Alaska's 2013 Air Monitoring Network Plan

Chapter 1

Monitoring Plan

Air Quality Division

Air Monitoring
&
Quality Assurance
Program

619 E. Ship Creek Ave. #249
Anchorage, AK 99501

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

www.state.ak.us/dec/

Table of Contents

List of Tables

1. ALASKA'S 2013 AMBIENT AIR QUALITY MONITORING PLAN

1.1.Introduction

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 diameter ($PM_{2.5}$) and one for coarse particulate matter less than 10 micrometers in 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. Since 2008, the EPA has strengthened the NAAQS for lead, ozone, sulfur dioxide, and nitrogen dioxide. Table 1.1presents the NAAQS with the most recent updates.

To protect public health and assess attainment with NAAQS limits, the State of Alaska Department of Environmental Conservation (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].

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

1. Monitor in larger communities to cover the largest possible population exposure;

2. Monitor in designated smaller towns and villages that are representative of multiple communities in a region; and

3. Monitor in response to air quality complaints.

[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 addition to the NAAQS for *criteria pollutants*, Title III of the CAA regulates a list of 188 hazardous air pollutants, often referred to as *HAPs* or air toxics. These air pollutants have been shown to be carcinogenic or exhibit high toxicity in humans and the environment. Air toxics are regulated through emission limits established for stationary sources, mobile sources, and other area sources. Special monitoring projects may be developed to evaluate source-specific locations. Currently, DEC has no air toxics monitoring planned for 2012-2013.

Table 1.1 – NAAQS for Criteria Pollutants (as revised October 2011)

Pollutant [Final Rule Citation]		Primary/ Secondary	Averaging Time	Level	Form
Carbon Monoxide [76 FR 54294, Aug 31, 2011]		Primary	8-hour	9 ppm	Not to be exceeded more than once per year
			1-hour	35 ppm	
Lead [73 FR 66964, Nov 12, 2008]		Primary and Secondary	Rolling 3-month Average	0.15 $\mu g/m^3$(1)	Not to be exceeded
Nitrogen Dioxide [75 FR 6474, Feb 9, 2010] [61 FR 52852, Oct 8, 1996]		Primary	1-hour	100 ppb	98th percentile, averaged over 3 years
		Primary and Secondary	Annual	53 ppb(2)	Annual Mean
Ozone [73 FR 16436, Mar 27, 2008		Primary and Secondary	8-hour	0.075 ppm(3)	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3-years
Particle Pollution [71 FR 61144, Oct 17, 2006]	$PM_{2.5}$	Primary and Secondary	Annual	15 $\mu g/m^3$	Annual mean, averaged over 3 years
			24-hour	35 $\mu g/m^3$	98th percentile, average over 3 years
	PM_{10}	Primary and Secondary	24-hour	150 $\mu g/m^3$	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide [75 FR 35520, Jun 22, 2010] [38 FR 25678, Sep 14, 1973]		Primary	1-hour	75 ppb(4)	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		Secondary	3-hour	0.5 ppm	Not to be exceeded more than once per year

(1) Final rule signed October 15, 2008. The 1978 lead standard (1.5 $\mu g/m^3$ as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.

(2) The official level of the annual NO2 standard is 0.053 ppm, equal to 53 ppb, which is shown here for the purpose of clearer comparison to the 1-hour standard.

(3) Final rule signed March 12, 2008. The 1997 ozone standard (0.08 ppm, annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years) and related implementation rules remain in place. In 1997, EPA revoked the 1-hour ozone standard

(0.12 ppm, not to be exceeded more than once per year) in all areas, although some areas have continued obligations under that standard ("anti-backsliding"). The 1-hour ozone standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is less than or equal to 1.(4)

(4) Final rule signed June 2, 2010. The 1971 annual and 24-hour SO2 standards were revoked in that same rulemaking. However, these standards remain in effect until one year after an area is designated for the 2010 standard, except in areas designated nonattainment for the 1971 standards, where the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standard are approved.

1.2. Monitoring Priorities

The Air Monitoring & Quality Assurance (AMQA) section of the DEC Air Quality Division has a small staff of professionals which coordinate with the Municipality of Anchorage, the Fairbanks North Star Borough, the City and Borough of Juneau, the City of Seward, the Kenai Peninsula Borough, and other, smaller communities to support and operate the statewide monitoring system. To protect public health and the environment, the 2013 Alaska Air Monitoring Plan is focused on eight air quality issues:

- Fine particulate matter ($PM_{2.5}$) monitoring
- Coarse particulate matter (PM_{10}) monitoring
- Carbon monoxide (CO) monitoring
- Lead (Pb) monitoring
- Ozone (O_3) monitoring
- Sulfur dioxide (SO_2) monitoring
- Wildland fire monitoring ($PM_{2.5}$)
- Rural communities and tribal village monitoring (primarily PM_{10})

1.2.1 Fine Particulate Matter-$PM_{2.5}$

The primary source of fine particulate matter ($PM_{2.5}$) is combustion. $PM_{2.5}$ is a major health issue for communities across the State of Alaska. More and more health studies show the higher rate of disease associated with particles penetrating deep into the lungs. For the people of Alaska, this problem is exacerbated by increased exposure to fine particulate during extended wintertime temperature inversions and wildland fires during the summer months. $PM_{2.5}$ monitoring is currently being conducted in all the major networks. Only the Seward PM_{10} monitoring program does not monitor for $PM_{2.5}$.

Fairbanks has consistently experienced the highest $PM_{2.5}$ values measured in the state. During the winter months, strong temperature inversions have contributed to trapping fine particle emissions in the lowest levels of the atmosphere. Since the strengthening of the $PM_{2.5}$ standard in December 2006, Fairbanks routinely records 20-30 exceedances each winter of the new 24 hour standard of 35 $\mu g/m^3$. Based on these exceedances, in December 2009 the Fairbanks North Star Borough was designated non-attainment for the $PM_{2.5}$ NAAQS. Fairbanks North Star Borough, DEC, the University of Alaska – Fairbanks (UAF), and a group of other air quality

professionals are currently investigating the problem to develop an effective control strategy for bringing the community into attainment status.

Particulate pollution in Juneau was recognized in the 1970s prompted by public complaints concerning road dust and woodstove emissions especially during wintertime inversions. The current monitoring site located in the Mendenhall Valley at the Floyd Dryden Middle School was originally established January 1, 1980. Based on exceedances throughout the 1980s, Juneau was designated non-attainment for PM_{10} in November 1991. The State of Alaska, and the City and Borough of Juneau developed a control strategy with an aggressive road paving program and a program to ban wood burning during periods of predicted temperature inversions. Data collected over the last decade indicate that the coarse particulate part of the problem was solved. In December 2008, the State of Alaska proposed to the EPA to place Juneau under a Limited Maintenance Plan for PM_{10}. Although never designated as non-attainment for $PM_{2.5}$, increases in fuel costs for residential heating and revision of the NAAQS in 2006 lowering the 24-hour standard to 35 $\mu g/m^3$ is reason for concern. Monitoring values observed in the Mendenhall Valley during wintertime inversions are often close to exceeding the new limit. The City and Borough of Juneau are aggressively enforcing the burn ban and issuing citations with fines for noncompliant residents. Monitoring is ongoing with recent updates to instrumentation.

The Municipality of Anchorage began monitoring for $PM_{2.5}$ in November 1998 and is currently monitoring at three sites in the network. The Municipality continues to be in compliance with the $PM_{2.5}$ NAAQS.

In the 1990s and up to 2008 the population of the central Matanuska-Susitna Valley grew very rapidly. Every year, DEC receives occasional public complaints related to smoke from land clearing operations. To help local leaders address air quality issues and to better protect public health, DEC installed a $PM_{2.5}$ continuous sampler in the downtown area of each community.

As part of a shift in the National Monitoring Strategy, Alaska began adding continuous $PM_{2.5}$ analyzers to Federal Reference Method (FRM) monitoring sites. The national long range plan was to convert all manual samplers to continuous analyzers to provide a more comprehensive monitoring database. The strategy required a collocation of continuous samplers with FRM monitors to determine if a bias existed in the collected data. This was considered an important step as agencies in the lower 48 states were noticing that the newer technology analyzers were producing significant data disparities. While analyzers have improved, and many have been designated as federal equivalent methods (FEM), operating them collocated with an FRM sampler is still preferred by DEC to validate their performance as significant discrepancies exist. The collocation is important, as good quality, continuous particulate data play a critical role in calculating daily Air Quality Indices (AQI). The AQI is used to help develop air quality advisories and protect public health. Alaska continues to study the accuracy of these samplers. Continuous $PM_{2.5}$ analyzers are now in place at three monitoring sites in the Anchorage network, five sites in the Fairbanks North Star Borough, three sites in the Mat-Su Valley, one site in Soldotna, and one site in Juneau. Correlation data were calculated for the Juneau $PM_{2.5}$ FRM and FEM monitors. Results from the linear regression analysis were well within EPA requirements and, as a result, operation of the $PM_{2.5}$ FRM manual sampler was discontinued.

Through an intergovernmental agreement with the Municipality of Anchorage and the State of Washington, real-time $PM_{2.5}$ data from the continuous monitors in Anchorage, Mat-Su, Fairbanks, and Juneau are now available to the public through the Alaska Air Monitoring Network website at https://fortress.wa.gov/ecy/aaqm/Default.htm.

1.2.2 Coarse Particulates-PM_{10}

The State of Alaska has been monitoring for dust in Anchorage, Juneau, the Mat-Su Valley, and Fairbanks for over twenty years. The Municipality of Anchorage and Juneau both violated the PM_{10} standards for several years. Juneau was designated as non-attainment for PM_{10} in 1991.

Eagle River, a community of about 30,000 located approximately 10 miles north of downtown Anchorage and within the municipal boundaries, was designated as non-attainment for PM_{10} in 1991. The Municipality of Anchorage, as a whole, skirted non-attainment status by development of the Eagle River PM_{10} attainment plan and entered into a Memorandum of Understanding with the EPA. The Memorandum of Understanding committed the Municipality and the State to develop and implement strategies to control the sources creating the violations, which had occurred between 1985 and 1987. The PM_{10} control plan was developed to address the PM_{10} problem in Eagle River. Because most of the PM_{10} in Eagle River was emitted from unpaved roads, the plan focused on paving or surfacing gravel roads in the area. This strategy has been successful. No violations have been measured since October 1987. A "Limited Maintenance Plan" for Eagle River was submitted to EPA and has been determined as *adequate* by an EPA conformity analysis. The Municipality is awaiting official approval of the Limited Maintenance Plan and a subsequent announcement of the reclassification of Eagle River to attainment status.

The Anchorage bowl is currently considered in attainment for PM_{10}. However, Anchorage has experienced exceedances of the NAAQS related to natural events such as volcanic eruptions and wind storms. Experience has shown that the effects of a volcanic eruption can linger for years following the event. Following the eruption of the Mt. Spurr volcano in August 1992, the NAAQS for PM_{10} was exceeded 18 times between 1993 and 1995. Intense wind storms in March 2001 and March 2003 created blowing dust conditions that contributed to a number of exceedances of the NAAQS. Because these exceedances were largely the result of natural events, EPA has not considered them when evaluating Anchorage attainment status with respect to PM_{10}.

Although natural events have contributed to some exceedances, most PM_{10} in Anchorage is believed to have man-made origins. PM_{10} can be generated from vehicle traffic on un-swept roads loaded with winter traction sand or from unpaved roads and parking lots. Anchorage sometimes nearly exceeds the NAAQS during spring break-up, especially near heavily traveled roads where traffic stirs up a winter's worth of accumulated road sand, pulverized road surface, and sediment.

The Municipality of Anchorage and the State of Alaska have modified road maintenance practices in an effort to reduce PM_{10} emissions from roadways. In 1996, they began using a coarser, cleaner traction sand to reduce the amount of fines (silt particles less than 75 microns in diameter) being applied to the roadway network. In recent years, the Municipality of Anchorage

has used magnesium chloride brine, a chemical dust suppressant to reduce PM_{10} emissions during the spring break-up when PM_{10} concentrations tend to be highest.

As discussed above, Juneau was designated non-attainment for PM_{10} in 1991. However, data collected over the last 13 years have shown effective control of road dust. The DEC and City and Borough of Juneau have submitted a PM_{10} Limited Maintenance Plan to Region 10 EPA. Monitoring is ongoing at the Floyd Dryden Middle School site.

The southern Matanuska-Susitna Valley, located 40 miles northeast of Anchorage, is transitioning from a rural-agricultural to an urban-suburban character. The cities of Wasilla and Palmer are the fastest growing communities in the state. Dust monitoring is currently performed at three sites: downtown Palmer, Wasilla, and in the Butte, a small community southeast of Palmer. Monitoring data typically show several exceedances of the PM_{10} NAAQS every year. Increased road paving has significantly reduced the road dust levels across the valley. However, all of the exceedances are related to exceptional events, which involve high winds off the Matanuska River and Knik River drainages which entrain glacial silt, raising dust levels into the unhealthy range. These exceptional events occur during the spring, summer, and into the fall until snow cover occurs.

In January 2011, DEC, in coordination with the city officials, the Alaska Native Tribal Health Consortium (ANTHC) and the Qutekcak Native Tribe (QNT), established a PM_{10} monitoring program in Seward. The monitoring program was prompted by citizen complaints of high levels of wind-blown dust. Samples were collected at three sites within the City limits. The special purpose monitoring program collected PM_{10} data for a period of fifteen months February 2011 through May 2012. A final report is to be issued in late summer of 2012.

A continuous PM_{10}, $PM_{2.5}$, and PM_{Coarse} monitoring site is located near the Kenai Peninsula Borough Building in Soldotna.

