Alaska Department of Environmental Conservation Annual Air Quality Monitoring Network Plan

June 2015

Air Quality Division

Air Monitoring
&
Quality Assurance
Program

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EXECUTIVE SUMMARY

This 2015 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 2016.

The State of Alaska monitoring priorities have remained the same. DEC is not actively engaged in monitoring for airborne lead (Pb). The source-oriented Pb monitoring program intended for the Red Dog Mine is not feasible due to the remote and rugged terrain. DEC is currently working on an updated modelling protocol for submission to EPA. After receiving EPA approval DEC expects to run the model and generate a final report on the modelling and waiver request within two months.

Changes to the network in 2014 included the shutdown of several sites. The Anchorage Turnagain CO State and Local Air Monitoring site (SLAMS) site and the Fairbanks CO SLAMS site in the Old Post Office were shut down. The Special Purpose Monitoring sites in Wasilla, Soldotna and Fairbanks (Hamilton Acres, North Pole Water) were also shut down entirely. The ozone monitor was moved from Wasilla to Palmer. The SPM maximum exposure PM_{10} site in Anchorage was shut down and is in the process of being relocated. In 2015 the collocated $PM_{2.5}$ Federal Reference Monitor (FRM) was moved from the Butte site to the Juneau Mendenhall Valley and the collocated $PM_{2.5}$ FRM in Palmer and the PM_{10} FRM in Butte were removed.

Most of the remaining 2015 network will stay in place for 2016. The main change is a re-designation of the North Pole Fire Station from a SPM site to a SLAMS site.

To further support monitoring efforts in rural Alaska, DEC set up a $PM_{2.5}$ monitoring program in Yakutat and proposes a site in Bethel.

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 use:
  - federal reference method (FRM), or
  - federal equivalent method (FEM)
- multi-pollutant stations (NCORE)
- $PM_{2.5}$ chemical speciation network stations (CSN), and
- special purpose monitoring (SPM) stations.

The plan shall include a statement of purposes 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, the Regional Administrator is not required to provide a separate opportunity for comment.

This 2015 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 2016. This plan shall include all required stations to be operational by January 1, 2016. Specific locations for the required monitors shall be included in the annual network plan submitted to the EPA Regional Administrator by July 1, 2015.

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,

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 MSA, CBSA, CSA or other area represented by the monitor,
10. The designation of any lead monitors as either source-oriented or non-source-oriented according to 40 CFR 58, Appendix D,
11. Any source-oriented monitors for which a waiver has been requested or granted by the EPA Regional Administrator as allowed for under paragraph 4.5(a)(ii) of 40 CFR 58, Appendix D,
12. Any source-oriented or non-source-oriented site for which a waiver has been requested or granted by the EPA Regional Administrator for the use of Pb-PM_{10} monitoring in lieu of 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 (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), ozone (O_3), and lead (Pb). Particulate matter has two associated NAAQS: one for fine particulate matter less than 2.5 micrometers in aerodynamic diameter ($PM_{2.5}$) and one for coarse particulate matter less than 10 micrometers in aerodynamic diameter (PM_{10}). Threshold limits established under the NAAQS to protect human health are known as primary standards. The primary health standards are to protect the most sensitive of the human population, including those people with existing respiratory or other chronic health conditions, children, and the elderly. Secondary standards established under the NAAQS are to protect the public welfare and the environment. Since promulgation of the original CAA, the EPA has continued to revise the NAAQS based on its assessment of national air quality trends and on current (and ongoing) health studies.

To protect public health and assess attainment 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 (Matanuska-Susitna) Valley have the bulk of the 710,231[1] people in the state, about 54%. The remainder of the population is distributed among the cities of Juneau and Fairbanks with populations of about 30,000-40,000 and many scattered and isolated small villages, most of which are off the road system and have populations ranging

[1] Population data obtained from the 2010 US Census, http://live.laborstats.alaska.gov/cen/dp.cfm

from 16 to 10,000 people. The total area of the state is approximately 656,425 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 complaints.

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 eight primary issues by descending priority:

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

2.1 *Fine Particulate Matter - $PM_{2.5}$*

The primary sources of fine particulates in the atmosphere are emissions from combustion processes. Health research in the lower 48 states and Alaska has found that $PM_{2.5}$ sized particles are creating major health problems throughout communities across the United States. For people in northern states with cold winters, this problem is exacerbated by increased exposure to fine particulate generated by home heating with wood during periods of extreme cold and extended wintertime temperature inversions which trap pollutants close to ground level. Smoke can also be a severe problem during spring and summer wildland fire season. Wildland fires may occur throughout Alaska but are very common to the Interior.

[2] Geographical data obtained from NetState.com, http://www.netstate.com/states/geography/ak_geography.htm

Wood smoke from home heating has been a major contributor to elevated fine particulate levels in Southeast Alaska for years. Juneau's Mendenhall Valley exceeded the PM_{10} standard[3] numerous times in the late 1980s and early 1990s, but successfully reduced particulate matter levels with an effective wood smoke control program, public education, and woodstove conversion to pellet stoves and oil-fired space heaters.

Fine particulates have also been a concern in some Interior Alaska communities, especially during the winter months when extremely strong inversions trap emitted particles close to the surface. In the smaller, rural villages, this problem is normally associated with wood smoke. In the large communities like Fairbanks, which is designated as non-attainment for the 24-hour $PM_{2.5}$ NAAQS, the pollution is a mix primarily comprising wood smoke from woodstoves and hydronic heaters, but also including emissions from coal-fired power plants, vehicular traffic, and oil-fired heating systems.

2.2 *Coarse Particulates - PM_{10}*

PM_{10} or "dust" impacts are widespread throughout Alaska and have been a pollutant of concern for over 40 years. PM_{10} has been monitored in Anchorage, Juneau, the Matanuska-Susitna Valley, and Fairbanks for over twenty years. Two locations in the State were designated non-attainment for dust in 1991: the Municipality of Anchorage (Eagle River) and the City and Borough of Juneau (Juneau).

Dust has also been identified as a problem in most of the rural communities in Alaska. With the exception of the "hub" communities, most of the smaller villages have a limited road system and few resources with which to pave roads. In addition, the soil composition is often frost susceptible and not conducive to paving. With the recent addition of all-terrain vehicles (4-wheelers) and more automobiles and trucks, the amount of re-entrained dust has increased substantially.

2.3 *Carbon Monoxide-CO*

Alaska's two largest communities, Anchorage and Fairbanks, were designated non-attainment for carbon monoxide (CO) in the mid to late 1980s. Motor vehicle CO emissions increase in the cold winter temperatures experienced in Alaska. These elevated emissions, combined with strong wintertime temperature inversions, resulted in both communities exceeding the CO standards numerous times each winter. Due to the implementation of control strategies, such as public use of engine block heaters and improvement to vehicle ignition systems, neither community has had a violation of the CO standard in almost 15 years. Both communities requested re-designation to attainment and were reclassified as *Limited Maintenance Areas* in 2004.

[3] There was no separate NAAQS for $PM_{2.5}$ prior to 1997 - $PM_{2.5}$ fell under the PM_{10} NAAQS.

2.4 *Lead Monitoring-Pb*

To comply with the November 2008 revision of the state and federal air quality standard for lead, DEC explored establishing a source-oriented, lead monitoring site near the Red Dog Mine in Alaska's Northwest Arctic Borough. The Red Dog Mine, fifty miles inland, extracts lead and zinc ore from an open-pit mine and concentrates the ore at their processing facility for transport to the coast where it is stored for barging and eventual export. The intent of the revised lead standard was source-oriented monitoring for all facilities that had potential annual emissions equal to or greater than one half ton of lead. The Red Dog Mine is the state's only emission source that meets this criterion. The area around the mine is extremely remote, rugged terrain with no road access and no access to power. Initially, a monitoring location was selected in the Native Village of Noatak, the closest community to the Red Dog Mine. EPA sanctioned the change in the monitoring strategy from source-oriented to population-oriented because of Alaska's rural character. The monitoring site was established in January 2010 and operated periodically through the middle of August 2011. The site consisted of collocated high volume samplers which collected samples for total suspend particulate (TSP). Filter analysis was performed at the Anchorage DEC Environmental Health laboratory. The site was finally shut down after DEC was unable to hire and maintain consistent local site operations using local residents. Several attempts to work through the tribe or by establishing private contracts were ultimately unsuccessful. Only two sampling periods yielded sufficient data to report to AQS, one from 1/13/2010 to 6/30/2010 and a second one from 6/6/2011 to 8/14/2011.

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. For this alternative demonstration the modeled lead concentration outside the ambient air boundary has to be less than 50% of the NAAQS. Under 40 CFR 58, Appendix D, section 4.5 (ii) DEC submitted a modeling protocol on October 23, 2012 as part of a waiver request to avoid the monitoring requirement. After initial review EPA requested updated information for the model's emissions inputs. EPA, DEC, and Red Dog Mine cooperatively set a schedule for submission of the updated information. Additional soil sampling was required to adequately determine emission factors for the gravel roads. Laboratory analysis of the required soil sampling was completed in August, 2014. DEC and EPA reviewed and approved the laboratory analysis report. The EPA subsequently approved the new emissions inventory and DEC plans to rerun the modeling and anticipates to generate a final report within six months after the last approval and updated timeline is now August, 2015. Currently, DEC is waiting for the mine to send updated coordinates to finish the modeling protocol. The next step, the modeling protocol from DEC to EPA, is anticipated to be completed by the end of May, 2015. Should the modeling show that lead levels around the mine ambient boundary exceed 50% of the lead standard, the Red Dog Mine will be required to start a monitoring program. At that point DEC will work with the mine to select a site and develop a schedule for the start-up of the monitoring project.

2.5 *Ozone Monitoring-O_3*

The March 27, 2008 revision of the national ozone standard required the State of Alaska to establish an O_3 monitoring program by April 1, 2010. The regulation required at least one State and Local Air Monitoring (SLAMS) O_3 site in a core based statistical area (CBSA) with a population greater than 350,000. The Anchorage/Matanuska-Susitna Valley population forms the only combined Metropolitan Statistical Area (MSA) in the State of Alaska which meets the criterion. The MOA Garden site was selected as a metropolitan site. Monitoring was conducted during O_3 season from 2010 through 2012. An O_3 monitoring site was also established in Wasilla in May 2011 and was moved to Palmer in May 2015. The multi-pollutant NCORE site in Fairbanks began monitoring for O_3 in 2012.

2.6 *Sulfur Dioxide Monitoring-SO_2*

The State of Alaska currently has no MSA which would require SO_2 monitoring under 40 CFR 58, Appendix D, paragraph 4.4.2. The only continuous SO_2 monitoring currently being performed in Alaska is at the NCORE site in Fairbanks. Monitoring for SO_2 was performed in Southeast Alaska in the 1980s and early 1990s in response to public concerns about emissions from the two regional pulp mills. While elevated concentrations were observed during the monitoring, the 8-hour SO_2 standard at the time was not exceeded. With the revision of the SO_2 standard and introduction of the 1-hour standard, additional monitoring in rural communities may be warranted. Short term studies in St. Mary's and Fairbanks indicate a potential for exceedances of the SO_2 standard during the winter time. Especially in light of the ubiquity of diesel power generation in rural Alaska, elevated SO_2 levels might be a widespread issue. A short-term monitoring program was conducted in the City of Eagle Alaska during the winter of 2013-14 due to public health concerns related to emissions from an underground shale-oil fire. No elevated concentrations were observed. As staffing and funding allow, DEC will conduct studies in rural communities to better understand the issue.

2.7 *Nitrogen Oxides Monitoring-NO_2 and NO_y*

Nitrogen oxides are a group of air pollutant compounds that primarily form during combustion and then react photo-chemically in the atmosphere to form secondary pollutants. This group of pollutants were consolidated and are regulated as a single pollutant under the NAAQS as nitrogen dioxide (NO_2). The State of Alaska currently has no MSA which would require NO_2 monitoring under 40 CFR 58, Appendix D, paragraph 4.3. However, the NCORE site in Fairbanks has been monitoring for NOy and NOy-NO since 10/5/2012 and NO_2 and NOx since 7/1/2014. Historically, NO_2 monitoring was conducted as part of the Unocal Tesoro Air Monitoring Program (UTAMP) conducted in North Kenai during the early 1990s. The state operated its own independent monitoring site and measured ammonia and NO_2. Elevated short term NO_2 values were observed, but the annual concentration was not exceeded.

With the revision to the NO_2 standard and introduction of the 1- hour NO_2 standard, DEC will have to evaluate if and where additional monitoring will be warranted.

As part of the multi-pollutant monitoring program and in an effort to better understand atmospheric chemistry in a PM2.5 non-attainment area, total reactive nitrogen compounds (NO_y) and ammonia (NH_3) monitors were installed at the NCORE site in Fairbanks. Unfortunately, due to instrument response-time and other technical instrumentation issues, the NH_3 monitoring program failed and the monitor was taken out of service. The instrument was replaced with an $NO_X/NO/NO_2$ trace-level monitor in February 2014 and started producing AQS quality data by July 2014.

3 STATE OF ALASKA AMBIENT AIR MONITORING NETWORK

3.1 *Current Monitoring Sites*

DEC operates and maintains a number of ambient air monitoring networks throughout the State of Alaska and provides technical support and oversight for air monitoring sites operated by the local air quality agencies in the Municipality of Anchorage (MOA) and the Fairbanks North Star Borough (FNSB). Table 3-1 provides the site name, address, geographic coordinates, and identification number for all the air monitoring sites submitting data to the EPA Air Quality System (AQS) database as of July 1, 2015.

Table 3-1. AQS Monitoring Sites as of May 2015

Site Name	Address	Latitude/ Longitude*	AQS Identification	Agency
Garden	3000 East 16th Ave. Anchorage, AK	61.205861N -149.824602W	02-020-0018	DEC
Laurel	4335 Laurel St. Anchorage, AK	61.181312N -149.834083W	02-020- 0051	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	FNSB
NCORE	809 Pioneer Road Fairbanks, AK	64.845307N -147.72552W	02-090-0034	FNSB
North Pole Fire Station #3	3288 Hurst Rd. North Pole, AK	64.762973N -147.310297W	02-090-0035	FNSB
Butte	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
Floyd Dryden Middle School	3800 Mendenhall Loop Road Juneau, AK	58.388889N -134.565556W	02-110-0004	DEC

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

Figure 3-1 shows the State of Alaska air monitoring networks that report to the EPA AQS database. Regional maps show the general monitoring site locations in the Municipality of Anchorage, Fairbanks North Star Borough, Matanuska-Susitna Valley, and the City and Borough of Juneau. In addition to the network maps, area maps which provide greater detail of the individual site locations are presented. All maps are presented in Figures 3-1 through 3-12. All map base images were prepared using Google Earth® with Landsat and US Geological Survey digital images.

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 site evaluation forms were reviewed and updated, when necessary, in 2015 by DEC and are presented in **Appendix A** of this report.

