 m	NCORE	4/1/2011	62101-1	061	Continuous	Met-One Temp Sensor
	PM _{2.5} LC Speciation	NCORE/CSN	1/1/2015	Multiple ²	Multiple ²	1/3	URG 3000N
	PM _{2.5} LC Speciation	NCORE/CSN	1/1/2015	Multiple ²	Multiple ²	1/3	Met-One Super SASS PM _{2.5} LC
A Street/ Fairbanks 02-090-0040	PM _{2.5} LC	SLAMS	~7/1/2019	88101-1	145	1/1	Thermo Scientific Sequential Partisol 2025i (VSCC)
	PM _{2.5} LC	SLAMS	11/29/2018	88501-3	731	Continuous	Met-One BAM 1020X (SCC)
	WD ¹ 3 m	SPM	TBD	61104-1	061	Continuous	Met-One Sonic Anemometer



2019 Air Quality Monitoring Plan

Site Name/Location	Pollutant Parameter	Monitor Designation	AQS Monitor Starting Date	AQS Parameter and Occurrence Code	AQS Method Codes	Sample Frequency	Equipment
	WS ¹ 3 m	SPM	TBD	61103-1	061	Continuous	Met-One Sonic Anemometer
	WD ¹ 10 m	SPM	1/31//2019	61104-1	061	Continuous	Met-One Sonic Anemometer
	WS ¹ 10 m	SPM	1/31/2019	61103-1	061	Continuous	Met-One Sonic Anemometer
Hurst Road/ North Pole 02-090-0035	PM _{2.5LC}	SLAMS	3/1/2012	88101-1	145	1/1	Thermo Scientific Sequential Partisol 2025i (VSCC)
	PM _{2.5LC} collocate	SLAMS	~7/1/2018	88101-2	145	1/3	Thermo Scientific Sequential Partisol 2025i (VSCC)
	PM _{2.5LC}	SLAMS	3/1/2012	88501-3	731	Continuous	Met-One BAM 1020X (SCC)
	PM _{2.5LC} Speciation	CSN	~9/1/2019	Multiple ³	Multiple ³	1/3	URG 3000N
	PM _{2.5LC} Speciation	CSN	~9/1/2019	Multiple ³	Multiple ³	1/3	Met-One Super SASS
	Ambient Temp 10 m	SPM	~9/1/2019	62101-1	061	Continuous	Met-One Temp Sensor



2019 Air Quality Monitoring Plan

Site Name/Location	Pollutant Parameter	Monitor Designation	AQS Monitor Starting Date	AQS Parameter and Occurrence Code	AQS Method Codes	Sample Frequency	Equipment
Hurst Road/ North Pole 02-090-0035	WD ¹ 10 m	SPM	~9/1/2019	61104-1	061	Continuous	Met-One Sonic Anemometer
	WS ¹ 10 m	SPM	~9/1/2019	61103-1	061	Continuous	Met-One Sonic Anemometer
	Ambient Temp 3 m	SPM	~9/1/2019	62101-2	061	Continuous	Met-One Sonic Anemometer
	WD ¹ 3 m	SPM	~9/1/2019	61104-2	061	Continuous	Met-One Sonic Anemometer
	WS ¹ 3 m	SPM	~9/1/2019	61103-2	061	Continuous	Met-One Sonic Anemometer
	Ambient Temp 23 m	SPM	~9/1/2019	62101-3	061	Continuous	Met-One Sonic Anemometer
Hurst Road/ North Pole 02-090-0035	WD ¹ 23 m	SPM	~9/1/2019	61104-3	061	Continuous	Met-One Sonic Anemometer
	WS ¹ 23 m	SPM	~9/1/2019	61103-3	061	Continuous	Met-One Sonic Anemometer

¹ WD and WS are reported to AQS as resultant² Multiple AQS codes are used to identify individual chemical species



2019 Air Quality Monitoring Plan

Table 3-9: Juneau μ SA: AQS Codes as of January 2020

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

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	PM ₁₀ STD/ PM ₁₀ LC	SLAMS	7/30/2018	81102-3/ 85101-3	122	Continuous	Met-One BAM 1020X Coarse
02-110-0004	PM _{2.5} LC	SLAMS	8/21/2009	88101-3	170	Continuous	Met-One BAM 1020X (VSCC)

Table 3-10: Bethel: AQS Codes as of January 2020

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

Site Name/Location	Pollutant Parameter	Monitor Designation	Monitor Starting Date	AQS Parameter and Occurrence Code	AQS Method Codes	Sample Frequency	Equipment
Bethel	PM ₁₀ STD/ PM ₁₀ LC	NCORE	5/23/2018	81102-3/ 85101-3	122	Continuous	Met-One BAM 1020X Coarse
02-050-0001	PM _{2.5} LC	SLAMS	5/23/2018	88501-3	731	Continuous	Met-One BAM 1020X (SCC)



2019 Air Quality Monitoring Plan

Table 3-11: January 2020 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 ₁₀ /PM _{2.5} /CO	(b) Typical concentrations (population density based) (d) General background concentration levels
Laurel	02-020- 0045	PM ₁₀	(a) Highest concentrations expected in area (c) Impact of significant sources/source categories
Parkgate	02-020-1004	PM ₁₀	(b) Typical concentrations (population density based) (d) General background concentration levels
NCore	02-090-0034	PM ₁₀ /PM _{2.5} /PM _{10-2.5} /CO/ SO ₂ /O ₃ / NO ₂ /NO/NO _y /NO _x /Speciation	(b) Typical concentrations (population density based) (d) General background concentration levels
Hurst Road	02-090-0035	PM _{2.5} /Speciation	(a) Highest concentrations expected in area
A Street	02-090-0040	PM _{2.5}	(a) Highest concentrations expected in area
Butte	02-170-0008	PM ₁₀ /PM _{2.5}	(c) Impact of significant sources/source categories (a) Highest concentrations expected in area
Bethel	02-050-0001	PM ₁₀ /PM _{2.5}	(b) Typical concentrations (population density based) (d) General background concentration levels
Floyd Dryden Middle School	02-110-0004	PM ₁₀ /PM _{2.5}	(b) Typical concentrations (population density based) (d) General background concentration levels



2019 Air Quality Monitoring Plan

Table 3-12: 2020 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 ₁₀ STD/PM ₁₀ LC	81102-3/85101-3	Population exposure	-Provide timely air pollution information -Determine ambient air quality standard compliance
	PM _{2.5} LC	88101-3	Population exposure	-Provide timely air pollution information -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 ₁₀ STD/PM ₁₀ LC	81102-3/85101-3	Population exposure	-Provide timely air pollution information -Determine ambient air quality standard compliance
Parkgate/ Eagle River 02-020-1004	PM ₁₀ STD/PM ₁₀ 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 ₁₀ STD/PM ₁₀ LC	81102-3/85101-3	Population exposure	-Provide timely air pollution information -Determine ambient air quality standard compliance
	PM _{2.5} LC	88101-3	Population exposure	-Provide timely air pollution information -Determine ambient air quality standard compliance



2019 Air Quality Monitoring Plan

Table 3-13: 2020 FNSB Instrument-Level Monitoring Purposes and AQS Monitoring Objective

Site Name/ Location/ AQS ID	Pollutant Parameter	AQS Parameter/ Occurrence Code	AQS Monitoring Objective	Monitoring Purpose(s)
NCore/ Fairbanks 02-090-0034	PM _{10STD} / PM _{10LC}	81102-3/ 85101-3	Population exposure	-Provide timely air pollution information - Determine ambient air quality standard compliance -Support air pollution research studies
	PM _{2.5LC}	88101-3	Population exposure	-Provide timely air pollution information -Support air pollution research studies
	PM _{2.5LC}	88101-1/2	Population exposure	-Determine ambient air quality standard compliance -Support air pollution research studies
	PM _{10LC} - PM _{2.5LC}	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 ₂ (1-hr)	42401-1	Population exposure	-Provide timely air pollution information -Determine ambient air quality standard compliance -Support air pollution research studies
	SO ₂ (5-min)	42401-2	Population exposure	-Determine ambient air quality standard compliance -Support air pollution research studies
	NO _y	42600-1	Population exposure	-Support air pollution research studies



2019 Air Quality Monitoring Plan

Site Name/ Location/ AQS ID	Pollutant Parameter	AQS Parameter/ Occurrence Code	AQS Monitoring Objective	Monitoring Purpose(s)
NCore/ Fairbanks 02-090-0034	NO	42601-1	Population exposure	-Support air pollution research studies
	NO _Y -NO	42612-1	Population exposure	-Support air pollution research studies
	NO _x	42603-1	Population exposure	-Support air pollution research studies
	NO	42601-2	Population exposure	-Support air pollution research studies
	NO ₂	42602-1	Population exposure	-Provide timely air pollution information -Determine ambient air quality standard compliance -Support air pollution research studies
	O ₃	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