1.2.3 Carbon Monoxide-CO

Strong wintertime temperature inversions and complex terrain resulted in non-attainment status for CO in Alaska's two largest population centers, Anchorage and Fairbanks. Both communities were designated as *Moderate Non-attainment* for CO in the late 1970s and re-designated as *Serious Non-attainment* in 1998. However, with implementation of air quality control strategies and improvement to automobile emission controls, both communities have not had a violation of the NAAQS for over ten years. Both communities requested re-designation to attainment. The EPA concurred and re-designated Anchorage and Fairbanks as maintenance areas in 2004.

The Anchorage CO monitoring network is currently comprised of four monitoring sites: one in east Anchorage, one in downtown Anchorage, one in west Anchorage near the airport, and one in Eagle River, a suburb of Anchorage ten miles to the northeast. The Municipality of Anchorage network has not recorded an exceedance of the CO NAAQS since December 1996.

The Fairbanks North Star Borough CO monitoring network originally consisted of three monitoring sites. Fairbanks has not exceeded the CO NAAQS since 1999. Because of continued compliance with the standard and the need to refocus on $PM_{2.5}$ non-attainment, the Fairbanks

monitoring program requested and EPA approved a reduction in the number of CO monitoring sites within the borough. Fairbanks currently operates two CO monitoring sites.

1.2.4 Lead Monitoring-Pb

To comply with the November 2008 and the December 2009 revisions to the NAAQS for lead (Pb), DEC established a source oriented monitoring site near the Red Dog Mine in the Northwest Arctic Borough. The Red Dog Mine extracts zinc and lead ore from an open-pit mine and concentrates the ore for export. The EPA NAAQS regulations for lead require source-oriented monitoring for all facilities that have potential annual emissions equal to, or greater than, 0.5 tons of lead. The Red Dog Mine is the only emission source in the State of Alaska that meets this criterion. The area around the mine is extremely remote, rugged terrain with no road access and is essentially uninhabited. The monitoring location selected was the Native Village of Noatak, the closest village 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 consists of collocated samplers which collected samples for total suspend particulate (TSP). The samples were collected and returned to Anchorage for laboratory analysis at the DEC Environmental Health (EH) laboratory. Unfortunately, because of problems with maintaining trained, year round operators within the Village, sampling has been suspended. Under 40 CFR 58, Appendix D, section 4.5 (ii) DEC has submitted a modeling protocol as part of a waiver request to avoid the monitoring requirement. DEC is currently in negotiations with the EPA for approval of the modeling protocol. DEC is planning to conduct summer time sampling programs in either Noatak and/or the nearby Village of Kivalina.

Because some piston-engine aircraft still use a leaded formulation of gasoline, EPA has recently instituted a special lead monitoring study at selected regional airports around the U.S. The Merrill Field Airport in Anchorage, Alaska was selected by the EPA to participate in the study based on the potential for planes using this airfield to collectively emit as much as 0.5 tons of lead annually. The Municipality of Anchorage instituted a TSP-lead sampling program at Merrill Field during the early winter of 2011. Sampling is conducted on a 1-in-6 schedule and will conclude in December 2012. The DEC EH lab in Anchorage is analyzing the samples for lead content. The Municipality expects to issue a final report by April 2013.

1.2.5 Ozone Monitoring-O_3

The March 27, 2008 revision of the ozone (O_3) NAAQS required the State of Alaska to establish an ozone monitoring program by April 1, 2010. The regulation requires at least one State and Local Air Monitoring Station (SLAMS) ozone 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 MSA in the State of Alaska which meets the criteria. The Municipality of Anchorage monitoring program established two monitoring sites in April 2010. For the 2011 Alaska ozone season (April-October), one ozone monitor was relocated from the Parkgate site in Eagle River to the Wasilla site in the Mat-Su Valley to be operated by DEC. These two ozone monitors are designated as special purpose monitors until sufficient data can be collected and analyzed to determine the appropriate SLAMS site location. Year-round ozone monitoring is conducted in Fairbanks as part of the multi- pollutant sampling suite at the NCORE site. The US National

Park Service operates a Clean Air Status and Trends Network (CASTNET) ozone monitoring site at the Denali National Park and Preserve, which is under consideration to be used as the wilderness site for Alaska to fulfill the latest ozone monitoring requirements.

1.2.6 Sulfur Dioxide Monitoring – SO_2

In 2010, EPA finalized revisions to the NAAQS for sulfur dioxide ($SO_{2)}$ (75 FR 35520, June 22, 2010). The revisions were to address the public health studies showing a direct correlation of short-term high concentrations of this pollutant with health effects for sensitive populations, i.e. children, the elderly, and people with underlying health conditions. The revisions also contained associated changes to ambient monitoring and data reporting requirements. To comply with the revised NAAQS requirements, DEC has installed a sulfur dioxide monitor at the NCORE multi-pollutant monitoring site located in Fairbanks. The sulfur dioxide concentration will be monitored at trace levels with hourly averages reported in parts per billion (ppb) to one decimal. In addition, the sulfur dioxide NAAQS revision requires that data averages be recorded in 5-minute blocks and that the maximum 5-minute block for the hour and the hourly average be reported.

1.2.7 Rural Community and Tribal Village Monitoring

The State provides support to Alaska's rural communities to make baseline assessments of local air quality. Because a majority of the citizens in these communities are Alaskan Native, much of the monitoring is supported by EPA's Indian Environmental General Assistance Program (IGAP) or EPA's Tribal Air Grant process. The IGAP program provides limited funding for equipment and training for monitoring to be used for baseline assessments but not for regulatory purposes.

Dust Monitoring

The State believes the high dust levels reported in the rural communities of Ambler, Bethel, Buckland, Kiana, Kotzebue, Noatak, Noorvik, and St Mary's represent the conditions that would be found in other rural communities across the state if they performed PM_{10} monitoring. This conclusion has been supported by numerous tribal studies conducted during the past decade. Most of the tribal monitoring has been done in the Northwest Arctic Borough but sampling in other villages throughout the state supports the same conclusion.

This year, DEC, the State of Alaska Department of Transportation & Public Facilities (DOT), and UAF are working together to identify and test potential dust control strategies for use in rural Alaska. The DEC is involved in the DOT project with UAF to assess the effectiveness of the chemical palliatives applied for dust control. The eight villages (named above)\ have had dust problems in the past (i.e. values exceeding the PM_{10} NAAQS) and have been chosen for a DOT demonstration project. DEC will monitor the effectiveness of the selected dust palliatives in four villages during the summer of 2012: Noorvik, Ambler, Noatak, and Buckland. Two of those villages, Noatak and Buckland, have not yet applied the dust palliatives provided for this study, and are planning to apply them this summer. DEC is planning to use FRM high-volume samplers in all four villages. DEC is also considering the possibility of adding continuous EBAM monitors at some of these sites to increase the amount of sampling data for the short summer season.

DEC is not planning to seek a PM_{10} non-attainment designation for rural communities at this time, but may in the future if the easier solutions for dust control are not found to be effective.

Wood Smoke Monitoring

Portions of rural Alaska may also have a $PM_{2.5}$ wood smoke problem. Strong winter inversions in interior Alaska coupled with weak economies, higher home heating bills, and easy access to wood have seen Alaskan's woodstove use on the rise. The impact on these small communities is unknown at this time, but cannot be overlooked in terms of protecting public health. However, at this time, DEC is not planning any monitoring to assess the $PM_{2.5}$ concentrations in rural Alaska.

1.2.8 Wildland Fire Monitoring

During the summer months when wildland fires spread thick, grey smoke over interior Alaska, Fairbanks and many other communities are often inundated with very high $PM_{2.5}$ levels. During the summers of 2004, 2005, and 2009, the community suffered through days of $PM_{2.5}$ levels that were more than 10 times the old standard of 65 $\mu g/m^3$. At times, smoke from these fires covered most of interior Alaska from the Bering Sea eastward to the Canadian border. In 2010, DEC placed continuous $PM_{2.5}$ monitors at Fort Yukon and Galena to study smoke impacts from summer wildland fire events in the State's interior. This program is ongoing.

1.2.9 Other Monitoring Issues

DEC has a number of other monitoring projects that the AMQA staff plan to bring to completion.

Alaska Air Monitoring Network

The Alaska Air Monitoring Network is a web-based data collection and reporting system that is intended to provide real-time data from continuous particulate samplers and pollutant gas monitors for near real time public access and so DEC can issue more timely air quality advisories. The information from each site is published to a web site which is accessed through a map-based GPS interface. Data from each site are used to calculate an Air Quality Index (AQI) which is presented on the site . The Alaska Air Monitoring Network was established by the Municipality of Anchorage in 2005 with funding derived through the Alaska Congressional delegation. DEC has expanded the system to include several sites throughout central Alaska. In 2012, the network includes:

Municipality of Anchorage	Fairbanks North Star Borough	Matanuska-Susitna Valley Borough	City and Borough of Juneau
Garden site (Airport Heights)	NCORE Site Multi-pollutant site (Downtown)	Palmer (South Gulkana in the City Park)	Juneau (Floyd Dryden Middle School)
DHHS Building (Downtown)	Fairbanks State Office Building (Downtown)	Wasilla (100 W Swanson near Fire Station #61)	
Tudor Road (East Anchorage)	North Pole Elementary (North Pole)	Butte (Harrison Court)	

Parkgate (Eagle River)	North Pole Fire Station #3 (North Pole)		

DEC is planning to include the Kenai/Soldotna area PM site during the summer of 2012. (https://fortress.wa.gov/ecy/aaqm/Default.htm).

1.3.Network Modifications

DEC annually reviews and modifies the State's air monitoring network based on the needs of the State, available funding, and EPA guidance. Budget cuts and staff shortages have a significant impact on the DEC's ability to conduct planned monitoring activities. Only a few changes to the statewide Air Monitoring Network are planned for the 2012-2013 monitoring year.

With the concurrence of EPA Region 10 and the DEC Air Monitoring Program manager, the Municipality of Anchorage (MOA), as of January 31, 2011, discontinued operation of FRM PM_{10} samplers at their Tudor Road site (02-020-0044) in Anchorage and at their Parkgate site (02-020-1004) in Eagle River. MOA continues to operate FEM PM_{10} monitors at both sites. MOA also continues to operate an FRM PM_{10} sampler collocated with a Coarse-BAM pair ($PM_{2.5}$and PM_{10}), at their Garden site (02-020-0018) in Anchorage. DEC, the Primary Quality Assurance Organization for the Municipality of Anchorage, continues to operate both primary and collocated PM_{10} FRM samples at their air monitoring site in Juneau (02-110-0004).

The particulate monitoring system at the Butte site in the Mat-Su Valley was modified in late 2011 by installing a new Coarse-BAM pair of MetOne BAM 1020X monitors to measure PM_{10} and $PM_{2.5}$. As of January 1, 2012, the new BAM $PM_{2.5}$ monitor now serve as the primary monitors for EPA's Air Quality System (AQS) database for this SLAMS site. The site retained two Partisol samplers to collect $PM_{2.5}$ and PM_{10} FRM data for correlation purposes.

The Fairbanks North Star Borough will discontinue monitoring activities at the TAC (Peger Road) site for the winter of 2012-2013. Moving the monitoring equipment to another location is under consideration.

After collecting data for more than a year, the Seward PM_{10} monitoring program will conclude at the end of May 2012. The data are to be finalized and a report issued this summer.

The Municipality of Anchorage anticipates concluding the year of monitoring for TSP-Lead at the Merrill Field Airport in December 2012. The data will be finalized and a report issued by April 2013.

MOA is considering discontinuing ozone monitoring at the Garden Site after the 2012 ozone sampling season and will prepare a waiver request document in cooperation with the DEC.

Alaska's 2013 Air Monitoring Network Plan

Chapter 2
Anchorage

Air Quality Division

Air Monitoring
&
Quality Assurance
Program

619 E. Ship Creek Ave. #249
Anchorage, AK 99501

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

www.state.ak.us/dec/

Table of Contents

List of Figures

List of Tables

2 ANCHORAGE MONITORING SITE DESCRIPTIONS

2.1 *General Information*

The Municipality of Anchorage (MOA) has a population[1] of 291,826 making it the largest municipality in Alaska. The MOA encompasses 1,697 square miles of land and 264 square miles of water and is located between the Chugach Mountains to the east, the Knik Inlet to the north, the Cook Inlet to the west, and the Turnagain Arm to the south. The average high and low temperatures in January are 22 ºF / 9 ºF.[2] The average high and low in July are 65 ºF and 52 ºF, respectively. Annual precipitation is 15.9 inches, with 69 inches of snowfall.

Anchorage was first designated non-attainment for Carbon Monoxide (CO) on January 27, 1978. It was designated as a serious non-attainment area on July 13, 1998. In the early 1980s, Anchorage experienced up to 50 exceedances of the NAAQS in a single year. However, with improvements in the motor vehicle emission controls and the implementation of a vehicle inspection and maintenance program, CO concentrations have declined significantly. The last violation of the NAAQS occurred in 1996. The EPA re-designated Anchorage as a maintenance area effective July 23, 2004. Appendix A lists the definitions of each designation.

Eagle River is a suburb of Anchorage located within the Anchorage Municipal Borough, and approximately ten miles northeast of city limits, commonly referred to as the Anchorage bowl. The last time Eagle River violated the PM_{10} NAAQS was in 1988 and it is currently designated as a non-attainment area. The MOA undertook an ambitious paving and road surfacing program in the late1980s that effectively controlled the PM_{10} problem. The MOA has prepared a PM_{10} Maintenance Plan for Eagle River that is currently under review by EPA. If EPA approves this Plan, Eagle River will be re-designated as a maintenance area for PM_{10}. PM_{10} levels in the MOA are occasionally affected by natural events such as volcanoes and wind-blown glacial dust that can lead to exceedances of the PM_{10} NAAQS. When volcanic ash-fall in the MOA is significant, such as that experienced from the eruption of Mt. Spurr in 1992, PM_{10} levels can be elevated for years afterward because of residual ash being continually re-entrained and re-deposited from wind storms. The MOA also experiences elevated PM_{10} along its major roads, especially during spring break-up when winter traction sand and other fine particulate matter deposited on the road is stirred-up by passing traffic. The MOA continues to work with Municipal and State road maintenance officials to reduce PM_{10} concentrations caused by street sweeping.

