Alaska Department of Environmental Conservation

Amendments to:
State Air Quality Control Plan

Vol. III: Appendix III.D.5.05

{Appendix to Volume II. Analysis of Problems, Control Actions; Section III. Area-wide Pollutant Control Program; D. Particulate Matter; 5. Fairbanks North Star Borough PM2.5 Control Plan}

Public Review Draft

November 14, 2014

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Governor

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Commissioner

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Appendix III.D.5.05

ADEC Annual Air Quality Monitoring Network Plan 2014-2015.

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Alaska Department of Environmental Conservation Annual Air Quality Monitoring Network Plan 2014 - 2015

August 29, 2014

Final Plan

Air Quality Division

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&
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EXECUTIVE SUMMARY

The Alaska Department of Environmental Conservation (DEC) annual network plan for the 2014 – 2015 air quality monitoring program has remained in a similar format as last year's plan. The network information has been made more accessible to EPA reviewers by summarizing the regulatory details into tables and figures with a brief discussion to provide clarification.

The State monitoring priorities have remained the same.

There have been only minor changes to the monitoring sites since the issuance of last year's plan. The PM_{10} Hi-Volume sampler at the Municipality of Anchorage, Garden Site was removed at the end of December 2013. The site's PM_{10} Beta Attenuation Monitor (BAM) became the primary instrument. The ammonia analyzer at the Fairbanks North Star Borough (FNSB) NCORE site failed to provide quality data, was removed from service in February 2014, and was replaced with a new trace-level $NO_2/NO_X/NO$ analyzer. Both of these actions were anticipated and addressed in the 2013 -2014 Network plan.

Currently, DEC is not actively engaged in monitoring for airborne lead (Pb). The source-oriented Pb monitoring program intended from the Red Dog Mine is not feasible due to the remote and rugged terrain. DEC is currently working with the EPA on a modelling approach and is awaiting new soil samples for the development of new emission inventory data for the mine.

In continuing efforts to develop control strategies to resolve $PM_{2.5}$ non-attainment, the DEC and FNSB monitoring programs propose a number of network modifications. These changes will improve efficiency and the cost-effective use of monitoring equipment and personnel resources, while continuing to assess pollutant concentrations and to further characterize local atmospheric chemistry. DEC and FNSB are again requesting approval to relocate the chemical speciation sampler from the State Office Building to the NCORE site and shutting down the CO site at the Old Post Office Building. Further detail and technical justification for these modifications are presented in Section 4. The FNSB is also planning to use their mobile monitoring system (sniffer technology) to further evaluate the North Pole Fire #3 site to determine if the site is a hot spot or truly representative of a larger neighborhood scale.

To further support monitoring efforts in rural Alaska DEC proposes $PM_{2.5}$ monitoring programs in Yakutat.

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.

The 2014-2015 plan shall include all required stations to be operational by July 1, 2014. Specific locations for the required monitors shall be included in the annual network plan submitted to the EPA Regional Administrator by July 1, 2014.

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 (Mat-Su) 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 from 16 people to 10,000 people. The total area of the state is approximately 1.7 million square kilometers (km) or 656,425 square miles[2].

[1] Population data obtained from the 2010 US Census, http://live.laborstats.alaska.gov/cen/dp.cfm
[2] Geographical data obtained from NetState.com, http://www.netstate.com/states/geography/ak_geography.htm

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 $PM_{2.5}$ size particles are creating major health problems throughout communities across the United States. For people in Alaska, 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 central interior.

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 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 nonattainment 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 Mat-Su 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 *maintenance* areas in 2004.

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 have to be less than 50% of the NAAQS. Under 40 CFR 58, Appendix D, section 4.5 (ii) DEC submitted a modeling protocol as part of a waiver request to avoid the monitoring requirement on October 23, 2012. 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. Due to weather and road conditions the soil sampling was not completed until late May 2014. Laboratory analysis of the samples and development of new emission factors is scheduled to be completed by late July. DEC and EPA requested a minimum of 30 days for review and approval. Once EPA approves the new emissions inventory, DEC plans to rerun the modeling and anticipates to generate a final report within six months. 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/Mat-Su 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. 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 allows, 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. 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 for 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 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 a $NO_X/NO/NO_2$ trace-level monitor in February 2014.

3 STATE OF ALASKA AMBIENT AIR MONITORING NETWORK

3.1 *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 and the Fairbanks North Star Borough. 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) data base as of July 1, 2014.

Table 3-1 AQS Monitoring Site as of July 1, 2014

Site Name	Address	Latitude/ Longitude*	AQS Identification
Garden Site	Municipality of Anchorage Trinity Christian Church 3000 East 16th Ave. Anchorage, AK	61.205861N -149.824602W	02-020-0018
Tudor Road Site	Municipality of Anchorage 3335 East Tudor Rd Anchorage, AK	61.181083N -149.817389W	02-020-0044
Turnagain Site	Municipality of Anchorage Unitarian Church 3201 Turnagain St. Anchorage, AK	61.191514N -149.934930W	02-020-0048
Parkgate/Eagle River Site	Municipality of Anchorage 11723 Old Glenn Hwy. Eagle River, AK	61.326700N -149.569707W	02-020-1004
Old Post Office Site	Fairbanks North Star Borough 250 Cushman St. Fairbanks, AK	64.845278N -147.721111W	02-090-0002
State Office Building Site	Fairbanks North Star Borough Federal Building 675 Seventh Ave. Fairbanks, AK	64.840833N -147.723056W	02-090-0010
NCORE Site	Fairbanks North Star Borough 809 Pioneer Road Fairbanks, AK	64.845307N -147.72552W	02-090-0034

North Pole Fire Station #3 Site	Fairbanks North Star Borough 388 Hurst Rd. North Pole, AK	64.762973N -147.310297W	02-090-0035
Butte Site	Matanuska-Susitna Valley Harrison Court Butte, AK	61.534100N – 149.0351855W	02-170-0008
Palmer Site	Matanuska-Susitna Valley South Gulkana St. Palmer, AK	61.599322N -149.103611W	02-170-0012
Wasilla Site	Matanuska-Susitna Valley 100 West Swanson Wasilla, AK	61.583331N -149.453624W	02-170-0013
Floyd Dryden Middle School Site	City and Borough Juneau 3800 Mendenhall Loop Road Juneau, AK	58.388889N -134.565556W	02-110-0004
Kenai Peninsula Borough Building Site	Kenai Peninsula Borough 144 North Binkley St. Soldotna, AK	60.489131N –151.070017W	02-122-0008

* 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 data base. Regional maps showing the monitoring networks for the Municipality of Anchorage, Fairbanks North Star Borough, Matanuska-Susitna Valley, City and Borough of Juneau, and Kenai Peninsula Borough are presented in Figures 3-2 through 3-6. In addition to the network maps, area maps are presented which provide greater detail of the individual site locations. 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 completed by DEC and are presented for review in **Appendix A** of this report.

Figure 3-1 State of Alaska AQS Air Monitoring Networks

Figure 3-2 Municipality of Anchorage Air Monitoring Network

Figure 3-2a Municipal of Anchorage Garden Site Area Map (Neighborhood Scale Site)

Figure 3-2b Municipality of Anchorage Tudor Road Site Area Map (Micro-Scale Site)

Figure 3-2c Municipality of Anchorage Turnagain Heights Area Map (Neighborhood Scale Site)

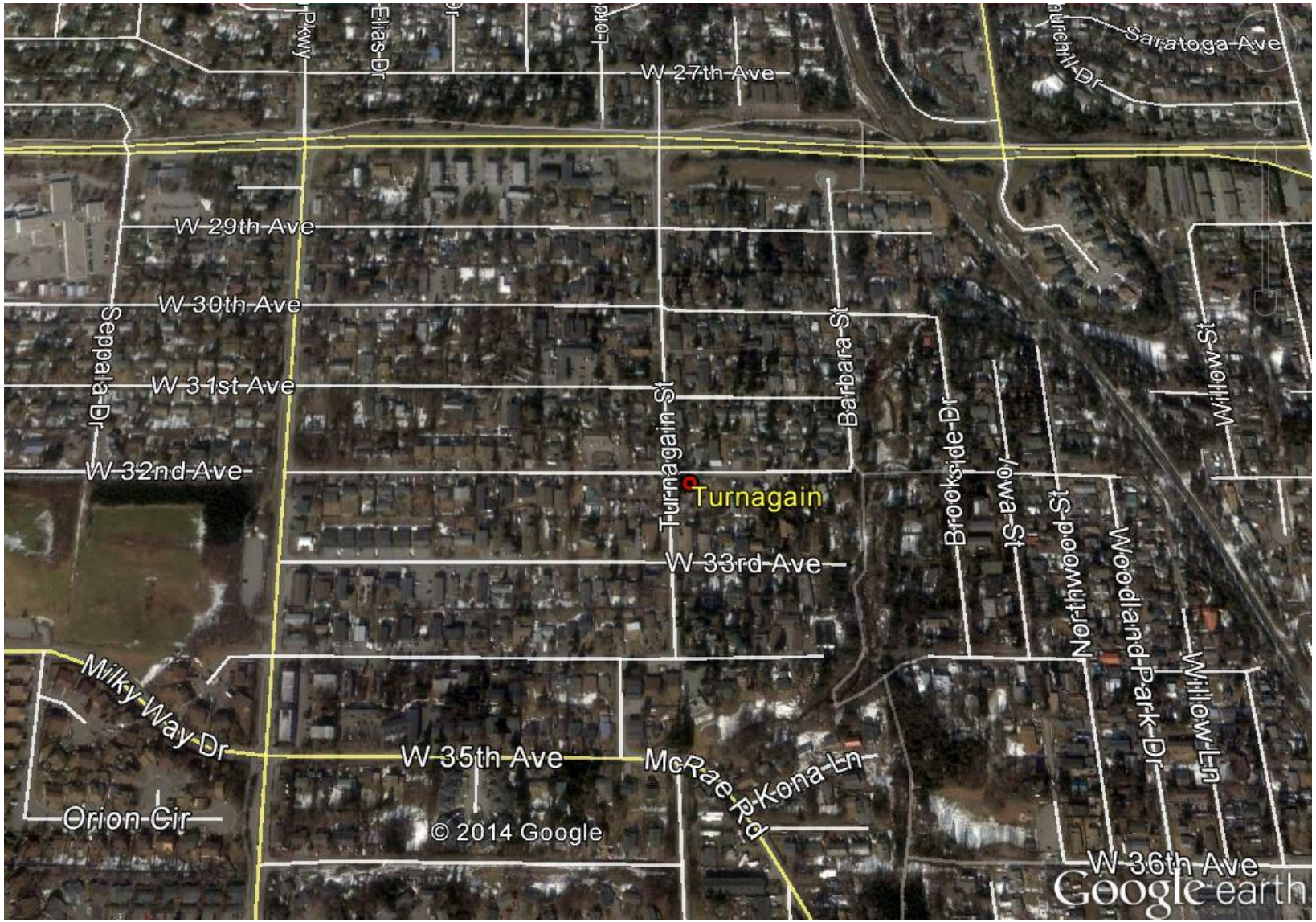

Figure 3-2d Municipality of Anchorage, Parkgate Eagle River Area Map (Neighborhood Scale Site)