2019 Air Quality Monitoring Plan

Site Name/ Location/ AQS ID	Pollutant Parameter	AQS Parameter/ Occurrence Code	AQS Monitoring Objective	Monitoring Purpose(s)
	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 @ 2 m	62101-2	Population exposure	-Provide timely air pollution information. -Support air pollution research studies
	Ambient Temp @ 10 m	62101-1	Population exposure	-Provide timely air pollution information. -Support air pollution research studies
	PM _{2.5LC} Speciation	Multiple*	Population exposure	-Support air pollution research studies -part of CSN
Hurst/ North Pole 02-090-0035	PM _{2.5LC}	88101-1	Population exposure	-Determine ambient air quality standard compliance
	PM _{2.5LC}	88501-3/88502-3	Population exposure	-Provide timely air pollution information
	PM _{2.5LC} collocated	88101-2	Population exposure	-Determine ambient air quality standard compliance
	Ambient Temp @ 3, 10, & 30 m	62101-2,1,3	Population exposure	-Provide timely air pollution information
	WD @ 10 & 30 m	61104-1,3	Population exposure	-Provide timely air pollution information
	WS@ 10 & 30 m	61103-1,3	Population exposure	-Provide timely air pollution information



2019 Air Quality Monitoring Plan

Table 3-14: 2020 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 ₁₀ STD/ PM ₁₀ LC collocated	81102-2/ 85101-2	Population exposure	-Determine ambient air quality standard compliance
	PM _{2.5} LC	88101-3	Population exposure	-Provide timely air pollution information -Determine ambient air quality standard compliance
	PM _{2.5} LC	88101-2	Population exposure	-Determine ambient air quality standard compliance

Table 3-15: 2020 Bethel Instrument-Level Monitoring Purposes and AQS Monitoring Objective

Site Name/ AQS ID	Pollutant Parameter	AQS Parameter/ Occurrence Code	AQS Monitoring Objective	Monitoring Purpose(s)
Bethel/ 02-050-0001	PM ₁₀ STD/ PM ₁₀ LC	81102-3/85101-3	Population exposure	-Provide timely air pollution information -Determine ambient air quality standard compliance
	PM _{2.5} LC	88501-3	Population exposure	-Provide timely air pollution information -Determine ambient air quality standard compliance



2019 Air Quality Monitoring Plan

Table 3-16: Monitors required by Nonattainment Area (NAA) or Limited Maintenance Plan (LMP)

MSA or μ 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 _{2.5} LC	88101-1	Fairbanks PM _{2.5} NAA
	NCore/Fairbanks	02-090-0034	CO	42101-3	Fairbanks CO LMP
Anchorage MSA	Garden/Anchorage	02-020-0018	CO	42101-3	Anchorage CO LMP
	Parkgate/Eagle River	02-020-0045	PM ₁₀ STD	81102-3	Eagle River PM ₁₀ LMP
Juneau μ MSA	Floyd Dryden Middle School/ Juneau	02-110-0004	PM ₁₀ STD	81102-3	Juneau PM ₁₀ LMP

Table 3-17: Collocations January 2020

Site Name/ Location/ AQS ID	Pollutant Parameter	AQS Parameter/ Occurrence Code	AQS Method Code	Equipment	Primary or Secondary
Butte/ Matanuska- Susitna Valley 02-170-0008	PM _{2.5} LC	88101-3	170	Met-One BAM 1020X Coarse	Primary
	PM _{2.5} LC collocate	88101-2	143	Thermo Scientific Partisol 2000i	Secondary
Hurst Road/ North Pole 02-090-0035	PM _{2.5} LC	88101-1	145	Thermo Scientific Partisol 2025i	Primary
	PM _{2.5} LC collocate	88101-2	145	Thermo Scientific Partisol 2025i	Secondary
NCore/ Fairbanks 02-090-0034	PM ₁₀ STD	81102-3/ 85101-3	122	Met-One BAM 1020X Coarse	Primary
	PM ₁₀ STD collocate	81102-2/ 85101-2	126	Thermo Scientific Partisol 2000i	Secondary
Parkgate/Eagle River 02-020-1004	PM ₁₀ STD	81102-3/ 85101-3	122	Met-One BAM 1020X Coarse	Primary
	PM ₁₀ STD collocate	81102-2/ 85101-2	126	Thermo Scientific Partisol 2000i	Secondary



2019 Air Quality Monitoring Plan

4 NETWORK MODIFICATIONS COMPLETED IN 2018 AND 2019

PM_{2.5} COLLOCATION

A Thermo Scientific Sequential Partisol 2025i PM_{2.5} sampler was set-up in May 2018 at the Fairbanks SOB site and a Thermo Partisol 2000i PM_{2.5} sampler was moved from the Juneau Floyd Dryden site to the Harrison Court site in Butte in August 2018. These two sites fulfill the collocation requirements for the network (Table 3-17).

PM₁₀ COLLOCATION

A Thermo Partisol 2000i PM₁₀ sampler was moved from the Juneau Floyd Dryden site to the Parkgate site in Eagle River in August 2018. This site along with the Thermo Partisol 2000i PM₁₀ sampler at the Fairbanks NCore site fulfill the collocation requirements for the network (Table 3-17).

DISCONTINUATION OF PALMER PM_{2.5} AND PM₁₀ MONITORING

DEC is in the process of shutting down and removing the Special Purpose Monitoring PM₁₀ and PM_{2.5} monitoring site in Palmer. This site is not a required site. Due to the current budgetary and staffing levels, DEC cannot continue to support this site.

DISCONTINUATION OF PARKGATE PM_{2.5} MONITORING

DEC is in the process of shutting down and removing the PM_{2.5} monitor at the Parkgate site. This monitor is not required to meet the minimum monitoring network. Due to the current budgetary and staffing levels, DEC cannot continue to support this site.

DISCONTINUATION OF SOB PM_{2.5} MONITORING

DEC established a new PM_{2.5} monitoring site in Fairbanks, the A Street site in late 2018. The intent is to document impacts in one of the Fairbanks hot spot locations, the Hamilton Acres neighborhood. A continuous PM_{2.5} monitor was operated during the 2018/2019 winter parallel to the SOB and NCore data collection. Analysis of the data corroborated that the A Street site experiences higher PM_{2.5} concentrations than the SOB site. EPA Region 10 staff has approved discontinuing the site in a letter dated June 26, 2019 (see <https://dec.alaska.gov/air/air-monitoring/monitoring-plans/> or Appendix I). DEC will move the Thermo Scientific Sequential Partisol 2025i PM_{2.5} sampler from the SOB to the A Street site by July 1, 2019 and shut down the SOB site. The NCore site will continue to operate in the downtown Fairbanks area. The collocated Thermo Scientific Sequential Partisol 2025i PM_{2.5} sampler at the SOB site will be moved to the North Pole Hurst Road site.



2019 Air Quality Monitoring Plan

SPECIATION AND $PM_{2.5}$ COLLOCATION AT HURST ROAD

DEC will install a new sampling shelter at the North Pole Hurst Road site to accommodate additional sampling equipment by August 1, 2019. The Hurst Road site will receive the collocated Thermo Scientific Sequential Partisol 2025i $PM_{2.5}$ sampler from the SOB site. Since the North Pole Hurst Road monitoring site is the dominating site in the nonattainment area, speciated $PM_{2.5}$ data is necessary for attainment planning. EPA OAQPS has provided DEC with a Met One SuperSASS and URG 3000N for the site. DEC will start collecting speciation filter samples as soon as the equipment has been installed. Additionally the meteorological instrumentation and 23 meter met tower formerly at the Fairbanks Peger site will be moved to the North Pole Hurst Road SLAMS site.

5 PLANNED NETWORK MODIFICATIONS FOR 2020

There are no proposed changes to the network for 2020.