The MOA air quality program currently operates five air monitoring stations in the municipality. The stations include monitors variously designated as State and Local Air

[1] Population data from http://2010.census.gov/news/releases/operations/cb11-cn83.html .
[2] Temperature data are from Point Campbell located near Cook Inlet. The waters of Cook Inlet have a moderating effect on temperatures, especially in the winter. Winter temperatures can be 20 ºF colder in east Anchorage than they are near the Inlet.

Monitoring Site (SLAMS) and as Special Purpose Monitors (SPM). The MOA SLAMS and SPM monitor designations are described in Table 2-1. Figure 2.1.1 shows the entire Anchorage monitoring network. Appendix B lists siting criteria.

Because the Anchorage–Matanuska/Susitna metropolitan statistical area has a combined population exceeding 350,000, federal regulations require at least one SLAMS ozone (O_3) monitoring station. In April 2010, Anchorage began ozone monitoring at the Garden site in east Anchorage and at the Parkgate site in Eagle River. The Parkgate site is located approximately 15 km (9.5 miles) to the northeast, downwind of the Anchorage bowl where the majority of the population in the area resides.[3] The Parkgate site was selected because of the possibility of it being affected by anthropogenic ozone formed from precursors generated in the city core. In 2010, concentrations and diurnal variation of ozone in Eagle River were remarkably similar to that measured in Anchorage. The ozone sampling season for Alaska is from April 1 through October 30.

In April 2011, the ozone monitor at the Parkgate site was relocated to the city of Wasilla located 45 km (28 mi) northeast of Anchorage (outside of Anchorage municipal limits) to further evaluate communities which could be potential receptors of ozone originating in Anchorage. All ozone sites will be listed as SPM until the data can be evaluated for determination of the appropriate SLAMS site.

Table 2-1: SLAMS and SPM sites in the Municipality of Anchorage

$PM_{2.5}$					
Site Name	**Location**	**AQS ID**	**Designation**	**Install Date**	**Scale**
Garden	Anchorage	02-020-0018	SLAMS	Nov, 1998 [1]	neighborhood
DHHS	Anchorage	02-020-0052	SPM	Jan, 2009	middle
Parkgate	Eagle River	02-020-1004	SLAMS	Jan, 2009	neighborhood
PM_{10}					
Site Name	**Location**	**AQS ID**	**Designation**	**Install Date**	**Scale**
Garden	Anchorage	02-020-0018	SLAMS	Nov, 1998	neighborhood
DHHS	Anchorage	02-020-0052	SPM	Jan, 2009	middle
Tudor	Anchorage	02-020-0044	SPM	Oct, 1996 [2]	microscale
Parkgate	Eagle River	02-020-1004	SLAMS	Oct, 1987	neighborhood
CO					
Site Name	**Location**	**AQS ID**	**Designation**	**Install Date**	**Scale**
Garden	Anchorage	02-020-0018	SLAMS	Jan, 1979	neighborhood
DHHS	Anchorage	02-020-0052	SPM	Sept, 2007	middle
Parkgate	Eagle River	02-020-1004	SLAMS	Dec,2005	neighborhood
Turnagain [3]	Anchorage	02-020-0048	SLAMS	Oct, 1998	neighborhood

[3] The prevailing wind direction is southwest during much of the April through October period when O_3 monitoring is required.

O_3					
Site Name	**Location**	**AQS ID**	**Designation**	**Install Date**	**Scale**
Garden	Anchorage	02-020-0018	SLAMS	April, 2010	neighborhood

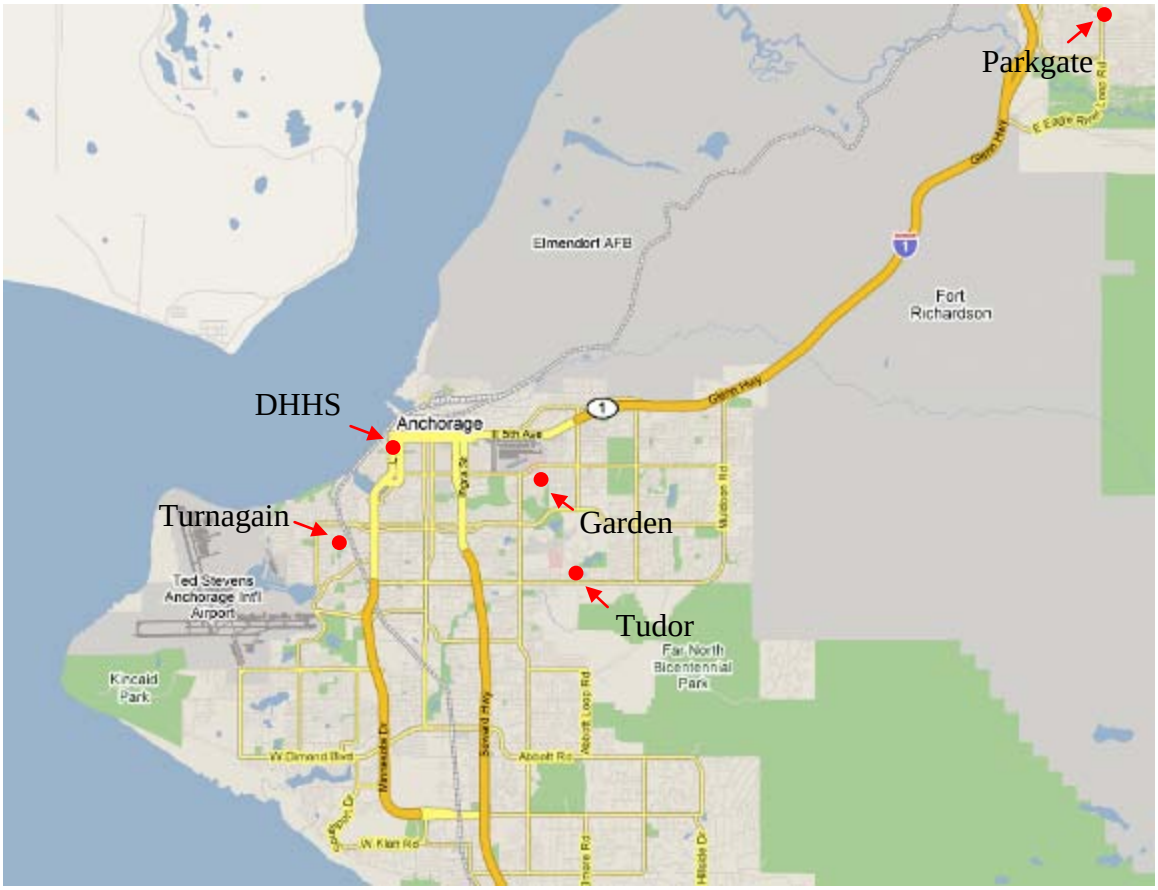


Figure 2.1:1: Map of Anchorage area. Red dots indicate monitoring sites.

2.2 *GARDEN SITE - ANCHORAGE*

3000 East 16th Avenue **AQS ID 02-020-0018**
Parameters: CO, $PM_{2.5}$, PM_{10}, & O_3 **Established: January 1, 1979**

2.2.1 Site Information

The Garden monitoring site is located at the Trinity Christian Reformed Church between 16th Avenue, Garden Street, and Sunrise Drive at latitude 61°12' 21.1" north (61.205861), longitude 149°49' 28.6" west (-149.824602), and 39 meters (128 feet) above sea level. Figure 2.2:1 shows a street map of the central Anchorage area and a satellite image of the area. The site is located in a suburban, residential area. Garden is a neighborhood, population-oriented CO and PM site.

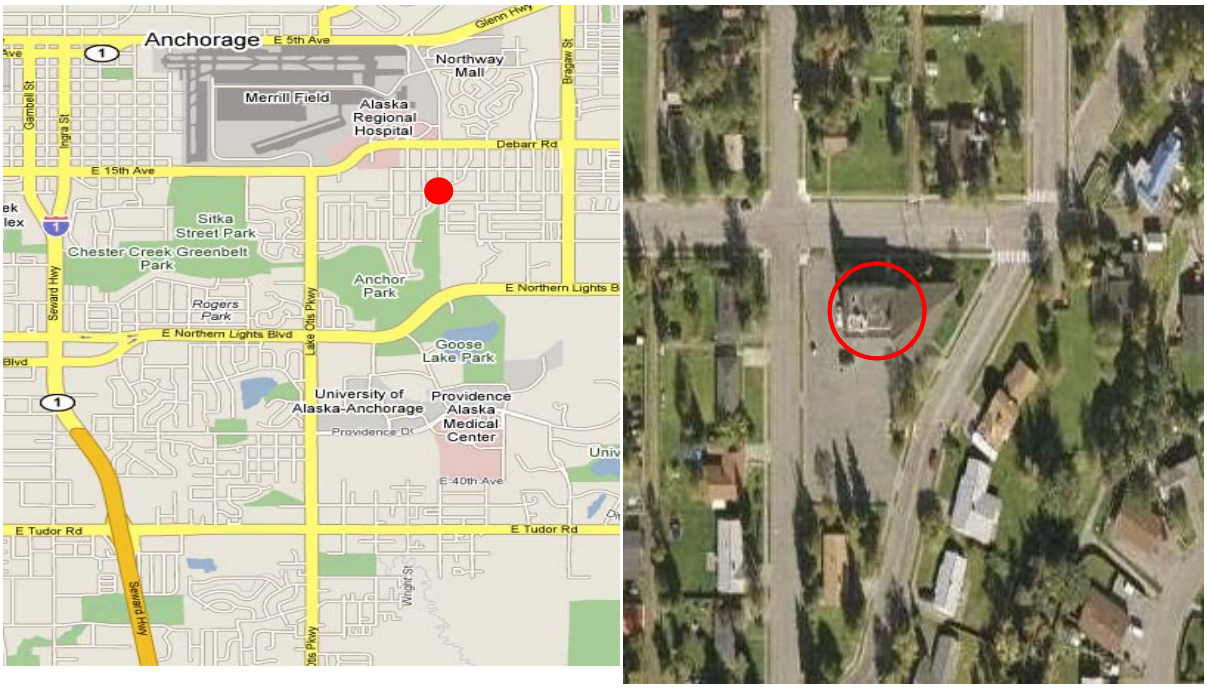


Figure 2.2:1: Street map and satellite image of the Garden monitoring site. The red circles indicate the site's location.

2.2.2 Sources

CO levels are closely associated with automobile activity and combustion from local residential heating systems in the area. Data suggest that cold starts and warm-up idling are especially significant sources of CO. Wood heating may also be a contributor. Warm-up idling and wood heating in the neighborhood are likely significant sources of $PM_{2.5}$. Fine and coarse particulate matter may also be impacted from the combustion from local heating systems as well as dust from the local road system. All roads in the vicinity are paved; the alleys are mostly unpaved, and roadways are sanded for traction during the winter months. Other contributing sources for coarse and fine particulate matter are the Merrill Field Airport (1 km north) and the Alaska Railroad (3 km northwest). Other sources in the Anchorage bowl which could influence this site are the

Municipal Light and Power turbines (90 and 250 megawatt gas turbines – 5 km west), Chugach Electric turbine (48 MW gas turbine – 6 km southeast), Fort Richardson turbine (18 MW gas turbine – 8 km northeast), and Elmendorf Air Force Base turbine (22 MW gas turbine – 6 km northwest). This site, like others in the MOA, is seasonally affected by wind-blown glacial loess, and occasionally impacted by wildfire smoke and ash from volcanic eruptions.

2.2.3 Monitors

The Garden Site is currently equipped with:

- PM_{10} (SLAMS) – One General Metal Works high-volume sampler operates on a 1-in-6 day sampling schedule.
- PM_{10} / $PM_{2.5}$ /PM_{Coarse} (SLAMS) – Dual Met-One Inc., BAM 1020X FEM continuous samplers which include one continuous sampler for PM_{10} and one continuous sampler for $PM_{2.5}$. PM_{Coarse} is calculated by subtracting the $PM_{2.5}$ value from the PM_{10} value. DEC uses the data to calculate an Air Quality Index for forecasting local air quality conditions and for reporting to the EPA Air Quality System (AQS) data base. Two Met One BAM 1020 monitors were installed in June 2008, and were tested for correlation with collocated FRM $PM_{2.5}$ and PM_{10} samplers. MOA has been submitting $PM_{2.5}$ and PM_{10} hourly data from these monitors to AQS since January 2009.
- CO (SLAMS) – A single Thermo Electron 48i-TLE CO monitor operates seasonally (October – March).
- O_3 (SLAMS) – A single Teledyne API 400E O_3 analyzer was installed in March 2010 and is operated seasonally (April through October).

2.2.4 Siting

The particulate matter samplers are located on the roof at the south end of the Trinity Christian Reformed Church. Access to the site is by use of a window from a split level section of the church. This split level area is several meters from the monitoring site. The roof height is six meters (19 feet), and there are no trees in the vicinity that significantly exceed the height of the samplers. The airflow to these samplers is unobstructed. The samplers are approximately 14 meters (32 feet) south of the nearest traffic lane of 16th Avenue.

The CO inlet probe is fixed to the north wall of the church 3 meters (9.5 feet) above the ground approximately 10 meters (32 feet) from the nearest traffic lane of 16th Avenue. Between the inlet and 16th Avenue is one tall spruce tree. The church itself obstructs air flow from the south. The probe inlet for the ozone analyzer is located 1 meter above the roof and is unobstructed.