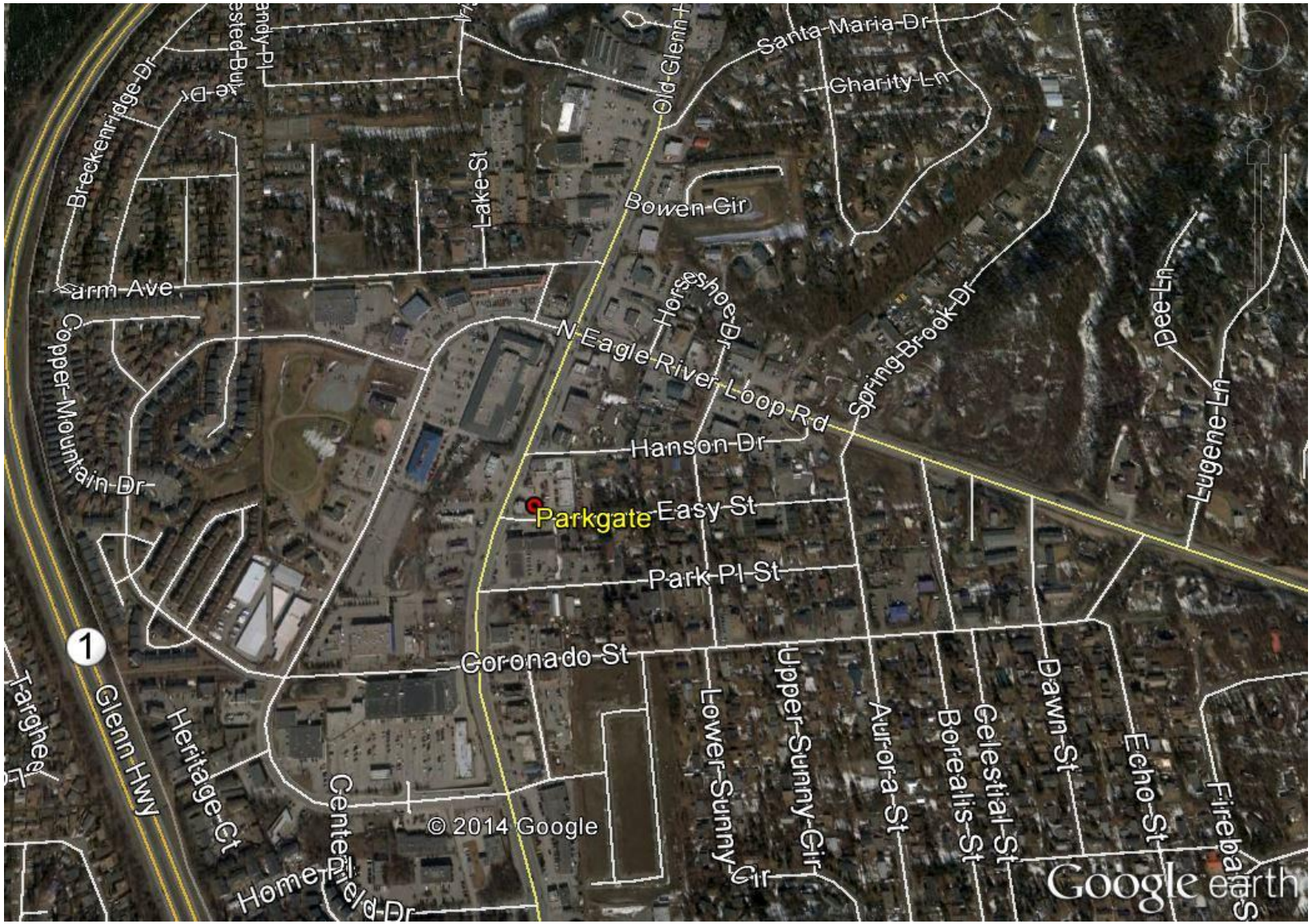

Figure 3-3 Fairbanks North Star Borough Air Monitoring Network

Figure 3-3a Fairbanks Downtown Area Map for the NCORE Site, the Old Post Office (Micro-Scale Site), and the State Office Building (Neighborhood Scale Site)

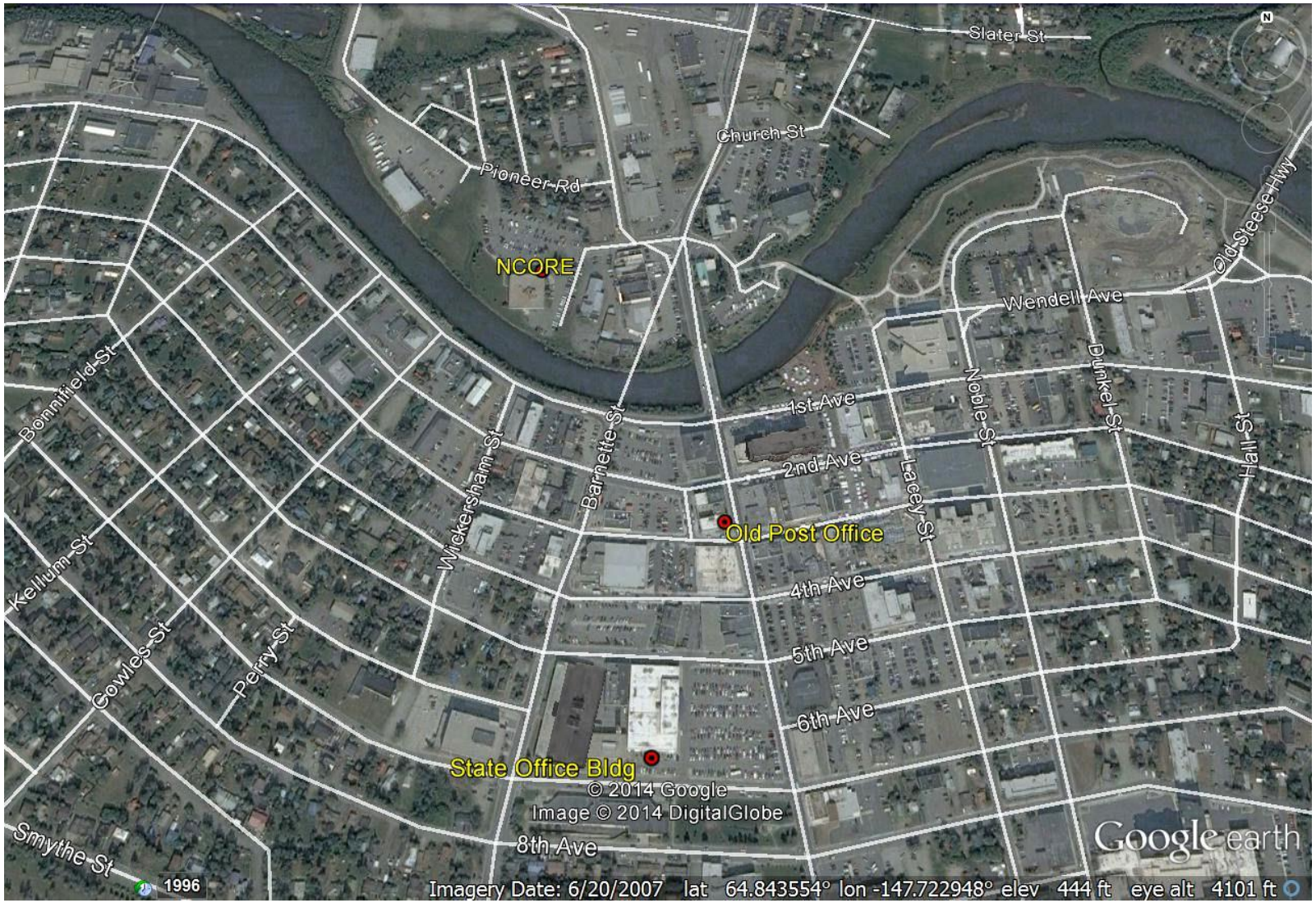

Figure 3-3b North Pole Fire #3 Area Map (Micro-Scale Site)