2019 Air Quality Monitoring Plan

Appendix A Network Evaluation Forms



2019 Air Quality Monitoring Plan

Table A-1 PM_{2.5} Network Evaluation Form

PART 58 APPENDIX D NETWORK EVALUATION FORM FOR PM _{2.5}				
STATE: <u>ALASKA</u> AGENCY: <u>DEPARTMENT OF ENVIRONMENTAL CONSERVATION</u> AQS AGENCY CODE: <u>02</u>				
EVALUATION DATE: <u>5-8-2019</u> EVALUATOR: <u>A. BREUNINGER</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 _{2.5} SLAMS sites listed in Table D-5 of this appendix. Use the form below and Table D-5 to verify if each of your MSAs have the appropriate number of SLAMS FRM/FEM/ARM samplers.	✓		
4.7.1(b)	Each required SLAMS FRM/FEM/ARM monitoring stations or sites must be sited to represent area-wide air quality in the given MSA (typically neighborhood or urban spatial scale, though micro-or middle-scale okay if it represent many such locations throughout the MSA).	✓		
4.7.1(b)(1)	At least one SLAMS FRM/FEM/ARM monitoring station is to be sited at neighborhood or larger scale in an area of expected maximum concentration for each MSA where monitoring is required by 4.7.1(a).	✓		
4.7.1(b)(2)	For CBSAs with a population of 1,000,000 or more persons, at least one FRM/FEM/ARM PM _{2.5} monitor is to be collocated at a near-road NO ₂ station.			✓
4.7.1(b)(3)	For MSAs with additional required SLAMS sites, a FRM/FEM/ARM monitoring station is to be sited in an area of poor air quality.	✓		
4.7.2	Each State must operate continuous PM _{2.5} analyzers equal to at least one-half (round up) the minimum required sites listed in Table D-5 of this appendix. At least one required continuous analyzer in each MSA must be collocated with one of the required FRM/FEM/ARM monitors, unless at least one of the required FRM/FEM/ARM monitors is itself a continuous FEM or ARM monitor, in which case no collocation requirement applies.	✓		
4.7.3	Each State shall install and operate at least one PM _{2.5} site to monitor for regional background and at least one PM _{2.5} site to monitor regional transport (note locations in comment field). Non-reference PM _{2.5} monitors such as IMPROVE can be used to meet this requirement.	✓		
4.7.4	Each State shall continue to conduct chemical speciation monitoring and analyses at sites designated to be part of the PM _{2.5} Speciation Trends Network (STN).	✓		
Comments:				



2019 Air Quality Monitoring Plan

MSA Description ¹	MSA population ^{2,3}	Design Value for years 2015-2017 24-hr/Annual Avg. µg/m3	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
Combined Municipality of Anchorage and Matanuska-Susitna Valley Borough (MSA)	399,148		1	2	2	0
MOA Garden		20/5.8		1	1	0
Mat-Su Butte		26/5.3		1	1	0
Fairbanks North Star Borough	98,971		1	4	1*	1 speciation
A Street		na		1 (2025i)	0*	0
NCore Site		30/8.3		1 (Partisol)	0*	1 speciation
Hurst Rd		65/12.8		2 (2025i; collocated)	0*	0
City and Borough of Juneau	32,113		0	1	1	0
Floyd Dryden		23/6.2		1	1	

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

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

³Population based on latest available census figures.

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

Table D-5 of Appendix D to Part 58 – PM2.5 Minimum Monitoring Requirements		
MSA population ^{1,2}	Most recent 3-year design value ≥85% of any PM2.5 NAAQS ³	Most recent 3-year design value <85% of any PM2.5 NAAQS ^{3,4}
>1 million	3	2
500K to 1 million	2	1
50K to <500K ⁵	1	0
¹ Minimum monitoring requirements apply to the Metropolitan statistical area (MSA). ² Population based on latest available census figures. https://www.census.gov/ ³ The PM _{2.5} National Ambient Air Quality Standards (NAAQS) levels and forms are defined in 40 CFR part 50. ⁴ These minimum monitoring requirements apply in the absence of a design value. ⁵ Metropolitan statistical areas (MSA) must contain an urbanized area of 50,000 or more population.		



2019 Air Quality Monitoring Plan

Table A-2 PM₁₀ Network Evaluation Form

PART 58 APPENDIX D NETWORK EVALUATION FORM FOR PM ₁₀				
STATE: <u>ALASKA</u> AGENCY: <u>DEPARTMENT OF ENVIRONMENTAL CONSERVATION</u> AQS AGENCY CODE: <u>02</u>				
EVALUATION DATE: <u>5-8-2019</u> EVALUATOR: <u>A. BREUNINGER</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 ₁₀ air quality trends and geographical patterns. Use the form below and Table D-4 to verify if your PM ₁₀ network has the appropriate number of samplers.	✓		
<p>Comments: All of the site locations are based on historical agreements among the EPA, ADEC and (where applicable) local agencies.</p> <p>Two exceedances on April 9, 2016 and November 16, 2018 at Palmer, and two exceedances at Butte on April 24, 2018 and May 10, 2018 2018 cause the entire Anchorage MSA to be categorized as high concentration. DEC qualified the exceedance day data as RJ (high winds). These four days could be the basis for a 2016 EEWR and a 2018 EEWR should EPA request DEC or EPA start another PM₁₀ designation process. Thus DEC assumes that medium concentration is applicable when these exceptional events are excluded from the compliance calculations (Table E-5 with assumed EEWRs).</p>				

MSA Description ¹	MSA population ^{2,3}	Minimum required number of PM ₁₀ stations (from Table D-4)	Present number of PM ₁₀ stations in MSA
Anchorage MSA (includes Mat-Su Borough)	399,148	3-4 (high conc)/1-2 (med conc; high winds EE exceedances removed)	4 (SLAMS [1 collocated], 1 SPM)
Fairbanks North Star Borough MSA	98,971	0 (low conc)	1 (NCore, collocated)
City and Borough of Juneau MSA	32,113	0 (low conc)	1 (SLAMS/LMP)
¹ see http://www2.census.gov/econ/susb/data/msa_codes_2007_to_2011.txt ² Minimum monitoring requirements apply to the Metropolitan statistical area (MSA). CBSA includes both MSAs and micropolitan statistical areas. ³ Population based on latest available (2018) census figures.			

Table D-4 of Appendix D to Part 58 – PM ₁₀ Minimum Monitoring Requirements			
MSA population ^{1,2}	High concentration ²	Medium concentration ³	Low concentration ^{4,5}
>1 million	6-10	4-8	2-4
500K to 1 million	4-8	2-4	1-2
250K to 500K	3-4	1-2	0-1
100K to 250K	1-2	0-1	0
¹ Selection of urban areas and actual numbers of stations per area will be jointly determined by EPA and the State agency. ² High concentration areas are those for which ambient PM ₁₀ data show ambient concentrations exceeding the PM ₁₀ NAAQS by 20 percent or more. ³ Medium concentration areas are those for which ambient PM ₁₀ data show ambient concentrations exceeding 80 percent of the PM ₁₀ NAAQS. ⁴ Low concentration areas are those for which ambient PM ₁₀ data show ambient concentrations less than 80 percent of the PM ₁₀ NAAQS. ⁵ These minimum monitoring requirements apply in the absence of a design value.			



2019 Air Quality Monitoring Plan

Table A-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>5-8-2019</u> EVALUATOR: <u>A. BREUNINGER</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 ₂ monitor in CBSAs having a population of 1,000,000 or more persons. If a CBSA has more than one required near-road NO ₂ monitor, only one CO monitor is required to be collocated with a near-road NO ₂ monitor within that CBSA.				✓
4.2.2(a)	Has the EPA Regional Administrator required additional CO monitoring stations above the minimum number of monitors required in 4.2.1? If so, note location in comment field.		✓		

Comments: The State of Alaska has no CBSA with a population of 1,000,000. Therefore, there are no near-road collocated sites for CO and NO₂. The Garden Site (AQS ID 02-020-0018) is the single CO site currently operating in the Municipality of Anchorage for Limited Maintenance Plan compliance. A single CO SLAMS monitor operated for Limited Maintenance Plan compliance in the Fairbanks North Star Borough at the Old Post Office Building site (AQS 02-090-0002) until 4/30/2014. Since then the Fairbanks North Star Borough multi-pollutant NCore site (02-090-0034) currently is the single CO site for compliance with NCore requirements and for Limited Maintenance Plan compliance in Fairbanks.

MSA Description ¹	CBSA population ^{2,3}	Minimum required number of SLAMS CO sites	Present number of SLAMS CO sites in MSA
Combined Municipality of Anchorage and Matanuska-Susitna Borough	399,148	0	1*
Fairbanks North Star Borough	98,971	0	1*

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

²Minimum monitoring requirements apply to the Core Based statistical area (CBSA). CBSA includes both metropolitan and micropolitan statistical areas.

³Population based on latest available census figures (2017).