2.2.5 Traffic

There are six other major roadways within three kilometers with approximate average daily traffic ranging from 14,000 to 47,000 vehicles. All roads are paved; alleys are usually gravel surface.

Figure 2.2:2: Pictures of the Garden Site

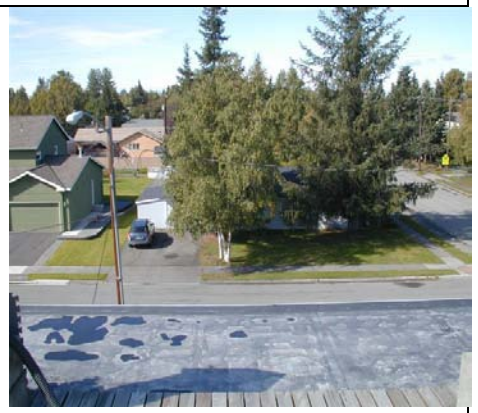
North	East	South	West
			
Views in four directions from the Garden Site			
			
Views in four directions towards the Garden Site			

Figure 2.2:3: View of CO probe at Garden Site. The red circle indicates where the probe is located.

2.3 *TUDOR SITE - ANCHORAGE*

3335 East Tudor Road **AQS ID 02-020-0044**
Parameters: PM_{10} **Established: October 12, 1996**

2.3.1 Site Information

The Tudor monitoring site is located at 3335 East Tudor at latitude 61°10' 51.9" north (61.181083), longitude 149°49' 2.6" west (-149.817389), and 50 meters (164 feet) above sea level. Figure 2.3:1 shows a street map of the central Anchorage area and a satellite picture of the area immediately surrounding the Tudor site. The site is located in an urban, commercial location. Tudor is a microscale, source-oriented PM_{10} site.

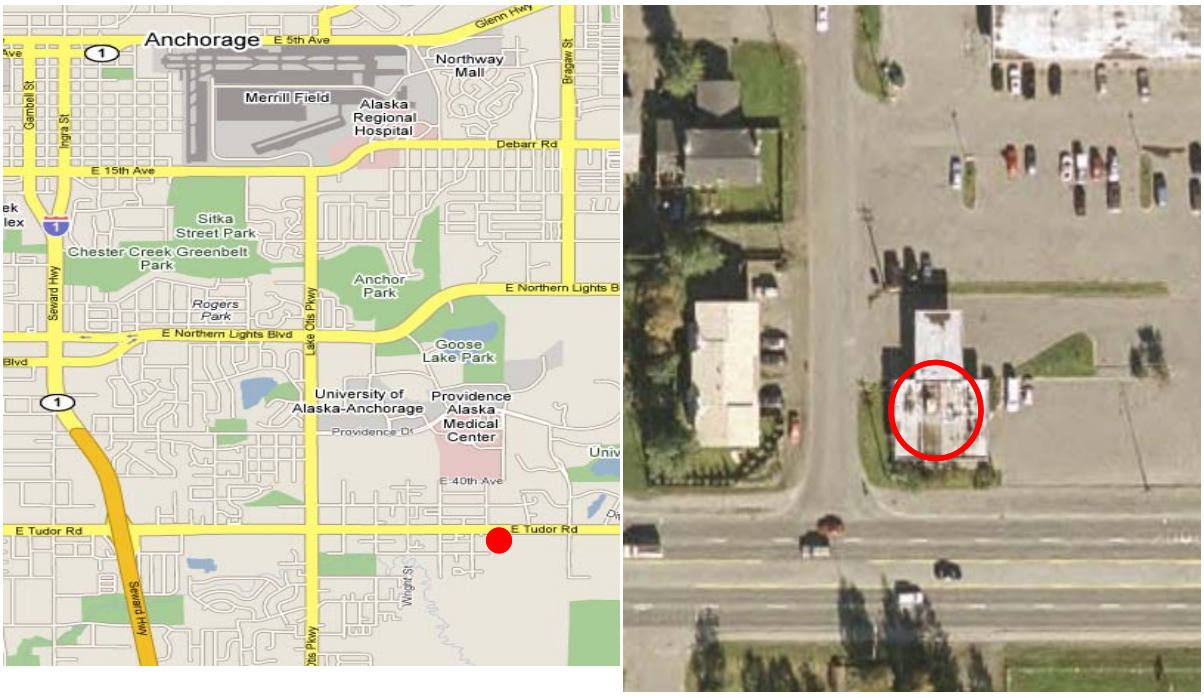


Figure 2.3:1: Street map and satellite image of the Tudor monitoring site. The red circle indicates the sites location.

2.3.2 Sources

The primary source of PM_{10} at this site is from automobile activity. This site is located approximately seven meters from Tudor Road. This section of Tudor Road carries an average daily traffic volume of 41,999 vehicles (2009). Another potential source is the Merrill Field Airport (5 km to the north). The Alaska Railroad passes over 8 km away. This site, like others in Anchorage, is seasonally affected by wind-blown glacial loess, and occasionally affected by wildfire smoke and volcanic eruptions.

2.3.3 Monitors

The Tudor Site is currently equipped with:

- PM_{10} (SPM) – A single Met One BAM1020X FEM monitor was installed in July 2010 to provide continuous PM_{10} measurements for fulfillment of the provision in 40 CFR, Part 50, Appendix. K, Section 3.1 (f) for counting the number of expected PM_{10} exceedances due to periodic sampling. Data from this monitor are also used for calculating the Air Quality Index.

2.3.4 Siting

The BAM 1020 PM_{10} monitor is located on the roof near the southeast edge. The roof height is 3.3 meters (10.5 feet), and there are no other nearby structures. The 6 meter (20 feet) tall mountain ash trees between the sampler and the roadway do not significantly exceed the height of the sampler. The airflow to the sampler is unobstructed. The sampler is approximately 7 meters north of the nearest traffic lane of Tudor Road.

2.3.5 Traffic

Besides Tudor Road, there are three other roadways within one kilometer (Lake Otis Blvd., Elmore Road, and Providence Drive) with traffic volumes exceeding 10,000 per day. There are numerous high volume roadways within a five kilometer radius. All roads are paved; however alleys in the area are usually gravel surface.

Figure 2.3:2 : Pictures of the Tudor Site

North	East	South	West
			
Views in four directions towards the Tudor Site			

2.4 *TURNAGAIN SITE - ANCHORAGE*

3201 Turnagain Street **AQS ID 02-020-0048**
Parameters: CO **Established: October 15, 1998**

2.4.1 Site Information

The Turnagain CO monitoring site is located at the corner of Turnagain Street and 32nd Avenue at latitude 61°11' 29.4"north (61.191514), longitude 149° 56' 5.7" west (-149.934930), and an elevation of 21 meters (69 feet) above sea level. Figure 2.4:1 is street map of the western part of Anchorage and a satellite picture of the Turnagain site and surrounding area. The site is located in a suburban location. Turnagain is a neighborhood scale, population-oriented site.

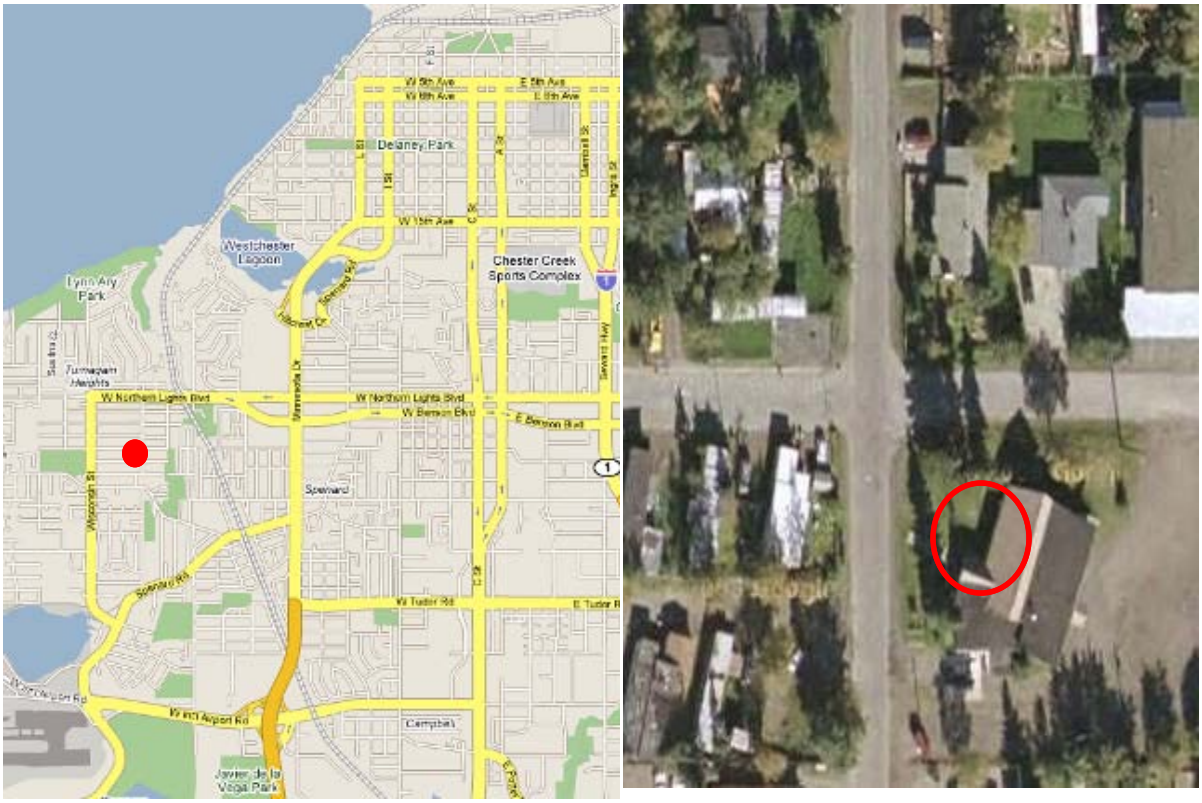


Figure 2.4:1: Street map and satellite image of the Turnagain monitoring site. The red circles indicate the sites location.

2.4.2 Sources

CO is closely associated with automobile activity and combustion from local residential heating systems in the area. Data suggest that cold starts and warm-up idling are an especially significant source of CO. Wood heating may also be a contributor. Less significant sources which might have influence on this site include the Anchorage International Airport and Lake Hood Float Plane Base which are located 2 kilometers

southwest. A Chugach Electric turbine (48 MW gas turbine) is located 4 kilometers southeast. More distant sources include Municipal Light and Power turbines (90 and 250 megawatt gas turbines) and an Elmendorf Air Force Base turbine (22 MW gas turbine).

2.4.3 Monitors

The Turnagain Site is currently equipped with:

- CO (SLAMS) – A single Thermo Electron 48C CO monitor operates seasonally (October through March).

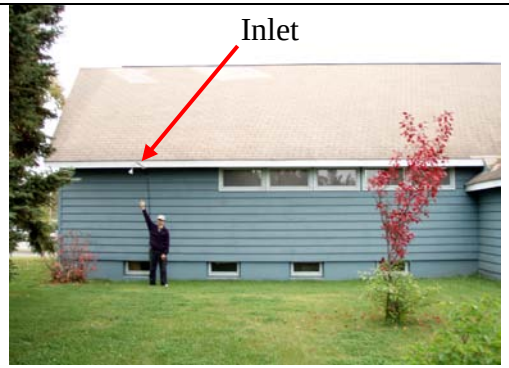
2.4.4 Siting

The monitor is installed in the Unitarian church. The inlet probe is approximately 3.0 meters (9.5 feet) above the ground. The inlet probe is approximately 18.5 meters (58 feet) from the nearest traffic lane of Turnagain Street. Between the inlet and Turnagain Street are several tall white spruce trees. The church itself obstructs air flow from the south and east.

2.4.5 Traffic

There are five major roadways within 3 kilometers having approximate average daily traffic ranging from 15,000 to 45,000 vehicles. There are residential streets and alleys in the vicinity.

Figure 2.4:2: Pictures of the Turnagain Site

North	East	South
		
Views in three directions towards the Turnagain Site		
East	**West**	**South**
		
Views in three directions from the Turnagain Site		

2.5 *DHHS - ANCHORAGE*

727 L Street. **AQS ID 02-020-0052**
Parameters: CO, $PM_{2.5}$, PM_{10} **Established: September 27, 2007**

2.5.1 Site Information

The Department of Health and Human Services (DHHS) monitoring site is located in the employee parking lot for DHHS at latitude 61° 12' 54.1" north (61.215027), longitude 149° 54' 11.2" west (-149.903111), and an elevation of 35 meters (115 feet) above sea level. Figure 2.5:1 shows a street map of the western part of Anchorage and a satellite picture of the DHHS site and surrounding area. The site is located downtown. The Municipality of Anchorage considers the DHHS site to be middle scale, representing a dimensional area up to 0.5 km.