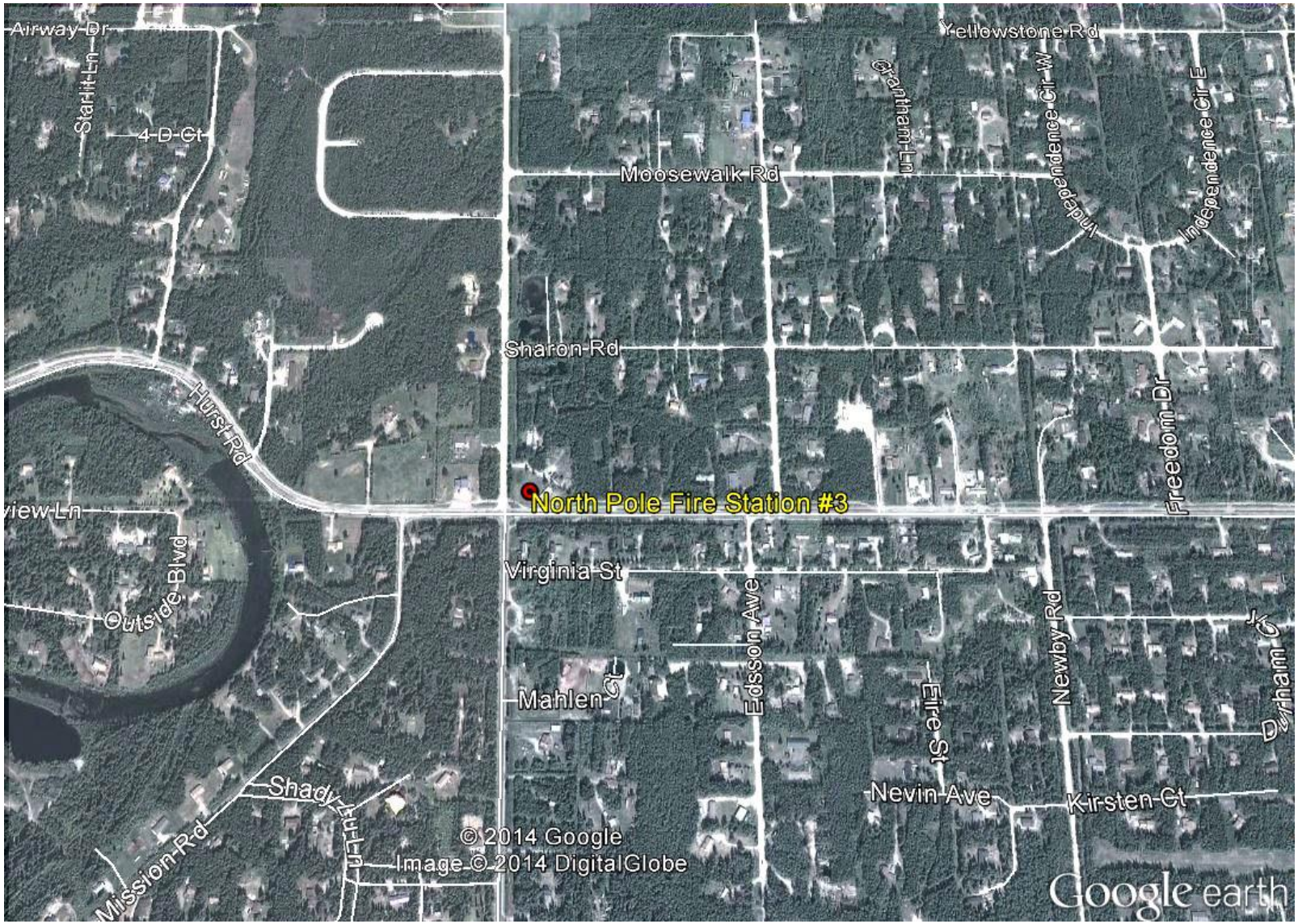

Figure 3-4 Matanuska-Susitna Valley Air Monitoring Network

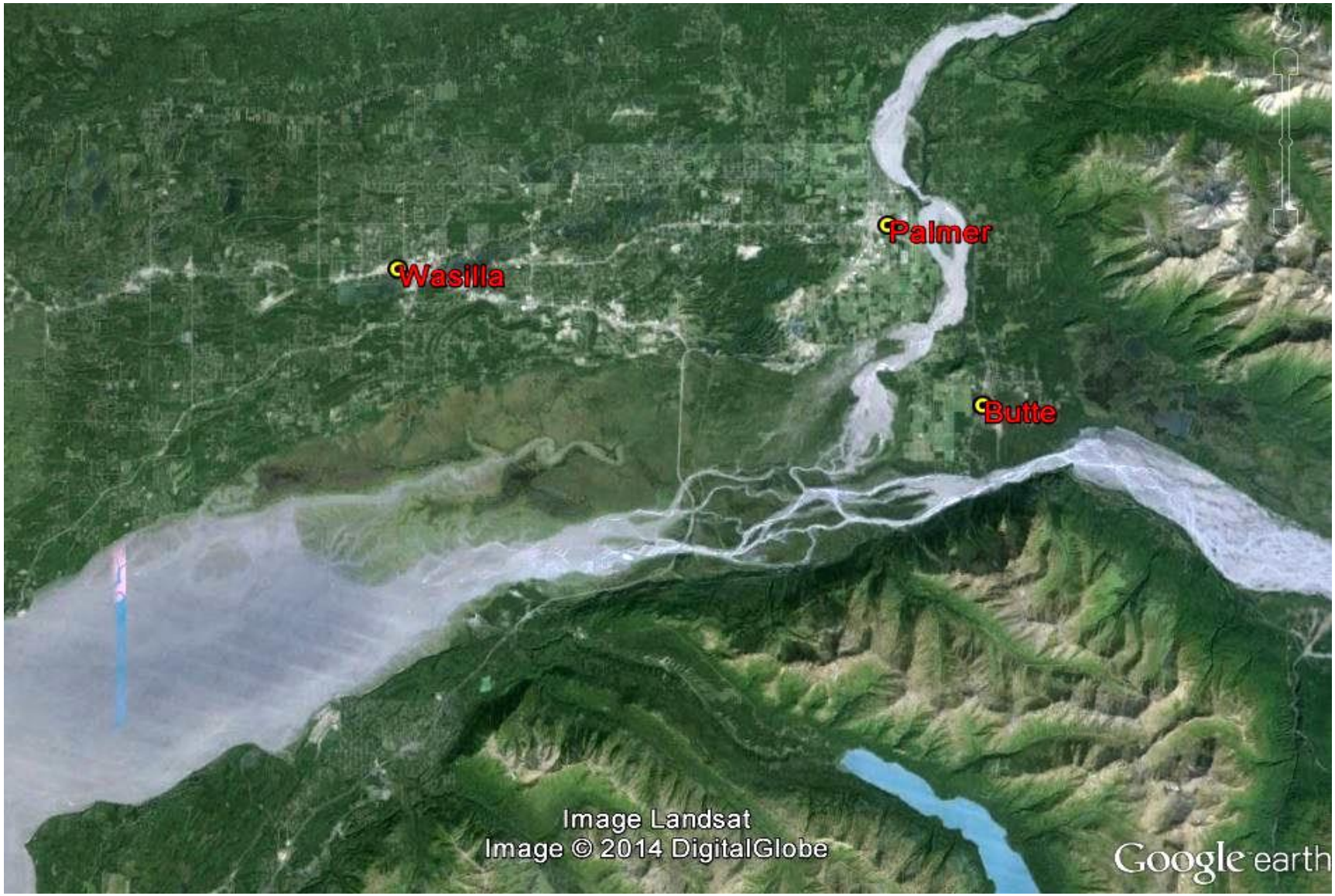

Figure 3-4a Matanuska-Susitna Valley, Butte Area Map (Neighborhood Scale Site)

Figure 3-4b Matanuska-Susitna Valley, Palmer Area Map (Neighborhood Scale Site)

Figure 3-4c Matanuska-Susitna Valley, Wasilla Area Map (Neighborhood Scale Site)

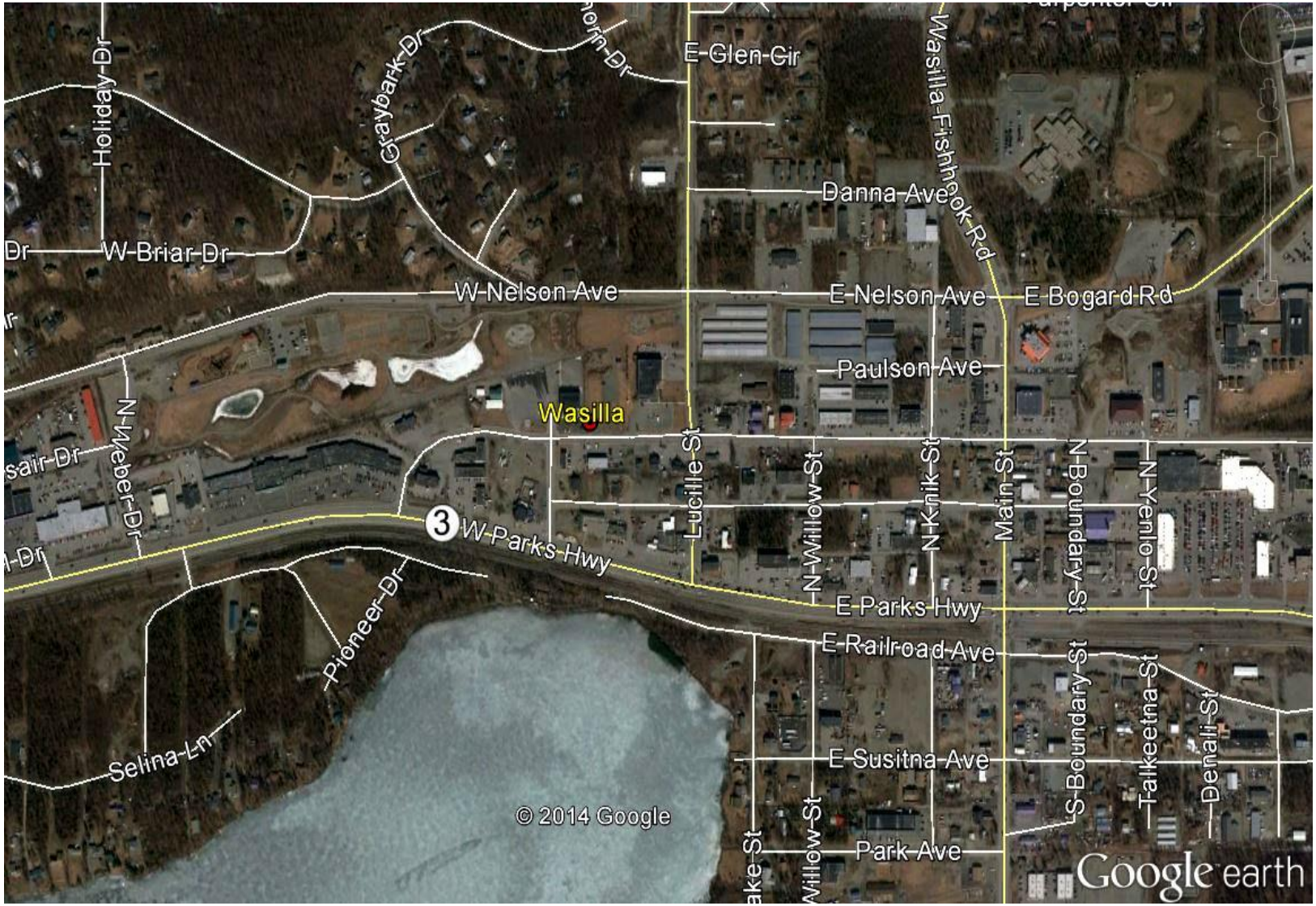

Figure 3-5 City and Borough of Juneau Air Monitoring Network (single site)

Figure 3-5a Floyd Dryden Middle School, Mendenhall Valley Area Map (Neighborhood Scale Site)