* Monitoring sites in both MSAs satisfy their respective CO Limited Maintenance Plans requirements



2019 Air Quality Monitoring Plan

Table A-4 O₃ Network Evaluation Form

PART 58 APPENDIX D NETWORK EVALUATION FORM FOR OZONE (O ₃)				
STATE: <u>ALASKA</u> AGENCY: <u>DEPARTMENT OF ENVIRONMENTAL CONSERVATION</u> AQS AGENCY CODE: <u>02</u>				
EVALUATION DATE: <u>5-8-2019</u> EVALUATOR: <u>A. BREUNINGER</u>				
APPLICABLE SECTION	REQUIREMENT	CRITERIA MET?		
		YES	NO	N/A
4.1(b)	At least one O ₃ site for each MSA, or CSA if multiple MSAs are involved, must be designed to record the maximum concentration (note location in comment field).		✓	
4.1(c)	The appropriate spatial scales for O ₃ sites are neighborhood, urban, and regional (note deviations in comment field).	✓		
4.1(f)	Confirm that the monitoring agency consulted with EPA R10 when siting the maximum O ₃ concentration site.	✓		
4.1(i)	O ₃ is being monitored at SLAMS monitoring sites during the "ozone season" as specified in Table D-3 of Appendix D to Part 58.	✓		
Comments: DEC received an EPA 5-Year Ozone NAAQS Monitoring Requirement Waiver for the Anchorage MSA: http://dec.alaska.gov/media/10956/2017-air-monitoring-network-plan-ozone-waiver.pdf (Palmer O ₃ was discontinued at the end of ozone season 2018. An ozone monitoring site was established in the Fairbanks North Star Borough at the multi-pollutant NCore site (AQS 02-090-0034) in August 2011 and has been operated year-round since then.				

MSA Description	MSA population	Minimum required number of SLAMS O ₃ sites (from Table D-2)	Present number of SLAMS O ₃ sites in CBSA	
Combined Municipality of Anchorage and Matanuska-Susitna Valley Borough (MSAs)	399,148	1	0	See EPA ozone waiver link*
Fairbanks North Star Borough	98,971	0	1**	NCore Site
* see https://www.census.gov/geographies/reference-files/time-series/demo/metro-micro/delineation-files.html				

* DEC received a EPA 5-Year Ozone NAAQS Monitoring Requirement Waiver for the Anchorage MSA

** fulfills State of Alaska NCore requirement

Table D-2 of Appendix D to Part 58 - SLAMS O ₃ Monitoring Minimum Requirements		
MSA population ^{1,2}	Most recent 3-year design value concentrations ≥85% of any O ₃ NAAQS ³	Most recent 3-year design value concentrations <85% of any O ₃ NAAQS ^{3,4}
>10 million	4	2
4-10 million	3	1
350,000-<4 million	2	1
50,000-<350,000 ⁵	1	0
¹ Minimum monitoring requirements apply to the Metropolitan statistical area (MSA). CBBSA includes both MSAs and micropolitan statistical areas. ² Population based on latest available census figures. ³ The ozone (O ₃) National Ambient Air Quality Standards (NAAQS) levels and forms are defined in 40 CFR part 50. ⁴ These minimum monitoring requirements apply in the absence of a design value. ⁵ Metropolitan statistical areas (MSA) must contain an urbanized area of 50,000 or more population.		

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



2019 Air Quality Monitoring Plan

Table A-5 SO₂ Network Evaluation Form

PART 58 APPENDIX D NETWORK EVALUATION FORM FOR SULFUR DIOXIDE (SO ₂)				
STATE: <u>ALASKA</u> AGENCY: <u>DEPARTMENT OF ENVIRONMENTAL CONSERVATION</u> AQS AGENCY CODE: <u>02</u>				
EVALUATION DATE: <u>5-8-2019</u> EVALUATOR: <u>A. BREUNINGER</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 ₂ monitoring sites (based on PWEl calculation specified in 4.4.2 – use Table 1 and 2 below to determine minimum requirement for each CBSA)	✓		
4.4.2(a)(1)	Is the monitor sited within the boundaries of the parent CBSA and is it one of the following site types: population exposure, highest concentration, source impacts, general background, or regional transport?			✓
4.4.3(a)	Has the EPA Regional Administrator required additional SO ₂ monitoring stations above the minimum number of monitors required in 4.4.2? If so, note location in comment field.		✓	
4.4.5(a)	Is your agency counting an existing SO ₂ monitor at an NCore site in a CBSA with a minimum monitoring requirement?			✓
Comments: As evident from the calculations shown below, the State of Alaska has no CBSAs which require SO ₂ monitoring. The operating SO ₂ monitor is located at the multi-pollutant NCore site in the Fairbanks North Star Borough operated for compliance with NCore site requirements.				

Table 1.

CBSA Description ¹	CBSA population ^{1, 2}	total amount of SO ₂ in tons per year emitted within the CBSA (from 2014 NEI ⁴)	PWEl (population x total emissions ÷ 1,000,000)	Minimum required number of SO ₂ monitors in CBSA (see Table 2 below)	Present number of SO ₂ monitors in CBSA
Combined Municipality of Anchorage and Matanuska-Susitna Valley Borough (MSA)	399,148	635.5	253.7	0	0
Fairbanks North Star Borough (MSA)	98,971	2390.8	236.6	0	1*
City and Borough of Juneau (μSA)	32,113	712.7	22.9	0	0
North Slope Borough	9,872	1235.0	12.2	0	0

¹ <https://www.census.gov/programs-surveys/popest.html> & <https://www.census.gov/geographies/reference-files/time-series/demo/metro-micro/delineation-files.html>

²Minimum monitoring requirements apply to the Core Based statistical area (CBSA). CBSA includes both metropolitan and micropolitan statistical areas.

³Population based on latest available census figures (2017).

⁴see <https://www.epa.gov/air-emissions-inventories/2014-national-emissions-inventory-nei-data>

*Satisfies NCore requirement

Table 2. Minimum SO₂ Monitoring Requirements (Section 4.4.2 of App D to Part 58)

PWEl (Population weighted Emission Index) Value	Require number of SO ₂ monitors
≥ 1,000,000	3
≥ 100,000 but < 1,000,000	2
≥ 5,000 but < 100,000	1



2019 Air Quality Monitoring Plan

Table A-6 NO₂ Network Evaluation Form

PART 58 APPENDIX D NETWORK EVALUATION FORM FOR NITROGEN DIOXIDE (NO ₂)				
STATE: <u>ALASKA</u> AGENCY: <u>DEPARTMENT OF ENVIRONMENTAL CONSERVATION</u> AQS AGENCY CODE: <u>02</u>				
EVALUATION DATE: <u>5-8-2019</u> EVALUATOR: <u>A. BREUNINGER</u>				
APPLICABLE SECTION	REQUIREMENT	CRITERIA MET?		
		YES	NO	N/A
4.3.2(a)	Near-road NO ₂ Monitors: One microscale near-road NO ₂ monitoring station in each CBSA with a population of 1,000,000 or more persons.			✓
4.3.2(a)	Near-road NO ₂ Monitors: An additional near-road NO ₂ monitoring station is required for any CBSA with a population of 2,500,000 persons, or in any CBSA with a population of 500,000 or more persons that has one or more roadway segments with 250,000 or greater AADT count.			✓
4.3.2(b)	Near-road NO ₂ Monitors: Measurements at required near-road NO ₂ monitor sites utilizing chemiluminescence FRMs must include at a minimum: NO, NO ₂ , and NO _x			✓
4.3.3(a)	Area-wide NO ₂ Monitoring: One monitoring station in each CBSA with a population of 1,000,000 or more persons to monitor a location of expected highest NO ₂ concentrations representing the neighborhood or larger spatial scales.			✓
Comments: The State of Alaska has no CBSA with a population of 1,000,000				

Table 1					
CBSA Description ¹	CBSA population ^{2, 3} (2010)	Required number of Near-road NO ₂ sites	Present number of Near-road NO ₂ sites	Required number of Area-wide NO ₂ sites	Present number of Area-wide NO ₂ sites
Combines Municipality of Anchorage and Matanuska-Susitna Valley Borough (MSA)	399,148	0	0	0	0
Fairbanks North Star Borough (MSA)	98,971	0	0	0	1*
City and Borough of Juneau (CBA)	32,113	0	0	0	0
¹ see https://www.census.gov/geographies/reference-files/time-series/demo/metro-micro/delineation-files.html ² Minimum monitoring requirements apply to the Core Based statistical area (CBSA). CBSA includes both metropolitan and micropolitan statistical areas. ³ Population based on latest available 2018 census estimates https://www.census.gov/programs-surveys/popest.html *NCore site requirement					