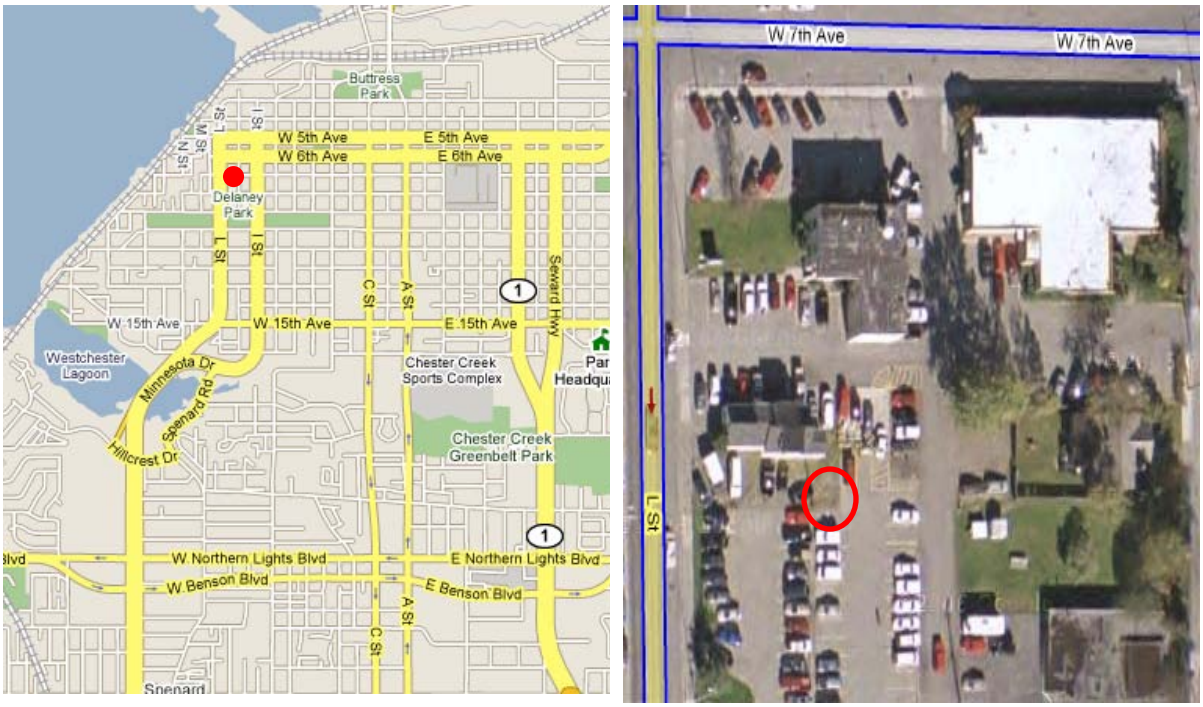


Figure 2.5:1: Street map and satellite image of the DHHS monitoring site. The red circles indicate the sites location.

2.5.2 Sources

This site is located approximately 28 meters east of L Street with an average daily traffic volume of 12,960 (2009). There are numerous streets within a one kilometer radius with daily traffic volumes exceeding 5,000 vehicles. The site is surrounded by parking areas for downtown workers which can be a source of cold start CO emissions especially in the evening when workers leave for the day. The Alaska Railroad passes within 800 meters of this site, and the rail yard, where locomotives commonly idle, is located approximately

two kilometers to the northeast. This site was established by the Municipality of Anchorage in September 2007 to represent typical exposure in the downtown business district.

2.5.3 Monitors

The DHHS Site is equipped with:

- CO (SPM) – A single Thermo Electron 48C CO monitor which operates seasonally (October – March).
- PM_{10} / $PM_{2.5}$ /PM_{Coarse} (SLAMS) – Dual Met-One Inc., BAM 1020X FEM continuous samplers which include one continuous sampler for PM_{10} and one continuous sampler for $PM_{2.5}$. PM_{Coarse} is calculated by subtracting the $PM_{2.5}$ value from the PM_{10} value. DEC uses the data to calculate an Air Quality Index for forecasting local air quality conditions and for reporting to the EPA Air Quality System (AQS) data base. Two Met One BAM1020 monitors were installed in September 2008. MOA has been submitting $PM_{2.5}$ and PM_{10} hourly data from these monitors to AQS since January 2009.

2.5.4 Siting

The monitors are installed in a small shed located at 727 L Street. The CO inlet probe is approximately 3 meters (9.5 feet) above the ground. The inlet probe is approximately 28 meters (85 feet) from L Street, the nearest traffic lane. The probe extends off the northwest corner of the shed, and air flow to the probe is unobstructed for 270 degrees. The PM_{10} and $PM_{2.5}$ inlets each extend 1 meter above the shed roof with 2 meters of separation between them. This site has sufficient separation distance from surrounding buildings to meet EPA siting criteria.

2.5.5 Traffic

There are four major roadways within 1.6 km with average daily traffic counts ranging from 12,000 to 16,000 vehicles.

Figure 2.5:2: Pictures of the DHHS Site

North	East	South	West
			
Views in four directions from the DHHS Site			
			
Views in four directions towards the DHHS Site			

2.6 *PARKGATE, EAGLE RIVER- ANCHORAGE*

11723 Old Glenn Highway **AQS ID 02-020-1004**
Parameters: CO, $PM_{2.5}$, & PM_{10}, **Established: January 1, 1974**

2.6.1 Site Information

The Parkgate PM_{10} monitoring site is located at the Parkgate Business Center building in Eagle River (a bedroom community of Anchorage that lies within the Municipality) at latitude 61° 19' 36.1" north (61.326700), longitude 149° 34' 10.9" west (-149.569707), and an elevation of100 meters (328 feet) above sea level. Figure 2.6:1 is a street map of the western Eagle River area and a satellite picture of the Parkgate site and surrounding area. The site is located in a suburban/commercial use area. The site is classified as neighborhood scale, population-oriented monitoring site.

The Eagle River dust problem goes back to the late 1980s when many of the roads and parking lots were not paved. Eagle River was declared non-attainment for PM_{10}. The MOA, by the early 1990's, had paved or surfaced nearly all the gravel roads in the non-attainment area. No violations of the NAAQS have been recorded in over 20 years. MOA has applied for re-designation of Eagle River to attainment status, and if approved, will be classified as a maintenance area for PM_{10}.

Ozone monitoring was performed at the Parkgate site during the 2010 ozone monitoring season (April through September). Upon review of the seasonal results, the program was discontinued at the Parkgate site and the equipment moved to Wasilla site in the Mat-Su Valley starting with the 2011 monitoring season, and continuing in 2012 and 2013.

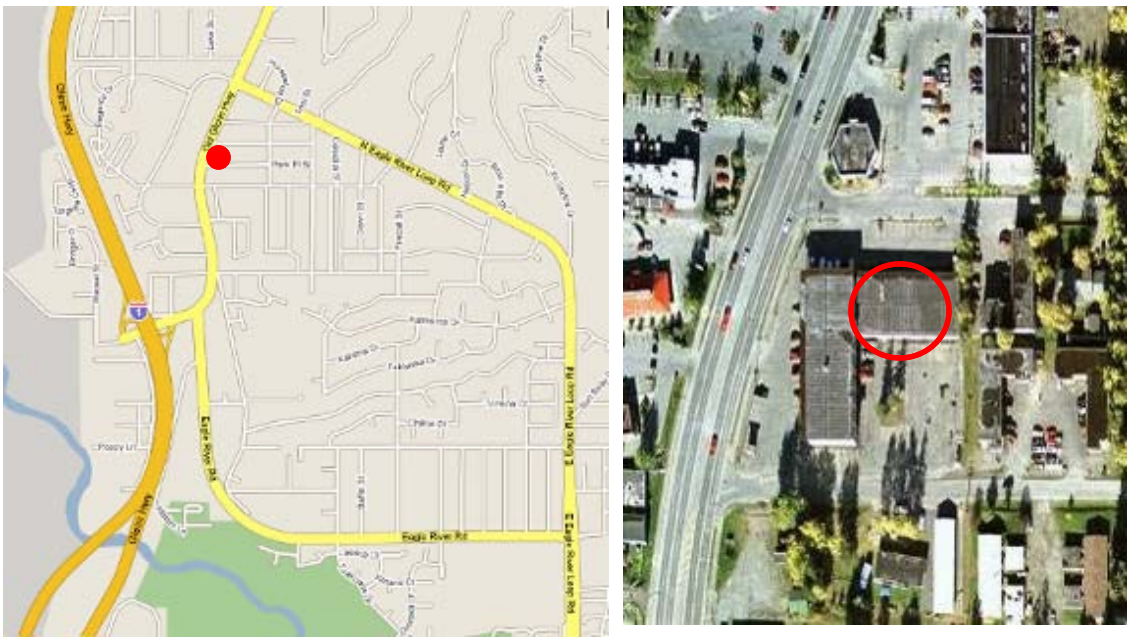


Figure 2.6:1: Street map and satellite image of the Eagle River monitoring site. The red circle indicates the sites location.

2.6.2 Sources

This site is located approximately 44 meters east of the Old Glenn Highway which carries an average daily traffic volume of 17,437 vehicles (2009). Re-entrained roadway dust from this road is a significant source of PM_{10} and the vehicle emissions are a major source of carbon monoxide. There are a number of retail and employee parking areas nearby, which are a source of cold start emissions. The Alaska Railroad passes within 4 kilometers of the site. Like other sites in the MOA, Eagle River is seasonally affected by wind-blown glacial loess, and occasionally affected by wildfire smoke and volcanic eruptions.

2.6.3 Monitors

The Eagle River Site is currently equipped with:

- CO (SLAMS) – A single Thermo Electron 48C CO monitor is operated seasonally (October – March).
- PM_{10} / $PM_{2.5}$ /PM_{Coarse} (SLAMS) – Dual Met-One Inc., BAM 1020X FEM continuous samplers which include one continuous sampler for PM_{10} and one continuous sampler for $PM_{2.5}$. PM_{Coarse} is calculated by subtracting the $PM_{2.5}$ value from the PM_{10} value. DEC uses the data to calculate an Air Quality Index for forecasting local air quality conditions and for reporting to the EPA Air Quality System (AQS) data base. Two Met One BAM 1020 monitors were installed in October 2008 and were tested for correlation with a collocated FRM PM_{10} sampler. MOA has been submitting $PM_{2.5}$ and PM_{10} hourly data from these monitors to AQS since Jan 2009.

2.6.4 Siting

The particulate monitors are located on the roof of the one-story Parkgate Business Center. The roof height is 5 meters (16 feet). There is another section of the building 10 meters (30 feet) to the west that is two stories tall (4 meters above the first story roof height). No trees in the vicinity significantly exceed the height of the samplers. The airflow to these samplers is unobstructed. The samplers are approximately 44 meters east of the nearest traffic lane of the Old Glenn Highway and 23 meters (73 feet) south of Easy Street.

The CO inlet probe is approximately 3 meters (9.5 feet) above the ground and is attached to the east side of the building. The CO probe inlet is approximately 42 meters east of the nearest traffic lane of the Old Glenn Highway and 23 meters (73 feet) south of Easy Street. Airflow to the probe inlet is unobstructed from the north, south, and east. The Parkgate building itself obstructs air flow to the CO probe inlet from the west.

2.6.5 Traffic

There are two major roadways within 3 kilometers with average traffic counts ranging from 13,500 to 29,550 vehicles per day. There are typical residential and commercial streets and alleys in the vicinity. All roads are paved and alleys are gravel surface.

Figure 2.6:2: Pictures of the Parkgate Site

North	East	South	West
			
Views in four directions Towards the Parkgate Site			

Alaska's 2013 Air Monitoring Network Plan

Chapter 3

Fairbanks North Star Borough

Air Quality Division

Air Monitoring
&
Quality Assurance
Program

619 E. Ship Creek Ave. #249
Anchorage, AK 99501

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

www.state.ak.us/dec/

Table of Contents

List of Figures

List of Tables

3 FAIRBANKS NORTH STAR BOROUGH MONITORING SITE DESCRIPTIONS

3.1 *General Information*

Fairbanks, population[1] 31,535, is the second largest city in Alaska and is located within the Fairbanks North Star Borough (FNSB) that has a population of 97,581. Fairbanks is situated on the banks of the Chena River in the upper Tanana Valley of Interior Alaska. Interior Alaska experiences seasonal temperature extremes. The average temperatures range from -2°F to -19°F in the winter and from 53°F to 72°F in the summer. Temperatures have been recorded as low as -78°F in mid-winter, and as high as 93°F in summer. Average annual precipitation is 11.3 inches. Ice fog is common during the winter. Fairbanks experiences 21 hours of direct daylight between May 10th and August 2nd each summer, and less than four hours of daylight between November 18th and January 24th each winter.

Fairbanks was designated non-attainment for carbon monoxide (CO) on November 15, 1990. The community developed a rigorous Inspection and Maintenance (I&M) program to reduce tail pipe emissions from automobiles and the EPA required automobile manufacturers to reduce environmental pollution, both of which have helped improve area air quality in the Fairbanks North Star Borough. Not having had any CO exceedances for several years, Fairbanks requested re-designation and was placed in CO maintenance status on July 23, 2004. Appendix A lists the definitions of each designation.

The FNSB Air Program operates and manages six monitoring stations: one State and Local Air Monitoring Site (SLAMS) for CO, one SLAMS site for $PM_{2.5}$, one Speciation Trend Network (STN) site, and three Special Purpose Monitoring (SPM) sites for $PM_{2.5}$. The FNSB SLAMS, STN, and SPM sites are identified below in Table 3-1:1. Appendix B lists siting criteria for each type of monitoring site.

The Fairbanks and North Pole monitoring sites are located within the Northern Alaska Air Quality Control Region and the Fairbanks non-attainment area. Figure 3-1:1 is a map showing the entire Fairbanks and North Pole area. The red dots indicate the locations of the six monitoring sites. Fairbanks is bordered by hills to the north and west, with the flats opening up to the south and east.

[1] Population data obtained from 2010 US Census (April 1, 2011).

Table 3.1:1 SLAMS and SPM sites in the Fairbanks North Star Borough

$PM_{2.5}$					
Site Name	**Location**	**AQS ID**	**Designation**	**Install Date**	**Scale**
State Office Building	Fairbanks	02-090-0010	SLAMS/STN	Oct, 1998	neighborhood
North Pole Elementary	North Pole	02-090-0033	SPM	Nov, 2008	neighborhood
NCore	Fairbanks	02-090-0034	SPM	Oct, 2009	neighborhood
North Pole Fire	North Pole	not available	SPM	Mar, 2012	neighborhood
CO					
Site Name	**Location**	**AQS ID**	**Designation**	**Install Date**	**Scale**
Old Post Office	Fairbanks	02-090-0002	SLAMS	Jan, 1972	micro

Pole Elementary

<u>Figure 3.1:1</u> Map of the Fairbanks and North Pole Area. Red dots indicate the locations of the monitoring sites.