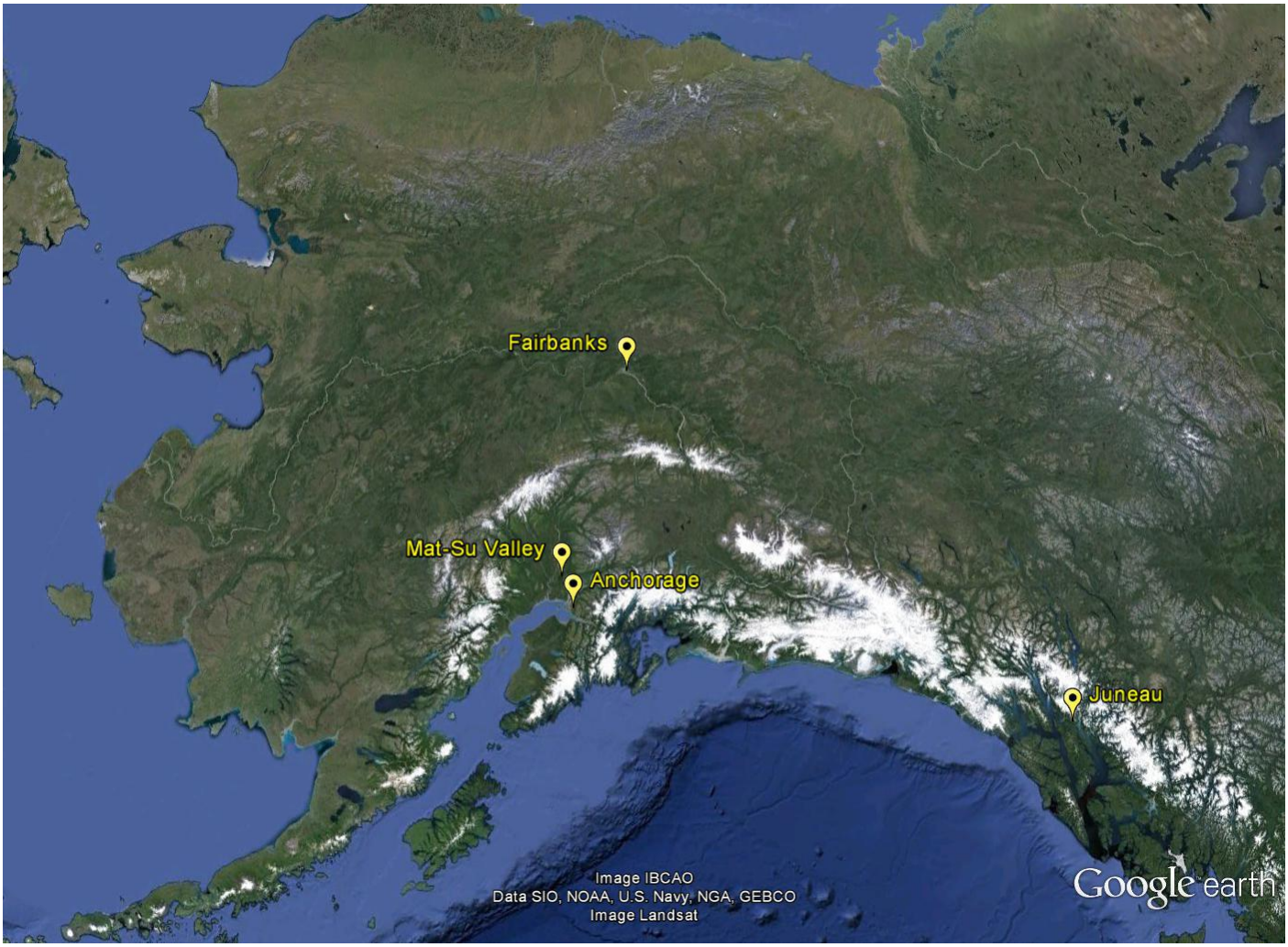


Figure 3-1. State of Alaska AQS Air Monitoring Networks

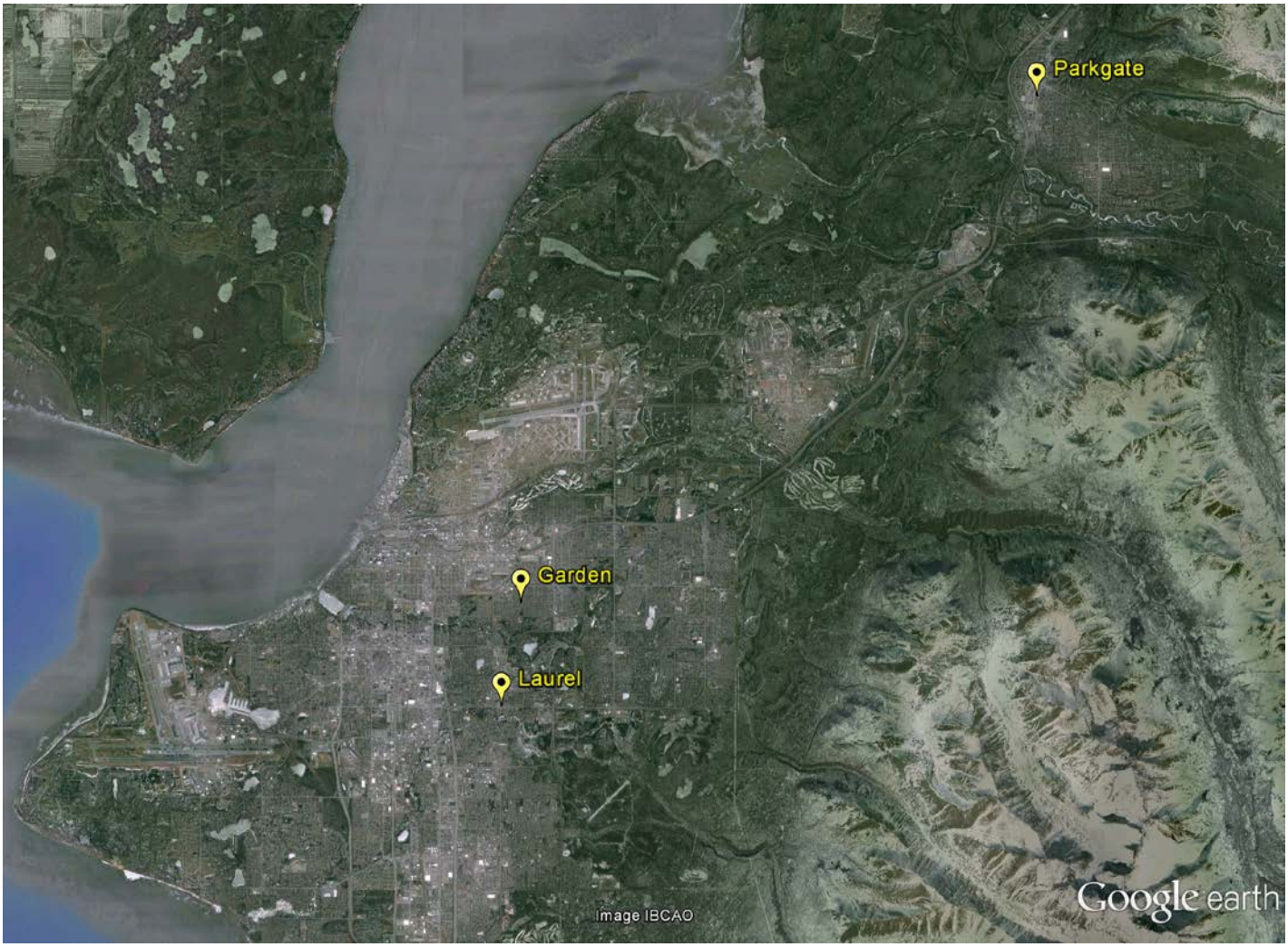


Figure 3-2. Anchorage Air Monitoring Network

Figure 3-3. Anchorage Garden Site Area Map

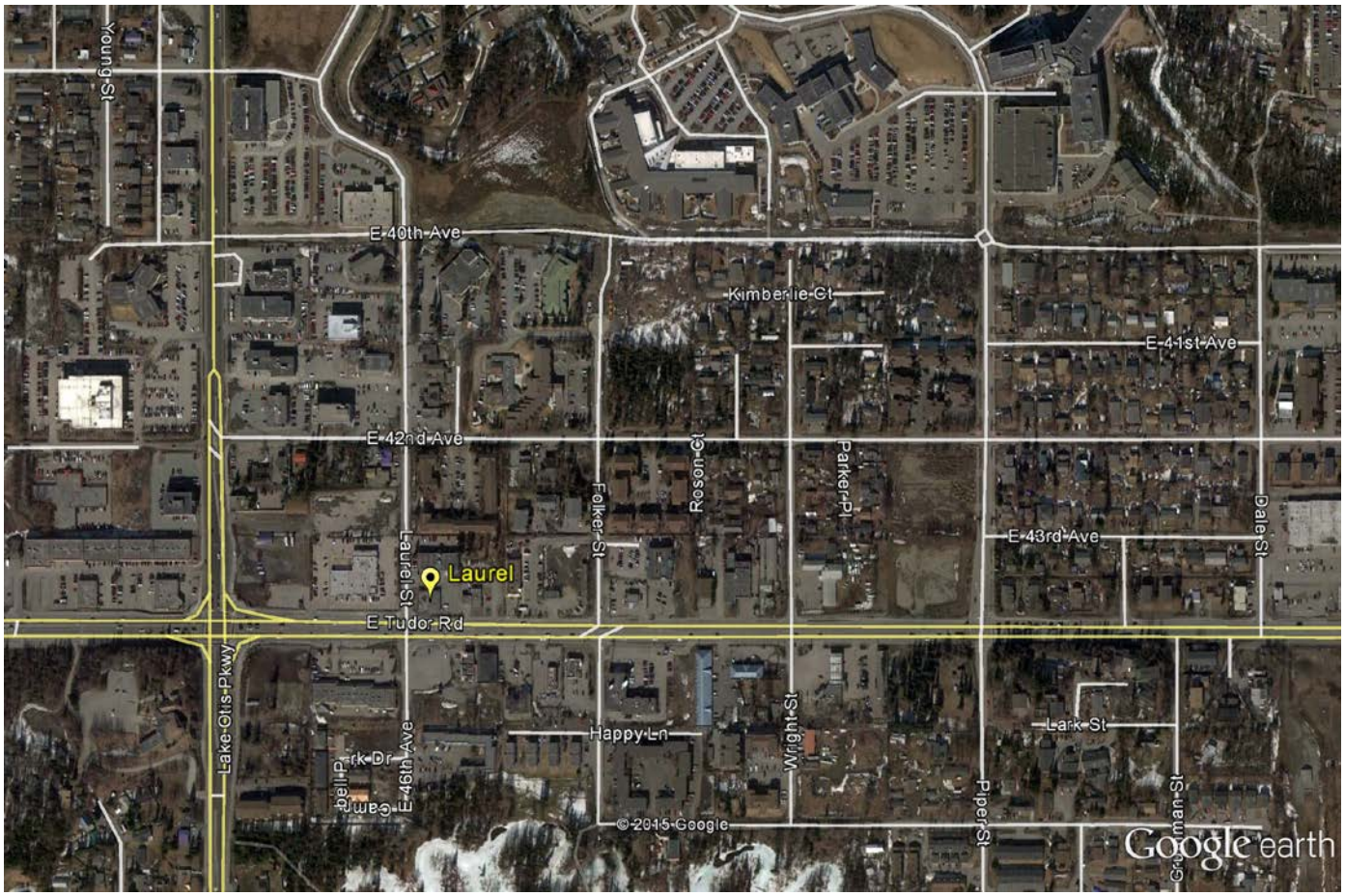


Figure 3-4. Anchorage Laurel Site Area Map

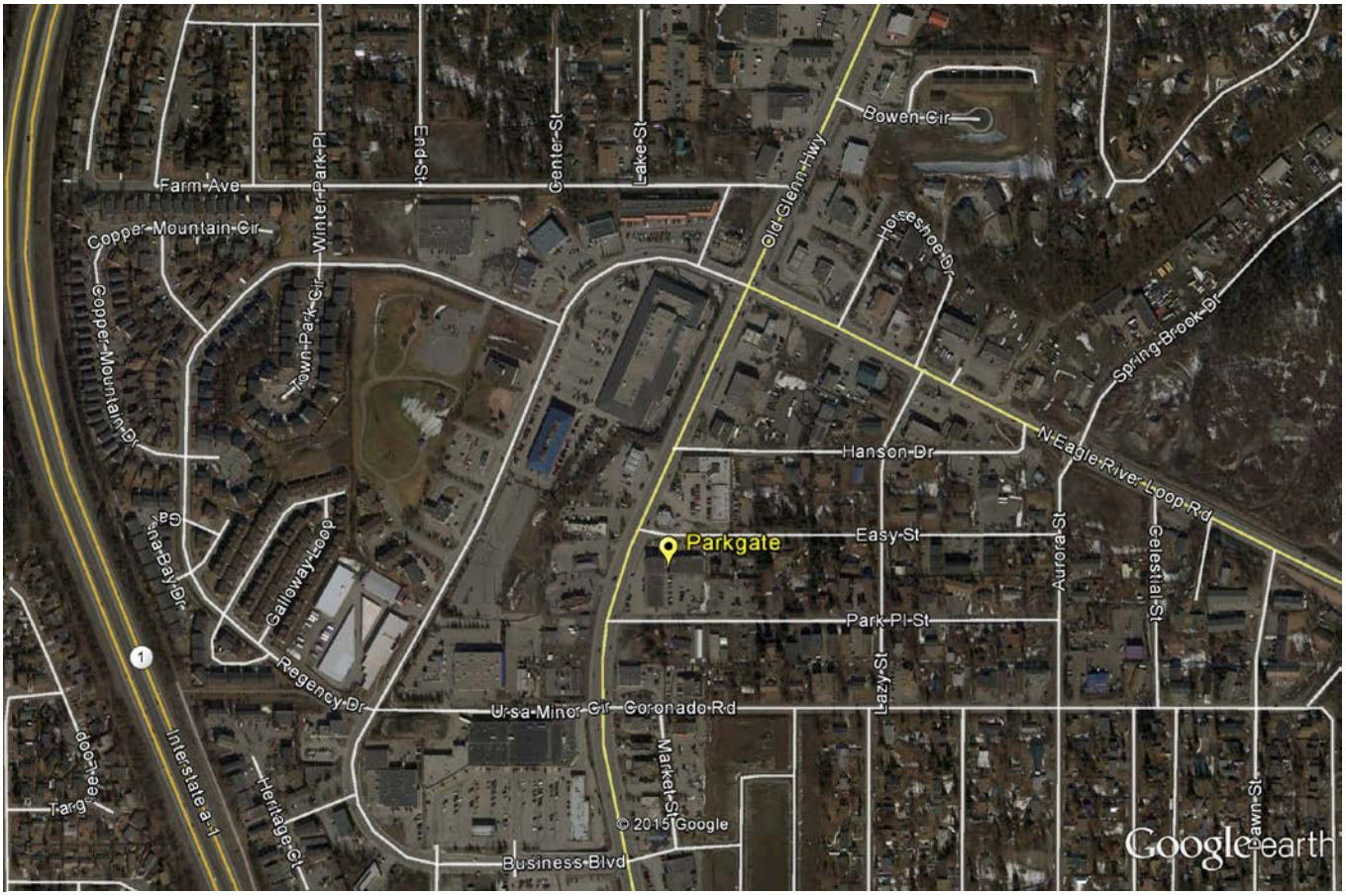


Figure 3-5. Anchorage Parkgate Eagle River Area Map

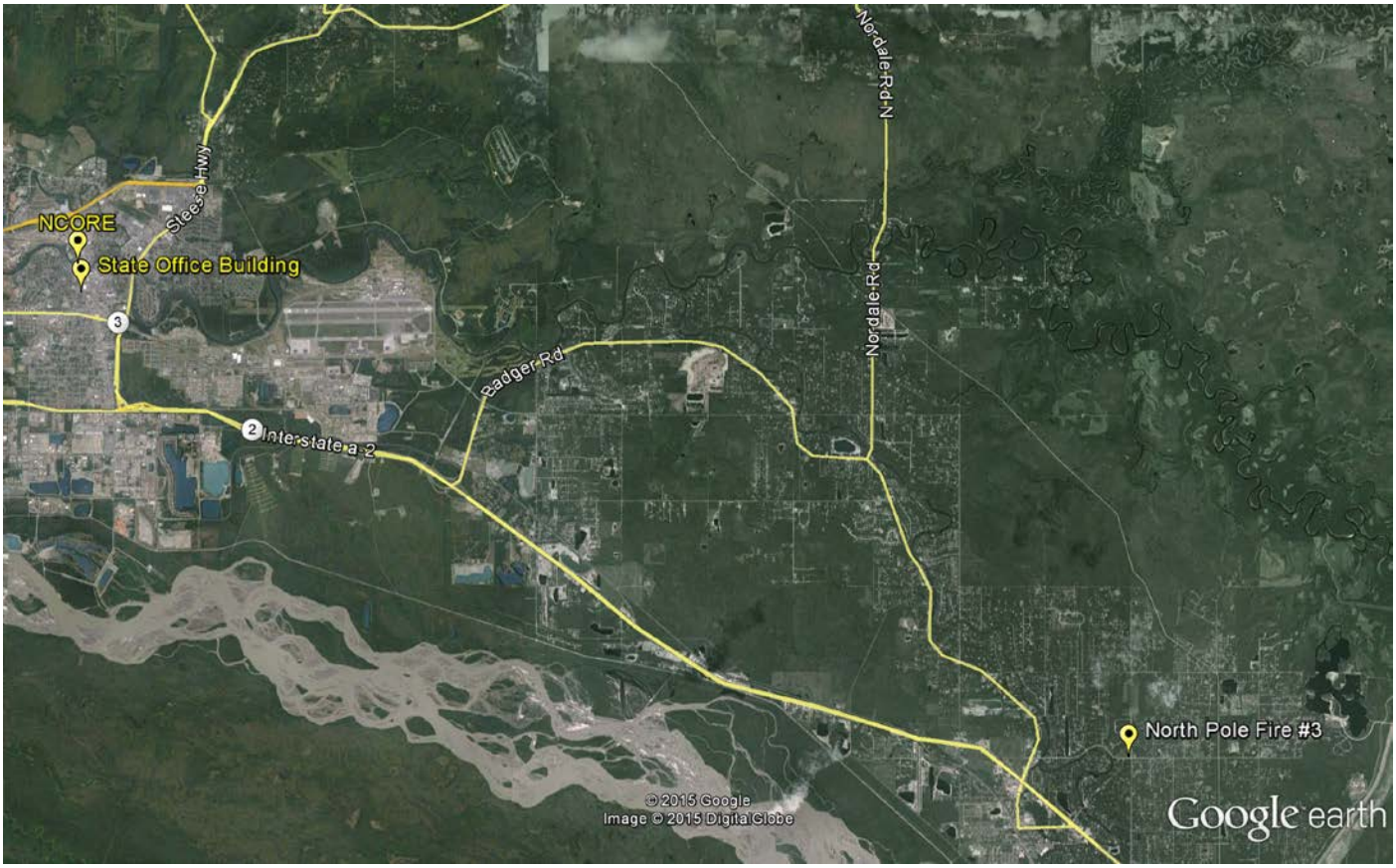


Figure 3-6. Fairbanks North Star Borough Air Monitoring Network

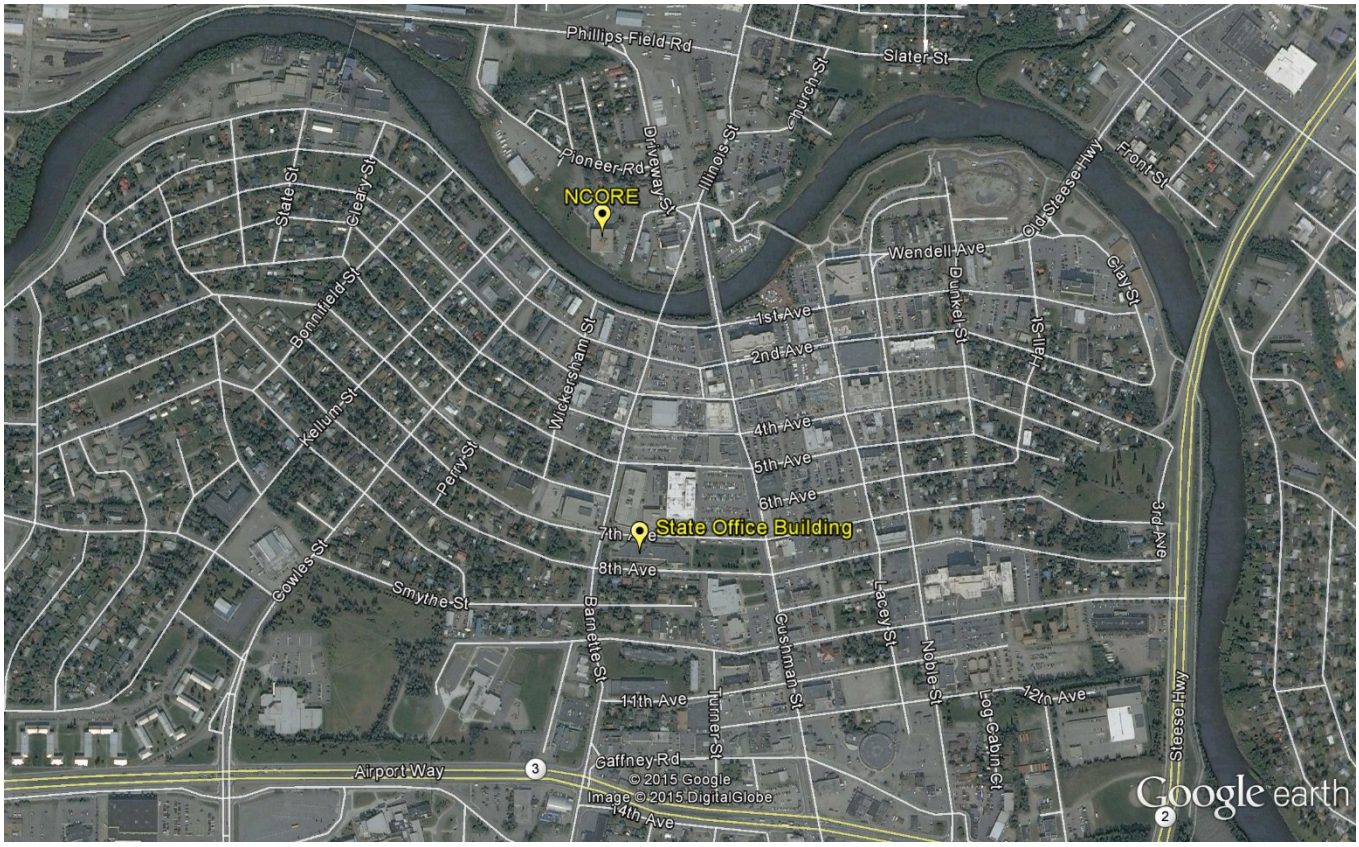


Figure 3-7. Fairbanks Downtown Area Map for the NCORE Site and the State Office Building