2019 Air Quality Monitoring Plan

Appendix B Summary of Monitoring Path & Siting Criteria Evaluation Forms



2019 Air Quality Monitoring Plan

Table B-1 Summary of Appendix E Forms: PM_{2.5}, PM₁₀, & PM_{10-2.5}

	Garden	Parkgate	Laurel*	Butte	Palmer	State Office Building	Hurst Road	A Street	NCore	Floyd Dryden	Bethel
Parameter(s)	PM _{2.5} & PM ₁₀	PM _{2.5} & PM ₁₀	PM ₁₀	PM _{2.5} & PM ₁₀	PM _{2.5} & PM ₁₀	PM _{2.5}	PM _{2.5}	PM _{2.5}	PM _{2.5} , PM ₁₀ & PM _{10-2.5}	PM _{2.5} & PM ₁₀	PM _{2.5} & PM ₁₀
Address	1600 E 16th Ave Anchorage	11723 Old Glenn Hwy, Eagle River	4335 Laurel St Anchorage	Harrison Ct Butte	S. Gulkana Palmer	675 7th Ave Fairbanks	3288 Hurst Rd North Pole	397 Hamilton Ave, Fairbanks	809 Pioneer Rd. Fairbanks	Floyd Dryden Middle School, Juneau	4 th Ave, Bethel
AQS ID	02-020-0018	02-020-1004	02-020-0045	02-170-0008	02-170-0012	02-090-0010	02-090-0035	02-090-0040	02-090-0034	02-110-0004	02-050-0001
2. HORIZONTAL AND VERTICAL PLACEMENT	Criteria met, 8 m	Criteria met, 7 m	Criteria met, 7 m	Criteria met, 4 m	Criteria met, 4 m	Criteria met, 6 m	Criteria met, 4 m	Criteria met, 4 m	Criteria met, 4 m	Criteria met, 7 m	Criteria met, 7 m
3. SPACING FROM MINOR SOURCES (a)	Criteria met, neighborhood	Criteria met	Criteria met, max impact site, winter graveled streets	Criteria not met, gravel cul-de-sac**	Criteria met	Criteria met, > 40 m to nearest solid fuel burning appliance	Criteria met	Criteria met	Criteria met, ~160m to Diving Duck Roasters, ~450m to power plant	Criteria met	No, on gravel pad & next to gravel roads
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	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, unrestricted	Criteria met, unrestricted	Criteria met, unrestricted	Criteria met, unrestricted
5. SPACING FROM TREES (a)	Criteria met, >10 m	Criteria met, >10 m	Criteria met, no trees within 200 m	Criteria not met, 5.5 m**	Criteria met, nearest tree > 25 m	Criteria met, >10 m	Criteria met, >10 m	Criteria met, >10 m	Criteria met, none	Criteria met, 12 m tall 25 m away	Criteria met
5. SPACING FROM TREES (c)*			Criteria met								
6. SPACING FROM ROADWAYS	Criteria met, ~14 m to road	Criteria met, 23 & 44 m to roads	Criteria met ¹ , 15 m to road, maximum exposure site	Criteria met, road > 150 m	Criteria met, road > 20 m	Criteria met, 20 m to road	Criteria met, 23 m to road	Criteria met, 23 m to road	Criteria met, ~ 70 m to road	Criteria met, 65 m to road	>30m to 5 th Ave
Changes that might compromise siting?	No	No	No	no	No	No	No	No	New trees 10m	No	No

*Laurel is the only microscale site in Alaska's PM network

** See Butte siting waiver (Appendix F)



2019 Air Quality Monitoring Plan

Table B-2 Summary of Appendix E Forms: CO

	Garden	NCore
Parameter(s)	CO	CO
Address	1600 E. 16th St. Anchorage	809 Pioneer Rd Fairbanks
AQS ID	02-020-0018	02-090-0034
2. HORIZONTAL AND VERTICAL PLACEMENT	Criteria met, 3.1 m	Criteria met, 3 m
3. SPACING FROM MINOR SOURCES	Criteria met, residential	Criteria met, ~160m to Diving Duck Roasters, ~450m to power plant
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 not met, 7.3 meter tall tree 2.3 meters away from probe	Criteria met, none (see comment below)
5. SPACING FROM TREES (c)	Criteria not met, 2.3 m from spruce dripline	Criteria met, no significant trees < 50 m
6. SPACING FROM ROADWAYS	Neighborhood scale but 7.6 meters from roadway	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 not met, 24 seconds	Criteria met, < 5 seconds
Changes that might compromise siting?	No	Trees planted 10 m away from inlet; may be an issue when they grow



2019 Air Quality Monitoring Plan

Table B-3 Summary of Appendix E Forms: O₃, SO₂, NO, NO_x, NO₂, and NO_y

	NCore		
Parameter(s)	O ₃	SO ₂	NO, NO _x , NO ₂ , & NO _y
AQS ID	02-090-0034		
Address	809 Pioneer Rd. Fairbanks		
2. HORIZONTAL AND VERTICAL PLACEMENT	Criteria met, 3m	Criteria met, 3m	Criteria met, 3m
3. SPACING FROM MINOR SOURCES	Criteria met, ~ 160m to Diving Duck Roasters, ~450m to power plant	Criteria met, ~ 160m to Diving Duck Roasters, ~450m to power plant	Criteria met, ~ 160m to Diving Duck Roasters, ~450m to power plant
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
4. SPACING FROM OBSTRUCTIONS (b)	Criteria met, unrestricted 360° airflow	Criteria met, unrestricted 360° airflow	Criteria met, unrestricted 360° airflow
4. SPACING FROM OBSTRUCTIONS (d)			No near-road
5. SPACING FROM TREES (a)	Criteria met, none	Criteria met, none	Criteria met, no significant trees <50 m
5. SPACING FROM TREES (b)		NA	NA
5. SPACING FROM TREES (c)	NA	NA	NA
6. SPACING FROM ROADWAYS	Criteria met, road > ~70m		NA
9. PROBE MATERIAL & RESIDENCE TIME (a)	Glass w/ FEP sample lines	Glass w/ FEP sample lines	Glass w/ FEP sample lines
9. PROBE MATERIAL & RESIDENCE TIME (c)	< 5 seconds	< 5 seconds	< 5 seconds
Changes that might compromise siting?	Trees planted 10 m away from inlet; may be an issue when they grow	Trees planted 10 m away from inlet; may be an issue when they grow	Trees planted 10 m away from inlet; may be an issue when they grow



2019 Air Quality Monitoring Plan

Table B-4 Blank Part 58 Appendix E Form for PM

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



2019 Air Quality Monitoring Plan

Table B-5 Blank Part 58 Appendix E Form for CO

PART 58 APPENDIX E SITE EVALUATION FORM FOR CO					
SITE NAME:		SITE ADDRESS:			
AQ5 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:					

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



2019 Air Quality Monitoring Plan

Table B-6 Blank Part 58 Appendix E Form for O₃

PART 58 APPENDIX E SITE EVALUATION FORM FOR O ₃					
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 ₂ or NO.				
4. SPACING FROM OBSTRUCTIONS	(a) To avoid scavenging, the probe inlet must have unrestricted airflow and be located away from obstacles. The separation distance must be at least twice the height that the obstacle protrudes above the probe inlet.				
	(b) The probe inlet must have unrestricted airflow in an arc of at least 180 degrees. This arc must include the predominant wind direction for the season of greatest pollutant concentration potential.				
5. SPACING FROM TREES	(a) To reduce possible interference the probe inlet must be at least 10 meters or further from the drip line of trees.				
	(c) No trees should be between source and probe inlet for microscale sites.				
6. SPACING FROM ROADWAYS	See spacing requirements table below				
9. PROBE MATERIAL & RESIDENCE TIME	(a) Sampling train material must be FEP Teflon or borosilicate glass (e.g., Pyrex).				
	(c) Sampling probes for reactive gas monitors at NCore must have a sample residence time less than 20 seconds.				
Are there any changes that might compromise original siting criteria? If so, provide detail in comment section.					
Other Comments:					

¹Distance 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.

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



2019 Air Quality Monitoring Plan

Table B-7 Blank Part 58 Appendix E Form for SO₂

PART 58 APPENDIX E SITE EVALUATION FORM FOR SO ₂					
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 ₂ .				
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:					



2019 Air Quality Monitoring Plan

Table B-8 Blank Part 58 Appendix E Form for NO, NOx, NO₂, and NO_y

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



2019 Air Quality Monitoring Plan

Table B-9 Roadway ADT for CO, O₃, SO₂, and NO suite Part 58 Appendix E Forms

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



2019 Air Quality Monitoring Plan

Appendix C Additional Monitoring Projects



2019 Air Quality Monitoring Plan

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. 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. 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. Due to current budget and staffing levels, DEC will not be able to place our own monitors in the field during the 2020 wildland fire season, but will attempt to support and leverage other agencies with sampling equipment to place monitors where needed. The DEC meteorologist or air quality staff with assistance from the National Weather Service (NWS) use meteorological and air monitoring data to forecast smoke movement and predict where air quality impacts might occur.