3.2 *OLD POST OFFICE SITE - FAIRBANKS*

250 Cushman Street **AQS ID 02-090-0002**
Parameters: CO **Established: January 1, 1972**

3.2.1 Site Information

The site is located in the Old Post Office building at 250 Cushman Street at latitude 64° 50' 43" north (64.845278), longitude 147° 43' 16" west (-147.721111), and elevation of 140 meters (460 feet) above sea level. Figure 3.2:1 shows a street map of downtown Fairbanks and satellite image of the area. The site is located in the middle of the central business district. The Old Post Office is a micro-scale, population-oriented site located in downtown Fairbanks.

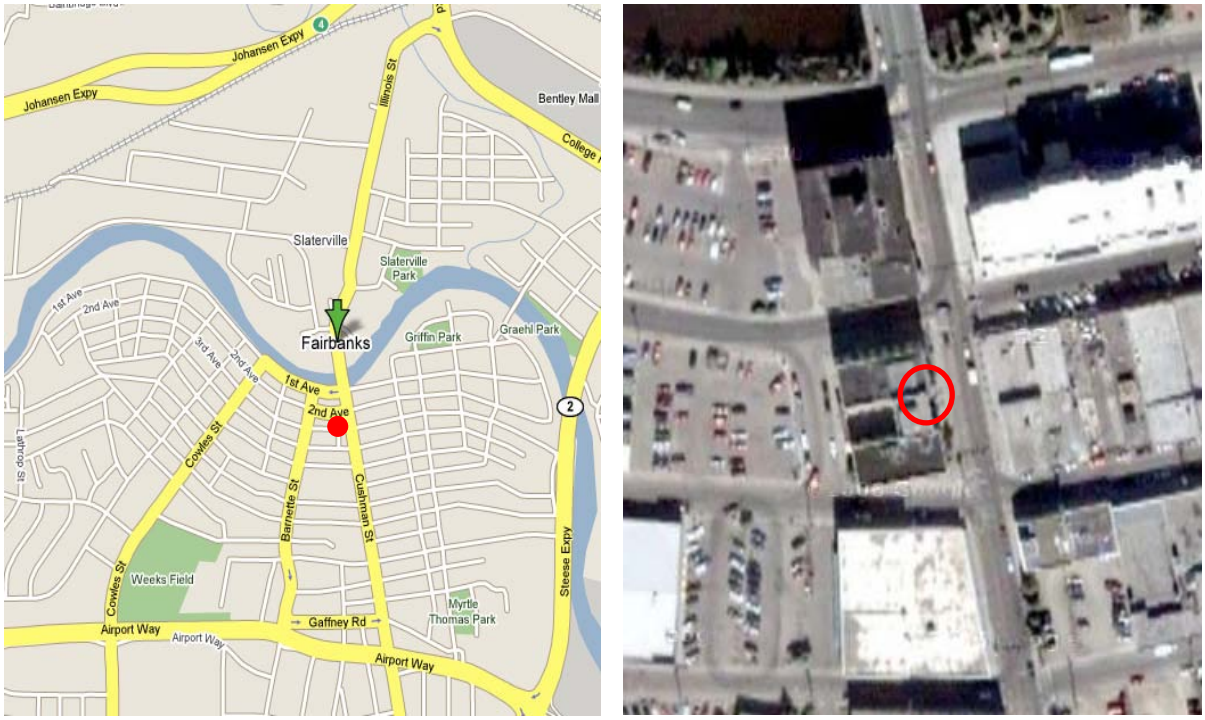


Figure 3.2:1 Map and satellite image of the Old Post Office monitoring site. The red circles indicate the site location.

3.2.2 Sources

The dominant source of CO emissions for this site is automobile exhaust. Within 200 meters of the site, land use is predominantly business (generally medical practices and small offices) with some small single family dwellings. Many older downtown houses have chimneys and may be using woodstoves in the winter for supplemental heat. The Alaska Railroad industrial area (north) and the Aurora Energy coal-fired power plant (west) are both located within one mile of the site. Coal-fired power plants operated by UAF (to the west) and Fort Wainwright Army Post (to the east) are located within five miles. Fairbanks is regularly impacted by wildland fire smoke in the summer months.

3.2.3 Monitors

The Old Post Office site is currently equipped with:

- CO (SLAMS) – A single Thermo Electron 48C CO monitor operates seasonally (October through March) with an inlet approximately 3 meters above the ground.

3.2.4 Siting

The Old Post Office is located between 2nd and 3rd Avenues on the west side of Cushman Street. The probe passes through the eastern exterior wall 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. There are no parking lots in the vicinity of the probe, but there is parallel parking on both 2nd and 3rd Avenues.

3.2.5 Traffic

This site is located at one of the busiest intersections in downtown Fairbanks. Traffic within one mile of the site shows annual average daily traffic counts ranging from 1,013 to 9,227 vehicles. The nearest traffic count site shown on the Department of Transport 2009 Traffic Map is on Cushman between 1st and 2nd Avenues with an annual average daily traffic count of 8,309 vehicles.[2]

[2] State Department of Transportation and Public Facilities, 2009 traffic maps,

Figure 3.2:3 Pictures of the Old Post Office Site

North	East	South
		
Views in three cardinal directions from the Old Post Office Site		
North	**South**	**West**
		
Views in three cardinal directions toward the Old Post Office Site		

3.3 *STATE OFFICE BUILDING - FAIRBANKS*

675 Seventh Avenue **AQS IDs 02-090-0010**
Parameters: $PM_{2.5}$ **Established: January 1, 1972**

3.3.1 Site Information

The site is located on the roof of the State Office Building at 675 7th Avenue. The latitude is 64° 50' 27" north (64.840833), longitude is 147° 43' 23" west (-147.723056), and elevation is140 meters (460 feet) above sea level. Figure 3.3:1 shows a street map of the downtown Fairbanks area and satellite image of the area. The site is located in the middle of the central business district. This is a neighborhood-scale, population-oriented $PM_{2.5}$ site.

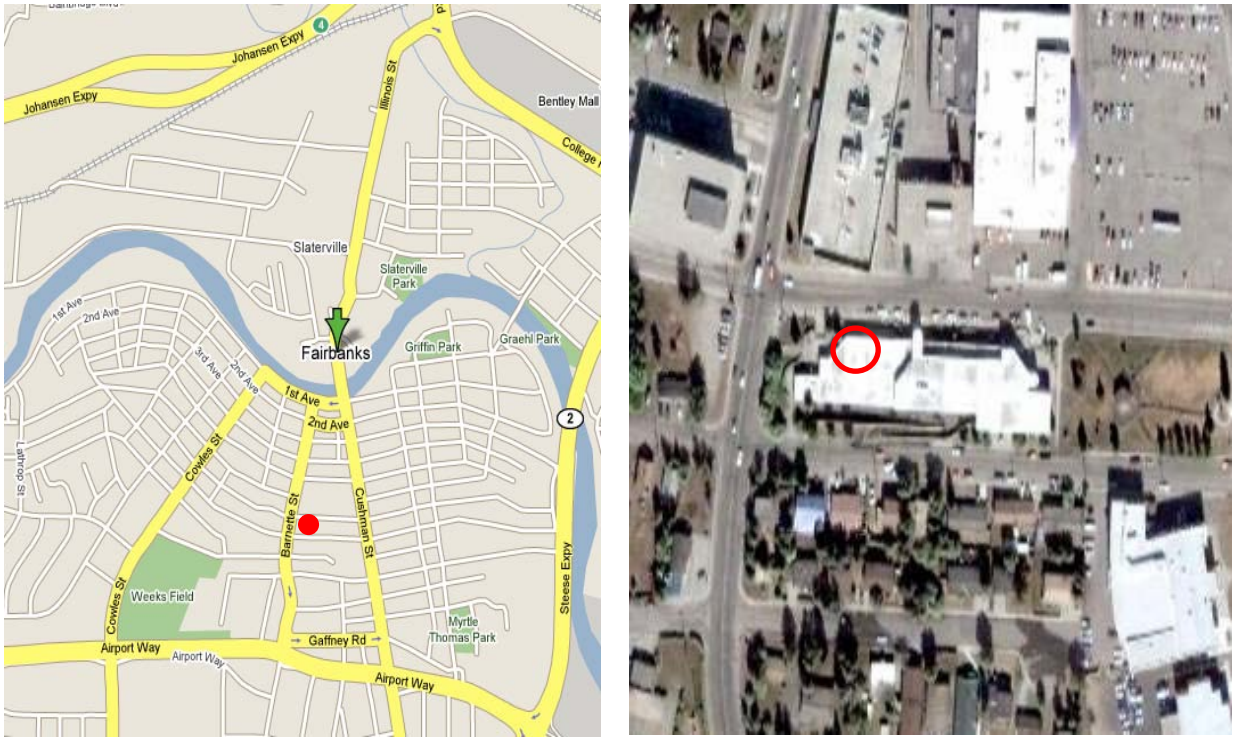


Figure 3.3:1 Map and satellite image of the State Office Building. The red dot and circle indicate the site location.

3.3.2 Sources

The dominant source of $PM_{2.5}$ for this site changes from season to season. During the long winter months the primary sources of $PM_{2.5}$are home heating, vehicle exhaust, and wood smoke. During the summer months, the main source is wildland fire smoke.

3.3.3 Monitors

The State Office Building site is currently equipped with:

- $PM_{2.5}$ (SLAMS) – Two Thermo Electron (formerly Rupprecht & Patashnick) Partisol 2000 samplers. One sampler runs on a 1-in-3 day sampling schedule with the second operating as a collocated monitor once every 6th day,
- $PM_{2.5}$ (SPM) – A single Met-One BAM 1020X FEM was installed to provide information in real time for calculating the Air Quality Index,
- $PM_{2.5}$ (STN) – A single Met-One Super SASS Speciation Monitor. This multi filter sampler is set to sample on a 1-in-3 day sampling schedule,
- $PM_{2.5}$ (STN) – A single URG 3000N Speciation Monitor. This single filter sampler is set to sample on a 1-in-3 day sampling schedule,
- Surface meteorology for wind speed/direction.

Two of the monitors provide speciation data for fine particulate are shown with a STN designation, an acronym for Speciation Trend Network.

3.3.4 Siting

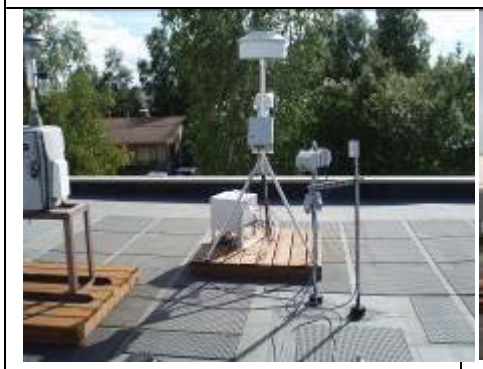
The equipment is located on the west end of the State Office Building's first story roof. The inlets for all samplers are approximately six meters above the ground. There is unrestricted airflow around the samplers. The building has a partial second floor that is approximately 3.75 meters higher than the roof the samplers sit upon. The nearest second floor wall is approximately thirty meters west of the samplers. There is a birch tree approximately ten meters south of the samplers; its height exceeds that of the inlets.

3.3.5 Traffic

This site is located in downtown Fairbanks with numerous roads within one mile of the site. Area roads have daily traffic counts ranging from 1,013 to 9,227 vehicles. The nearest traffic count site on 7th Avenue shows an annual average daily traffic count of 1,248 vehicles and the traffic count site on Barnette Street near 7th Avenue shows an annual average daily traffic count of 3,868 vehicles[3]. There are no parking lots in the vicinity of the probe, but there is parallel street parking on 7th Ave.

[3] State Department of Transportation and Public Facilities, 2009 traffic maps,

Figure 3.3.2: Pictures of the State Office Building

North	East	South	West
			
Views in four directions from the State Office Building			
		**Not available, equipment in close proximity to edge of the roof**	
Views in four directions towards the State Office Building Site			

3.4 *NCORE – FAIRBANKS*

809 Pioneer Road **AQS ID: 02-090-0034**
Parameters: Multi-Pollutant Site **Established: October 29, 2009**
($PM_{10-2.5}$, PM_C, SO_2, NO_Y, NO, NH_3, CO, O_3, and Met)

3.4.1 Site Information

The site is located near the Fairbanks North Star Borough building on Pioneer Road at latitude of 64° 50′ 44.6″ north (64.845690), longitude of 147° 43′ 38.2″ west (-147.727413), and elevation of 472 feet (144 meters) above sea level. Figure 3.4:1 shows a street map and the satellite image of the local area. This is a neighborhood-scale, population-oriented site.

Figure 3.4:1 Map and new shelter of the NCore monitoring site. The red dot indicates the site location.

3.4.2 Sources

The dominant source of $PM_{2.5}$ for this site changes from season to season. The source contribution to winter time $PM_{2.5}$ is still being studied. Wood smoke from home heating is currently considered one of the major sources. During the summer months, the main source is wildland fire smoke.

3.4.3 Monitors

The NCORE monitoring site is currently equipped with:

- $PM_{2.5}$ (SPM) – One Thermo Electron (formerly Rupprecht & Patashnick) Partisol 2000 sampler on a 1-in-3 day alternating sampling schedule.
- PM_{10} / $PM_{2.5}$ /PM_{Coarse} (SPM) – Dual Met-One Inc., BAM 1020X FEM continuous monitors which include one continuous sampler for PM_{10} and one continuous sampler for $PM_{2.5}$. PM_{Coarse} is calculated by subtracting the $PM_{2.5}$ value from the PM_{10} value. DEC uses the

data to calculate an Air Quality Index for forecasting local air quality conditions and for reporting to the EPA Air Quality System (AQS) data base.