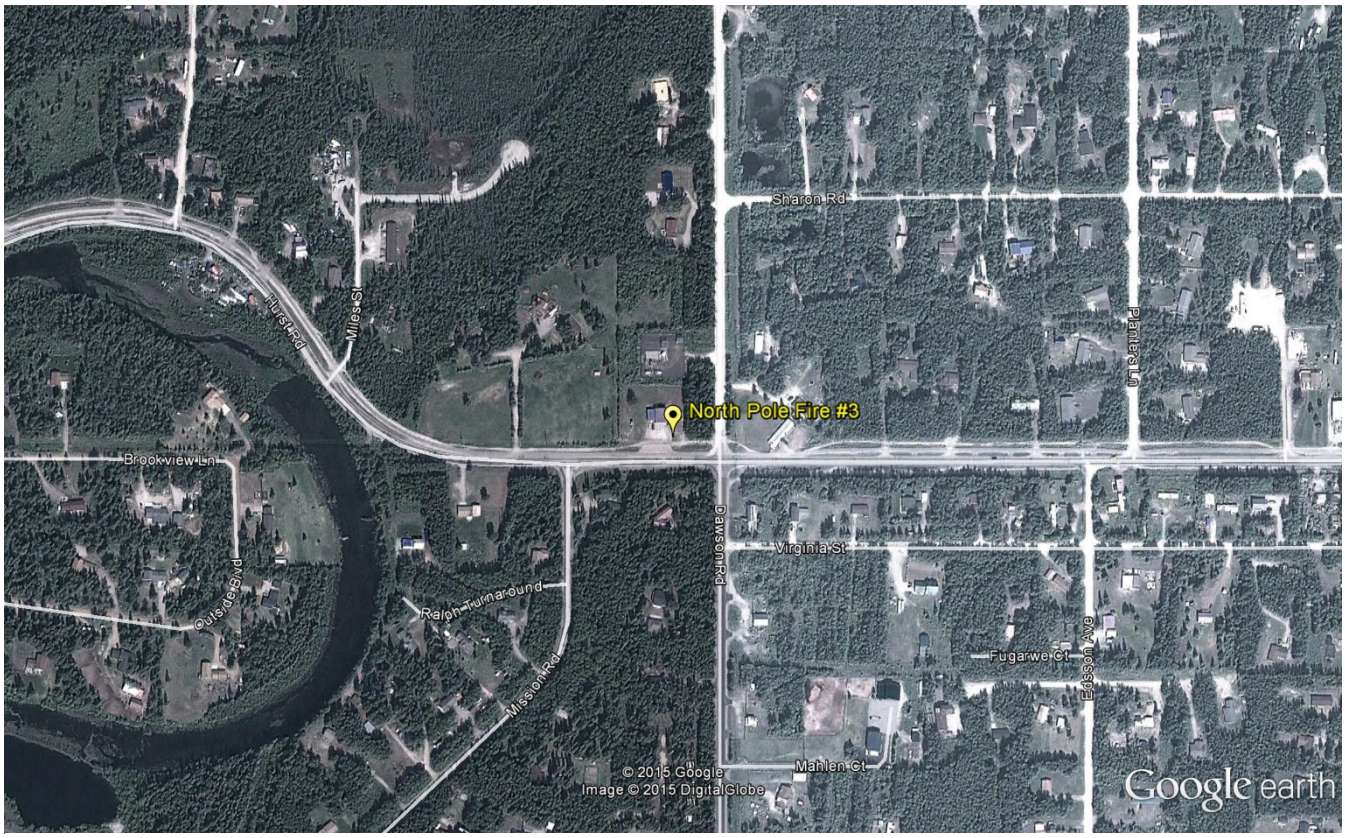


Figure 3-8. North Pole Fire #3 Area Map

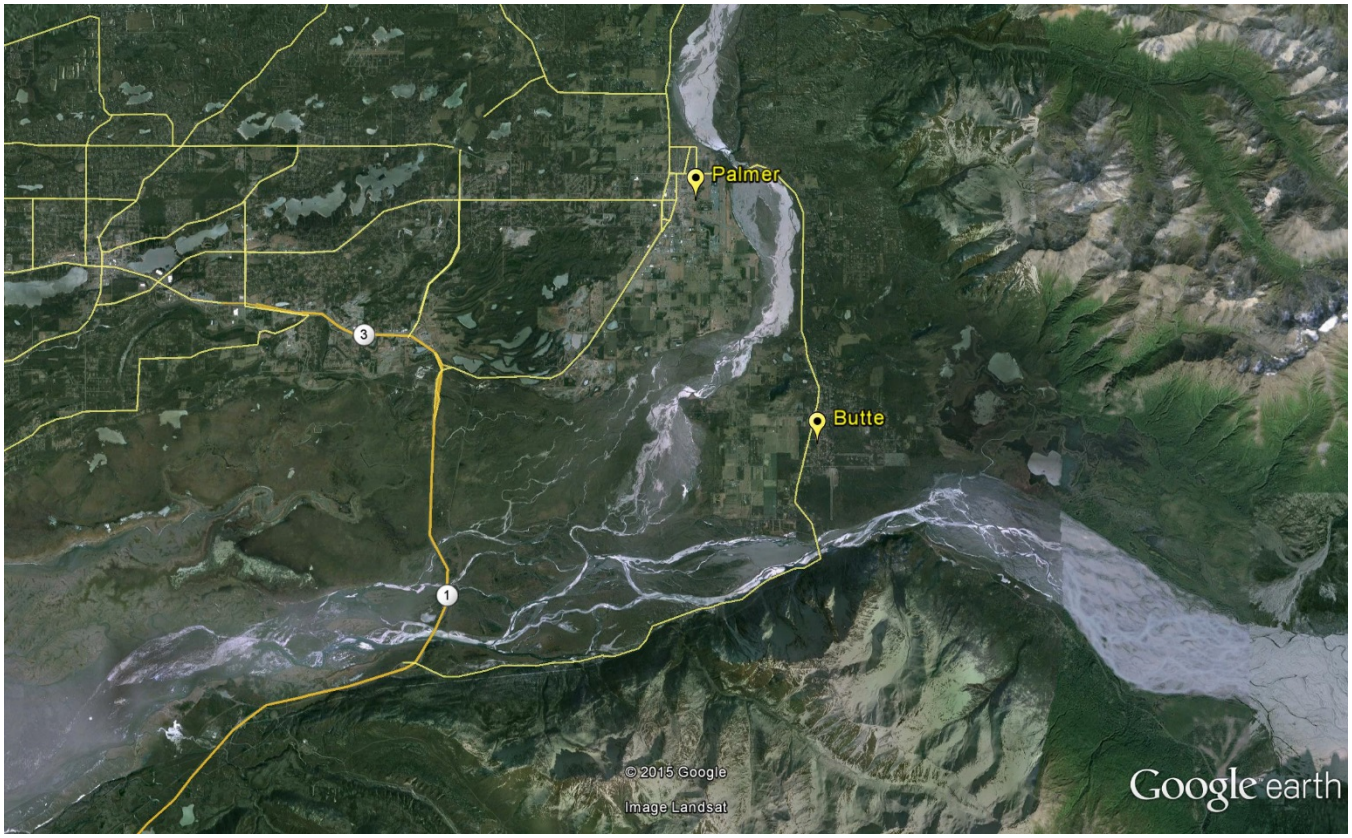


Figure 3-9. Matanuska-Susitna Valley Air Monitoring Network

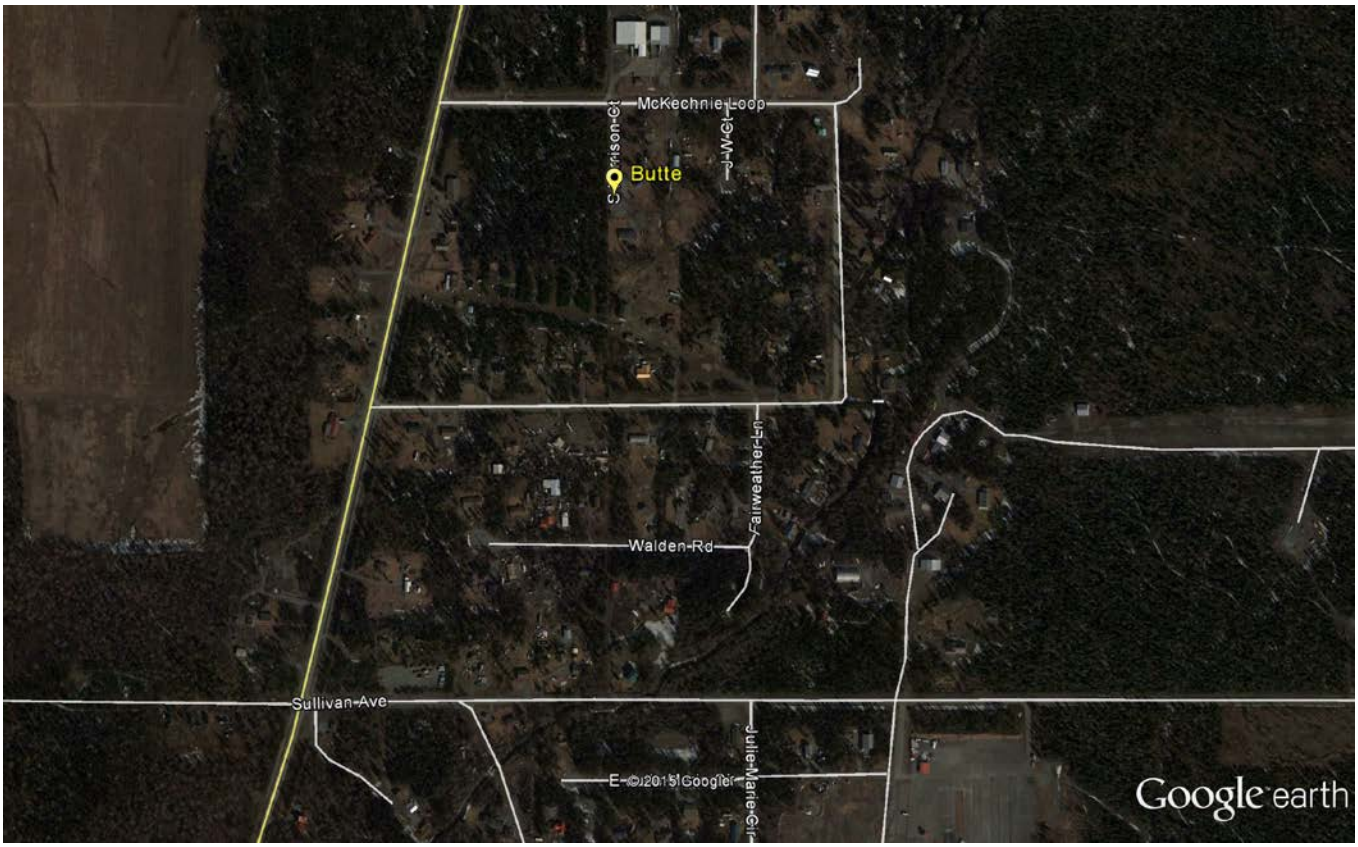


Figure 3-10. Matanuska-Susitna Valley, Butte Area Map

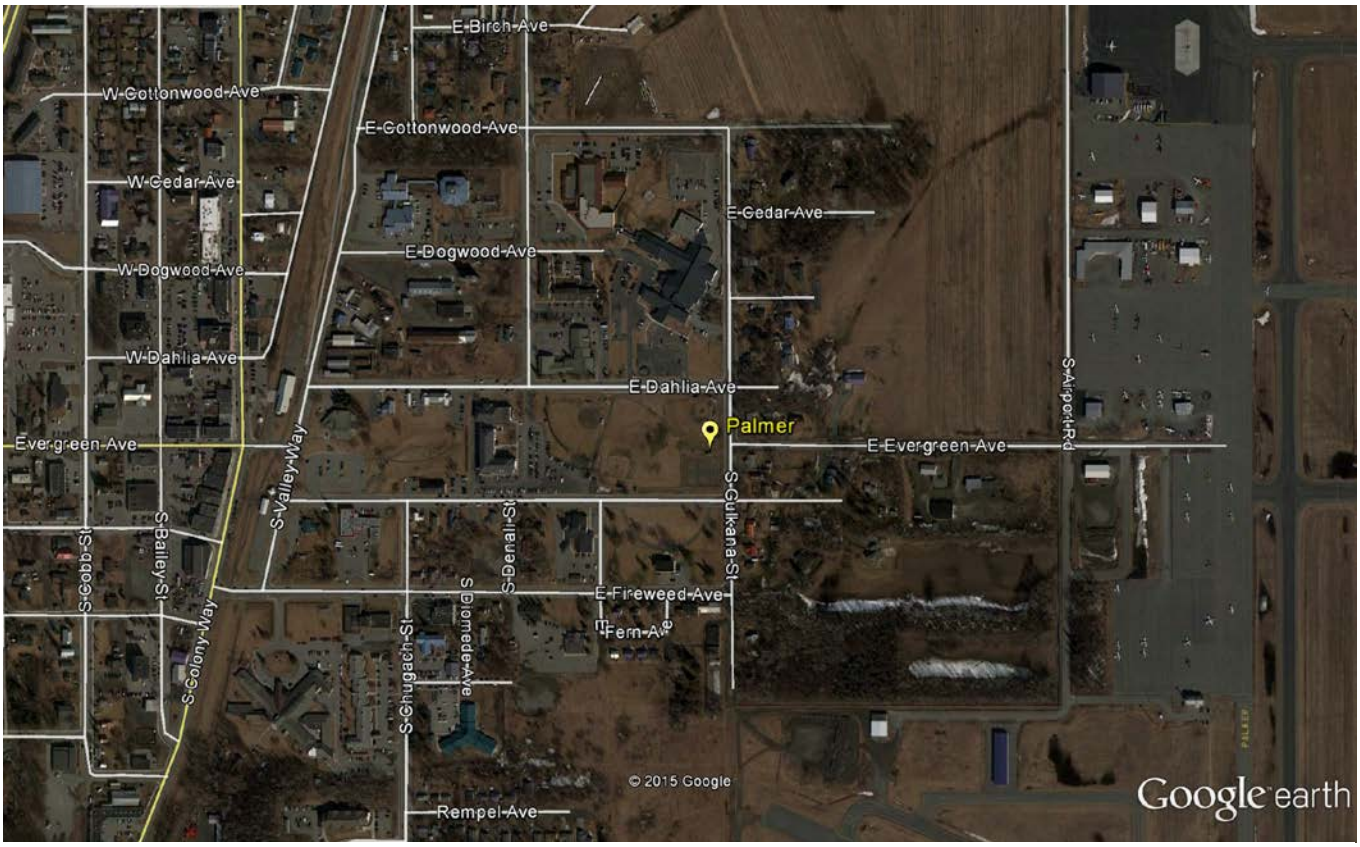


Figure 3-11. Matanuska-Susitna Valley, Palmer Area Map

Figure 3-12. City and Borough of Juneau Air Monitoring Network, Floyd Dryden Middle School, Mendenhall Valley Area Map

3.2 *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. Those site evaluation forms are presented in **Appendix B** of this report. Included are two tables: one for CO sites (Table 3-2) and one for PM sites (Table 3-3).

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 is a list of definitions relating to monitoring site scaling:

Micro-scale—defines the concentrations in air volumes associated with area dimensions ranging from several meters up to about 100 meters.

Middle Scale—defines the concentration typical of areas up to several city blocks in size with dimensions ranging from about 100 meters to 0.5 kilometer.

Neighborhood Scale—defines concentrations within some extended area of the city that has relatively uniform land use with dimensions in the 0.5 to 4.0 kilometers range.

Urban Scale—defines the overall, citywide conditions with dimensions on the order of 4 to 50 kilometers. This scale would usually require more than one site for definition.

The following table (Table 3-2) lists all CO monitoring sites in Anchorage and Fairbanks and how they fit the siting criteria from Appendix E of 40 CFR Part 58.

Table 3-2. CO Monitoring Sites in Anchorage and Fairbanks July 2013 - June 2014

Site Name	Monitoring Scale	Probe Distance from Wall (meters)	Height (meters)	Unrestricted Air Flow	Spacing from Roadway (meters)	Trees
Garden	Neighborhood	1	3	180 degrees unobstructed	7	Yes
NCORE	Neighborhood	Not applicable	4	360 degrees unobstructed	85	None

Particulate Matter (PM_{10} and $PM_{2.5}$) Sites

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

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

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

Table 3-3. PM Monitoring Sites in Alaska as of May 2015

Site Name	Monitoring Scale	Height (meters)	Spacing from Obstructions (meters)	Spacing from Roadway (meters)	Traffic (VPD)	Trees
Garden	Neighborhood	10	12m to 5m tall penthouse	10	< 5,000	None
Laurel	Neighborhood	Under construction at time of this document				
Parkgate	Neighborhood	6	13m to 4m tall penthouse	44	11,000	None
Butte	Neighborhood	4	> 8	150	Unknown, probably < 5,000	None
Palmer	Neighborhood	4	> 8	18	Unknown, probably < 5,000	None
State Office Building	Neighborhood	6	30m to 3.75m tall penthouse	20	7,400	None
NCORE	Neighborhood	4	75 m to 12 m building	85	3,559	None
North Pole Fire #3	Neighborhood	4	none	23 to Hurst Rd	3,730	> 30
Floyd Dryden	Neighborhood	6	Furnace flue @ 20m, 4m penthouse @ 15m	65	12,770	12 m tall 25m away

3.3 *Monitoring Methods, Designation and Sampling Frequency*

Table 3-4 presents information used in coding the data submitted by DEC to the AQS database. The information provided in Table 3-4 for each monitoring site includes pollutant parameter name, monitor designation, the AQS parameter and POC codes, the AQS method code, the frequency of sampling, and the instrumentation used. The monitor designation states the purpose for which the data are to be used, such as: for State & Local Air Monitoring (SLAMS) to demonstrate NAAQS compliance, Special Purpose Monitoring (SPM) for general air quality assessments, and the Chemical Speciation Network (CSN) for atmospheric chemistry assessments. The 5-digit AQS parameter codes are specific to the pollutant, instrumentation, and sampling equipment used, and how the concentration units are expressed in either local conditions or corrected to standard conditions for temperature and pressure. The 5-digit parameter code identifies the parameter being measured e.g. PM_{10}, SO_2, or wind speed. The 1-

digit POC code is the parameter occurrence code. As suggested by Region 10 EPA, DEC uses the POC to indicate whether the sampler or instrument is (1) a primary data source, or (2) a secondary data source such as a collocated sampler, or (3) that an instrument is measuring on a continuous basis. The AQS method code provides information specific to the analytical technique used for the pollutant determination such as instrumental analysis using chemiluminescence for nitric oxide or gravimetric analysis for particulate. The notation presented in the sample frequency indicates how often the pollutant concentration is determined. For example, 1/6 indicates that one sample is collected every sixth day according to the national EPA air monitoring schedule. Continuous indicates that an instrument is continuously analyzing a sample stream providing a pollutant concentration on a real-time basis (e.g. 1-min SO_2 reading) or a near-real time basis (e.g. 1-hour $PM_{2.5}$ reading from a beta attenuation monitor, a BAM). The equipment information column identifies on-site equipment (either a sampler or instrument) specific to the AQS parameter code.

Other monitoring sites operated by DEC to gather data related to rural road dust and wildland fires, but that are not submitted to the AQS data base 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**. Those values caused by exceptional events and with which EPA has already concurred or for which DEC has made application for concurrence have not been included in these summaries.