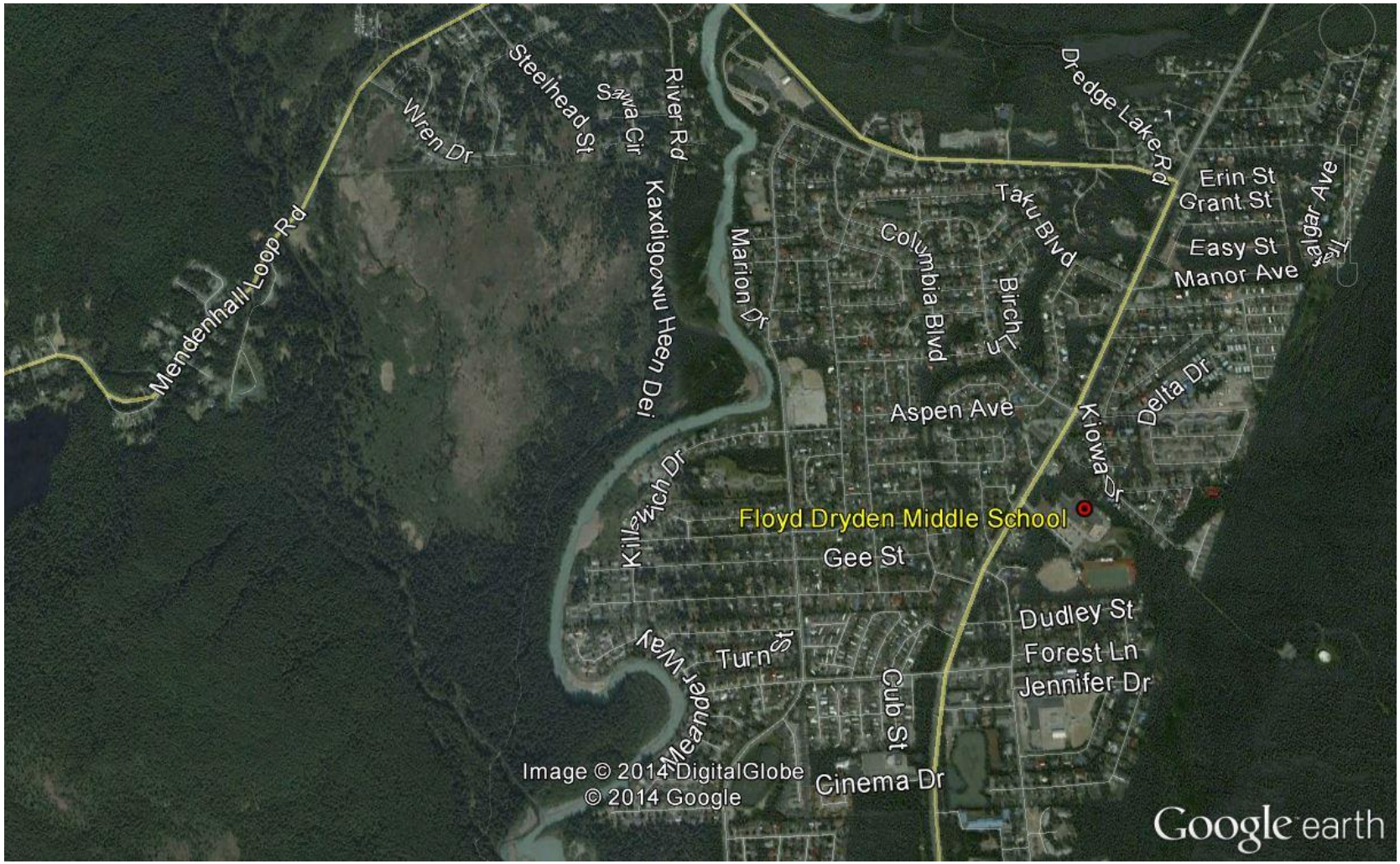

Figure 3-6 Kenai Peninsula Borough Air Monitoring Network (single site)

Figure 3-6a Kenai Peninsula Borough, Soldotna Area Map (Neighborhood Scale Site)

3.2 *Siting Criteria*

In 2014 EPA Region 10 also 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). Certain sites have been found to have had their monitoring scale incorrectly designated. A discussion of the monitoring scale changes follows each table.

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 with definitions on 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 (including SPM) 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
Turnagain	Neighborhood	1	3	180 degrees unobstructed	12 from 500 VPD roadway	Yes
NCORE	Neighborhood	Not applicable	4	360 degrees unobstructed	85	None
Old Post Office	Micro-scale	1	3	180 degrees unobstructed	3	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 (including SPM) 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 July 1, 2014

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
Tudor	Micro-scale	3.3	4m, tree tops level with inlet	7	46,900	3 trees to the south
Parkgate	Neighborhood	6	13m to 4m tall penthouse	44	11,000	None
Harrison Court	Neighborhood	4	> 8	150	Unknown, probably < 5,000	None
Palmer	Neighborhood	4	> 8	18	Unknown, probably < 5,000	None
Wasilla	Neighborhood	4	> 8	20	16,494	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	Micro-scale	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
Soldotna	Neighborhood	4	None	~ 30	< 5,320	10 m to group of 6 m tall trees

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 (SLAM) 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 or 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. The POC indicates whether the sampler or instrument is a primary data source (1) or a secondary data source such as a collocated sampler (2) or that an instrument is measuring on a continuous basis (3). 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 specific on-site equipment (either a sampler or instrument) 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 are presented in **Appendix E**.

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Table 3-4 Air Monitoring Method Codes July 1, 2014

Site Name/ Location	Pollutant Parameter	Monitor Designation	Monitoring Starting Date	AQS Parameter Code - POC Code	AQS Method Codes	Sample Frequency	Equipment Information
Garden Site Anchorage	PM_{10STD}	SLAM	01/01/2009	81102-3	122	Continuous	Met-One BAM 1020X Coarse
	$PM_{2.5LC}$	SLAM	01/01/2009	88101-3	170	Continuous	Met-One BAM 1020X Coarse
	CO	SLAM	01/01/1979	42101-1	554	Continuous Seasonal Oct-Mar	Thermo Env. Inst. Model 48i
Turnagain Anchorage	CO	SLAM	10/15/1998	42101-1	054	Continuous Seasonal Oct-Mar	Thermo Env. Inst Model 48c
Tudor Anchorage	PM_{10STD}	SLAM	07/01/2010	81102-3	122	Continuous	Met-One BAM 1020X Coarse
Parkgate Eagle River	$PM_{2.5LC}$	SLAM	01/01/2009	88101-3	170	Continuous	Met-One BAM 1020X Coarse
	PM_{10STD}	SLAM	01/01/2009	81102-3	122	Continuous	Met-One BAM 1020X Coarse
State Office Building	$PM_{2.5LC}$ Carbon	CSN	03/17/2005	Multiple*	Multiple*	1/3	URG 3000N

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Site Name/ Location	Pollutant Parameter	Monitor Designation	Monitoring Starting Date	AQS Parameter Code - POC Code	AQS Method Codes	Sample Frequency	Equipment Information
Fairbanks	$PM_{2.5LC}$ Speciation	CSN	03/17/2005	Multiple*	Multiple*	1/3	Met-One Super-SASS
	$PM_{2.5LC}$	SLAMS	10/23/1998	88101-1	117	1/3	R & P Partisol 2000
Old Post Office Fairbanks	CO	SLAM	10/01/2009	42101-1	054	Continuous Seasonal Oct-Mar	Thermo Env. Inst. Model 48c
NCORE Fairbanks	PM_{10LC}	NCORE	02/15/2011	85101-3	122	Continuous	Met-One BAM 1020X Coarse
	PM_{10STD}	NCORE	02/15/2011	81102-3	122	Continuous	Met-One BAM 1020X Coarse
	$PM_{2.5LC}$	NCORE	02/15/2011	88501-3	170	Continuous	Met-One BAM 1020X Coarse
	PM_{10LC} - $PM_{2.5LC}$	NCORE	02/15/2011	86101-3	185	Continuous	Met-One BAM 1020X Coarse
	$PM_{2.5LC}$	NCORE	11/04/2009	88101-1	117	1/3	R&P Partisol 2000
	$PM_{2.5LC}$ collocated	NCORE	05/01/2013	88101-2	117	1/6	R & P Partisol 2000
	PM_{10STD}	NCORE	11/10/2012	81102-1	126	1/3	R&P Partisol 2000
	PM_{10LC}	NCORE	11/10/2012	85101-1	126	1/3	R&P Partisol 2000

Site Name/ Location	Pollutant Parameter	Monitor Designation	Monitoring Starting Date	AQS Parameter Code - POC Code	AQS Method Codes	Sample Frequency	Equipment Information
NCORE Fairbanks	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	10/05/2012	42600-1	574	Continuous	Thermo Fisher 42iY-TL
	NO	NCORE	10/05/2012	42601-1	574	Continuous	Thermo Fisher 42iY-TL
	$PM_{2.5LC}$ Speciation	CSN**	Not Submitted to AQS	Multiple*	Multiple*	1/3 Seasonal Nov-Mar	Met-One Super-SASS
	NO_X	NCORE	03/01/2014	42603-1	074	Continuous	Thermo Fisher 42i-TLi
	NO	NCORE	03/01/2014	42601-1	074	Continuous	Thermo Fisher 42i-TL
	NO_2	NCORE	03/01/2014	42602-1	074	Continuous	Thermo Fisher 42i-TL

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Site Name/ Location	Pollutant Parameter	Monitor Designation	Monitoring Starting Date	AQS Parameter Code - POC Code	AQS Method Codes	Sample Frequency	Equipment Information
NCORE Fairbanks	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
	BP	NCORE	04/05/2011	64101-1	014	Continuous	Met-One Barometer
	Amb Tmp 2 m	NCORE	04/01/2011	62101-2	061	Continuous	Met-One
	Amb Tmp 10 m	NCORE	04/01/2011	62101-1	061	Continuous	Met-One
	$PM_{2.5LC}$	SPM	Not Submitted to AQS	NA**	NA**	1/3 Seasonal Oct-Mar	Met-One Super SASS $PM_{2.5}$ LC
North Pole Fire #3	$PM_{2.5LC}$	SPM	03/014/2012	88101-1	117	1/3 Seasonal Oct - Mar	R&P Partisol 2000
	$PM_{2.5LC}$	SPM	Not Submitted to AQS	88501-3	170	Continuous	Met-One BAM 1020X Coarse
	PM_{10STD}	SPM	Not Submitted to AQS	81102-3	122	Continuous	Met-One BAM 1020X Coarse

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Site Name/ Location	Pollutant Parameter	Monitor Designation	Monitoring Starting Date	AQS Parameter Code - POC Code	AQS Method Codes	Sample Frequency	Equipment Information
Palmer Mat-Su Valley	PM_{10LC}	SPM	01/01/2010	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
	$PM_{2.5LC}$	SPM	10/05/2012	88101-1	117	1/6	R&P Partisol 2000
	PM_{10STD}	SPM	01/01/2010	81102-3	122	Continuous	Met-One BAM 1020X Coarse
Butte Mat-Su Valley	PM_{10LC}	SPM	04/11/1998	85101-3	122	Continuous	Met-One BAM 1020X Coarse
	$PM_{2.5LC}$	SLAM	08/10/2011	88101-3	170	Continuous	Met-One BAM 1020X Coarse
	PM_{10STD}	SPM	04/11/1998	81102-1	126	1/6	R&P Partisol 2000
	PM_{10LC}	SPM	04/11/1998	85101-1	126	1/6	R&P Partisol 2000
	$PM_{2.5LC}$	SPM	04/11/1998	88101-1	117	1/6	R&P Partisol 2000