- Carbon Monoxide (CO) – Thermo Scientific Model 48i-TLE continuous CO monitor
- Sulfur Dioxide (SO_2) - Thermo Scientific Model 43i-TLE continuous SO_2 monitor
- $PM_{2.5}$ (STN) – A single Met-One Super SASS Speciation Monitor
- Ozone (O_3) - Teledyne Model 403E continuous O_3 monitor
- Ammonia (NH_3) - Thermo Scientific Model 17i continuous NH_3 monitor
- Surface meteorology for wind speed/direction, ambient temperature, and barometric pressure

Data collection began November 2, 2011.

In December 2010, the NCORE monitoring site was expanded with the purchase and installation of a new temperature-controlled shelter. The shelter was designed for operation in sub-Arctic conditions with higher rated insulation and an Arctic entry. Additional trace-level gas monitors are being installed and scheduled to be operational by mid-June 2012. The additional monitors include:

- Nitrogen oxide (NO) - Thermo Scientific Model 42i-TLE continuous NO monitor (delayed due to instrument problems requiring factory repairs, scheduled for start-up in mid June)
- Total reactive nitrogen (NO_y) - Thermo Scientific Model 42i-Y continuous NO_y monitor (delayed due to instrument problems requiring factory repairs, scheduled for start-up in mid-June)

3.4.1 Siting

DEC decided to locate the NCORE multi-pollutant monitoring site in Fairbanks because Fairbanks is dealing with the most significant air quality impacts in the state. Details of the technical site selection process are provided in Appendix G.

The site is located approximately 35 meters north of the Chena River near the Fairbanks North Star Borough Building. There is a small patch of birch trees 6 to10 meter tall that sit approximately 32 meters to the east of the site. The heights of the trees exceed the height of the monitor inlets. There is a 12 meter tall building approximately 75 meters to the southeast of the site and a 7 meter tall building approximately 50 meters to the west.

3.4.2 Traffic

This site is located in downtown Fairbanks with numerous roads within one mile of the site. The downtown Fairbanks area has annual average daily traffic counts ranging from 1,031 to 9,227 vehicles with the closest counting site on First Avenue (directly across the river) at 3,559 vehicles[4]. There are parking lots in the vicinity of both adjacent buildings.

[4] State Department of Transportation and Public Facilities, 2009 traffic maps

Figure 3.4:2 Pictures of the NCore monitoring site.

North	East	South	West
			
Views in four directions from the NCore site			
			
Views in four directions towards the NCore site			

3.5 *NORTH POLE ELEMENTARY SITE*

250 Snowman Lane **AQS ID: 02-090-0033**
Parameters: $PM_{2.5}$, WS/WD, Temp, Chemical Speciation, **Established: Dec. 20, 2008**
Black Carbon

3.5.1 Site Information

The site is located at the North Pole Elementary School on the east side of the parking lot at a latitude of 64° 45' 8.41" north (64.752336), longitude of 147° 20' 49.95" west (-147.347208), and elevation of 146 meters (479 feet) above sea level. Figure 4.8:1 shows a street map of the local area. This is a neighborhood-scale, population-oriented site.

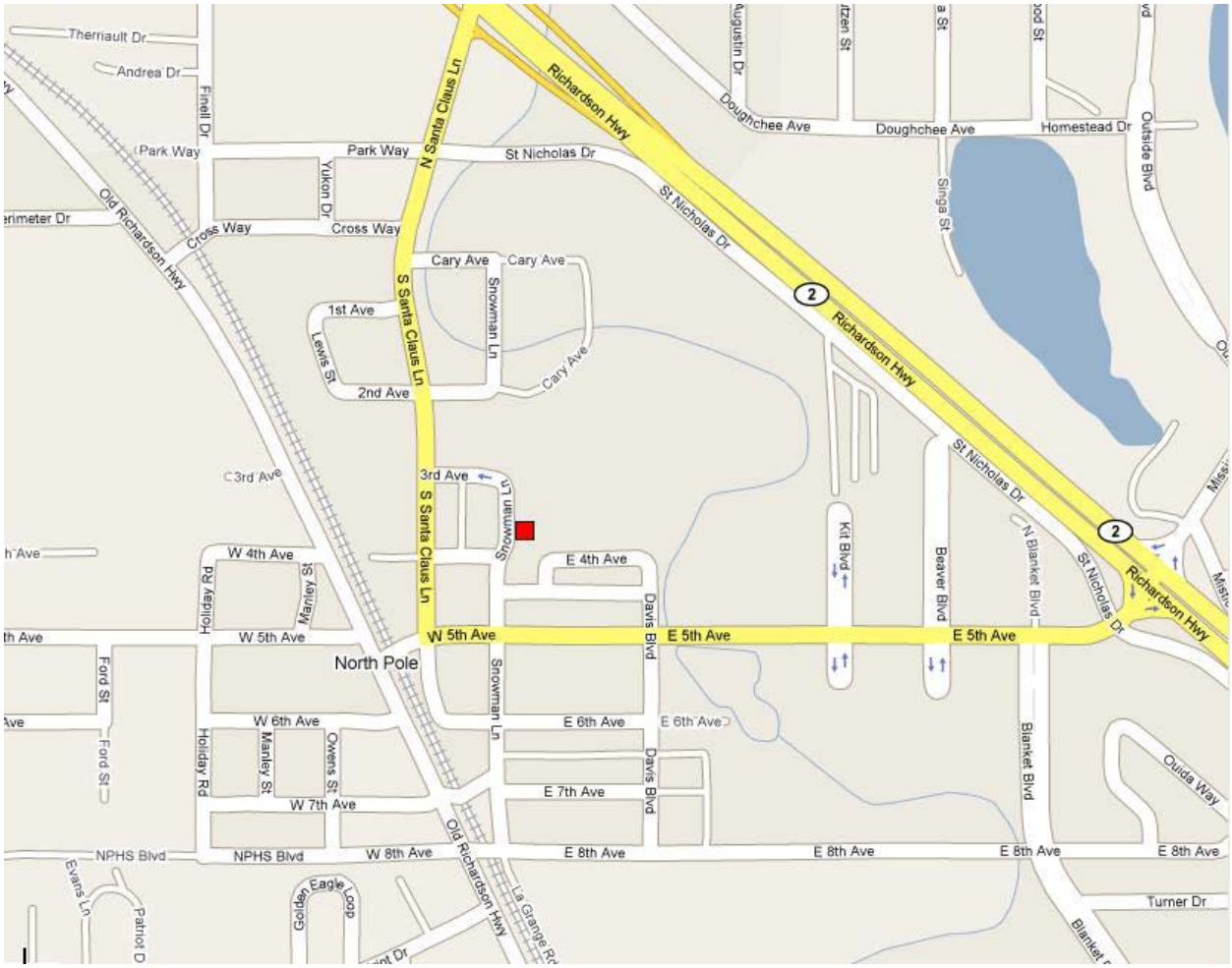


Figure 3.6:1 Map of the North Pole Elementary monitoring site. The red square indicates site location.

3.5.2 Sources

The dominant source of $PM_{2.5}$ for this site changes from season to season. The source contribution to winter time $PM_{2.5}$ is still being studied. Wood smoke from home heating is currently considered one of the major sources. During the summer months, the main source is wildland fire smoke. The goals of the FNSB Winter Monitoring Project conducted during the winters of 2008-09, 2009-10, and 2010-11 are to evaluate wintertime pollutant characteristics and develop a strategy to reduce the concentration in North Pole.

3.5.3 Monitors

The North Pole Elementary site is currently equipped with:

- $PM_{2.5}$ (SPM) – One Thermo Electron (formerly Rupprecht & Patashnick) Partisol 2000 sampler on a 1-in-3 day alternating sampling schedule.
- $PM_{2.5}$ (SPM) – A single Met-One BAM 1020X FEM was installed to provide information in real time for calculating the Air Quality Index.
- $PM_{2.5}$ (SPM wintertime only) – A single Met-One Super SASS Speciation Monitor. This multi-filter sampler is set to sample on a 1-in-3 day sampling schedule.
- Wind Speed/Wind Direction/Ambient Temperature - MetOne Sonic Anemometer Model 50.5H and a Met-One BX 592-2 temperature sensor.

3.5.4 Siting

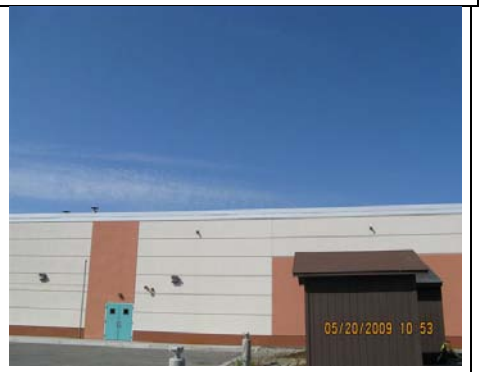
The North Pole Elementary School site is located on the eastside parking lot of North Pole Elementary School on Snowman Lane. The monitoring instrumentation is housed in a self-contained monitoring shelter. The sample inlets extend above the roof of the shelter at approximately 4 meters above ground level.

3.5.5 Traffic

The site is within approximately 1000 feet (300 meters) of the Richardson Highway. Land use within a 400 meter radius of the site is a mixture of commercial, industrial, and residential. Annual average daily traffic estimated along the Richardson Highway through North Pole is 10,875 vehicles. Annual average daily traffic along Snowman Lane is unknown but the nearest traffic site along South Santa Claus Lane averages 4,126 vehicles.[5]

[5] State Department of Transportation and Public Facilities, 2009 traffic maps,

Figure 4.8.2: Pictures of the North Pole Elementary Site

North	East	South	West
			
Views in four directions from the North Pole Elementary Site			
			
Views in four directions towards the North Pole Elementary Site			

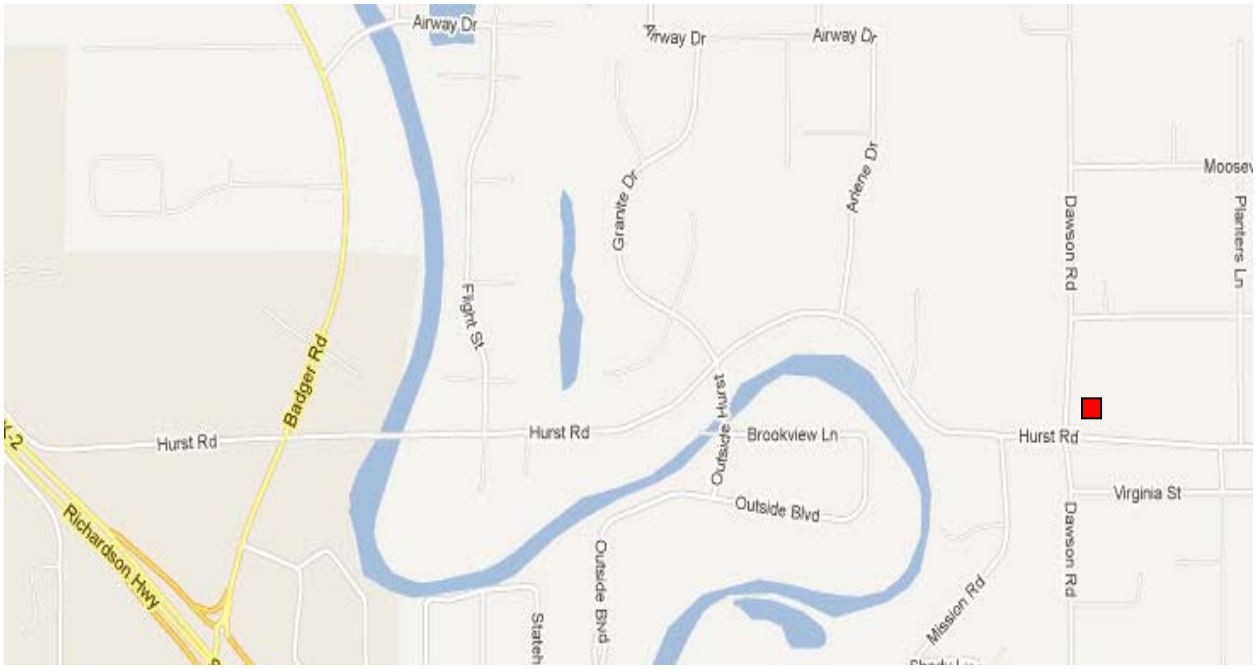
3.6 *NORTH POLE FIRE SITE*

3288 Hurst Rd **AQS ID: n/a**
Parameters: $PM_{2.5}$, WS/WD, Temp, Chemical Speciation, **Black Carbon** **Established: Mar. 1, 2011**

3.6.1 Site Information

The site is located at the North Pole Fire Station #3 on the west side of the Fire Station at a latitude of 64° 45' 46.7" north (64.762973), longitude of -147° 18' 37.0" west (-147.310297), and elevation of 145 meters (475 feet) above sea level. Figure 3.7:1 shows a street map of the local area. This is a neighborhood-scale, population-oriented site. An AQS site code is yet to be established for this location.

Figure 3.7:1 Map of the North Pole Fire #3 monitoring site. The red square indicates site location. (Site map courtesy of Google Maps)



3.6.2 Sources

The dominant source of $PM_{2.5}$ for this site changes from season to season. The source contribution to winter time $PM_{2.5}$ is still being studied. Wood smoke from home heating is currently considered one of the major sources. During the summer months, the main source is wildland fire smoke. The goals of the FNSB Winter Monitoring Project conducted during the winters of 2008-09, 2009-10, and 2010-11 are to evaluate wintertime pollutant characteristics and develop a strategy to reduce the concentration in North Pole. Preliminary studies suggest that this new site might be more representative of the North Pole neighborhood scale pollutant levels.