Table 3-4. AQS Codes as of May 2015; 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 - Occurrence Code	AQS Method Codes	Sample Frequency	Equipment
Garden Site/ Anchorage	PM_{10STD}/ PM_{10LC}	SLAMS	01/01/2009	81102-3/ 85101-3	122	Continuous	Met-One BAM 1020X Coarse
	$PM_{2.5LC}$	SLAMS	01/01/2009	88101-3	170	Continuous	Met-One BAM 1020X Coarse
	CO	SLAMS	01/01/1979	42101-1	554	Continuous (Oct-Mar)	Thermo Env. Inst. Model 48i
Laurel/ Anchorage	PM_{10STD}/ PM_{10LC}	SLAMS	Not yet service at time of report	81102-3/ 85101-3	122	Continuous	Met-One BAM 1020X
Parkgate/ Eagle River	PM_{10STD}/ PM_{10LC}	SLAMS	01/01/2009	81102-3/ 85101-3	122	Continuous	Met-One BAM 1020X Coarse
Parkgate/ Eagle River	$PM_{2.5LC}$	SLAMS	01/01/2009	81102-3/ 85101-3	170	Continuous	Met-One BAM 1020X Coarse
State Office Building/ Fairbanks	$PM_{2.5LC}$	SLAMS	10/23/1998	88101-1	143	1/3	R & P Partisol 2000
NCORE/ Fairbanks	PM_{10STD}/ PM_{10LC}	NCORE	02/15/2011	81102-3/ 85101-3	122	Continuous	Met-One BAM 1020X Coarse
	$PM_{2.5LC}$	NCORE	02/15/2011	88101-3	170	Continuous	Met-One BAM 1020X Coarse
	PM_{10STD}/ PM_{10LC}	NCORE	11/10/2012	81102-1/ 85101-1	126	1/3	R&P Partisol 2000
	$PM_{2.5LC}$	NCORE	11/04/2009	88101-1	143	1/3	R&P Partisol 2000

Site Name/ Location	Pollutant Parameter	Monitor Designation	Monitor Starting Date	AQS Parameter - Occurrence Code	AQS Method Codes	Sample Frequency	Equipment
NCORE/ Fairbanks	PM_{10LC} - $PM_{2.5LC}$	NCORE	11/10/2012	86101-1	143	1/3	paired R&P Partisol 2000
	$PM_{2.5LC}$ collocated	NCORE	05/08/2013	88101-2	143	1/6	R & P Partisol 2000
	CO	NCORE	08/01/2011	42101-1	554	Continuous	Thermo Fisher 48i
	SO_2 (1-hr)	NCORE	08/01/2011	42401-1	560	Continuous	Thermo Fisher 43i-TL
	SO_2 (5-min)	NCORE	08/18/2011	42401-2	560	Continuous	Thermo Fisher 43i-TL
	NO_Y	NCORE	01/01/2013	42600-1	674	Continuous	Thermo Fisher 42iY-TL
	NO	NCORE	10/05/2012	42601-1	674	Continuous	Thermo Fisher 42iY-TL
	NO_Y-NO	NCORE	10/05/2012	42612-1	674	Continuous	Thermo Fisher 42iY-TL
	NO_X	NCORE	03/01/2014	42603-1	574	Continuous	Thermo Fisher 42i-TL
	NO	NCORE	03/01/2014	42601-2	674	Continuous	Thermo Fisher 42i-TL
	NO_2	NCORE	03/01/2014	42602-1	574	Continuous	Thermo Fisher 42i-TL
	O_3	NCORE	08/01/2011	44201-1	087	Continuous	Teledyne API 400E
	WD	NCORE	04/05/2011	61104-1	061	Continuous	Met-One Sonic Anemometer
	WS	NCORE	04/05/2011	61103-1	061	Continuous	Met-One Sonic Anemometer

Site Name/ Location	Pollutant Parameter	Monitor Designation	Monitor Starting Date	AQS Parameter - Occurrence Code	AQS Method Codes	Sample Frequency	Equipment
	BP	NCORE	04/05/2011	64101-1	014	Continuous	Met-One BAM 1020X Barometer
	Ambient Temp @ 2 m	NCORE	04/01/2011	62101-2	061	Continuous	Met-One Temp Sensor
	Ambient Temp @ 10 m	NCORE	04/01/2011	62101-1	061	Continuous	Met-One Temp Sensor
	$PM_{2.5LC}$ Speciation	CSN	1/1/2015	Multiple*	Multiple*	1/3	URG 3000N
	$PM_{2.5LC}$ Speciation	CSN	1/1/2015	Multiple*	Multiple*	1/3	Met-One Super SASS $PM_{2.5}$ LC
North Pole Fire #3/ North Pole	$PM_{2.5LC}$	SLAMS	03/01/2012	88101-1	143	1/3	R&P Partisol 2000
	$PM_{2.5LC}$	SPM	03/01/2012	88501-3/ 88502-3	170	Continuous	Met-One BAM 1020X
Palmer/ Matanuska-Susitna Valley	PM_{10STD}/ PM_{10LC}	SPM	01/01/2010	81102-3/ 85101-3	122	Continuous	Met-One BAM 1020X Coarse
	$PM_{2.5LC}$	SPM	01/01/2010	88101-3	170	Continuous	Met-One BAM 1020X Coarse
	O_3	SPM	4/1/2015	44201-1	087	Continuous Seasonal Apr - Oct	Teledyne API 400E
Butte/ Matanuska-Susitna Valley	PM_{10STD}/ PM_{10LC}	SPM	04/11/1998	81102-3/ 85101-3	122	Continuous	Met-One BAM 1020X Coarse
	$PM_{2.5LC}$	SLAMS	08/10/2011	88101-3	170	Continuous	Met-One BAM 1020X Coarse

Site Name/ Location	Pollutant Parameter	Monitor Designation	Monitor Starting Date	AQS Parameter - Occurrence Code	AQS Method Codes	Sample Frequency	Equipment
Floyd Dryden Middle School/ Juneau	PM_{10STD}/ PM_{10LC}	SLAMS	01/01/1986	81102-1/ 85101-1	126	1/6	R&P Partisol 2000
	PM_{10STD}/ PM_{10LC}	SLAMS collocated	01/01/1986	81102-2/ 85101-2	126	1/6	R&P Partisol 2000
	$PM_{2.5LC}$	SLAMS	08/21/2009	88101-3	170	Continuous	Met-One BAM 1020X
	$PM_{2.5LC}$	SLAMS	4/1/2015	88101-2	143	1/6	R&P Partisol 2000

* - multiple AQS codes are used to identify individual chemical species

3.4 *Comparison of $PM_{2.5}$ FRM and Continuous Methods*

EPA designated the Met One BAM as a Class III Federal Equivalence Method (FEM) in 2008. To qualify as an FEM the instrument needs to meet performance criteria when compared to the FRM. The performance criteria for Class III FEM approval for monitors must meet the key statistical metrics for multiplicative bias (slope) between 0.9 and 1.1 and an additive bias (intercept) between -2.00 and 2.00 (40 CFR Part 58.11 e, 40 CFR Part 53 Subpart C Figure C-2).

DEC has deployed $PM_{2.5}$ Met One BAM statewide. DEC found that all Alaskan $PM_{2.5}$ BAM sites meet FEM performance requirements, except for the Fairbanks sites prior to calendar year 2014 and the North Pole sites. **Figure 3-13** depicts a graphical summary of the results.

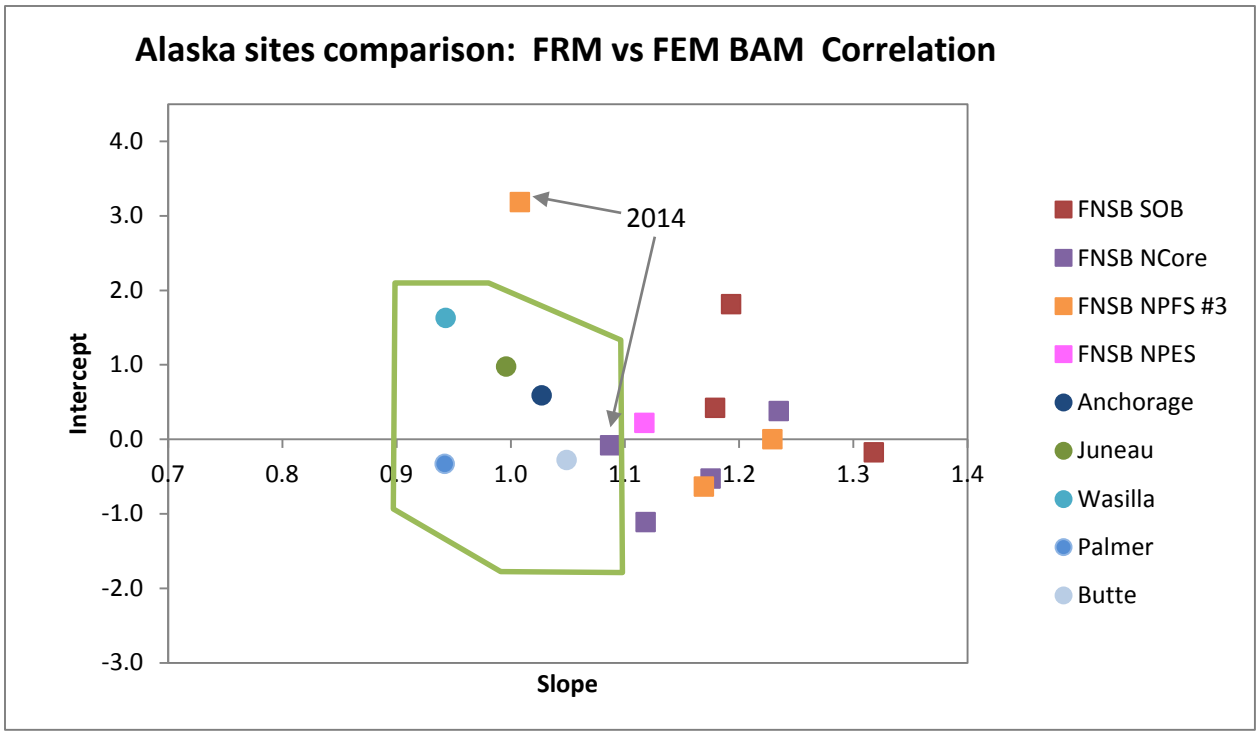


Figure 3-13: Alaska FRM FEM Correlations; the green box shows Class III performance criteria

The green box in **Figure 15** represents acceptable limits for slope and intercept for $PM_{2.5}$ methods. The Floyd Dryden BAM in Juneau, Garden BAM in Anchorage and the Matanuska-Susitna Valley BAMs at Butte, Palmer and Wasilla all met the slope and intercept performance criteria for $PM_{2.5}$ FEM. In 2014

A more detailed discussion of the comparison between the two sampling methods can be found in **Appendix F**.

4 NETWORK MODIFICATIONS COMPLETED IN 2014/2015

EPA approved the decommissioning of the Fairbanks North Star Borough decommissioned the CO SLAMS site in the Old Post Office in Fairbanks effective March 31 2014, as well as the Municipality of Anchorage shut down of the CO SLAMS site at the Turnagain site in Anchorage effective March 31, 2014.

DEC notified EPA of the shutdown of several SPM sites (Prior approval from EPA is not required for discontinuance of and SPM, 40 CFR 58.20 (f)). The network realignment was made necessary due to budget issues. DEC decommissioned the $PM_{10}/PM_{2.5}$ SPM site in Soldotna in the Kenai Peninsula Borough effective July 2014. DEC removed the FRM $PM_{2.5}$ monitor from the Palmer site in the Matanuska Susitna Valley effective December 31, 2014. On request from the school principal the SPM monitoring site was moved from the Watershed Charter School in Fairbanks after the last sampling date on March 31, 2014. The monitoring trailer was moved to North Pole and the North Pole Water site was operated during the 2014/15 winter.

DEC installed two seasonal $PM_{2.5}$ SPM sites in Yakutat in November, 2014 to assess the impacts of two planned biomass boiler to provide heat for city buildings.

In 2015 FNSB moved the CSN site from the SOB to NCORE in Fairbanks (January 1, 2015) with EPA approval. Due to changes in MOA budget monitoring activities are now split between the State and MOA, with the MOA performing the routine monitoring site maintenance and the DEC assuming responsibility for all data review, quality assurance and quality control, data reduction and reporting.

DEC notified EPA of the shut down the $PM_{10}/PM_{2.5}$ SPM site in Wasilla in the Matanuska Susitna Valley effective March 31, 2015 and the relocation of the ozone site to Palmer effective April 2015. DEC also decommissioned the collocated FRM PM_{10} at the Butte site in the Matanuska-Susitna Valley effective March 31, 2015. The collocated FRM $M_{2.5}$ monitor was removed from the Butte site and moved to the SLAMS site at Floyd Dryden in Juneau effective April 23, 2015

As in previous winter the Fairbanks North Star Borough moved SPM sampling sites throughout the non-attainment area to better understand the air quality impacts experienced in various neighborhoods. The SPM sites usually remain in one location in the order of two to six weeks.

In their approval letter for the 2014-15 Annual Network Plan from October 30, 2014, EPA requested additional information about the purpose and role of a new SPM site DEC and FNSB established in North Pole, the North Pole Water site. FNSB staff coordinated with DEC and EPA on drafting a request letter and after preliminary EPA approval a final version of the letter was posted to the State's public notice website on March 23, 2014. Public comments were received and are displayed in **Appendix G**. The comments address not only the North Pole Water

monitoring sites, but detail overall concern about air monitoring in the Fairbanks North Pole non-attainment area.

Much of the monitoring performed in the Fairbanks North Star Borough up to now has been funded through the Federal Highways Administration CMAQ program. Recent changes in FHWA grant eligibility resulted in funding loss to DEC and FNSB, since most of the monitoring no longer qualifies for this type of funding source. DEC therefore has to focus the available funding on regulatory monitoring requirements and acceptable monitoring technologies. To fulfill the regulatory requirement DEC is proposing a change in the monitoring network in North Pole, see section 5.1.1 below.

5 PROPOSED NETWORK MODIFICATIONS FOR 2016

5.1 *$PM_{2.5}$ Network*

5.1.1 Fairbanks North Star Borough

DEC proposes to re-designate the North Pole Fire Station from a SPM site to a SLAMS site.

In the 2014 annual network plan DEC had listed this site as a micro-scale site since recent data from surrounding monitoring locations recorded much lower concentrations. The monitoring data collected at several areas within a 1-2 mile radius of the North Pole Fire Station site indicate that the neighborhood does not experience homogenous $PM_{2.5}$ concentrations at the level measured at the site, thus suggesting that the siting scale might be more appropriately categorized as a micro-scale site. In a letter from February 2, 2015 regarding the changes to the monitoring network within the Municipality of Anchorage EPA disagreed with DEC on the monitoring scale of this site, stating that insufficient data were available to document the State's determination.
As per 40 CFR 58 Appendix D a SLAMS site is required in an area of maximum neighborhood scale impact. In their letter EPA recommended the State conduct a saturation study to determine the scale of the North Pole Fire Station site.

Due to the technical difficulties of measuring $PM_{2.5}$ concentrations comparable to the NAAQS in the harsh climate experienced in a typical North Pole winter, a saturation study as proposed by EPA would both be logistically challenging and cost prohibitive. Additionally should it be determined that the site is truly a micro-scale site, DEC would be required to find and establish a new site to represent in a neighborhood with maximum concentration.

DEC therefore decided to forgo the cost intensive demonstration and to re-designate the North Pole Fire Station as a SLAMS site. Per EPA request DEC and FNSB already agreed to operate the site year it year round starting in 2015. The primary sampler with be the FRM with a continuous analyzer operating for use in air quality advisories. To fund the year round operations DEC decided to shut down the second site in North Pole, the North Pole Water site.

In the past several years FNSB has used the continuous $PM_{2.5}$ Met One BAM analyzers for short term monitoring to gather additional information all across the non-attainment area. These short term special purpose monitoring sites are in place in the order of a few weeks to several months, usually no more than three months. Early on FNSB and DEC used the data gathered from these sites to negotiate the boundaries of the non-attainment area with EPA. Since the non-attainment area was established, the additional monitoring has been used to either respond to citizen's complaints or to determine areas with lower and higher $PM_{2.5}$ concentrations than the long term monitoring sites. Monitoring equipment is very expensive and many lower cost technologies do not compare well with the regulatory required sampling equipment in the sub-arctic winter environment. FNSB and DEC have, therefore, decided to focus on the same continuous analyzers as used in the long term monitoring sites. While these samplers also show a positive bias of 10-20%. i.e. the equipment is known to record 10-20% higher than the Federal Reference Monitors (FRM), there are several advantage to using this equipment. These analyzers produce hourly data and the instrument can be hooked into the State's data acquisition system. As in the past, FNSB and DEC will display the data from these short term monitoring sites on the respective 'real-time' data websites. (http://co.fairbanks.ak.us/airquality/, http://dec.alaska.gov/Applications/Air/airtoolsweb/Aq/.) At the long term sites, the FRM data from the previous calendar year are used to establish a correlation with the continuous analyzers. These correlated values, often referred to as FRM-like values are displayed on the above mentioned websites. Since the short term sites do not have an FRM and not enough data to establish a site specific correlation, the correlations from the nearest long term sites will be used to calculate the correlated values for display. A summary report of the site location and concentrations measured will be incorporated into the annual network plan for the following year.

5.1.2 Rural Alaska

DEC plans to install a year-round $PM_{2.5}$ SPM site in Bethel, a community on the west coast of the state. Bethel is the largest community in the state that is not on the road system i.e. accessible only by air or water. It is the main port on the Kuskokwim River and is the hub community for those living in the Yukon-Kuskokwim Delta. Due to budgetary issues this project is progressing slower than initially estimated. Site selection is planned for later in 2015 with a proposed start up as early as spring 2016.

APPENDIX A: NETWORK EVALUATION FORMS

PART 58 APPENDIX D NETWORK EVALUATION FORM FOR CARBON MONOXIDE (CO)					
STATE: ALASKA **AGENCY:** DEPARTMENT OF ENVIRONMENTAL CONSERVATION **AQS AGENCY CODE:** 02 **EVALUATION DATE:** April 14, 2014 **EVALUATOR:** ROBERT MORGAN, ENV. PROGRAM SPECIALIST					
APPLICABLE SECTION	REQUIREMENT	OBSERVED	CRITERIA MET?		
			YES	NO	N/A
4.2.1(a)	One CO monitor is required to operate collocated with one required near-road NO_2 monitor in CBSAs having a population of 1,000,000 or more persons. If a CBSA has more than one required near-road NO_2 monitor, only one CO monitor is required to be collocated with a near-road NO_2 monitor within that CBSA.		√		
4.2.2(a)	Has the EPA Regional Administrator required additional CO monitoring stations above the minimum number of monitors required in 4.2.1? If so, note location in comment field.		√		
Comments: The State of Alaska has no CBSA with a population of 1,000,000: therefore, there are no near-road collocated sites for CO and NO_2. Two SLAMS sites for CO are currently operating in the Municipality of Anchorage for NAAQS compliance, the Garden Site (AQS ID 02-020-0018) and the Turnagain Site (AQS ID 02-020-0048). One CO SLAMS site is operating for NAAQS compliance in the Fairbanks North Star Borough, at the Old Post Office Building (AQS 02-090-0002). The Fairbanks North Star Borough also operates a CO monitor at the multi-pollutant Ncore site (AQS ID 02-090-0034).					