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Site Name/ Location	Pollutant Parameter	Monitor Designation	Monitoring Starting Date	AQS Parameter Code - POC Code	AQS Method Codes	Sample Frequency	Equipment Information
Butte Mat-Su Valley	PM_{10STD}	SPM	08/10/2011	81102-3	122	Continuous	Met-One BAM 1020X Coarse
Wasilla Mat-Su Valley	PM_{10LC}	SPM	10/01/2008	85101-3	122	Continuous	Met-One BAM 1020X Coarse
	$PM_{2.5LC}$	SPM	10/01/2008	88101-3	170	Continuous	Met-One BAM 1020X Coarse
	O_3	SPM	04/15/2011	44201-1	087	Continuous Seasonal Apr - Oct	Teledyne API 400E
Floyd Dryden Middle School Juneau	PM_{10STD}	SLAM	01/01/1986	81102-1	126	1/6	R&P Partisol 2000
	PM_{10STD}	SLAM collocated	01/01/1986	81102-2	126	1/6	R&P Partisol 2000
	PM_{10LC}	SPM	01/01/1986	85101-1	126	1/6	R&P Partisol 2000
	PM_{10LC}	SPM collocated	01/01/1986	85101-2	126	1/6	R&P Partisol 2000

Site Name/ Location	Pollutant Parameter	Monitor Designation	Monitoring Starting Date	AQS Parameter Code - POC Code	AQS Method Codes	Sample Frequency	Equipment Information
Floyd Dryden Middle School Juneau	$PM_{2.5LC}$	SLAM	08/21/2009	88101-3	170	Continuous	Met-One BAM 1020X Coarse
Kenai Peninsula Borough Building Soldotna	PM_{10STD}	SPM	10/20/2011	81102-3	122	Continuous	Met-One BAM 1020X Coarse
	PM_{10LC}	SPM	10/20/2011	85101-3	122	Continuous	Met-One BAM 1020X Coarse
	$PM_{2.5LC}$	SPM	10/20/2011	88101-3	170	Continuous	Met-One BAM 1020X Coarse

* - multiple AQS codes are used to identify individual chemical species.
** - the NCORE $PM_{2.5LC}$ speciation monitoring program will be discontinued in July 2014.

4 PROPOSED NETWORK MODIFICATIONS FOR 2014 - 2015

4.1 *$PM_{2.5}$ Network*

4.1.1 Fairbanks Speciation

DEC proposes relocating the CSN site to the NCORE site by October 1, 2014. The NCORE site is located less than 0.5 miles from the State Office Building (SOB) site and was intended to include the CSN site. The Fairbanks North Star Borough installed a Met One Super SASS $PM_{2.5}$ speciation monitor at the NCore site in the fall of 2011. Up until now, DEC paid for the analysis with Federal Highway Administration (FHWA) CMAQ funds. DEC contracted RTI to perform the laboratory analysis because RTI is the laboratory with which EPA contracted to analyze the filters from all the national CSN sites, including the SOB CSN site. Due to changes in FHWA grant eligibility, monitoring projects like the speciation sampling at the NCore and SOB sites no longer qualify for CMAQ funding. DEC does not have any additional funding source to maintain sampling at both sites and suggests relocating the official CSN site from the SOB to the NCore site. The NCore speciation sampling funded through the CMAQ grant will end July 2014.

A comparison of the 2011/2012 and 2012/2013 winter speciation data shows very good agreement between both sites. Although filters were also collected and analyzed during the summer of 2012, the summertime $PM_{2.5}$ concentrations are so low that they make a comparison difficult and, thus, the summer data were not included in the following analysis.

The correlations presented below compare the major components of $PM_{2.5}$ ($PM_{2.5}$ mass, Organic Carbon, Elemental Carbon, Total Carbon, Sulfate, Nitrate and Ammonium) for all filters for winter only from November 2011 through March 2013 between the SOB and NCore sites. Both sites collected samples every third day. For the two winters 101 filter samples were compared. The correlated data are displayed in Figures 4-1 and 4-2. The total $PM_{2.5}$ mass as measured by the speciation samplers is compared in Figure 4-1.

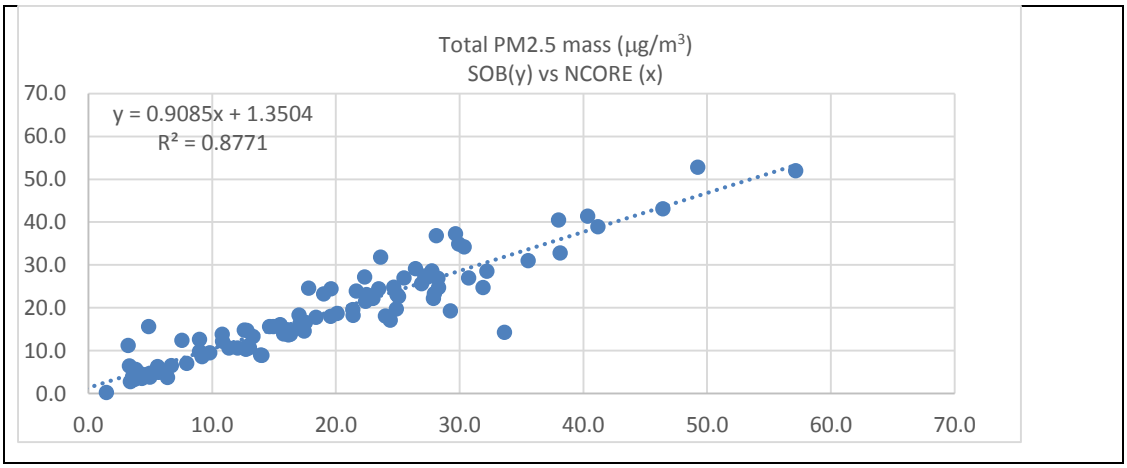


Figure 4-1 Correlation of NCore and SOB PM2.5 mass (species) from two winter seasons, 2011/12 and 2012/13

$PM_{2.5}$ mass correlates well. Figure 4-2 shows the correlation of the other $PM_{2.5}$ species. A simple side by side comparison of the carbon analysis is expected to show some discrepancies, since the NCore site did not have the same sampler as was used at the CSN site at the SOB. Never the less all the compounds show good correlation, with r^2 values above 0.82 for all above mentioned compounds except elemental carbon (EC).

The EC plot below shows a number of days for which the NCore EC mass concentration is almost double the SOB EC mass. Elemental carbon usually makes up less than 10% of the overall $PM_{2.5}$ mass. Part of the discrepancy of the EC correlation is that two different analysis methods are used for carbon. The SOB CSN site is equipped with the EPA required carbon sampler (URG-3000N) using the IMPROVE –TOR (Interagency Monitoring of Protected Visual Environments- Thermal Optical Reflective) EPA preferred method and the NCore site used the NIOSH (National Institute for Occupational Safety and Health) developed method. It is possible to apply correlations to EC measurements, but then a mass balance approach is used to derive Organic Carbon with the SANDWICH (Frank, 2006) method. The SANDWICH method is used for comparing FRM $PM_{2.5}$ mass concentrations verses speciation total $PM_{2.5}$ mass concentrations, not for comparing two speciation sites. To directly compare two speciation measurements it is best to compare the Total Organic Carbon (TOC). The two TOC concentrations that are reported to AQS for the SOB and NCore sites use the above mentioned different analysis methods. To better assess the relationships between the SOB and NCore, as well as other speciation sites within the non-attainment area an additional filter was collected at the SOB during the winter of 2011 through the winter of 2012/13. These filters were analyzed according to the same NIOSH method as used for the NCore site.

A direct comparison the Total Organic Carbon NIOSH method results from both sites is shown in the bottom graph of Figure 4.2. The correlation has an r^2 value of 0.84 and percent difference of 4%. Even collocation at one site would be considered well within the allowable criteria with an overall percent difference below 4%, let alone comparing two separate locations. Figure 4.2 also shows EC collocated at the State Office Building (EC-NIOSH and EC IMPROVE-TOR corrected to NIOSH). Differences exist even when measuring EC at the same site, see the correlation coefficient of r2 = 0.56. DEC is not able to determine if the remaining discrepancy between these measurements is a reflection of different source mixes at the two sites, laboratory analysis errors, other measurement issues, or a combination of all of the above listed possibilities.