Volcanic Ash Monitoring

The Alaska Volcano Observatory and DEC will cooperate on volcanic ash monitoring should a volcano begin erupting. DEC uses a PM₁₀ Met One E-BAM with an AIRSIS communication system that allows the DEC meteorologist 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. Various agencies and groups operate the equipment. The site in Anchorage is operated by the Alaska Department of Health and Social Services. The DEC Air Quality Division operates the sites in Fairbanks and Juneau.

Juneau Cruise Ship Ambient Air Impact Saturation Study

The State of Alaska Department of Environmental Conservation (DEC) Water and Air Divisions are studying air quality in Juneau using low cost monitors prior to and during the 2019 cruise ship season. The project is a result of increased public complaints on air emissions from cruise ships and changes to ship operations and numbers.

AS 46.03.488 allows the Department to conduct monitoring of the direct and indirect effects of cruise vessels in Alaska. The last study regarding air quality impacts from cruise ships emissions in Juneau was conducted in 2000. DEC has observed changes to the cruise ship industry such as the increasing size of ships, increased number of port visits, and significant increase in the use of exhaust gas scrubbers on cruise ship engines. The Department also conducts opacity monitoring for compliance with Alaska marine vessel regulations using EPA Reference Method 9.

The Air Monitoring and Quality Assurance Program (AMQA) is conducting a preliminary saturation study in downtown Juneau prior to and during the summer cruise season of 2019 focusing on the overall ambient air quality. As the most visited cruise ship port, Juneau was



2019 Air Quality Monitoring Plan

chosen for this study. A saturation study floods a small area with a large number of low-cost sensors for a short period of time, typically to answer a defined set of questions. The objectives are to:

- address ambient air quality complaints centered on the cruise ship industry emissions;
- determine which areas of downtown Juneau are most affected (maximum impact locations); and
- assess if the scale in terms of frequency, duration, spatial variability and severity of these impacts has the potential to significantly affect public health and/or violate Clean Air Act air quality standards.

The saturation study uses a tightly spaced grid of low cost particulate monitors ($PM_{2.5}$) and several passive sulfur dioxide (SO_2) monitors to meet these objectives. $PM_{2.5}$ is commonly used as an indicator of exhaust plumes. Elevated SO_2 samples may confirm that the plume(s) originate from cruise ships as Juneau has no significant sources of SO_2 . The pollutant data will be combined with wind speed and wind direction information, prior to and during the cruise ship season, to characterize pollution events affecting downtown Juneau. Depending on the results from the 2019 saturation study and availability of funding, DEC may conduct a more in-depth study that could include monitoring for additional pollutants and the use of higher cost/higher accuracy monitoring equipment or may establish a long term air quality monitoring network in downtown Juneau to provide a reliable baseline of air quality conditions.



2019 Air Quality Monitoring Plan

Appendix D Improve Network



2019 Air Quality Monitoring Plan

The Alaska Regional Haze 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) 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>.



2019 Air Quality Monitoring Plan

Appendix E NAAQS Summary Tables



2019 Air Quality Monitoring Plan

Table E-1 PM_{2.5} DV under local/actual conditions (µg/m³); exceedance exceptional event values not included

PM _{2.5} Monitoring Sites	AQS Site ID	98 th Percentile			Weighted Annual Mean			2018 Design Value	
		2018	2017	2016	2018	2017	2016	24-hour	Annual
Garden/ Anchorage	02-020-0018	17.7	26.9	16.1	5.4	5.5	6.5	20	5.8
Parkgate / Eagle River	02-020-1004	14.4	15.4	13.8	5.1	4.2	4.1	15	4.7
Butte/ Matanuska-Susitna Valley	02-170-0008	19.2	29.7	29.2	4.6	5.7	5.8	26	5.3
Palmer/ Matanuska-Susitna Valley	02-170-0012	8.5	11.1	9.2	3.3	3.2	2.8	10	3.0
State Office Building/ Fairbanks	02-090-0010	27.0*	38.0	39.7	7.6*	9.1*	8.8	35	8.5
NCore Site/ Fairbanks	02-090-0034	25.3	34.4	30.3	7.3	8.6	9.1	30	8.3
Hurst Rd/ North Pole	02-090-0035	52.8	75.5	66.8	10.8	14.0	13.7	65	12.8
A Street/Fairbanks	02-090-0040	-**	-	-	-	-	-	-	-
Floyd Dryden/Juneau	02-110-0004	22.1	22.4	24.0*	6.9	5.6	6.0*	23	6.2
Bethel	02-050-0001	-**	-	-	-	-	-	-	-

* Annual values did not meet data completeness criteria.

**Did not meet completeness; A Street began operation 11/29/18 Bethel began operation 6/6/18



2019 Air Quality Monitoring Plan

Table E-2 DV O₃ (ppb)

O ₃ Monitoring Sites	Site ID	2018			2017			2016			3-Years	
		Valid Days	Percent Compl	4 th Max	Valid Days	Percent Compl	4 th Max	Valid Days	Percent Compl	4 th Max	Percent Compl	Design Value
NCore/ Fairbanks	02-090-0034	324	89	0.041	277	76	0.048	207	97	0.036	87	0.041

Table E-3 DV SO₂ (ppb)

SO ₂ Monitoring Sites	Site ID	2018		2017		2016		3-yrs Design Value
		99 th Percentile	Completed Quarters	99 th Percentile	Completed Quarters	99 th Percentile	Completed Quarters	
NCore/Fairbanks	02-090-0034	37	4	35	4	35	4	36

Table E-4 DV NO₂ (ppb)

NO ₂ Monitoring Sites	Site ID	2018		2017		2016		3-yrs Design Value
		98 th Percentile	Completed Quarters	98 th Percentile	Completed Quarters	98 th Percentile	Completed Quarters	
NCore/ Fairbanks	02-090-0034	53.8	4	54.5	4	54.9	3	54



2019 Air Quality Monitoring Plan

Table E-5 PM₁₀ DV under standard conditions (µg/m³); exceedance exceptional event values not included

PM ₁₀ Monitoring Sites*	Site ID	2018			2017			2016		
		Exceed- ances	1 st Max 24-hr	2 nd Max 24-hr	Exceed- ances	1 st Max 24-hr	2 nd Max 24-hr	Exceed- ances	1 st Max 24-hr	2 nd Max 24-hr
Garden/ Anchorage	02-020-0018	0	59	59	0	68	65	0	88	84
Laurel/Anchorage	02-020-0045	0	128	102	0	99	87	0	90	76
NCore/ Fairbanks	02-090-0034	0	72	59	0	37	36	0	80	69
Butte/ Matanuska-Susitna Valley	02-170-0008	0	52 (187& 155 high wind EEs)	49	0	113	107	0	63	83
Palmer/ Matanuska-Susitna Valley	02-170-0012	0	131 (255 high wind EE)	80	1	156	119	0	112 (178 high wind EE)	94
Bethel	02-050-0001	0	108**	104**	--	--	--	--	--	--

* See Juneau and Eagle River Limited Maintenance Plans for Floyd Dryden and Parkgate

** Began operation 6/6/18; did not meet completeness



2019 Air Quality Monitoring Plan

Appendix F EPA Butte Siting Waiver



**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.

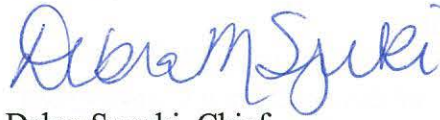
Region 10 agrees with your assessment that the spacing from roadways requirement, as specified in 40 CFR Part 58, Appendix E §6, is met for the Butte air monitoring station. The vehicle traffic at this location is minimal and sufficiently offset from the ambient air monitoring station such that the requirements 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 PM₁₀ and PM_{2.5} measurements at this ambient air monitoring station. As such, Region 10 approves a waiver from the 40 CFR Part 58, Appendix E §5 siting requirements for this site. This waiver is in effect for five years from the date of this letter.

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

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

Sincerely,



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



2019 Air Quality Monitoring Plan

Appendix G EPA Ozone Monitoring Waiver

Adopted

2019 Air Quality Monitoring Plan



**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,

A handwritten signature in black ink, appearing to be "Gina Bonifacino".

Gina Bonifacino
Acting Manager, Air Planning Unit



2019 Air Quality Monitoring Plan

Appendix H EPA Lead Monitoring Waiver

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY****REGION 10**

1200 Sixth Avenue, Suite 900
Seattle, WA 98101-3140

AUG 11 2016

OFFICE OF
AIR AND WASTE

Ms. Denise Koch
Director, Division of Air Quality
Alaska Department of Environmental Conservation
410 Willoughby Avenue, Suite 303
Juneau, Alaska 99811-1800

Dear Ms. Koch:

In your letter dated April 14, 2016, Alaska Department of Environmental Conservation requested a waiver of the lead monitoring requirements at the Red Dog Mine based on the results of dispersion modeling conducted by your staff. The Red Dog Mine is a source of lead emissions exceeding 0.5 tons/year which requires lead monitoring as specified in 40 C.F.R. Part 58, Appendix D, section 4.5(a).