MSA Description[1]	CBSA population[2, 3] (2010)	Minimum required number of SLAMS CO sites	Present number of SLAMS CO sites in MSA
Municipality of Anchorage	291,826	2	2
Fairbanks North Star Borough	97,581	1	1

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

PART 58 APPENDIX D NETWORK EVALUATION FORM FOR NITROGEN DIOXIDE (NO2)				
STATE: ALASKA **AGENCY:** DEPARTMENT OF ENVIRONMENTAL CONSERVATION **AQS AGENCY CODE:** 02 **EVALUATION DATE:** April 14, 2014 **EVALUATOR:** ROBERT MORGAN, ENV. PROGRAM SPECIALIST				
APPLICABLE SECTION	**REQUIREMENT**	**CRITERIA MET?**		
		YES	**NO**	**N/A**
4.3.2(a)	Near-road NO2 Monitors: One microscale near-road NO_2 monitoring station in each CBSA with a population of 500,000 or more persons.	√		
4.3.2(a)	Near-road NO2 Monitors: An additional near-road NO_2monitoring station is required for any CBSA with a population of 2,500,000 persons, or in any CBSA with a population of 500,000 or more persons that has one or more roadway segments with 250,000 or greater AADT count.	√		
4.3.2(b)	Near-road NO2 Monitors: Measurements at required near-road NO_2 monitor sites utilizing chemiluminescence FRMs must include at a minimum: NO, NO_2, and NO_X	√		
4.3.3(a)	Area-wide NO2 Monitoring: One monitoring station in each CBSA with a population of 1,000,000 or more persons to monitor a location of expected highest NO_2 concentrations representing the neighborhood or larger spatial scales.	√		
Comments: The State of Alaska has no CBSA with a population of 500,000 or more persons.				

Table 1					
CBSA Description[1]	CBSA population[2, 3] (2010)	Required number of Near-road NO2 sites	Present number of Near-road NO2 sites	Required number of Area-wide NO2 sites	Present number of Area-wide NO2 sites
Municipality of Anchorage	291,826	0	0	0	0
Matanuska-Susitna Valley Borough	88,995	0	0	0	0
Fairbanks North Star Borough	97,581	0	0	0	0
City and Borough of Juneau	31,275	0	0	0	0

[1]see http://www2.census.gov/econ/susb/data/msa_codes_2007_to_2011.txt
[2]Minimum monitoring requirements apply to the Core Based statistical area (CBSA). CBSA includes both metropolitan and micropolitan statistical areas.
[3]Population based on latest available census figures.

PART 58 APPENDIX D NETWORK EVALUATION FORM FOR OZONE (O_3)

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

EVALUATION DATE: April 14, 2014 **EVALUATOR**: ROBERT MORGAN, ENV. PROGRAM SPECIALIST

APPLICABLE SECTION	REQUIREMENT	CRITERIA MET?		
		YES	NO	N/A
4.1(b)	At least one O_3 site for each MSA, or CSA if multiple MSAs are involved, must be designed to record the maximum concentration (note location in comment field).	√		
4.1(c)	The appropriate spatial scales for O_3 sites are neighborhood, urban, and regional (note deviations in comment field).	√		
4.1(f)	Confirm that the monitoring agency consulted with EPA R10 when siting the maximum O3 concentration site.	√		
4.1(i)	O3 is being monitored at SLAMS monitoring sites during the "ozone season" as specified in Table D-3 of Appendix D to Part 58.	√		

Comments: Ozone monitoring was established at the Municipality of Anchorage, Garden site (AQS ID 02-020-0018) as a SLAMS site in April 2010. This site was established to be representative of the combined MSAs for the Municipality of Anchorage and the Matanuska Valley Borough. Ozone monitoring was conducted at this site for three seasons 2010, 2011, and 2012. The ozone three-year design value was 0.045 ppm, which represents 60 percent of the NAAQS. Ozone monitoring was established at the Wasilla site (AQS ID 02- in the Matanuska-Susitna Valley Borough as a SPM site in 2011. Monitoring was conducted during the ozone seasons in 2011 and 2012. Equipment problems prevented the monitoring season in 2013 but monitoring was resumed beginning April 2014.

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.

MSA Description[4]	MSA population[1, 2]	Minimum required number of SLAMS O3 sites (from Table D-2)	Present number of SLAMS O3 sites in CBSA	
Municipality of Anchorage	291,826 (2010)	0	0	
Matanuska-Susitna Valley Borough	88,995 (2010)	0	0	1 SPM site in Wasilla
Combined (MSAs)	380,821	1	0	3-years completed
Fairbanks North Star Borough	21,820	0	0	1 Ncore Site

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

Table D-2 of Appendix D to Part 58 - SLAMS O3 Monitoring Minimum Requirements

MSA population[1, 2]	Most recent 3-year design value concentrations ≥85% of any O3 NAAQS[3]	Most recent 3-year design value concentrations <85% of any O3 NAAQS[3, 4]
>10 million	4	2
4-10 million	3	1
350,000-<4 million	2	1
50,000-<350,000[5]	1	0

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

Table D-3 of Appendix D to Part 58— Ozone Monitoring Season by State

State	Begin month	End Month
Alaska	April	October
Idaho	May	September
Oregon	May	September
Washington	May	September

PART 58 APPENDIX D NETWORK EVALUATION FORM FOR PM2.5				
STATE: ALASKA **AGENCY**: DEPARTMENT OF ENVIRONMENTAL CONSERVATION **AQS AGENCY CODE**: 02 **EVALUATION DATE**: April 14, 2014 **EVALUATOR**: ROBERT MORGAN, ENV. PROGRAM SPECIALIST				
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 PM2.5 monitors such as IMPROVE can be used to meet this requirement.	√		
4.7.4	Each State shall continue to conduct chemical speciation monitoring and analyses at sites designated to be part of the $PM_{2.5}$ Speciation Trends Network (STN).	√		
Comments:				

MSA Description[1]	MSA population[2,3]	Design Value for years 2011-2013 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
Municipality of Anchorage	291,826		0	2	2	0
Garden Site		20/5.6	SLAMS/FEM	1	1	
Parkgate		16/5.0	SLAMS/FEM	1	1	
Matanuska-Susitna Valley Borough	88,995		1	1	3	0
Butte Site		31/6.3	SLAMS/RFM & FEM	1	1	
Palmer Site		11/3.8	SPM/RFM & FEM	1	1	
Wasilla Site		18/5.3	SPM/FEM	1	1	
Fairbanks North Star Borough	97,581		1	4		3 speciation
State Office Building		42/11.2	SLAMS/RFM	1		2 speciation
Ncore Site		45/11.1	NCore/2 FRM	2 (collocated)		
North Pole		139/NA*	SPM/RFM	1		1 speciation
City and Borough of Juneau	27,940		0	1	1	0
Floyd Dryden Site		24/6.5	SLAMS/FEM	1	1	

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

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

[3]Population based on latest available census figures.

*Design values are not calculated based on seasonal sampling.

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.

APPENDIX B: MONITORING PATH & SITING CRITERIA EVALUATION FORMS

PART 58 APPENDIX E SITE EVALUATION FORM FOR CO					
SITE NAME: Garden	SITE ADDRESS: 3000 E 16th Ave, Anchorage				
AQS ID: 02-020-0018	EVALUATION DATE: 4/10/2014	EVALUATOR: C. Salerno			
APPLICABLE SECTION	REQUIREMENT	OBSERVED	CRITERIA MET?		
			YES	NO	N/A
2. HORIZONTAL AND VERTICLE PLACEMENT	For neighborhood or larger spatial scale sites the probe must be located 2-15 meters above ground level and must be at least 1 meter vertically or horizontally away from any supporting structure, walls, *etc.*, and away from dusty or dirty areas. If located near the side of a building or wall, then locate on the windward side relative to the prevailing wind direction during the season of highest concentration potential.	Probe height 3 meters	X		
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.		X		
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).		X		
	(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.		X		
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.	1*		X	
	(c) No trees should be between source and probe inlet for microscale sites.	2*		X	
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.				X
	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.				X
9. PROBE MATERIAL & RESIDENCE TIME	(a) Sampling train material must be FEP Teflon or borosilicate glass (e.g., Pyrex) for reactive gases.		X		
	(c) Sampling probes for reactive gas monitors at NCore must have a sample residence time less than 20 seconds.			X	
Are there any changes that might compromise original siting criteria? If so, provide detail in comment section.					X
Other Comments: Trees have grown slightly					

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

[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.

1* Tree dripline is approximately 5 meters from probe inlet
2* One white spruce between probe and 16th street

PART 58 APPENDIX E SITE EVALUATION FORM FOR PM2.5, PM10, PM10-2.5,and Pb

SITE NAME: Garden SITE ADDRESS: 3000 E 16th Ave, Anchorage

AQS ID: 02-020-0018 EVALUATION DATE: 4/10/2014 EVALUATOR: C. Salerno

APPLICABLE SECTION	REQUIREMENT	OBSERVED	CRITERIA MET?		
			YES	NO	N/A
2. HORIZONTAL AND VERTICLE PLACEMENT	2-15 meters above ground level for neighborhood or larger spatial scale, 2-7 meters for microscale spatial scale sites and middle spatial scale $PM_{10-2.5}$ sties. 1 meter vertically or horizontally away from any supporting structure, walls, *etc.*, and away from dusty or dirty areas. If located near the side of a building or wall, then locate on the windward side relative to the prevailing wind direction during the season of highest concentration potential.	Roof height 6 meters. All PM inlets 8 meters	X		
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.		X		
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.		X		
	(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.		X		
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.		X		
	(c) No trees should be between source and probe inlet for microscale sites.		X		
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.		X		
Are there any changes that might compromise original siting criteria?				X	

Other Comments: ADT ≤ 10,000 traffic lane 14 meters north of probe

PART 58 APPENDIX E SITE EVALUATION FORM FOR PM2.5, PM10, PM10-2.5,and Pb					
SITE NAME: Parkgate			SITE ADDRESS: 11723 Old Glenn Hwy, Eagle River		
AQS ID: 02-020-1004	EVALUATION DATE: 4/10/2014		EVALUATOR: C. Salerno		
APPLICABLE SECTION	REQUIREMENT	OBSERVED	CRITERIA MET?		
			YES	NO	N/A
2. HORIZONTAL AND VERTICLE PLACEMENT	2-15 meters above ground level for neighborhood or larger spatial scale, 2-7 meters for microscale spatial scale sites and middle spatial scale $PM_{10-2.5}$ sties. 1 meter vertically or horizontally away from any supporting structure, walls, *etc.*, and away from dusty or dirty areas. If located near the side of a building or wall, then locate on the windward side relative to the prevailing wind direction during the season of highest concentration potential.	Roof height 5 meters Probe inlet 7 meters	X		
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.		X		
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.		X		
	(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.		X		
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.		X		
	(c) No trees should be between source and probe inlet for microscale sites.		X		
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.		X		
Are there any changes that might compromise original siting criteria?				X	
Other Comments: ADT~17,600 (2012) on Old Glenn Hwy, Traffic lane 44 meters east Easystreet, traffic lane 23 meters south					

PART 58 APPENDIX E SITE EVALUATION FORM FOR CO					
SITE NAME: FNSB-Ncore		SITE ADDRESS: 905 Pioneer Rd, Fairbanks			
AQS ID: 02-090-0034 EVALUATION DATE: 4/10/14 EVALUATOR: Ron Lovell					
APPLICABLE SECTION	REQUIREMENT	OBSERVED	CRITERIA MET?		
			YES	NO	N/A
2. HORIZONTAL AND VERTICLE PLACEMENT	For neighborhood or larger spatial scale sites the probe must be located 2-15 meters above ground level and must be at least 1 meter vertically or horizontally away from any supporting structure, walls, *etc.*, and away from dusty or dirty areas. If located near the side of a building or wall, then locate on the windward side relative to the prevailing wind direction during the season of highest concentration potential.		X		
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.		X		
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).		X		
	(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.		X		
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.		X		
	(c) No trees should be between source and probe inlet for microscale sites.		X		
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.		X		
	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.		X		
9. PROBE MATERIAL & RESIDENCE TIME	(a) Sampling train material must be FEP Teflon or borosilicate glass (e.g., Pyrex) for reactive gases.		X		
	(c) Sampling probes for reactive gas monitors at NCore must have a sample residence time less than 20 seconds.		X		
Are there any changes that might compromise original siting criteria? If so, provide detail in comment section.				X	
Other Comments:					

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

[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.

PART 58 APPENDIX E SITE EVALUATION FORM FOR O3					
SITE NAME: FNSB-Ncore			SITE ADDRESS: 905 Pioneer Rd, Fairbanks		
AQS ID: 02-090-0034	EVALUATION DATE: 4/10/14	EVALUATOR: Ron Lovell			
APPLICABLE SECTION	REQUIREMENT	OBSERVED	CRITERIA MET?		
			YES	NO	N/A
2. HORIZONTAL AND VERTICLE PLACEMENT	2-15 meters above ground level. 1 meter vertically or horizontally away from any supporting structure, walls, *etc.*, and away from dusty or dirty areas. If located near the side of a building or wall, then locate on the windward side relative to the prevailing wind direction during the season of highest concentration potential.		X		
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.		X		
	(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.		X		
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.		X		
	(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.		X		
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.		X		
	(c) No trees should be between source and probe inlet for microscale sites.		X		
6. SPACING FROM ROADWAYS	See spacing requirements table below		X		
9. PROBE MATERIAL & RESIDENCE TIME	(a) Sampling train material must be FEP Teflon or borosilicate glass (e.g., Pyrex).		X		
	(c) Sampling probes for reactive gas monitors at NCore must have a sample residence time less than 20 seconds.		X		
Are there any changes that might compromise original siting criteria? If so, provide detail in comment section.				X	
Other Comments:					

Roadway average daily traffic, vehicles per day	Minimum distance[1] (meters)	Minimum distance[1, 2] (meters)
≤1,000	10	10
10,000	10	20
15,000	20	30
20,000	30	40
40,000	50	60
70,000	100	100
>110,000	250	250

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

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

PART 58 APPENDIX E SITE EVALUATION FORM FOR SO2

SITE NAME: FNSB-Ncore SITE ADDRESS: 905 Pioneer Rd, Fairbanks

AQS ID: 02-090-0034 EVALUATION DATE: 4/10/14 EVALUATOR: Ron Lovell

APPLICABLE SECTION	REQUIREMENT	OBSERVED	CRITERIA MET?		
			YES	NO	N/A
2. HORIZONTAL AND VERTICLE PLACEMENT	2-15 meters above ground level. 1 meter vertically or horizontally away from any supporting structure, walls, *etc.*, and away from dusty or dirty areas. If located near the side of a building or wall, then locate on the windward side relative to the prevailing wind direction during the season of highest concentration potential.		X		
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.		X		
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.		X		
	(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.		X		
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.		X		
	(c) No trees should be between source and probe inlet for microscale sites.		X		
6. SPACING FROM ROADWAYS	There are no roadway spacing requirements for SO2.				X
9. PROBE MATERIAL & RESIDENCE TIME	(a) Sampling train material must be FEP Teflon or borosilicate glass (e.g., Pyrex).		X		
	(c) Sampling probes for reactive gas monitors at NCore must have a sample residence time less than 20 seconds.		X		
Are there any changes that might compromise original siting criteria? If so, provide detail in comment section.				X	

Other Comments:

PART 58 APPENDIX E SITE EVALUATION FORM FOR NO, NOx, NO2, and NOy					
SITE NAME: FNSB-Ncore			SITE ADDRESS: 905 Pioneer Rd, Fairbanks		
AQS ID: 02-090-0034	EVALUATION DATE: 4/10/14		EVALUATOR: Ron Lovell		
APPLICABLE SECTION	REQUIREMENT	OBSERVED	CRITERIA MET?		
			YES	NO	N/A
2. HORIZONTAL AND VERTICLE PLACEMENT	For neighborhood or larger spatial scale sites the probe must be located 2-15 meters above ground level and must be at least 1 meter vertically or horizontally away from any supporting structure, walls, *etc.*, and away from dusty or dirty areas. Microscale near-road NO_2 monitoring sites are required to have sampler inlets between 2 and 7 meters above ground level. If located near the side of a building or wall, then locate the sampler probe on the windward side relative to the prevailing wind direction during the season of highest concentration potential.		X		
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.		X		
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.		X		
	(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.		X		
	(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.		X		
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.		X		
	(c) No trees should be between source and probe inlet for microscale sites.		X		
6. SPACING FROM ROADWAYS	See spacing requirements table below		X		
9. PROBE MATERIAL & RESIDENCE TIME	(a) Sampling train material must be FEP Teflon or borosilicate glass (e.g., Pyrex).		X		
	(c) Sampling probes for reactive gas monitors at NCore and at NO_2 sites must have a sample residence time less than 20 seconds.		X		
Are there any changes that might compromise original siting criteria? If so, provide detail in comment section.				X	
Other Comments:					

Roadway average daily traffic, vehicles per day	Minimum distance[1] (meters)	Minimum distance[1, 2] (meters)
≤1,000	10	10
10,000	10	20
15,000	20	30
20,000	30	40
40,000	50	60
70,000	100	100
≥110,000	250	250

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

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

PART 58 APPENDIX E SITE EVALUATION FORM FOR PM2.5, PM10, PM10-2.5,and Pb					
SITE NAME: FNSB-Ncore			SITE ADDRESS: 905 Pioneer Rd, Fairbanks		
AQS ID: 02-090-0034	EVALUATION DATE: 4/10/14		EVALUATOR: Ron Lovell		
APPLICABLE SECTION	REQUIREMENT	OBSERVED	CRITERIA MET?		
			YES	NO	N/A
2. HORIZONTAL AND VERTICLE PLACEMENT	2-15 meters above ground level for neighborhood or larger spatial scale, 2-7 meters for microscale spatial scale sites and middle spatial scale $PM_{10-2.5}$ sties. 1 meter vertically or horizontally away from any supporting structure, walls, *etc.*, and away from dusty or dirty areas. If located near the side of a building or wall, then locate on the windward side relative to the prevailing wind direction during the season of highest concentration potential.		X		
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.		X		
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.		X		
	(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.		X		
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.		X		
	(c) No trees should be between source and probe inlet for microscale sites.		X		
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.		X		
Are there any changes that might compromise original siting criteria?				X	
Other Comments:					

PART 58 APPENDIX E SITE EVALUATION FORM FOR PM2.5, PM10, PM10-2.5,and Pb					
SITE NAME: FSOB			SITE ADDRESS_____		
AQS ID: 02-090-0010	EVALUATION DATE: 4/11/14		EVALUATOR: Paul Wright		
APPLICABLE SECTION	REQUIREMENT	OBSERVED	CRITERIA MET?		
			YES	NO	N/A
2. HORIZONTAL AND VERTICLE PLACEMENT	2-15 meters above ground level for neighborhood or larger spatial scale, 2-7 meters for microscale spatial scale sites and middle spatial scale $PM_{10-2.5}$ sties. 1 meter vertically or horizontally away from any supporting structure, walls, *etc.*, and away from dusty or dirty areas. If located near the side of a building or wall, then locate on the windward side relative to the prevailing wind direction during the season of highest concentration potential.		X		
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.		X		
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.		X		
	(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.		X		
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.		X		
	(c) No trees should be between source and probe inlet for microscale sites.		X		
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.		X		
Are there any changes that might compromise original siting criteria?				X	
Other Comments:					

PART 58 APPENDIX E SITE EVALUATION FORM FOR PM2.5, PM10, PM10-2.5,and Pb					
SITE NAME: NPF3 SITE ADDRESS: 3288 Hurst Rd, North Pole AQS ID: 02-090-0035 EVALUATION DATE: 4/11/2014 EVALUATOR: Paul Wright					
APPLICABLE SECTION	REQUIREMENT	OBSERVED	CRITERIA MET?		
			YES	NO	N/A
2. HORIZONTAL AND VERTICLE PLACEMENT	2-15 meters above ground level for neighborhood or larger spatial scale, 2-7 meters for microscale spatial scale sites and middle spatial scale $PM_{10-2.5}$ sties. 1 meter vertically or horizontally away from any supporting structure, walls, *etc.*, and away from dusty or dirty areas. If located near the side of a building or wall, then locate on the windward side relative to the prevailing wind direction during the season of highest concentration potential.		X		
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.		X		
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.		X		
	(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.		X		
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.		X		
	(c) No trees should be between source and probe inlet for microscale sites.		X		
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.		X		
Are there any changes that might compromise original siting criteria?				X	
Other Comments: There is a group of three trees to the north of the inlet. The distance from the probe inlet to the drip line of the tree is just within acceptance criteria. Future growth may require the tree to be trimmed to meet acceptance criteria.					