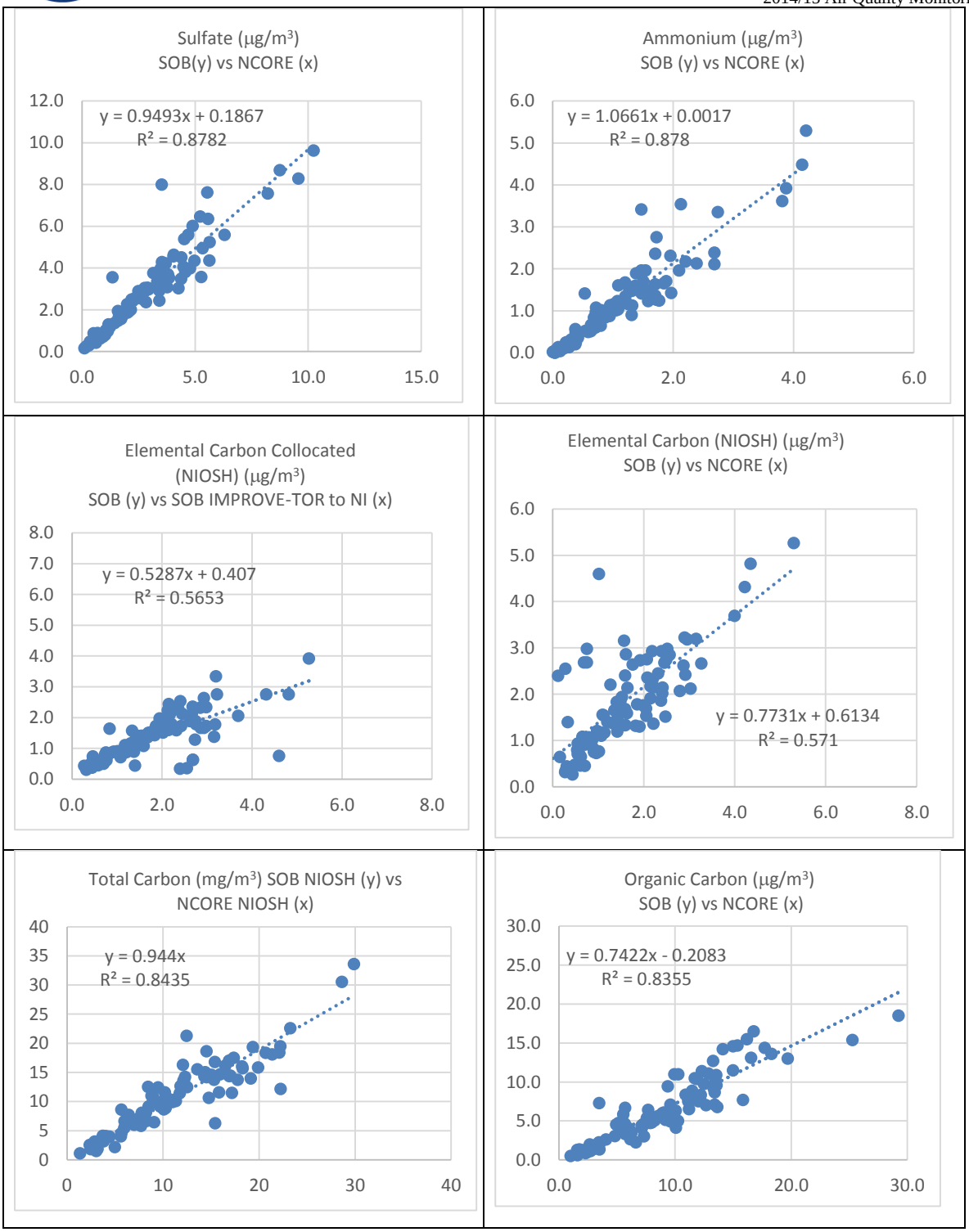


Figure 4-2. Correlation of NCore and SOB species from two winter seasons, 2011/12 and 2012/13

Since the above mentioned correlations of the two sites understate their similarities a relocation of the CSN site from SOB to the NCore site does not only make sense from a financial standpoint but will also combine the speciation dataset with the multi pollutant gaseous dataset

collected at the NCore site. Future analysis of source mixes and the evaluation of control measures used to reduce $PM_{2.5}$ concentrations in Fairbanks will benefit from the data collection of a wide spectrum of compounds at one site.

4.1.2 Fairbanks $PM_{2.5}$ SLAMS Sites

DEC requests EPA to consider the suspension of the Fairbanks State Office Building (SOB) $PM_{2.5}$ SLAMS (FRM) monitors starting with the winter of 2015/16.

Below is a comparison of FRM data from both sites for the last four calendar years. The NCore site was established at its current location because an expansion of the SOB site was not possible and with the intent to absorb all the functions of the SOB site. DEC recognizes that the SOB $PM_{2.5}$ monitor is the violating monitor in the Fairbanks $PM_{2.5}$ non-attainment area, but believes that the NCore site can be used as a representative site for the Fairbanks downtown area for the long term.

Table 4-1 presents a comparison of summary statistics between the SOB and NCore sites for the calendar years 2010 through 2013.The data show that the concentrations at both sites are fairly consistent with minimal differences. The 2013 24-hour design values are only 1 µg/m^3 different, while the 2013 annual design values are identical.

Table 4-1 Summary Statistics for the Calendar Years 2010-2013 for $PM_{2.5}$ FRM data from the SOB and NCore sites

Summary statistics in µg/m^3								
	2010		2011		2012		2013	
	SOB	***NCore***	***SOB***	***NCore***	***SOB***	***NCore***	***SOB***	***NCore***
Mean	13.9	13.0	10.8	10.8	10.3	10.6	10.5	10.5
Standard Deviation	14.5	13.3	10.4	10.2	11.6	11.2	9.5	10.1
Minimum	0.6	1.1	1.0	0.0	0.0	0.5	1.2	0.2
Maximum	83.2	63.8	42.6	45.9	55.5	56.9	56	52.8
98th percentile	51.8	50.7	38.0	33.1	49.6	50.0	36.3	36.2
24 hour Design Value	50		47		46	45	41	40
Annual Design Value	11.7		11.5		11.2	11.4	10.7	10.7

The frequency distribution below (Figure 4-3) shows a pattern very similar to the summary statistics presented above. The frequency distribution is expressed in terms of the AQI index levels rather than concentration. There is no difference between the sites for AQI levels green (good air quality) and red (unhealthy air quality), and only a 0.9% difference in the number of days with yellow (moderate air quality) and orange (unhealthy air quality for sensitive groups) AQI levels. Both sites report that roughly 2/3 (67%) of the days in Fairbanks have air quality that is good, 26% moderate, and about 5% days unhealthy for sensitive groups or worse.

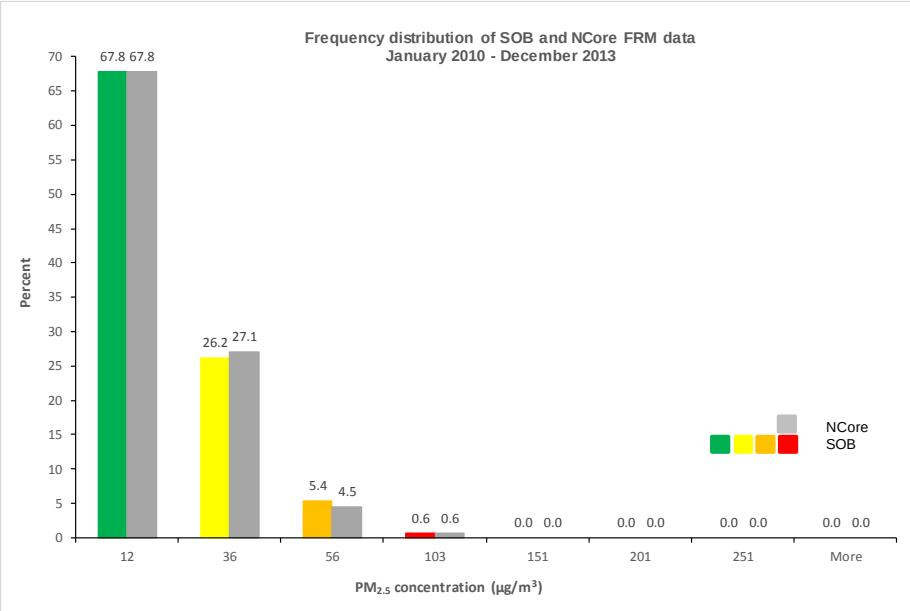


Figure 4-3. Frequency distribution of $PM_{2.5}$ concentrations for the Fairbanks SOB and NCore sites from January 2010 through December 2013

Both sites also correlate well on a daily basis, especially during the past two full calendar years (2012 and 2013) when $PM_{2.5}$ concentrations at both locations have shown strong agreement. The correlation coefficients for both years are above 0.97 (2012 r^2= 0.97 and 2013 r^2 = 0.98).Figures 4-4 shows linear correlations of the 24-hour $PM_{2.5}$ FRM measurements at both sites for 2012 and 2013, respectively.

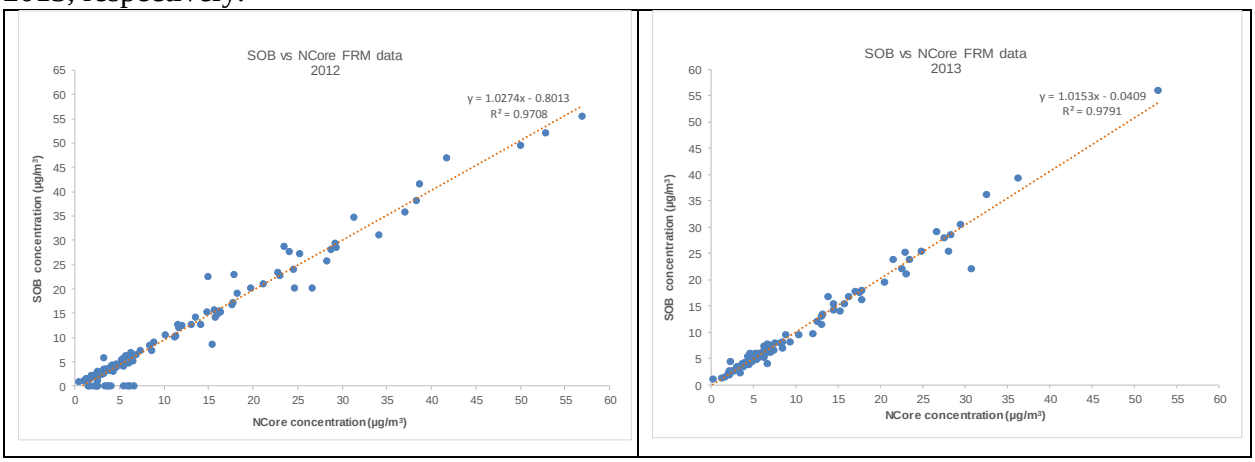


Figure 4-4. Correlation of the SOB $PM_{2.5}$ FRM and NCore FRM $PM_{2.5}$ data for 2012 on the left and 2013 on the right.

The overall linear correlation for 2012 shows a 3% difference in the slope, while the 2013 correlation shows a 1.5% difference. The daily differences between the sites are very small and below what would be considered acceptable for collocated samplers at a single site, so these sites should be considered identical, i.e. the measured differences are within the noise of the measurements.

According to 40 CFR 58.14 the State can request the discontinuation of a SLAMS monitoring site recording exceedances for logistical reasons only (c)(6). Section (c)(2) allows for removal of any of the other criteria pollutant monitoring sites if the site records lower concentrations than a similar site within the same distinct nonattainment area, but excludeds $PM_{2.5}$ from this rule. While DEC acknowledges that the FRM at the SOB is the violating monitor, the NCore site was established in close proximity to the SOB site for the purpose of absorbing the functions of that SOB SLAMS site. DEC believes that the intent of the rule is to ensure that no areas with air quality impacts are overlooked, not to create situations where two sites within the same neighborhood have to continue operations because both site record the same exceedance conditions. DEC believes the SOB site to be a redundant site. Therefore DEC requests EPA to consider suspending the SOB site after the 2014/15 winter until 40 CFR 58.14 can be reviewed and clarified.

4.1.3 Rural Alaska

DEC is committed to installing new $PM_{2.5}$ sites to assess fine particulate in rural Alaska. Working with the Alaska Native Tribal Health Consortium (ANTHC) and community leaders, DEC is planning to install a two-site network in Yakutat. The planned two-year study is to assess existing $PM_{2.5}$ concentrations and to evaluate impacts from the potential installation of new biomass boilers in the community. The Yakutat installation and startup is scheduled for the fall of 2014.

4.2 *Carbon Monoxide (CO) Network*

DEC proposes shutting down the Fairbanks Old Post Office CO site before the next CO sampling season begins on October 1, 2014. CO is currently also sampled at the Fairbanks NCORE site. A comparison of the data from both sites follows below.