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). The modeling approach and protocol for the Red Dog Mine conducted by ADEC were consistent with the EPA's guidance, and were approved by the EPA. The results of this modeling demonstrates that the maximum ambient air 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.

The approval and existence of this lead source-monitoring waiver for the Red Dog Mine should be identified in the next Alaska 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.

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 for renewal must be submitted to EPA 120 days prior to the expiration of this waiver. The formal request to renew the lead source-monitoring waiver must demonstrate that the site conditions for which the previous modeling was conducted are still appropriate. 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.

If you have any questions on this subject, please have your staff contact Mr. Keith Rose at (206) 553-1949 or rose.keith@epa.gov.

0103 1 1 2019

Sincerely,

A handwritten signature in blue ink that reads "Tim Hamlin". The signature is written in a cursive, flowing style.

Timothy B. Hamlin
Director

cc: Ms. Barbara Trost
ADEC

Ms. Deanna Huff
ADEC



2019 Air Quality Monitoring Plan

Appendix I EPA Approval for Shutdown of SOB Site and Relocation of Site to A Street



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10**

1200 Sixth Avenue, Suite 155
Seattle, WA 98101-3123

JUN 26 2019

2019 Air Quality Monitoring Plan

AIR & RADIATION
DIVISION

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 15, 2019, correspondence requesting to modify the existing PM_{2.5} ambient air monitoring network for the Fairbanks PM_{2.5} nonattainment area. In this correspondence you requested to discontinue the operation of the State Office Building ambient air monitoring station (AQS ID: 02-090-0010) and relocate the PM_{2.5} sampling equipment to the proposed Fairbanks A-Street monitoring station (AQS ID: 02-090-0040).

My staff completed the review of the information you provided. We agree that the results of your 2018/2019 winter season study demonstrate that the A-Street location is more representative of the general Hamilton Acres neighborhood area than the State Office Building location. Your study also indicates that the A-Street monitoring location also experiences wintertime PM_{2.5} daily concentrations higher than the State Office Building station. Per 40 CFR 58.14(c) the EPA can approve the discontinuation of a State and Local Air Monitoring Station (SLAMS) monitor if implementation of the NAAQS is not compromised and the requirements of 40 CFR Part 58, Appendix D continue to be met.

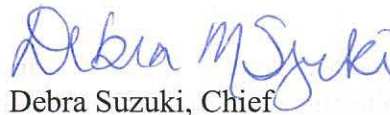
My office consulted the EPA's Office of Air Quality Planning and Standards regarding your request. Through that conversation we determined that because the Hurst Road monitoring station (AQS ID: 02-090-0035) is the controlling design value monitor for the Fairbanks nonattainment area, implementation of the NAAQS will not be compromised by discontinuing the State Office Building monitoring station to establish the A-Street monitoring station. The regulatory PM_{2.5} monitoring network size will not be changed through this network modification, so the minimum PM_{2.5} network size requirements specified in 40 CFR Part 58, Appendix D will continue to be met by ADEC for the Fairbanks Metropolitan Statistical Area.

Region 10 approves the relocation of the State Office Building air monitoring samplers (AQS ID: 02-090-0010) to the A-Street Station (AQS ID: 02-090-0040). Region 10 approves the shutdown of the SLAMS PM_{2.5} State Office Building station during CY 2019, with the specific date for the shutdown during CY 2019 to be determined by ADEC to best meet the logistical requirements of establishing the A-Street station prior to the start of the 2019/2020 winter season. As resources permit, the EPA encourages ADEC to continue the operation of the State Office Building air monitoring station through the end of CY 2019 in addition to establishing the A-Street monitoring station this year. This would allow for the computation of a more statistically valid design value at the State Office Building monitoring station. However, priority should be given to establishing the A-Street monitoring station

with a regulatory monitoring method as soon as possible over continuing to operate the FRM sampler at the State Office Building air monitoring station if resource constraints arise. The PM_{2.5} monitor for the A-Street station will be designated as a SLAMS monitor in AQS for the Fairbanks North Star Borough network when this monitor becomes operational in CY 2019. Note that we would not be able to use the monitoring data from the A-Street station for determining attainment until there is a valid 3-year design value, 2020-2022 would be the earliest.

Thank you for performing the parallel monitoring study to assess the A-Street station's representativeness for this PM_{2.5} monitor relocation. Please continue to keep my staff informed as the State Office Building station is discontinued and when the A-Street station becomes operational. If you have any questions regarding this SLAMS relocation approval, please contact me at (206) 553-0985 or Doug Jager at (206) 553-2961.

Sincerely,



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

DRAFT AIR QUALITY MONITORING PLAN

2017-2018

Fairbanks North Star Borough

July 13, 2017

Prepared by:
FNSB Air Quality Division
3175 Peger Road
Fairbanks, AK 99709

Table of Contents

	Page
List of Tables	iii
List of Figures	iii
A. Introduction	4
a. Background	4
b. Roles and Responsibilities	4
B. Monitoring Program Purpose	5
C. Site Selection	6
a. Process (AQ Working Group)	6
b. Site Locations	7
D. Task description	8
a. Description of Work	8
b. Schedule of Activities	8
E. Data Acquisition	8
a. Sampling Methods	8
b. Sampling Equipment	8
c. Sampling System Corrective Action	9
F. Instrument/Equipment Testing, Inspection, and Maintenance	10
a. Quality Assurance and Quality Control (QA/QC)	10
b. Equipment Inspection	10
G. Data Management	11
a. Data Recording	11
b. Data Validation	11
c. Data Transmittal	11
d. Data Analysis	11
H. Assessment and Oversight	12
a. Reporting	12

List of Tables

	Page
Table 1. Anticipated project timeline.	8
Table 2. Equipment required for data collection, transmittance and regular maintenance.	9
Table 3. Monitor maintenance and frequency; MetOne Neighborhood Monitor (NHM), personal DataRAM (pDR).	10

List of Figures

	Page
Figure 1. Fairbanks North Star Borough (FNSB) Air Quality Division’s proposed monitor locations.	7

A. Introduction

a. Background

In December of 2009, the EPA designated a part of the Fairbanks North Star Borough (FNSB) as a non-attainment area for particulate matter 2.5 microns in diameter or smaller (PM_{2.5}). Prior to July 2016 the FNSB had operated multiple regulatory monitoring sites and special purpose monitoring stations in the Borough, per the Memorandum of Understanding between the Alaska Department of Environmental Conservation (ADEC) and FNSB. In July of 2016 FNSB returned regulatory air quality monitoring responsibilities to ADEC. The FNSB Assembly passed Ordinance No. 2016-20-1A on August 11, 2016 which appropriated \$290,400 to fund the Community-Based Air Quality Monitoring Program for fiscal years FY17, FY18, and FY19. In June of 2017, the EPA re-classified the FNSB PM_{2.5} non-attainment area as a serious area.

Extensive ambient air monitoring has been completed in the non-attainment area, ranging from regulatory monitors to mobile monitors, and a continuation of varied monitoring programs is needed to:

- Further the understanding and extent of the PM_{2.5} pollution;
- Provide the FNSB and the public with actionable information; and,
- Gauge progress towards attainment of the ambient standard.

b. Roles and Responsibilities

Stakeholders in the community monitoring program include: FNSB, ADEC, Mayor's Air Quality Working Group, and Contractor(s). Responsibilities of each stakeholder under this monitoring plan are as follows:

FNSB Staff	Manage the community monitoring program including project coordination amongst stakeholders, contract management, and budgeting. Perform monitor calibration, data management, and data validation.
Contractor	Router installation/configuration, monitor installation and maintenance, and monitor inspection.
ADEC	Hosting online data services for personal DataRAMs (pDR), loan six (6) pDR units to FNSB, and providing review/feedback on monitoring plan.
AQ Working Group	Develop purpose for community monitoring program.

B. Monitoring Program Purpose

On June 9th, 2017 the Mayor's air quality working group met to determine the purpose of the local monitoring program. The purpose of the FNSB monitoring program, ranked in order of importance is to:

1. Provide select elementary schools with local real time PM_{2.5} data for decision making, and to display the data for public access;
2. Continue to gather data at previous monitoring sites for continuity;
3. Delineate and gather additional data on hot spots;
4. Co-locate Met One Neighborhood Monitor (NHM) with pDR monitors to develop a correlation; and,
5. To monitor areas of interest where possible air flow drainage into the Air Quality Control Zone (AQCZ) may show PM_{2.5} transfer from areas outside the AQCZ.