PART 58 APPENDIX E SITE EVALUATION FORM FOR PM2.5, PM10, PM10-2.5,and Pb					
SITE NAME: Butte	SITE ADDRESS: Harrison Ct, Butte				
AQS ID: 02-170-0008	EVALUATION DATE: 04/16/14	EVALUATOR: Daniella Fawcett, Ryan Dukowitz			
APPLICABLE SECTION	REQUIREMENT	OBSERVED	CRITERIA MET?		
			YES	NO	N/A
2. HORIZONTAL AND VERTICLE PLACEMENT	2-15 meters above ground level for neighborhood or larger spatial scale, 2-7 meters for microscale spatial scale sites and middle spatial scale $PM_{10-2.5}$ sties. 1 meter vertically or horizontally away from any supporting structure, walls, *etc.*, and away from dusty or dirty areas. If located near the side of a building or wall, then locate on the windward side relative to the prevailing wind direction during the season of highest concentration potential.	Trees>10m	X		
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.	Paved road, gravel cul de sac	X		
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.	No obstacles	X		
	(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.	No obstacles	X		
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.	Trees>10m	X		
	(c) No trees should be between source and probe inlet for microscale sites.				X
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.	Road>100m away	X		
Are there any changes that might compromise original siting criteria?				X	
Other Comments:					

PART 58 APPENDIX E SITE EVALUATION FORM FOR PM2.5, PM10, PM10-2.5,and Pb					
SITE NAME: Palmer		SITE ADDRESS: S Gulkana St, Palmer			
AQS ID: 02-170-0012 EVALUATION DATE: 04/16/14 EVALUATOR: Daniella Fawcett, Ryan Dukowitz					
APPLICABLE SECTION	REQUIREMENT	OBSERVED	CRITERIA MET?		
			YES	NO	N/A
2. HORIZONTAL AND VERTICLE PLACEMENT	2-15 meters above ground level for neighborhood or larger spatial scale, 2-7 meters for microscale spatial scale sites and middle spatial scale $PM_{10-2.5}$ sties. 1 meter vertically or horizontally away from any supporting structure, walls, *etc.*, and away from dusty or dirty areas. If located near the side of a building or wall, then locate on the windward side relative to the prevailing wind direction during the season of highest concentration potential.	Sampling inlet>3m above ground No walls >600m	X		
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.	Raved roads only No sources nearby	X		
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.	No obstacles Nearest tree>100m	X		
	(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.	No obstacles	X		
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.	Nearest tree>100m	X		
	(c) No trees should be between source and probe inlet for microscale sites.				X
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.	Road>20m away	X		
Are there any changes that might compromise original siting criteria?				X	
Other Comments:					

PART 58 APPENDIX E SITE EVALUATION FORM FOR O3					
SITE NAME PALMER SITE ADDRESS S. GULKANA ST.					
AQS ID 02-170-0012 EVALUATION DATE 4/7/2015 EVALUATOR LAURA BARRY					
APPLICABLE SECTION	REQUIREMENT	OBSERVED	CRITERIA MET?		
			YES	NO	N/A
2. HORIZONTAL AND VERTICLE PLACEMENT	2-15 meters above ground level. 1 meter vertically or horizontally away from any supporting structure, walls, *etc.*, and away from dusty or dirty areas. If located near the side of a building or wall, then locate on the windward side relative to the prevailing wind direction during the season of highest concentration potential.	3.66 m above ground	X		
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.	N/A	X		
	(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.	N/A	X		
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.	N/A	X		
	(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.		X		
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.	No trees	X		
	(c) No trees should be between source and probe inlet for microscale sites.	No trees	X		
6. SPACING FROM ROADWAYS	See spacing requirements table below	22.12 m	X		
9. PROBE MATERIAL & RESIDENCE TIME	(a) Sampling train material must be FEP Teflon or borosilicate glass (e.g., Pyrex).	teflon	X		
	(c) Sampling probes for reactive gas monitors at NCore must have a sample residence time less than 20 seconds.	N/A			
Are there any changes that might compromise original siting criteria? If so, provide detail in comment section.					
Other Comments:					

Roadway average daily traffic, vehicles per day	Minimum distance[1] (meters)	Minimum distance[1, 2] (meters)
≤1,000	10	10
10,000	10	20
15,000	20	30
20,000	30	40
40,000	50	60
70,000	100	100
≥110,000	250	250

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

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

PART 58 APPENDIX E SITE EVALUATION FORM FOR PM2.5, PM10, PM10-2.5,and Pb					
SITE NAME: Floyd Dryden	SITE ADDRESS: Mendenhall Valley, Juneau				
AQS ID 02-110-0004	EVALUATION DATE: 4/28/14	EVALUATOR: Gus van Vliet			
APPLICABLE SECTION	REQUIREMENT	OBSERVED	CRITERIA MET?		
			YES	NO	N/A
2. HORIZONTAL AND VERTICLE PLACEMENT	2-15 meters above ground level for neighborhood or larger spatial scale, 2-7 meters for microscale spatial scale sites and middle spatial scale $PM_{10-2.5}$ sties. 1 meter vertically or horizontally away from any supporting structure, walls, *etc.*, and away from dusty or dirty areas. If located near the side of a building or wall, then locate on the windward side relative to the prevailing wind direction during the season of highest concentration potential.	8m	X		
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.		X		
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.	Inlet height 8 m, Tree height 40 m, Acceptable distance 64 m, Actual distance of separation 29 m		X	
	(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.		X		
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.		X		
	(c) No trees should be between source and probe inlet for microscale sites.				X
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.				X
Are there any changes that might compromise original siting criteria?				X	
Other Comments: The distance of separation between the probe inlet and the tree line is 29 meters as compared to the calculated acceptance criteria for Item 4(a) of 64 meters. These are old growth Spruce trees and these measurements have remained approximately the same since monitoring began at this long-term site. Although the separation distances do not meet the criteria, the spacing and coverage of surrounding tall trees is representative for the Mendenhal Valley neighborhood.					

APPENDIX C: ADDITIONAL MONITORING PROJECTS

Smoke Monitoring for Air Quality Advisories

Smoke from wildland fires can affect large areas and impacts 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 wild 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 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 and visibility information. Often a combination of both data sets is used to issue air quality advisories. The DEC meteorologist or AQ staff with assistance from the NWS use meteorological and air monitoring data to forecast smoke movement and predict where air quality impacts might be experienced.

DEC, with the help of local site operators, currently operates two continuous analyzers in rural Alaska during the wild fire season: Galena and Ft Yukon. DEC also has two portable, battery-operated, continuous particulate matter monitors (E-BAM) equipped with satellite communication devices, which can transmit the data to a website. The E-BAM instrument requires little maintenance and staff is typically only needed at set-up and to ensure proper operation for the first day. Remote data access allows staff in the DEC office or in the field to use the data for advisories and briefings. Currently no additional samplers are requested, as staff time and travel funds are the limiting factor in expanding the smoke monitoring network.

Mercury Monitoring

DEC received funding through the Alaska Coastal Impact Assessment program to expand the current network of two Mercury Deposition Network (MDN) sites (measuring wet deposition mercury) as part of the National Atmospheric Deposition Program (NADP) in Kodiak, Nome, and in Unalaska (Dutch Harbor). This funding supports the laboratory analysis of the Kodiak and Unalaska samples to include the following trace metals: lead, cadmium, copper, nickel, zinc, chromium, beryllium, arsenic, and selenium. These compounds are typically found in the exhaust of major stationary sources and have been used to identify source emission signatures. The Alaska Coastal Deposition Network, comprising the existing sites in Kodiak and Unalaska will be operated using the techniques and quality assurance protocols of the MDN, managed by the NADP, until September 30, 2015. DEC's Alaska Coastal Impacts Assessment Program grant also includes funding for out-of-state analysis of the data in conjunction with back trajectory modeling and integration with meteorology after the monitoring has ended.

The data gathered by the Alaska Coastal Deposition Network will be used to determine if deposition is localized or if Alaska's coastal ecosystem is uniformly impacted. As airborne transport is the major contamination pathway, the data collected should be considered essential for use in preventative ecosystem management. Increases in airborne pollutants will slowly make their way into the ecosystem, thus deposition data can be used to predict future ecosystem impacts, plan mitigation strategies, and assist ecosystem management. In addition, deposition data can be used to develop and corroborate models for mitigation strategies and opportunities.

DEC, meteorological, and atmospheric science researchers will combine the trace metal and mercury data with local and global meteorological data to assess long range and short range transport patterns to identify potential local, regional, and international source regions. The mercury data will be available on the MDN web page. The trace metal data will be stored in a database at the DEC AQ office and will be linked with the mercury and meteorological data. The reports will be shared with the fish tissue monitoring program and any interested parties. A final report will be posted on the DEC web page.

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 University of Alaska Fairbanks operates the Fairbanks site. The DEC Air Quality Division operates the site in Juneau. A decision needs to be made if these sites are intended as early warning stations or to document radiation levels experienced throughout the state. If early warning is the goal, the sites in Anchorage and Fairbanks are not the best locations to meet this objective. The sites should either be moved to the coast to allow for early detection and actions before the radiation reaches the population centers inland or additional coastal monitors should be installed to meet this need.

APPENDIX D: IMPROVE NETWORK

In 1977, Congress amended the Clean Air Act to include provisions to protect the scenic vistas of the nation's national parks and wilderness areas. In these amendments, Congress declared as a national visibility goal:

> *The prevention of any future, and the remedying of any existing, impairment of visibility in mandatory Class I Federal areas which impairment results from manmade air pollution. (Section 169A)*

At that time, Congress designated all wilderness areas over 5,000 acres and all national parks over 6,000 acres as mandatory federal Class I areas. These Class I areas receive special visibility protection under the Clean Air Act.

The 1990 amendments to the Clean Air Act established a new Section 169(B) to address regional haze. To address the 1990 Clean Air Act amendments, the problem of long-range transport of pollutants causing regional haze, and to meet the national goal of reducing man-made visibility impairment in Class I areas, EPA adopted the Regional Haze Rule in 1999.

Alaska has four Class I areas subject to the Regional Haze Rule: Denali National Park, Tuxedni National Wildlife Refuge, Simeonof Wilderness Area, and Bering Sea Wilderness Area. They were designated Class I areas in August 1977. Figure 1 shows their locations, with Denali National Park in the Interior, Tuxedni

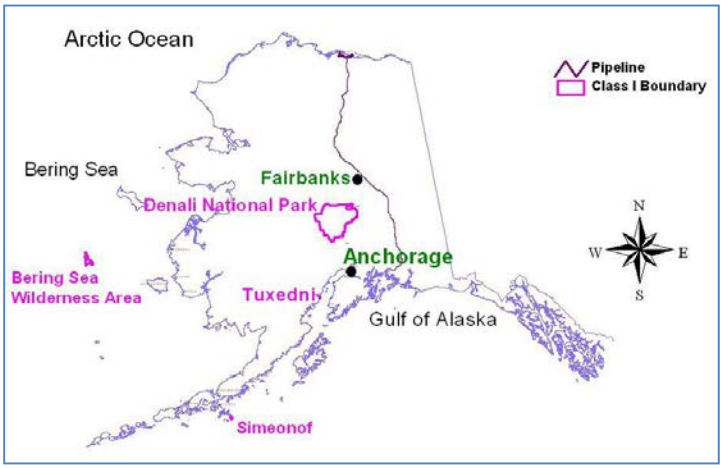


Figure 1. Alaskan Class I Areas

In Alaska, Class I Areas are managed by the National Park Service (NPS) and the U.S. Fish and Wildlife Service (USFWS.)

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 stations (Denali National Park and Preserve, Simeonof, and Tuxedni) were 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.

Denali National Park and Preserve

Denali National Park and Preserve (DNPP) is a large park in the interior of Alaska. It has kept its integrity as an ecosystem because it was set aside for protection fairly early in Alaska's history. Denali National Park headquarters lies 240 miles north of Anchorage and 125 miles southwest of Fairbanks, in the center of the Alaska Range. The park area totals more than 6 million acres. Denali is the only Class I site in Alaska that is easily accessible and connected to the road system. Denali has the most extensive air monitoring of Alaska's Class I areas, so more detailed examinations of long-term and seasonal air quality trends are possible for this site.

IMPROVE monitoring sites were established at two locations within or near the boundaries of the National Park and Preserve. The first air monitoring site is located near the eastern end of the park road at the Park Headquarters. A second, newer site, known as Trapper Creek, is located to the south of the Park at another site with reliable year-round access and electrical power.

The Denali Headquarters monitoring site (DENA1) is across the Park Road from park headquarters, approximately 250 yards from headquarters area buildings. The site (elevation of 2,125 feet) sits above the main road (elevation 2,088 feet). The side road to the monitoring site winds uphill for 130 yards, providing access to the monitoring site and a single-family residential staff cabin. The hill is moderately wooded, but the monitoring site sits in a half an acre clearing. During the park season, mid-May to mid-September, 70 buses and approximately 560 private vehicles per day loaded with park visitors traverse the road. During the off season, approximately100 passenger and maintenance vehicles pass within 0.3 miles of the monitoring site. Private vehicles are only allowed on the first 14.8 miles of the Park Road.

The Trapper Creek IMPROVE monitoring site (TRCR1) is located 100 yards east of the Trapper Creek Elementary School. The site is located west of Trapper Creek, Alaska and a quarter mile south of Petersville Road. The site is the official IMPROVE site for Denali National Park and Preserve and was established in September 2001 to evaluate the long-range transport of pollution into the Park from the south. The elementary school experiences relatively little traffic during the day, about 4 buses and 50 automobiles. The school is closed June through August. This site was selected because it has year-round access to power, is relatively open, and is not directly impacted by local sources.

IMPROVE monitoring data have been recorded at the Denali Headquarters IMPROVE site from March of 1988 to present. The IMPROVE monitor near the Park's headquarters was the original IMPROVE site. Due to topographical barriers, such as the Alaska Range, it was determined that the headquarters site was not adequately representative of the entire Class I area. Therefore, Trapper Creek, just outside of the park's southern boundary, was chosen as a second site for an IMPROVE monitor and is the official Denali IMPROVE site as of September 10, 2001. The headquarters site is now the protocol site. A Clean Air Status and Trends Network (CASTNet) monitor is located near the Denali Headquarters IMPROVE site.

Simeonof Wilderness Area

Simeonof Wilderness Area comprises 25,141 acres located in the Aleutian Chain, 58 miles from the mainland. It is one of 30 islands that make up the Shumagin Group on the western edge of

the Gulf of Alaska. Access to Simeonof is difficult due to its remoteness and the unpredictable weather. Winds are mostly from the north and northwest as part of the mid-latitude westerlies. Occasionally winds from Asia blow in from the west. The island is isolated and the closest air pollution sources are marine traffic in the Gulf of Alaska and the community of Sand Point.

The Fish and Wildlife Service placed an IMPROVE air monitor in the community of Sand Point to represent the wilderness area. The community is on a nearby, more accessible island approximately 60 miles north west of the Simeonof Wilderness Area. The monitor has been on-line since September 2001. The location was selected to provide representative data for regional haze conditions at the wilderness area.

Tuxedni National Wildlife Refuge

Tuxedni National Wildlife Refuge is located on a fairly isolated pair of islands in Tuxedni Bay, Cook Inlet in Southcentral Alaska. There is little human use of Tuxedni except for a few kayakers and some backpackers. There is an old cannery built near Snug Harbor on Chisik Island which is not part of the wilderness area; however it is a jumping off point for ecotourists staying at Snug Harbor arriving by boat or plane. The owners of the land have a commercial fishing permit as do many Cook Inlet fishermen. Set nets are installed around the perimeter of the island and in Tuxedni Bay during fishing season.

Along with commercial fishing, Cook Inlet has reserves of gas and oil that are currently under development. Gas fields are located at the Kenai area and farther north. The inlet produces 30,000 barrels of oil a day and 485 million cubic feet of gas per day. Pipelines run from Kenai to the northeast and northeast along the western shore of Cook Inlet starting in Redoubt Bay. The offshore drilling is located north of Nikiski and the West McArthur River. All of the oil is refined at the Nikiski refinery and the Kenai Tesoro refinery for use in Alaska and overseas.

The Fish and Wildlife Service installed an IMPROVE monitor near Lake Clark National Park to represent conditions at Tuxedni Wilderness Area. This site is on the west side of Cook Inlet, approximately 5 miles from the Tuxedni Wilderness Area. The site was operational as of December 18, 2001, and represents regional haze conditions for the wilderness area. In 2014 the property owner and site operator notified the US Fish and Wildlife Service that he would no longer be able to service the site. At that time USFWS, US NPS and DEC began looking for a new site location. A site location is currently being explored on the eastern side of the Cook Inlet close to the community of Nikiski.

Bering Sea Wilderness Area

The Bering Sea Wilderness Area is located off the coast of Alaska about 350 miles southwest of Nome. Hall Island is at the northern tip of the larger St Matthew Island.

The Bering Sea Wilderness Area had a DELTA-DRUM sampler placed on it during a field visit in 2002. However, difficulties were encountered with the power supply for the sampler and no valid data are available from that effort. No IMPROVE monitoring is currently planned for the Bering Sea Wilderness Area because of its inaccessibility.

Monitoring data and additional information for the Alaskan IMPROVE sites are available from the EPA website, http://vista.cira.colostate.edu/improve .

Additional Monitoring Considerations

DEC published a final study report for the Regional Haze Trans-boundary Monitoring project in July 2012.
(http://www.dec.state.ak.us/air/am/Haze%20report/Final%20Regional%20Haze%20Trans-Boundary%20Monitoring%20Project.pdf)
One of the driving factors for the study was the quantitative evaluation of foreign contribution to local air quality impacts. While long-range transport of pollutants was observed and documented through various measurement techniques, DEC was unable to quantify international source contribution even as a whole. Current sampling methods do not provide enough time resolution to adequately document short events lasting only a few days i.e., the IMPROVE sampling schedule misses 2/3 of the year because samplers operate every third day. DRUM samplers which operate on a semi-continuous basis i.e., collecting 3-hour samples, initially seemed a viable method to collect year-round data and provide a comparison to the IMPROVE chemical analysis. Even if all the other problems encountered with operating the DRUM samplers in a remote field setting could be overcome, a reliable quantitative comparison to the IMPROVE data set is not possible given the low mass loading on the DRUM sampling strips combined with uncertainty for start and end hours.

DELTA-DRUM Samplers have been used at several sites in Alaska for relatively short periods. Researchers have unsuccessfully modified these samplers for remote winter use in Denali Park. Drum samplers were set up at the Denali and Trapper Creek sites as well as in McGrath and Lake Minchumina in February and March 2008. They experienced numerous mechanical and pump problems due to severe winter conditions and proved to be too problematic. These samplers operated intermittently between February/March 2006 and April 2009, resulting in very little usable data.