CO sampling began at the NCore site in 2010 while the Old Post Office site has been in operation since 1972. No exceedances of the CO standard have been recorded in Fairbanks since 2000. During the past three sampling years, the hourly concentrations never rose above 7ppm for the 1-hour or 8-hour averages, respectively and the concentrations have decreased steadily over the past years. Table 4-2 summarizes the 1st and 2nd max concentrations for the 1-hour and 8 hour CO averages at the Old Post Office site and the NCORE site for 2011through 2013.

The maximum 1-hour CO concentration measured at the Old Post Office site in the past 3 years was 6.9 ppm (2012), compared to 4.7 ppm recorded at the NCore site that same year. These concentrations are less than 20% of the 1-hour National Ambient Air Quality Standard of 35 ppm.

The maximum 8-hour rolling average CO concentration measured during the past 3 years occurred in 2011 at the old Post Office site and was recorded as 6.9 ppm compared to 3.0 ppm measured at the NCore site during the same year or 3.5 ppm measured in 2013.

Both sites are located in downtown Fairbanks less than 0.25 miles apart. The Old Post Office site is situated in a busy street canyon on the south side of the Chena River and the NCore site is located in an open area on the north side of the river. The Old Post Office site was considered a maximum impact site that was chosen when vehicle emissions in Fairbanks caused winter-time CO exceedances.

Table 4-2 CO concentrations measured in Fairbanks

	Old Post Office		**NCORE**	
	1st max	2nd max	1st max	2nd max
1 hour average				
2011	6.9	5.4	3.0	2.6
2012	6.8	6.7	4.7	4.5
2013	5.9	4.9	3.8	2.8
8 hour moving average				
2011	6.9	5.4	3.0	2.6
2012	6.8	6.7	2.4	2.1
2013	3.6	3.5	3.5	2.7

The sample inlet passes through the eastern exterior wall of the building and extends out one meter at a height of two meters above the ground. The inlet is three meters from the nearest traffic lane on Cushman Street and ten meters (32 feet) from the intersection at 2nd Avenue. A traffic light backs up traffic past the inlet probe, effectively causing the sampler to measure idling vehicle emissions. Modern automotive technology has reduced vehicular CO emissions significantly, so that even under this siting scenario, the CO standards are met.

Currently elevated CO levels seem to be correlated with elevated $PM_{2.5}$ levels during inversions when overall pollution from all source categories are trapped close to the ground.

Access and budgetary issues make the Old Post Office site a non-desirable location for sampling. In recent years the building owners have had numerous tenants in the retail shop through which the FNSB staff gain access to the instrument room. These tenants have retail assets and administrative offices they want secured and so access and hours of operation vary from tenant to tenant. The limitations on access has presented challenges for the FNSB staff, causing technicians to make emergency access calls to address equipment issues. These emergency access requests are not always granted especially when they are not based on a fire or safety concern.

While the CO levels are consistently lower at the NCore site, DEC believes that the NCore site measurements are a conservative representation of CO concentrations found across Fairbanks. Because of the low CO concentrations recorded over many years and the siting issues discussed above, DEC recommends decommissioning the Old Post Office site and consolidating the CO monitoring network to one sampler at the NCore site.

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).					

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.				

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[a]	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

[a]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 for Alaska begins April through October

PART 58 APPENDIX D NETWORK EVALUATION FORM FOR PM10				
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
4.6(a)	Table D-4 indicates the approximate number of permanent stations required in MSAs to characterize national and regional PM10 air quality trends and geographical patterns. Use the form below and Table D-4 to verify if your PM10 network has to appropriate number of samplers.	√		
Comments: All of the site locations are based on historical agreements among the EPA, ADEC and (where applicable) local agencies.				

MSA Description[1]	MSA population[2, 3]	Minimum required number of PM10 stations (from Table D-4)	Present number of PM10 stations in MSA
Municipality of Anchorage	291,826	3	3 (2 SLAMS, 1 SPM)
Matanuska-Susitna Valley Borough	88,995	1	3 (1 SLAMS, 2 SPM)
Fairbanks North Star Borough	97,581	1	1 (1 Ncore)
City and Borough of Juneau	31,275	1	2 (collocated)
Kenai Peninsula Borough (Soldotna)	55,400	0	1 (SPM)

[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.

Table D-4 of Appendix D to Part 58 – PM10 Minimum Monitoring Requirements			
MSA population[1, 2]	High concentration2	Medium concentration3	Low concentration4 5
>1 million	6-10	4-8	2-4
500K to 1 million	4-8	2-4	1-2
250K to 500K	3-4	1-2	0-1
100K to 250K	1-2	0-1	0

[1]Selection of urban areas and actual numbers of stations per area will be jointly determined by EPA and the State agency.
[2]High concentration areas are those for which ambient PM10 data show ambient concentrations exceeding the PM10 NAAQS by 20 percent or more.
[3]Medium concentration areas are those for which ambient PM10 data show ambient concentrations exceeding 80 percent of the PM10 NAAQS.
[4]Low concentration areas are those for which ambient PM10 data show ambient concentrations less than 80 percent of the PM10 NAAQS.
[5]These minimum monitoring requirements apply in the absence of a design value.

PART 58 APPENDIX D NETWORK EVALUATION FORM FOR PM2.5 Page 1 of 2

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.	X		
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).	X		
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).	X		
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.			X
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.	X		
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.	X		
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.	X		
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).	X		

Comments: In regards to requirement 40 CFR 58, Appendix D 4.7.3, ADEC will use the Trapper Creek IMPROVE site as the $PM_{2.5}$ background site. A monitoring location is yet to be designated as the PM2.5 transport site.

PART 58 APPENDIX D NETWORK EVALUATION FORM FOR PM2.5 Page 2 of 2						
MSA Description[1]	MSA population[2,3]	Design Value for years 2011-2013 24-hr/Annual Avg. µg/m^3	Minimum required number of PM2.5 SLAMS FRM/FEM/ARM sites (from Table D-5)	Present number of PM2.5 SLAMS FRM/FEM/ARM sites in MSA	Present number of continuous PM2.5 FEM/ARM analyzers in MSA	Present number of continuous PM2.5 STN analyzers in MSA
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		140/23.0*	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	
Kenai Peninsula Borough	55,400		0			0
Soldotna Site		8/1.7*	SPM/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 calculations are not valid based on data completeness.

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.

PART 58 APPENDIX D NETWORK EVALUATION FORM FOR SULFUR DIOXIDE (SO_2)				
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
4.4.1	State and, where appropriate, local agencies must operate a minimum number of required SO_2 monitoring sites (based on PWEI calculation specified in 4.4.2 – use Table 1 and 2 below to determine minimum requirement for each CBSA)	√		
4.4.2(a)(1)	Is the monitor sited within the boundaries of the parent CBSA and is it one of the following site types: population exposure, highest concentration, source impacts, general background, or regional transport?			√
4.4.3(a)	Has the EPA Regional Administrator required additional SO_2 monitoring stations above the minimum number of monitors required in 4.4.2? If so, note location in comment field.		√	
4.4.5(a)	Is your agency counting an existing SO2 monitor at an NCore site in a CBSA with a minimum monitoring requirement?			√
Comments: As evident from the calculations shown below, the State of Alaska has no CBSAs which require SO_2 monitoring. The operating SO_2 monitor is located at the multi-pollutant Ncore site in the Fairbanks North Star Borough.				

Table 1.

CBSA Description[1]	CBSA population[1, 2]	total amount of SO2 in tons per year emitted within the CBSA (use 2008 NEI[4])	PWEI (population x total emissions ÷ 1,000,000)	Minimum required number of SO2 monitors in CBSA (see Table 2 below)	Present number of SO2 monitors in CBSA
Municipality of Anchorage	291,826	746.8	217.9	0	0
Fairbanks North Star Borough	97,581	2,614.3	255.1	0	1
Matanuska-Susitna Valley Borough	88,995	226.9	20.2	0	0
Juneau	31.275	1,198.8	37.5	0	0
North Slope Borough	9,430	1,722.1	16.2	0	0

[1]see http://www.census.gov/population/metro/data/def.html
[2]Minimum monitoring requirements apply to the Core Based statistical area (CBSA). CBSA includes both metropolitan and micropolitan statistical areas.
[3]Population based on latest available census figures.
[4]see http://www.epa.gov/ttn/chief/eiinformation.html

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

PWEI (Population weighted Emission Index) Value	Require number of SO2 monitors
>= 1,000,000	3
>= 100,000 but < 1,000,000	2
>= 5,000 but < 100,000	1

APPENDIX B: MONITORING PATH & SITING CRITERIA EVALUATION FORMS

Anchorage Municipality Monitoring Sites

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 CO					
SITE NAME: Turnagain	SITE ADDRESS: 3201 Turnagain St, Anchorage				
AQS ID: 02-020-0048	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 drip line approximately 6 meters from probe inlet
2* Three white spruce between probe and turnagain

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

SITE NAME: Tudor SITE ADDRESS: 3335 E Tudor Rd, Anchorage

AQS ID: 02-020-0044 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 3.3 meters Probe inlet 5.3 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.	1*	X		
	(c) No trees should be between source and probe inlet for microscale sites.	2*	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.	3*	X		
Are there any changes that might compromise original siting criteria? Trees have grown slightly				X	

Other Comments: 1* 5 meter distance between drip line of trees and sampler

2* 6 meter tall trees source/roadway and sampler do not significantly exceed height of sampler

3* ADT is approximately 35,000 (2012) Tudor traffic lane 7 meters south

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					

Fairbanks North Star Borough Monitoring Sites

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 CO

SITE NAME: Old Post Office SITE ADDRESS: 250 Cushmen St, Fairbanks

AQS ID: 02-090-0002 EVALUATION DATE: 4/28/14 EVALUATOR: McCormick

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.	1m-building 3.3m-good	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).	Street canyon	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.	4m	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.	12m	X		
9. PROBE MATERIAL & RESIDENCE TIME	(a) Sampling train material must be FEP Teflon or borosilicate glass (e.g., Pyrex) for reactive gases.	Teflon	X		
	(c) Sampling probes for reactive gas monitors at NCore must have a sample residence time less than 20 seconds.	Non-reactive			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 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.					