C. Site Selection

a. Process (AQ Working Group)

At the June 9th meeting of the Mayor's AQ working group monitor locations were determined. Beginning with pDR monitors, the working group listed numerous proposed monitor locations, primarily at elementary schools in the Borough. Each proposed pDR location was discussed using the ranked purposes in section B as criteria until consensus was reached on the twelve locations for pDR monitors. Due to the uncertainty of data quality from the NHM monitors, the working group reached consensus that eleven of the NHM monitors would be colocated with each pDR monitor for the purpose of determining data quality and possibly a correlation or correction factor. The remaining NHM locations were determined by consensus using the ranked purposes in section B as criteria. Site locations are as follows:

2017/2018 pDR monitor proposed site locations:

- North Pole Elementary (2016 site) (collocated NHM)
- Badger Rd Elementary (2016 site) (collocated NHM)
- Nordale Elementary (2016 site) (collocated NHM)
- Watershed Elementary (2016 site) (collocated NHM)
- Peger Rd. AQ Office (2016 site)
- Ticasuk Brown Elementary (collocated NHM)
- Hunter Elementary (collocated NHM)
- Ann Wien Elementary (collocated NHM)
- Woodriver Elementary (collocated NHM)
- Bradway and Dennis Fire Station (collocated NHM)
- Badger and Plack Christian School (collocated NHM)
- Rental on Redstone Rd North Pole (collocated NHM)

2017/2018 NHM proposed site locations:

- Tanana Middle School
- Joy Elementary
- University Way Transfer site (West Farmers Loop)
- Alyeska NP site on Nelson
- Jim W. private home
- Chena Lakes Maint. Shop

b. Site Locations

FNSB Air Quality Proposed Monitor Locations



Figure 1. Fairbanks North Star Borough (FNSB) Air Quality Division's proposed monitor locations.

D. Task description

a. Description of Work

Thirty two low cost air quality monitors will be deployed within the AQCZ to monitor $PM_{2.5}$ concentrations at select locations. NHMs will be collocated with pDR units to determine the agreement between the monitoring devices under sub-Arctic conditions. pDR data will be autonomously displayed on the ADEC website and made available to the public. Due to data quality concerns, NHM data will only be available internally to ADEC and FNSB staff.

b. Schedule of Activities

Table 1. Anticipated project timeline.

	2017						2018							
	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Request for Proposal														
Purchasing														
Setup/Testing														
Data Collection														
Retrieval														
Data Analysis														

E. Data Acquisition

a. Sampling Methods

Sampling will be conducted using pDRs and NHMs; continuous and stationary nephelometers used for the detection of $PM_{2.5}$. Twenty NHMs and twelve pDRs will be deployed throughout the FNSB, eleven of these sites will be used to collect data from a collocated NHM and pDR for comparability (Fig. 1). At sites of collocation, pDR units will be placed inside a warm building with the air-intake tube running directly outside. The air intake will be outfitted with a 110 VAC pipe heater in order to heat the incoming air to approximately 0 °C to insure small ice crystals do not skew $PM_{2.5}$ concentrations. NHM monitors will operate entirely outside of the heated building. Both air intakes at collocated sites will be positioned at the same height and will be within 3m of one another.

b. Sampling Equipment

All nephelometers (NHM and pDRs) are already in hand and, those requiring it, will be calibrated before the winter season. The FNSB currently has four WR-11 routers available for data transmittance from the pDRs. The 2016-2017 monitoring contractor recommends that all future router purchases are the newer 4G LTE compatible WR-21 units and that the older WR-11 routers are replaced with the same.

Table 2. Equipment required for data collection, transmittance and regular maintenance.

Item	Description	Current Quantity
pDR	Aerometric nephelometer with adjustable particle size selecting cyclone	12
NHM	Aerometric nephelometer with fixed particle size selecting cyclone	20
Router (Digi WR-11)	3G/4G LTE cellular router for wireless data uplink	4
BGI TetraCal	NIST Traceable Standard for volumetric airflow calibrator	1
934-AH Filters	Whatman glass microfiber filters	200

c. Sampling System Corrective Action

Data from the Peger Road monitor located at the Air Quality office is not of particular interest to meet the purpose of the monitoring plan, but is placed at the Air Quality office for troubleshooting purposes. In addition, the pDR located at the Air Quality office will be utilized as a backup in the event of a mechanical failure at one of the other sampling locations. If any of the eleven NHMs collocated with a pDR requires maintenance, a solitary unit will be relocated to continue the data collection at the collocated location.

F. Instrument/Equipment Testing, Inspection, and Maintenance

a. Quality Assurance and Quality Control (QA/QC)

QA/QC will comply with select components of the EPA's *QA Handbook Volume II, Appendix D*. Flow rate will be verified according to the schedule in Table 3, NHM monitors must remain within 10% of the 2.0 liters per minute (lpm) flow rate and pDRs will remain within 10% of the 1.52 lpm flow rate. A leak check will be performed monthly. Maintenance and calibration will be conducted at least as frequently as described in Table 3. Filter changes and cleaning may require more frequent attention if PM_{2.5} concentrations are high for an extended period, it will be the contractor's duty to determine if the monitors will require a more frequent maintenance schedule.

Table 3. Monitor maintenance and frequency; MetOne Neighborhood Monitor (NHM), personal DataRAM (pDR).

Monitor	Maintenance Item	Frequency
pDR	Filter change	3-7 Days
	Clean cyclone	3-7 Days
	Flow audit	3-7 Days
	Background check/zero	3-7 Days
	Leak check	1 Month
	Factory service/calibration	12 Months
NHM	Clean sharp-cut cyclone	Biweekly
	Clean particle trap	Biweekly
	Clean inlet	Biweekly
	Flow audit	Biweekly
	Leak check	1 Month
	Factory service/calibration	24 Months

b. Equipment Inspection

Monitors will be inspected on a weekly basis to verify they are in proper working condition. Inspection will include verification of power, warming and restarting if required, removal of ice, snow and frost. Any damaged items will be documented, reported and repaired if possible as soon as can be feasibly done.

c. Pre and Post sampling linearity testing

Monitors will be located next to a Met One BAM for 24-72 hours at the beginning and end of the winter to determine a correlation to the BAM data. This linearity test can be used to adjust the data for final data validation and analysis.

G. Data Management

a. Data Recording

NHM

NHMs, connected to the internet, interface with the MetOne cloud based service, “GroveStreams.” The data is stored in the cloud for two years. A responsible party at the FNSB Air Quality Division will ensure that data is downloaded from the cloud regularly and at the end of the season to secure and backup the data.

pDR

pDRs connect to the internet through Digi TransPort routers. Data will be available through ADEC, a responsible party at the FNSB Air Quality Division will ensure that data is downloaded from ADEC and/or the pDRs regularly, and at the end of the season, to insure the data is backed up and secured.

b. Data Validation

It will be assumed that the monitors are functioning optimally for the duration between two equipment checks and flow verification passes. These equipment checks will be conducted on a weekly basis, verifying the past weeks’ worth of data collection. In the event of a failed test, the data collected from the last passed check and flow verification will be flagged, and will be excluded from future analyses. A responsible party at the FNSB Air Quality Division will perform weekly data validation.

c. Data Transmittal

NHM

NHMs are turn-key systems outfitted with a stock cellular based router. The units will be set up by the technician and accessed through the unique URLs provided by MetOne. Due to data quality concerns, these data will be for internal use only and not made available to the public.

pDR

pDR data will be connected to a remote server and transmitted via the wireless router at least four times per minute. Hourly averages will be displayed on the ADEC real-time AQ page as both actual concentration of PM_{2.5} and Air Quality Index (AQI). The borough currently has four DigiTransport WR-11 wireless routers but more will need to be purchased and setup by the contractor. If possible, retirement of the older WR-11 routers (3G) for the newer WR-21 (4G) is advised to improve coverage and connectivity.

d. Data Analysis

Data analysis will be conducted using statistical computing software. Expected products include regressions of each pDR and NHM pairing to determine the strength of correlation of the pair. A Bland-Altman Plot, or other appropriate test, will be used to show whether the paired nephelometers differ significantly from one another ($p \leq 0.05$). 95% confidence intervals will be determined for NHMs for use with future deployments. Data analysis will be conducted by FNSB staff or another qualified entity.

H. Assessment and Oversight**a. Reporting**

Monitor failures, estimated repair time and return to service will be documented by the contractor and reported to FNSB within one week. A detailed record of date, time and location will be kept of monitor placement and movements. Weekly maintenance and activity logs will be kept by the contractor and provided upon request. Regular communication with the contract manager will take place as often as once per week.

b. Data interpretation and summary report