DEC still has concerns about the location of the Denali headquarters IMPROVE site as being representative of the entire Class I area. The Denali Headquarters IMPROVE site is located within the area of most heavy use and development and, thus, may not be representative of the pristine wilderness that makes up the remainder of the park lands. Lake Minchumina was clearly the cleanest site. An argument could be made that most of the 6 million acres of DNPP best resemble Lake Minchumina with its current 13 residents compared to Denali headquarters or Trapper Creek which see nearly a half a million visitors per year. Most of the park visitors (432,301 in 2008), and DNPP staff (145 permanent, 290 summer seasonal) and Talkeetna staff (10 permanent, approximately 20 summer seasonal) are concentrated around DNPP headquarters (personal communication Blakesley 2012, June 6; DNPP, 2012). Traffic is mostly concentrated on the main highway and the single dirt road through the wilderness area (DNPP, 2012).

The question that still needs to be answered is whether or not the Lake Minchumina site is more representative of the entire park than the two existing IMPROVE sites at Denali Headquarters and Trapper Creek. Before a final decision for relocation would be made, additional studies should be conducted that integrate meteorological observations with aerosol concentrations more quantitatively than was possible for this study analysis. As DEC continues to implement its Regional Haze plan and performs required updates in future years, the experience and data gained through this study can be used to inform the development and planning for new

monitoring efforts that may provide additional insight into aerosol impacts in Alaska's Class I areas. Given the vast, remote areas of Alaska, the challenge remains to develop air monitoring approaches that can be successfully operated in the State's wilderness areas.

Future studies will use more robust sampling equipment for long term monitoring. Because of the remoteness of Alaska's Class I sites, DEC will most likely explore other sampling equipment for regulatory monitoring to demonstrate compliance with the Regional Haze Rule glide-path. As the concentrations of anthropogenic aerosols decreases toward background it will become more difficult to monitor successfully in the future without advances in monitoring instrumentation and pump and power technologies.

APPENDIX E: NAAQS SUMMARY TABLES

Table E-1. $PM_{2.5}$ under local /actual conditions (µg/m^3); exceptional event values not included

$PM_{2.5}$ Monitoring Sites	AQS Site ID	98th Percentile			Weighted Annual Mean			2014 Design Value	
		2014	2013	2012	2014	2013	2012	24-hr	Annual
Garden/ Anchorage	02-020-0018	18.5	15.7	28.4	5.8	4.9	6.6	21	5.8
Parkgate / Eagle River	02-020-1004	14.2	15.0	17.9	5.1	5.0	5.3	16	5.2
Butte/ Matanuska-Susitna Valley	02-170-0008	39.5	27.9	33.4	7.9	6.4	5.9	34	6.7
Palmer/ Matanuska-Susitna Valley	02-170-0012	9.2	11.1	13.7	2.1	3.2	4.2	11	3.1
Wasilla/ Matanuska-Susitna Valley	02-170-0013	15.5	16.0	22.8	3.4	4.0	5.7	18	4.4
State Office Building/ Fairbanks	02-090-0010	34.5	36.3	49.6	10.3	10.6	10.7	40	11.0
NCORE Site/ Fairbanks	02-090-0034	31.6	36.2	50.0	10.8	10.5	11.3	39	11.3
North Pole Fire #3/ North Pole	02-090-0035	138.3	121.6	158.4	34.1*	29.1*	16.8	139	NA
Floyd Dryden/ Juneau	02-110-0004	27.5	22.7	23.5	7.7	5.9	6.4	25	6.7

* Annual values did not meet data completeness criteria.

Table E-2. PM_{10} under standard conditions (µg/m^3); exceptional event values not included

PM_{10} Monitoring Sites	Site ID	2014			2013			2012		
		Exceed-ances	1st Max 24-hr	2nd Max 24-hr	Exceed-ances	1st Max 24-hr	2nd Max 24-hr	Exceed-ances	1st Max 24-hr	2nd Max 24-hr
Garden/ Anchorage	02-020-0018	0	91	87	0	65	58	0	76	69
Tudor/ Anchorage	02-020-0044	2	198	155	1	256	120	0	120	11 5
Parkgate/ Eagle River	02-020-1004	0	111	109	1	174	78	0	81	77
NCORE/ Fairbanks	02-090-0034	0	94	74	0	111	95	0	95	83
Butte/ Matanuska-Susitna Valley	02-170-0008	0	117	107	0	81	72	0	113	81
Palmer/ Matanuska-Susitna Valley	02-170-0012	0	110	106	0	113	84	0	121	118
Wasilla/ Matanuska-Susitna Valley	02-170-0013	0	127	118	0	78	63	0	120	109
Floyd Dryden/ Juneau	02-110-0004	0	38	31	0	33	24	0	24	19

Table E-3. Sites within Limited Maintenance Plan areas - PM_{10} under standard conditions ($\mu g/m^3$)

PM_{10} Monitoring Sites	Site ID	5-year mean (2010 through 2014)
Parkgate/ Eagle River	02-020-1004	18
Floyd Dryden/ Juneau	02-110-0004	8

Table E-4. CO (ppm)

		2014			2013			2012		
CO Monitoring Sites	Site ID	Exceed-ances	1st Max 8-hr	2nd Max 8-hr	Exceed-ances	1st Max 8-hr	2nd Max 8-hr	Exceed-ances	1st Max 8-hr	2nd Max 8-hr
Garden Site / Anchorage	02-020-0018	0	2.7	2.5	0	3.4	3.1	0	4.4	4.3
Turnagain Site (MOA)	02-020-0048	0	3.3	2.8	0	4.5	4.0	0	6.6	5.5
Old Post Office/ Fairbanks	02-090-0002	0	3.2	2.9	0	3.6	3.2	0	6.8	6.7
NCORE/ Fairbanks	02-090-0034	0	2.0	1.9	0	2.8	2.7	0	2.4	2.1

Table E-5. SO2 (ppb)

SO2 Monitoring Sites	Site ID	2014		2013		2012		3-yrs Design Value
		99th Percentile	Completed Quarters	99th Percentile	Completed Quarters	99th Percentile	Completed Quarters	
NCORE/ Fairbanks	02-090-0034	40*	3	37	4	49	4	42

Table E-6. O3 (ppm)

O_3 Monitoring Sites	Site ID	2014			2013			2012			3-Years	
		Valid Days	Percent Compl	4th Max	Valid Days	Percent Compl	4th Max	Valid Days	Percent Compl	4th Max	Percent Compl	Design Value
Wasilla/ Matanuska-Susitna Valley	02-170-0013	159	74	.045*	NA	NA	NA	143	67	0.048*	59	.046
NCORE/ Fairbanks	02-090-0034	210	98	.044	209	98	0.048	197	92	0.048	96	.046

* Annual values did not meet data completeness criteria
NA – not available

6 APPENDIX F: ALASKA'S $PM_{2.5}$ FRM FEM COMPARISON

Assessment of the continuous $PM_{2.5}$ Met One BAM 1020 sampler performance in the State of Alaska Air monitoring Network 2009-2014

INTRODUCTION

$PM_{2.5}$ is a mass based standard. It is the measurement of particulate matter with an aerodynamic diameter of 2.5 micrometers (μm) or less. The samples are measured in units of micrograms of $PM_{2.5}$ per cubic meter ($\mu g/m^3$). When EPA made $PM_{2.5}$ a criteria pollutant in 1997 (62 CFR 38652), the 24 hour standard was 65 $\mu g/m^3$ and the annual standard was 15 $\mu g/m^3$. The 24-hour standard is probabilistic where the 98th percentile is averaged over three years to determine a design value. At the time of promulgation of the $PM_{2.5}$ standard, sampling technology was based on gravimetric analysis. After pre-weighing in the lab, filters were deployed for 24 hours (usually midnight to midnight), retrieved and shipped to a lab where they were they were equilibrated to a standard temperature and relative humidity before final weighing. The time between the monitored day and the filter weighing was a minimum of four days and often much longer. A desire for real-time data led to the development of semi-continuous particulate monitors. Filter-based Federal Reference Method (FRM) data were used in health studies to establish the NAAQS. To compare with health data on which the NAQQS are based, these new monitors needed to yield results as close to the FRM as possible. Several different approaches led to reference or equivalent methods like BAM (based on beta ray attenuation), nephelometer (based on laser measuring light scatter of particles) and TEOM-FDMS (based on the changing frequency of an oscillating microbalance). The Met One BAM 1020 provides hourly data and is designated as a federal equivalent method (FEM) for $PM_{2.5}$ when paired with a very sharp cut cyclone (VSCC). The Met One BAM 1020 was put into use in Alaska as an FEM starting in 2009. It is used at eleven to thirteen sites for monitoring $PM_{2.5}$ concentrations.

Following guidance in the National Monitoring Strategy, Alaska began adding continuous $PM_{2.5}$ analyzers to Federal Reference Method (FRM) monitoring sites. The national long range plan was to convert all manual samplers to continuous analyzers to provide a more comprehensive monitoring database, increasing the monitoring data threefold from sampling every three days to daily and even hourly sampling. The strategy required a collocation of continuous samplers with FRM monitors to determine if a bias existed in the collected data. EPA approved several continuous samplers as Federal Equivalent Methods (FEM). FEM designation is attained by the vendors and includes three FRM and three candidate samplers at four sites (with five campaigns total) distributed across the country and across seasons. A FEM is performance criteria based (multiplicative bias, additive bias and correlation of 23 valid data sets per campaign) (Wayland, 2008).

Even after FEM designation, agencies in the lower 48 states noticed that the newer technology analyzers were producing significant data disparities. In some cases, substantial discrepancies exist between FRM and FEM data (Hanley and Reff, 2011). While analyzers and guidance on how to operate them in various climates have improved their operation, collocation with an FRM sampler is still preferred by DEC to validate their performance as Alaska continues to experience disagreement between methods. Continuous $PM_{2.5}$ analyzers are now in place at two monitoring sites in the Anchorage network, two sites in the Fairbanks North Star Borough, two sites in the Mat-Su Valley, and one site in Juneau.

INSTRUMENTATION

R &P Partisol 2000

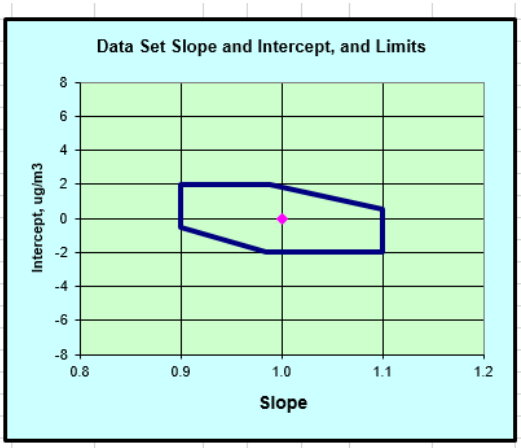
EPA designated the Thermo Scientific Inc. Partisol 2000 (previously Rupprecht and Patashnick, R&P) with a BGI Inc. very sharp cut cyclone (VSSC) as Federal Reference Method (FRM) April 3, 2002. Prior to then the WINS impactor was the standard FRM method for Partisols. The State of Alaska has operated a network of three to seven Partisols with VSCC set up to measure $PM_{2.5}$.

Met One Beta Attenuation Monitor 1020

For hourly data recording the State mainly uses the $PM_{2.5}$ Met One Beta Attenuation Monitors (BAM 1020) which EPA designated as Federal Equivalent Method (FEM) March 12, 2008 (EQPM-0308-170). The State of Alaska has operated a network of seven to ten Met One BAMs.

FEM performance criteria

Federal Equivalent Monitor (FEM) approval is given to more recent instrumentation that meets within a set tolerances the original Federal Reference Method instrumentation conditions that were designated by EPA to measure concentrations of criteria pollutants for meeting NAAQ Standards. The performance criteria for FEM approval for Class III sites must meet the key statistical metrics for multiplicative bias (slope) between 0.9 and 1.1 and an additive bias (intercept) between -2.00 and 2.00 (40 CFR Part 58.11 e, 40 CFR Part 53 Subpart C Figure C-2). In addition for the slope and intercept the correlation between the FRM and FEM should be greater than or equal to 0.95000. However failure to meet the correlation does not cause a monitor to fail FEM requirements. It cannot be used as a reason to exclude data from a continuous FEM monitor (40 CFR part 58.11 e). All DEC monitoring $PM_{2.5}$ BAMs are Class III (continuous monitors). Initially upon FEM designation of the Met One BAM, EPA said the BAM could be designated as the primary sampler in lieu of an FRM without any evaluation period since a comparison should have been already conducted in the network in which it is to be used (EPA, July 24, 2008). Alternatively, it could be collocated with a SLAMS FRM monitor. Because Alaska has such a wide range of extreme weather conditions, DEC decided to collocate all $PM_{2.5}$ BAMs with FRMs until acceptable slope and intercept between the instruments has been obtained.



Regression statistics		Slope[1]	Intercept[2]	Correlation (r)
Statistics for this test site:				
Limits for	Upper:	1.100		
Class III	Lower:	0.900		
Test Results (Pass/Fail):				

[1]Multiplicative bias [2]Additive bias

Figure 14. EXCELTM FEM performance criteria; EPA Spreadsheet Template, Summary sheet

EPA FRM FEM Regression Workbook

EPA published an Excel™ template for calculating results related to a request for approval of an Approved Regional Method (ARM) for $PM_{2.5}$ to aid in meeting the requirements laid out in 40 CFR 58, Appendix C (Figure 14; EPA, 2013). DEC uses the spreadsheet for calculation of the correlation between FRM and FEM $PM_{2.5}$ monitors. Alaska runs Thermo Scientific (formerly Rupprecht & Patashnick) Partisol 2000 monitors with very sharp cut cyclones (VSCC) as FRM monitors and Met One BAM1020 instruments as FEM monitors.

RESULTS

Except for Fairbanks (2009-2013) and North Pole (2009-2014) sites, DEC found that all other Alaskan $PM_{2.5}$ BAM sites met FEM performance requirements. The green box in all the figures represents acceptable limits for slope and intercept for $PM_{2.5}$ methods. The Floyd Dryden BAM in Juneau, Garden BAM in Anchorage and the Matanuska-Susitna (Mat-Su) Valley BAMs at Butte, Palmer and Wasilla all met the slope and intercept performance criteria for $PM_{2.5}$ FEM (

Figure **15** and Table 7). FEM designation does not require but recommends a correlation of greater than or equal to 0.9500 (40 CFR Part 53 Subpart C Section 53.35). Correlations (r) for Butte, Juneau, and Anchorage ranged from 0.9530 to 0.9804 meeting FEM requirements but

Wasilla and Palmer had lower correlations of 0.8616 and 0.9365 respectively. DEC attributes this low correlation to the lack of many high concentrations measured at the sites. Of Wasilla's 91 valid pairs (31 had less than 3 µg/m^3 and were excluded) only three contained concentrations greater than 15 µg/m3. Currently in 2014 the Palmer site has an FRM collocated with an FEM BAM. Palmer has a correlation (r) of 0.90126. Like the Wasilla site, the Palmer site has more than enough valid pairs (127 valid with 68 excluded because of concentrations less than 3 µg/m^3) available but only a single pair had a concentration higher than 12 µg/m^3 (12/17/2012 FRM = 18.5 g/m^3 and BAM = 19.5 µg/m^3).

Correlation data were calculated for the Juneau $PM_{2.5}$ FRM and FEM monitors. Results from the linear regression analysis were well within EPA requirements and, as a result, operation of the $PM_{2.5}$ FRM manual sampler was discontinued April 1, 2011.

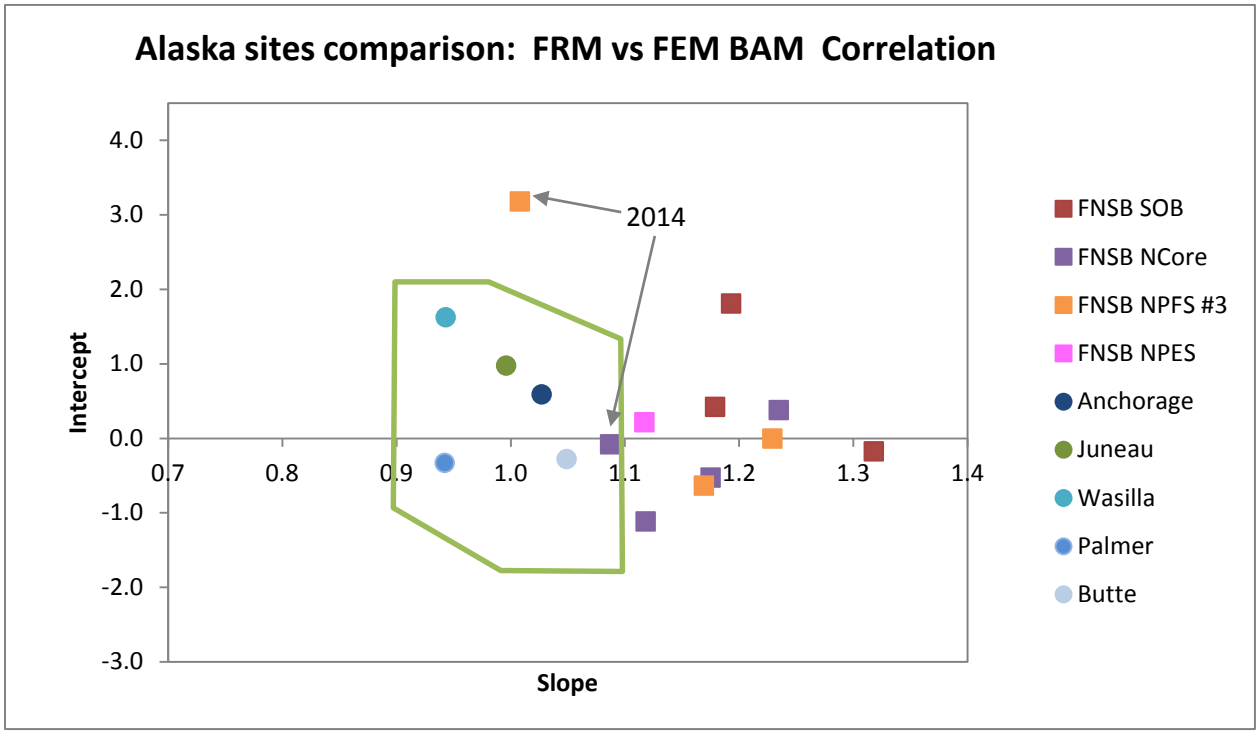


Figure 15. Alaska FRM FEM Correlations; the green box shows Class III performance criteria

Table 1. Correlation comparison: Alaska FRM (Partisol 2000) vs FEM (Met One BAM)

Site/year	N		Regression Statistics FRM, BAM‡		Comments
	All data pairs*	Pairs <3 µg/m³	Slope	Intercept	
FNSB SOB					
2011 all	**119**	22	1.179	0.423	
2012 all	**115**	28	1.318	-0.173	
2013 1/1/13 - 4/28/13	38	2	1.193	1.812	BAM removed 5/1/13
FNSB NCore					
2011 all	69	0	1.175	**-0.527**	
2012 all	**118**	22	1.235	**0.380**	
2013 all	**112**	12	1.118	-1.113	
2014 all	**118**	23	**1.087**	**-0.081**	
FNSB NPFS #3					
2012 all	**108**	22	1.169	-0.633	
2013 1Q & 4Q	49	4	1.229	0.000	winter only
2014 1Q & 4Q	57	9	**1.008**	3.182	
FNSB NPES					
2012 only 1Q &2Q	45	6	1.117	**0.219**	Jan -April 15, 2012
Mat-Su Valley					
Wasilla 2011	**91**	32	**0.943**	**1.628**	
Palmer 10-2012 to 12-2014	**127**	68	**0.942**	**-0.328**	Partisol removed 4/1/15
Butte 8-2011 to 12-2013	**127**	61	**1.049**	**-0.277**	
Juneau					
Floyd Dryden 10/2009 - 5/2011	**109**	59	**0.996**	**0.977**	
Anchorage					
Garden 1-2009 to 6-2011	**149**	32	**1.027**	**0.591**	

* 90 pairs are required as sufficient data according to EPA's spreadsheet; **bold PASS criteria**

‡ Regression statistics within acceptable limits; **bold PASS criteria**

FNSB operated several $PM_{2.5}$ sites over the recent years. This document looks at the main four longer term sites: State Office Building (SOB), NCore, North Pole Elementary (NPE) and North Pole Fire Station #3 (NPFS). Most sites have a Met One BAM 1020 while the NCore site has a Coarse Met One BAM pair. The FNSB non-attainment area experiences very high wintertime and occasional summertime high $PM_{2.5}$ concentrations due to primarily home-heating/vehicle exhaust and wildfires respectively. These concentrations are obviously above the NAAQS and are some of the highest concentrations in the United States at times during extreme winter inversions. With the exception of NCore in 2014 (Figure 2), none of the sites have met both FEM additive and multiplicative bias criteria. DEC decided to calculate annual correlations whenever possible. The results, either of all the data for Fairbanks and North Pole BAMs, or split out by calendar year, have not met the slope requirement for FEM designation since 2009 except for 2014 NCore (Table 1). The intercepts and correlations do meet the requirements for FEM designation (except for North Pole Elementary School in 2013 and NCore in 2014). Met One BAMs have a tendency to bias high especially in extreme conditions of humidity and temperature (Gobeli, 2008).