Matanuska-Susitna Valley Monitoring Sites

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 PM2.5, PM10, PM10-2.5,and Pb					
SITE NAME: Wasilla SITE ADDRESS: 100 block of W Swanson Ave, Wasilla AQS ID: 02-170-0013 EVALUATION DATE: 4/16/14 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.	Inlet >3m above ground	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.	Only paved roads 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	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 >10m away from sampling site	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 from sampling site	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: Wasilla	SITE ADDRESS: 100 block of W Swanson Ave, Wasilla				
AQS ID: 02-170-0013	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. 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.	The sampling inlet is about 4m above the 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.	No sources	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.	No sources	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.	No obstacles	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.	No obstacles	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.	Closest trees >10m away from sampling site	X		
	(c) No trees should be between source and probe inlet for microscale sites.				X
6. SPACING FROM ROADWAYS	See spacing requirements table below	Road >20m away from sampling site	X		
9. PROBE MATERIAL & RESIDENCE TIME	(a) Sampling train material must be FEP Teflon or borosilicate glass (e.g., Pyrex).	FEP Teflon	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.

City and Borough of Juneau Monitoring Site

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.					

Kenai Peninsula Borough Monitoring Site

PART 58 APPENDIX E SITE EVALUATION FORM FOR PM2.5, PM10, PM10-2.5,and Pb					
SITE NAME: Soldotna	SITE ADDRESS: 144 N Binkley Street and corner of Shady Lane, Soldotna, AK				
AQS ID 02-122-0008	EVALUATION DATE: 3/14/14, 4/16/14	EVALUATOR: Ryan Dukowitz, Mary Pfauth			
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.	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.		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.	40 ft	X		
Are there any changes that might compromise original siting criteria?				X	
Other Comments:					

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 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. In addition, one new wet deposition monitoring site in Nome will be established to measure mercury deposition along with the above mentioned trace metal contaminants in rain or snowfall. This Alaska Coastal Deposition Network, consisting of the new site and the existing sites in Kodiak and Unalaska will be operated using the techniques and quality assurance protocols of the MDN, managed by the NADP.

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.

Working with DEC and National Weather Service meteorologists and atmospheric scientists schooled in the analysis of back trajectories, the trace metal and mercury data will be combined 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:

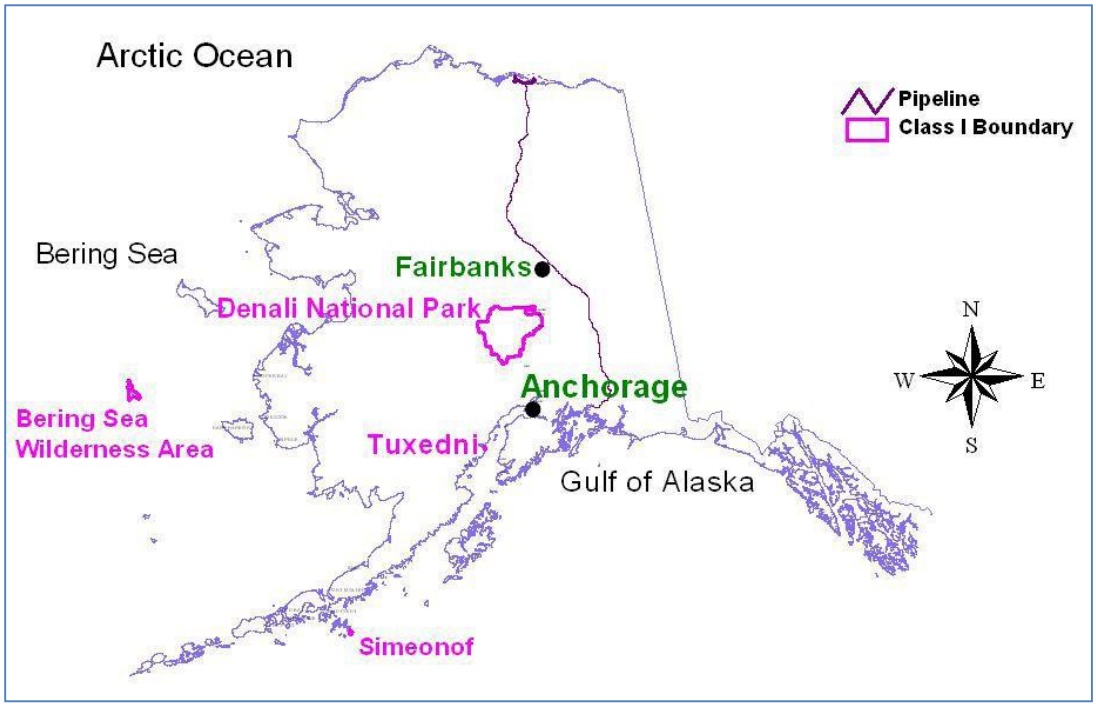
> *The prevention of any future, and the remedying of any existing, impairment of visibility in mandatory Class I Federal areas which impairment results from manmade air pollution. (Section 169A)*

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 and Simeonof Wilderness Areas as coastal, and the Bering Sea Wilderness Area.

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 midlatitude 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.

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

Alaska Monitoring NAAQS Summary for $PM_{2.5}$ as µg/m^3 at Local Conditions

NAAQS 35 µg/m^3 (24-Hr, 98th percentile, average over 3 years)
NAAQS 15 µg/m^3 (Annual mean, averaged over 3 years)

		98th Percentile 24-hour Mean				Weighted Annual Mean				2013-2011 Design Value	
$PM_{2.5}$ Monitoring Sites	**Site ID**	**2013**	**2012**	**2011**		**2013**	**2012**	**2011**		**24-hr**	**Annual**
The Garden Site (MOA)	02-020-0018	15.7	28.4	17.3		4.9	6.6	5.2		20	5.6
Parkgate Site (MOA)	02-020-1004	15.0	17.9	15.7		5.0	5.3	4.6		16	5.0
The Butte Site (Mat-Su Valley)	02-170-0008	27.9	33.4	30.2		6.4	5.9	6.4		31	6.3
Palmer Site (Mat-Su Valley)	02-170-0012	11.1	13.7	9.1		3.2	4.2	4.1		11	3.8
Wasilla Site (Mat-Su Valley)	02-170-0013	16.0	22.8	15.1		4.0	5.7	6.3		18	5.3
State Office Building (FNSB)	02-090-0010	36.3	49.6	38.0		10.6	10.7	10.7		41	10.7
NCORE Site (FNSB)	02-090-0034	36.2	50.0	33.1		10.5	11.3	10.4		40	10.7
North Pole Fire #3 (FNSB)	02-090-0035	121.6	158.4	ND		29.1	16.8	ND		NC	NC
Floyd Dryden Site (Juneau)	02-110-0004	22.7	23.5	24.8		5.9	6.4	7.2		24	6.5
Soldotna Site (Kenai Peninsula Borough)	02-122-0008	8.3*	7.4	8.2*		0.9*	1.0	2.9*		NC	NC

ND – No data available, the site was not installed until March 2012.
* Annual values did not meet data completeness criteria, as a result the 3-year design values were not calculated (NC)
NA – not applicable, design values calculations are based on 3 years of complete data

Alaska Monitoring NAAQS Summary for PM_{10} as µg/m^3 at STP NAAQS 150 µg/m^3 (Not to be exceeded more than once per year on average over 3 years)										
PM_{10} Monitoring Sites	**Site ID**	**2013**			**2012**			**2011**		
		Exceedances	1st Max 24-hr	2nd Max 24-hr	Exceedances	1st Max 24-hr	2nd Max 24-hr	Exceedances	1st Max 24-hr	2nd Max 24-hr
The Garden Site (MOA)	02-020-0018	0	40	34	0	59	53	0	39	36
Tudor Road Site (MOA)	02-020-0044	1	256	120	0	120	115	0	129	117
Parkgate Site (MOA)	02-020-1004	1	174	78	0	81	77	0	95	62
NCORE (FNSB)	02-090-0034	0	75	72	0	95	83	0	64	52
Butte Site (Mat-Su Valley)	02-170-0008	0	29	26	0	113	81	0	34	34
Palmer Site (Mat-Su Valley)	02-170-0012	0	113	94	0	152	121	2	214	174
Wasilla Site (Mat-Su Valley)	02-170-0013	0	78	63	0	120	109	0	NA	NA
Floyd Dryden Site (Juneau)	02-110-0004	0	33	24	0	24	19	0	24	21
Soldotna Site (Kenai Peninsula Borough)	02-122-0008	0	84	68	0	131	108	NA	NA	NA

NA – data not available

Alaska Monitoring NAAQS Summary for PM_{10} as µg/m^3 at STP 5–Year Arithmetic mean for 2009 through 2013 as related to Limited Maintenance Plan compliance with the annual critical design value (CDV) of 40 µg/m^3		
PM_{10}Monitoring Sites	**Site ID**	**2009 through 2013 5- year Arithmetic Mean (µg/m^3)**
Parkgate Site (MOA)	02-020-1004	15
Floyd Dryden Site (Juneau)	02-110-0004	8

Alaska Monitoring NAAQS Summary for CO as ppm

NAAQS 9 ppm as 8-Hour Mean (Not to be exceeded more than once per year)
NAAQS 35 ppm as 1-Hour Mean (Not to be exceeded more than once per year)

CO Monitoring Sites	Site ID	2013			2012			2011		
		Exceedances	1st Max 8-hour	2nd Max 8-hour	Exceedances	1st Max 8-hour	2nd Max 8-hour	Exceedances	1st Max 8-hour	2nd Max 8-hour
The Garden Site (MOA)	02-020-0018	0	3.4	3.1	0	4.4	4.3	0	3.9	3.6
Turnagain Site (MOA)	02-020-0048	0	4.5	4.0	0	6.6	5.5	0	4.4	4.2
Old Post Office (FNSB)	02-090-0002	0	3.6	3.2	0	6.8	6.7	0	6.9	5.4
NCORE (FNSB)	02-090-0034	0	2.8	2.7	0	2.4	2.1	0	3.0	2.6

Alaska Monitoring NAAQS Summary for SO_2 as ppb

NAAQS 75 ppb (99th percentile of 1-hour daily maximum concentration averaged over 3 years)

SO_2 Monitoring Site	Site ID	2013		2012		2011		3-yrs Design Value
		99th Percentile	Completed Quarters	99th Percentile	Completed Quarters	99th Percentile	Completed Quarters	
NCORE (FNSB)	02-090-0034	37	4	49	4	44*	1	41

Alaska Monitoring NAAQS Summary for O_3 as ppm

NAAQS 0.075 ppm 8-hour (Annual 4th highest daily maximum 8-hr concentrations averaged over 3 years)

O_3 Monitoring Sites	Site ID	2013			2012			2011			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 Site (Mat-Su Valley)	02-170-0013	NA	NA	NA	143	67	0.048*	167	78	0.049	NC	NC
NCORE (FNSB)	02-090-0034	209	98	0.048	197	92	0.048	85	40*	0.035	NC	NC

* Annual values did not meet data completeness criteria, as a result the design values were not calculated (NC).

NA – not applicable, design values calculations are based on 3 years of complete data