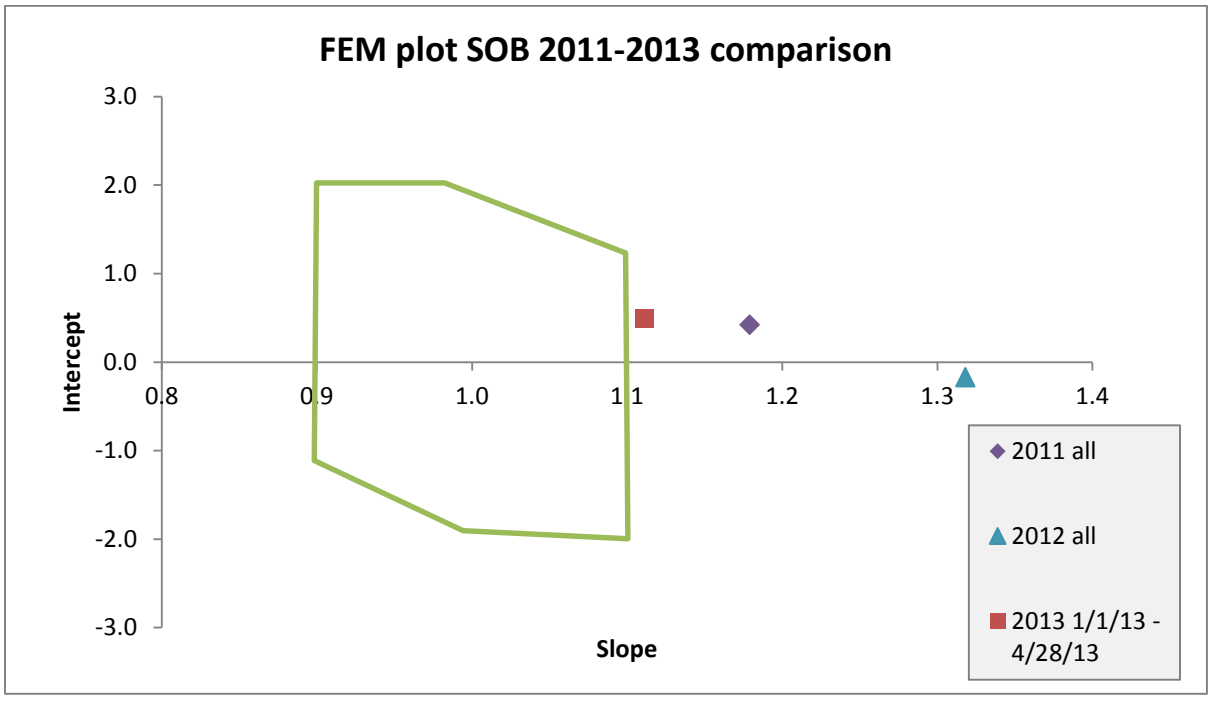


Figure 16. SOB FRM FEM Bias Plot; the green box represents the bounds of Class III performance criteria

The State Office Building site was installed October 23, 1998 to demonstrate attainment of the 24-hour PM2.5 NAAQS (65 µg/m^3) promulgated July 18, 1997. The NAAQS were strengthened in 2006 lowering the 24-hour $PM_{2.5}$ level to 35 µg/m^3 which caused the Fairbanks area to go into nonattainment after three years. Correlations between the primary FRM and the FEM BAM were calculated for 2011 through 2014 (Figure 3 and Table 2). Bold text indicates the statistical parameters which met FEM criteria on all the tables in this report.

Table 8. SOB Correlation Summary

SOB FRM- BAM Correlation Summary

Year	2011	2012	2013
Valid data sets	**119**	**115**	38
Enough valid data sets?	**sufficient**	**sufficient**	insufficient
Excluded (< 3 µg/m^3)	22	28	2
Slope	1.179	1.318	1.812
Intercept	0.423	-0.173	-1.113
Correlation r	**0.98885**	**0.98666**	**0.96764**
Slope P/F	Fail	Fail	Fail
Intercept P/F	**Pass**	**Pass**	**Pass**
Correlation P/F	**Pass**	**Pass**	**Pass**

* began sampling 2/20/2011

DEC was required to establish a multi pollutant site in the state by January 1, 2010. Because of its air quality issues, DEC chose Fairbanks as the location for this site. NCore sites are intended to be located with the Chemical Speciation Sites (CSN), which in Alaska was still part of the SOB site. Due to building logistics, the multi-pollutant site could not be added to the SOB, therefore the NCore site was established in close proximity to the SOB. The NCore site was established in late 2010 with the intent of eventually absorbing all the functions of the SOB site. A pair of Coarse Met One BAMs (PM_{10} and $PM_{2.5}$) started monitoring on February 15, 2011 at the NCore site located just across the Chena River from the State Office Building and behind the main FNSB building. In addition to measuring PM_{10} and $PM_{2.5}$ the NCore site also houses trace level SO_2, O_3, CO, NO_2, NO_x, and NO_y as well as meteorological monitors. NCore speciation monitoring began November 3, 2013 and the CSN site officially moved over to the NCore site starting January 1, 2015.

Probably due to severe weather conditions in winter causing longer inversions, the 2012 FEM FRM correlation shows the most extreme slope for both sites (1.318 and 1.235 for SOB and the NCore site respectively). The NCore slope converges on the high side of the Class III boundary in 2013 and was inside the box in 2014. FNSB staff added heat tape to the BAM down tubes at NCore to drive off volatiles in the air stream all the way to the BAM tape where beta attenuation is measured in 2013 (Hanley and Reff, 2011; Gobeli et al,2008). Unfortunately, the SOB BAM was in a shelter on the building and the heater could not keep up with the cold weather; it most likely measure more volatiles driving the concentration higher in comparison to the FRM measurements. In 2013 the SOB slope was 1.193 and NCore slope was 1.113 (see Table 8 and Table 9). Additionally, more frequent zero air tests and subsequent background adjustments were done to address the changes in humidity between seasons (Hanley and Reff, 2011).

Table 9. NCore Correlation Summary

NCore FRM- BAM Correlation

Year	2011	2012	2013	2014
Valid data sets	69*	**118**	**112**	**118**
Enough valid data sets?	insufficient	**sufficient**	**sufficient**	**sufficient**
Excluded (< 3 μg/m^3)	0	22	12	23
Slope	1.175	1.235	1.118	**1.087**
Intercept	**-0.527**	**0.380**	**-1.113**	**-0.081**
Correlation r	**0.98152**	**0.99376**	**0.98884**	**0.99327**
Slope P/F	Fail	Fail	Fail	**Pass**
Intercept P/F	**Pass**	**Pass**	**Pass**	**Pass**
Correlation P/F	**Pass**	**Pass**	**Pass**	**Pass**

* began sampling 2/20/2011

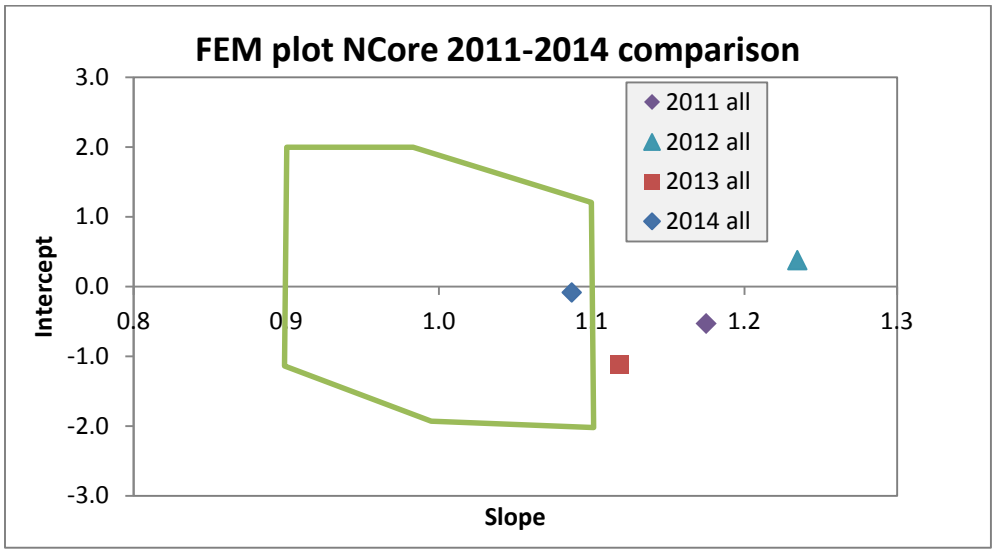


Figure 17. NCore FRM FEM Bias Plot; the green box represents the bounds of Class III performance criteria

Heated down tubes and increased frequency of zero air tests and subsequent background corrections appeared to improve the performance of the Met One BAM 1020 at the NCore site in 2014 to within the bias tolerances required for FEM designation. Unfortunately, the improvements described for the FNSB BAMs were not sufficient to bring the North Pole Fire station BAM into the acceptable range of the performance criteria. The winters of 2013-14 and 2014-15 had unusually mild temperatures and therefore less smoke from home heating could be a confounding factor. It often has the highest $PM_{2.5}$ concentrations in the winter inversions. The slope measured in the 2012 calendar year was 1.169 and increased in the winter quarters of 2013 to 1.229 (Table 10 and 5). It may be that 2013 was a much harsher winter than 2012 and the inversions caused higher $PM_{2.5}$ concentrations. The BAMs appear to be biased high, especially at higher $PM_{2.5}$ concentrations. It also may be that the sources and source distribution near the sites have changed and contain more volatiles.

North Pole Elementary School also measured very elevated $PM_{2.5}$ concentrations during winter inversions (Table 11 and Figure 6). The North Pole Elementary School site was shut down at the end of March 2013.

Table 10. NPFS#3 FEM FRM Correlation Summary

NP Fire Station #3 FRM- BAM Correlation

Year	2012	2013*	2014*
Valid data sets	**108**	49	57
Enough valid data sets?	**sufficient**	insufficient	insufficient
Excluded (< 3 µg/m^3)	22	4	9
Slope	1.169	1.229	1.008
Intercept	**-0.219**	**2.163**	**3.182**
Correlation r	**0.99517**	**0.98336**	**0.99694**
Slope P/F	Fail	Fail	**Pass**
Intercept P/F	**Pass**	**Pass**	Fail
Correlation P/F	**Pass**	**Pass**	**Pass**

* Winter only (Oct 1 – Mar 30)

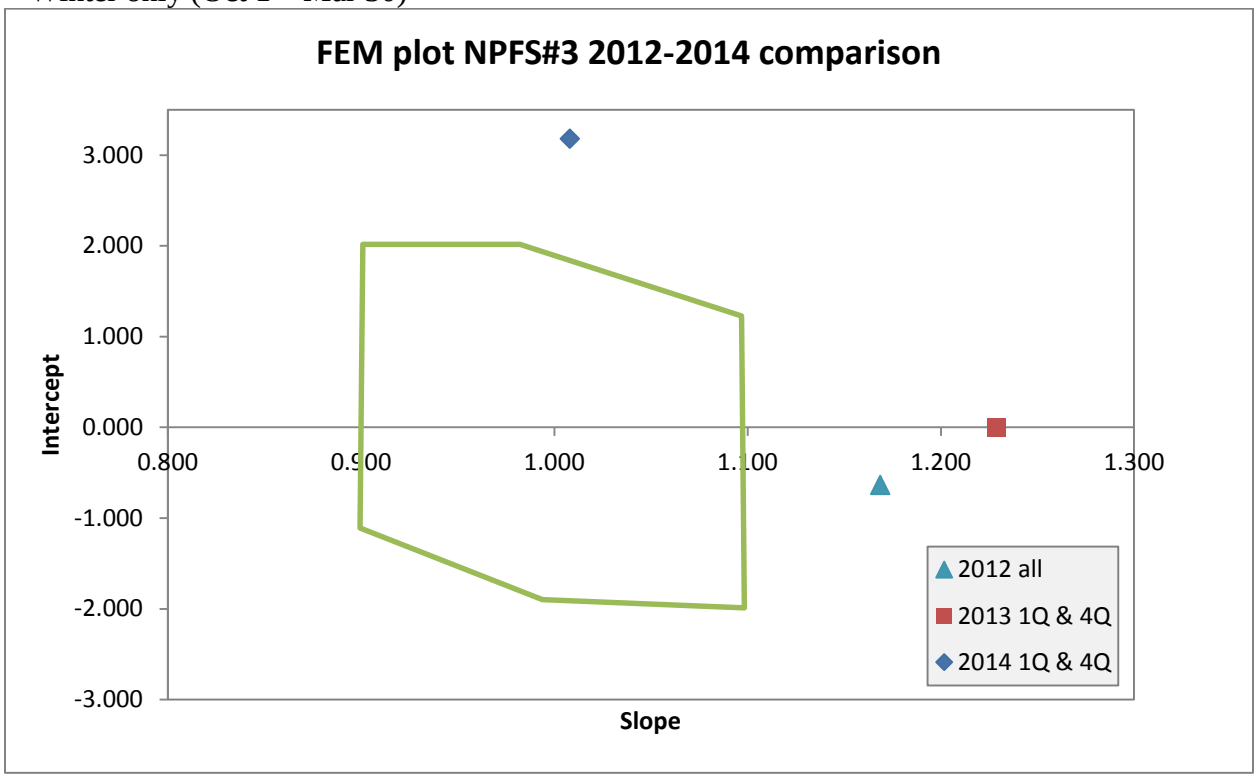


Figure 18. NPFS#3 FRM FEM Bias Plot; the green box represents the bounds of Class III performance criteria

Table 11. NPE FRM FEM Correlation Summary

NP Elementary School FRM- BAM Correlation (winter only)

Year	1Q & 4Q 2012	1Q2013
Valid data sets	45	29
Enough valid data sets?	insufficient	insufficient
Excluded (< 3 µg/m^3)	6	3
Slope	1.117	**0.219**
Intercept	**0.983**	2.163
Correlation r	**0.99312**	**0.95431**
Slope P/F	Fail	**Pass**
Intercept P/F	**Pass**	Fail
Correlation P/F	**Pass**	**Pass**

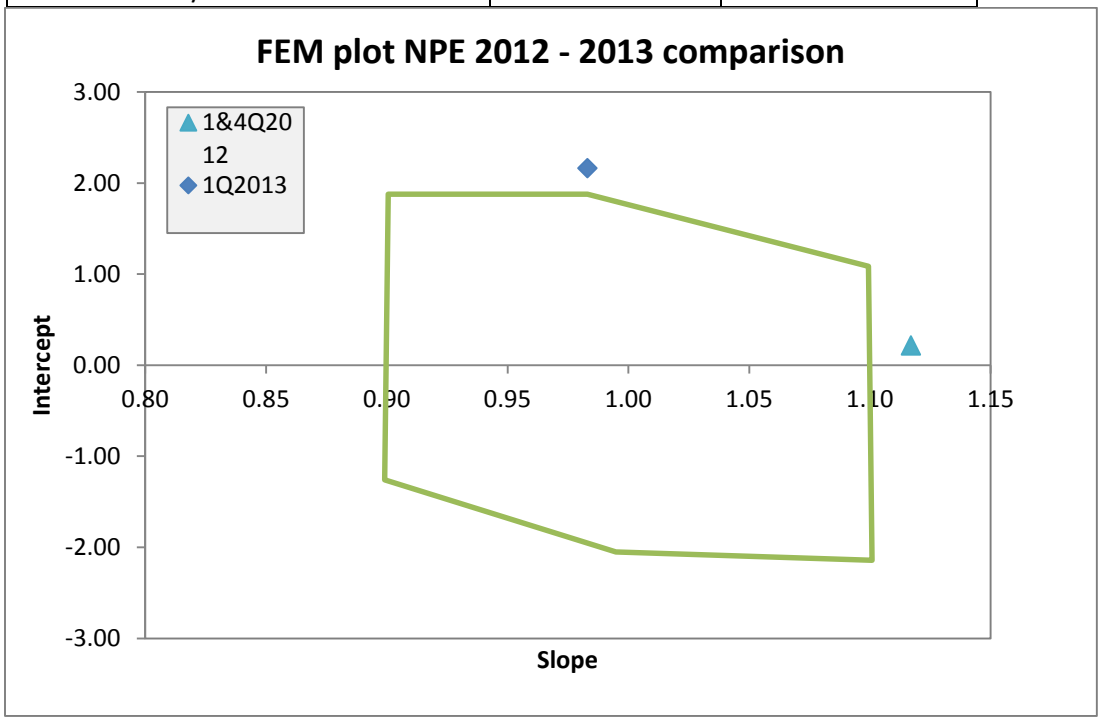


Figure 6. NPES FRM FEM Bias Plot; the green box represents the bounds of Class III performance criteria

Trends in the FNSB sites may be related to changes in the operation of the BAMs. These include adding heat tape to the down tubes of continuous BAMs and more frequent zero air tests to reflect the changing humidity conditions between winter and summer. Trends may also reflect source changes over the years either in the local area for North Pole sites or neighborhood areas for the Fairbanks sites. Weather variability among years most likely confounds the trends at times. DEC will continue to look into the data to determine more specific reasons for the NSFB FEM slopes in the future.

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7 APPENDIX G: PUBLIC COMMENTS RECEIVED DURING THE COMMENT PERIOD ANNOUNCING THE ESTABLISHMENT OF THE NORTH POLE WATER SPM SITE