3.6.3 Monitors

The North Pole Fire site is currently equipped with:

- $PM_{2.5}$ (SPM) – One Thermo Electron (formerly Rupprecht & Patashnick) Partisol 2000 sampler on a 1-in-3 day alternating sampling schedule.
- $PM_{2.5}$ (SPM) – A single Met-One BAM 1020X FEM was installed to provide information in real time for calculating the Air Quality Index
- $PM_{2.5}$ (SPM wintertime only) – A single Met-One Super SASS Speciation Monitor. This multi-filter sampler is set to sample on a 1-in-3 day sampling schedule.
- Wind Speed/Wind Direction/Ambient Temperature - MetOne Sonic Anemometer Model 50.5H and a Met-One BX-592-2 Ambient Temperature Sensor.

3.6.4 Siting

The North Pole Fire Station site is located on the west side of North Pole Fire Station #3 at 3288 Hurst Rd. The monitoring instruments are housed in a self-contained monitoring shelter. The sample inlets extend above the roof of the shelter at approximately 4 meters above ground level.

3.6.5 Traffic

The site is within approximately 75 feet (23 meters) of Hurst Road. It is also 280 feet (85 meters) from the intersection of Hurst Road and Dawson Road. Land use within a 400 meter radius of the site is mixture of residential and light agricultural. Annual average daily traffic estimated along the Richardson Highway through North Pole is 10,875 vehicles. Annual average daily traffic along Hurst Rd is 3730 is vehicles.[6]

[6] State Department of Transportation and Public Facilities, 2010 traffic maps

Figure 4.8.2: Pictures of the North Pole Fire Site

North	East	South	West
			
Views in four directions from the North Pole Fire Site			
			
Views in four directions towards the North Pole Fire Site			

Alaska's 2013 Air Monitoring Network Plan

Chapter 4

Juneau

Air Quality Division

Air Monitoring
&
Quality Assurance
Program

619 E. Ship Creek Ave. #249
Anchorage, AK 99501

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

www.state.ak.us/dec/

Table of Contents

List of Figures

4 JUNEAU MONITORING SITE DESCRIPTION

4.1 *General Information*

The City and Borough of Juneau is located in Southeast Alaska and includes the mainland side of Gastineau Channel and Douglas Island. The City and Borough encompass 2,594 square miles of land and 488 square miles of water. Juneau has a mild, maritime climate with average winter temperatures ranging from 25°F to 35°F and average summer temperatures ranging from 44°F to 65°F. Annual precipitation varies throughout the region with 92 inches in downtown Juneau and 54 inches at the airport ten miles to the north-west. Snowfall averages 101 inches at the airport. The population of the City and Borough of Juneau is 31,275.[1]

Currently there is one particulate matter monitoring site in Juneau which is operated by DEC staff. The AQS ID number for the site is 02-110-0004, Floyd Dryden Middle School (PM_{10} and $PM_{2.5}$). Figure 4.1:2 below indicates the location of the site.

Juneau was designated non-attainment for PM_{10} on November 15, 1990. The primary sources of particulate matter that attributed to non-attainment were road dust and emissions from residential wood stoves. Working with DEC, the community established a pollution control strategy which involved two separate action plans to minimize exceedance of the standard. The first was an aggressive street paving program to minimize the impact of road-dust. The second was to issue air quality notices that would limit use of woodstoves during wintertime meteorological conditions that would increase risk of an exceedance. The control strategy was successful and as a result the monitoring program has not recorded an exceedance of the PM_{10} NAAQS since 1994. DEC has prepared a PM_{10} Maintenance Plan for the Juneau Mendenhall Valley that is currently under review by EPA. If EPA approves this Plan, Juneau will be re-designated as a maintenance area for PM_{10}. Definitions of designations and siting criteria can be found in Appendix A.

In addition to the particulate samplers at Floyd Dryden, DEC operates a RadNet site for the EPA. The RadNet site is part of a nationwide monitoring network which tracks radiation in the nation's air, precipitation, drinking water, and milk. RadNet monitoring sites collect near real-time data for beta and gamma radiation. Equipped with an onboard data acquisition system, the data are transmitted by satellite uplink or cellular service to computers at the EPA National Air and Radiation Laboratory (NAREL). The sites also collect airborne particulate (filter) samples, drinking water samples, and milk samples which are shipped to NAREL to determine the concentration of radionuclides. At the Floyd Dryden site, DEC maintains the radiation detector with the data acquisition/communication system and operates the particulate sampling program.

[1] Population data obtained from 2010 US Census (April 1, 2011).

4.2 *Floyd Dryden Middle School Site - Juneau*

3800 Mendenhall Loop Road **AQS ID 02-110-0004**
Parameters: $PM_{2.5}$, PM_{10} **Established: January 1, 1980**

4.2.1 Site Information

The Juneau site is located on the roof of Floyd Dryden Middle School in the Mendenhall Valley, off Mendenhall Loop Road between North El Camino Street and Spruce Lane. The latitude is 58° 23' 30" north (58.383421), the longitude is 134° 33' 30"west (-134.558333), and the elevation is 18 meters (143 feet) above sea level. Figure 4.2:1 is a satellite image of the site and surrounding area. The site is located in the middle of a residential area and is a neighborhood-scale, population-oriented site.

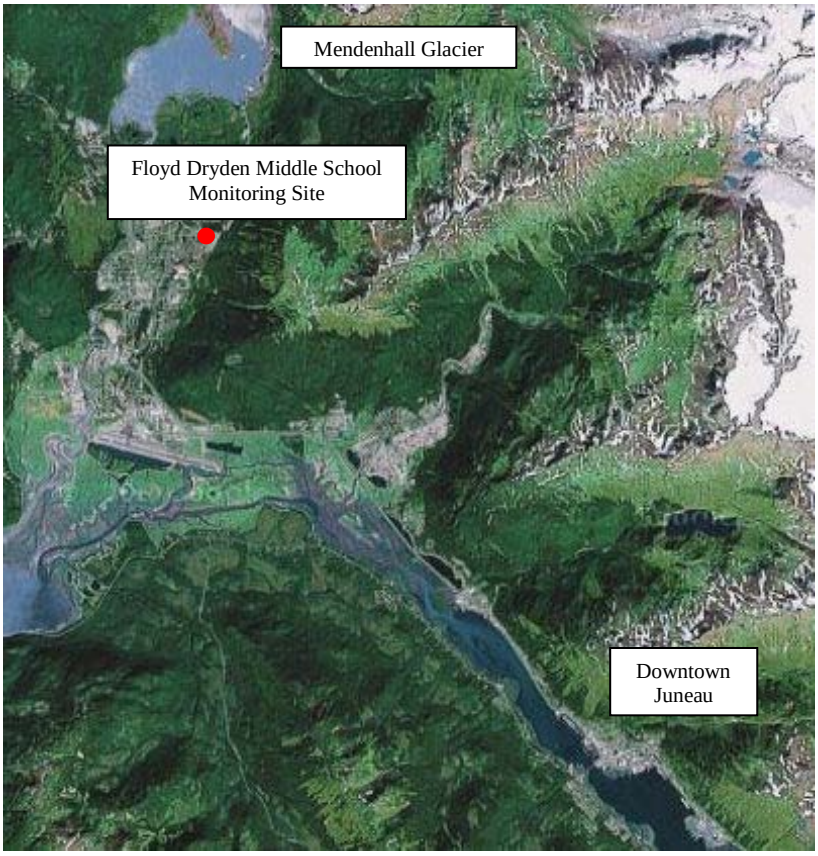


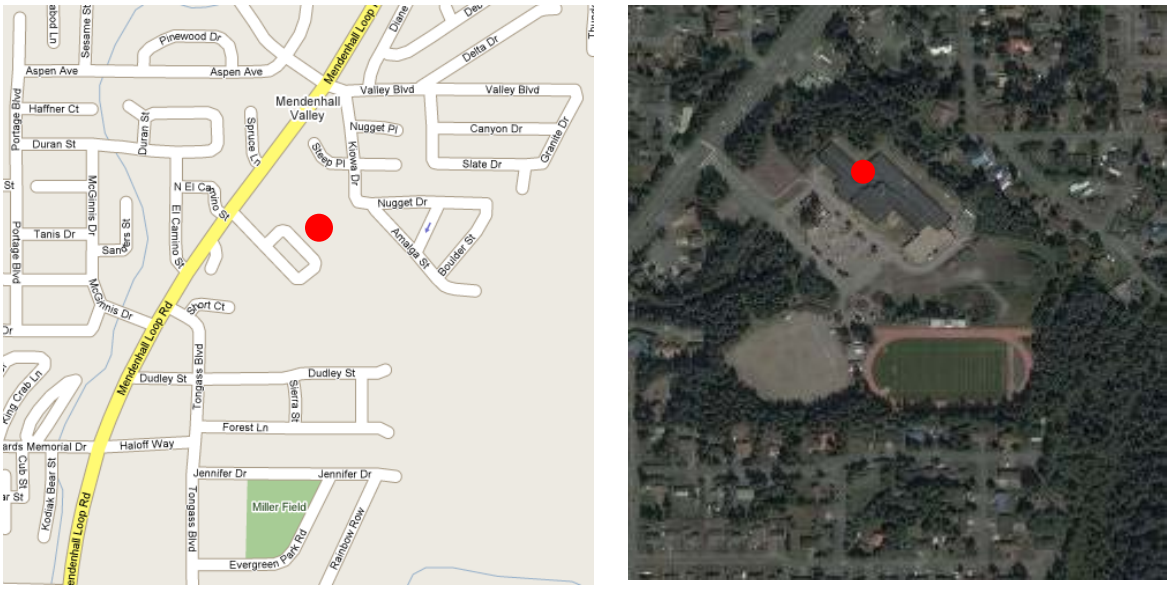
Figure 4.2:1: Satellite Image of Juneau and the Mendenhall Valley. Red circle indicates the monitoring site (Courtesy of Google Maps)

4.2.2 Sources

The Mendenhall Valley is located northwest of downtown Juneau and is separated from the Lemon Creek Valley by the west-east oriented Heintzelman Ridge. With the exception of wildfire smoke from Canada and the Alaskan mainland, pollution sources outside the valley are not expected to impact the monitoring site at Floyd Dryden Middle School. The sources of particulate matter within the Mendenhall Valley include:

residential wood smoke, dust from ball fields, playgrounds, road-dust tracking, automobile exhaust, fugitive dust from construction/land clearing, and smoke from open burning. Figure 4.2:1 presents a street map and satellite image of the neighborhood surrounding the site.

Juneau International Airport (average of 1050 passengers daily) is 3.2 km (2 miles) away at the south end of Mendenhall Valley, and may potentially affect the Floyd Dryden site when winds are from the south. Within 8 km (5 miles) are a gravel pit and the Mendenhall Glacier, both of which may cause crustal material to be re-entrained during dry windy conditions. On occasion during summer months, wildfire smoke, carried by long range transport from North-Western Canada, has been known to impact the Mendenhall Valley.



<u>Figure 4.2:2</u>: Map and satellite image of the Floyd Dryden monitoring site. The red circle indicates the monitoring site. (Courtesy of Google Maps)

4.2.3 <u>Monitors</u>

The Floyd Dryden Site is currently equipped with:

- PM_{10} (SLAM) – Two Thermo Scientific Partisol 2000 FRM samplers running collocated on a 1-in-6 day sampling schedule.
- $PM_{2.5}$ (SLAM) – A single MetOne Instruments BAM 1020 continuous monitor provides information in near real-time for documenting compliance with the NAAQS and calculating the Air Quality Index.
- Radiation – (RadNet) A single RadNet fixed air monitoring station. The RadNet apparatus contains sampling equipment for collection of particulate samples and has an onboard radiation detector and data acquisition system that uploads near real-time radiation data to EPA's NAREL computer system.

4.2.4 Siting

The samplers are installed on the roof of Floyd Dryden Middle School, approximately six meters (19 feet) above the ground. There is a furnace flue approximately 20 meters (64 feet) to the east of the sampler roof location. There is also a nearby dryer vent coming out of the building on the ground level directly below the current sampler location. The school has a penthouse which is approximately four meters above the roof and six meters (19 feet) to the south of the closest monitor.

The samplers are installed approximately 65 meters (207 feet) from the nearest traffic lane. A row of 15 meter (48 feet) tall trees are within 25 meters (80 feet) on the northern side of the site. Airflow is generally uninterrupted with the exception of the trees to the north-northeast. These trees are not considered to be a barrier because most elevated PM concentrations occur during winter inversions and/or during times when the wind is less than five mph. Under these conditions, the particulate concentrations are thought to have homogeneous dispersion. The monitors are on the north side of the school and away from the parking lot.

Photographs of the Floyd Dryden site are shown in Figure 4.2:3. Please note that a third Partisol is shown in the photographs. The third sampler is maintained in standby status in case one of the other samplers malfunctions.

4.2.5 Traffic

The Floyd Dryden site is approximately 200 meters east of Mendenhall Loop Road. The nearest traffic count site on Mendenhall Loop Road shows an average daily traffic count of 14,184 vehicles. This value is the highest average daily count along the Mendenhall Loop Road.[2] All roads in the vicinity of the monitoring site are paved and, in the winter, sanded for traction. The school has a paved parking lot with a lane for school bus traffic.

[2] State Department of Transportation and Public Facilities, 2009 traffic maps,

Figure 4.2:3: Pictures of the Floyd Dryden site.

North	East	South	West
			
Views in four cardinal directions from the Floyd Dryden Site			
			
Views in four cardinal directions toward the Floyd Dryden Site			

Alaska's 2013 Air Monitoring Network Plan

Chapter 5

Matanuska-Susitna Borough

Air Quality Division

Air Monitoring
&
Quality Assurance
Program

619 E. Ship Creek Ave. #249
Anchorage, AK 99501

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

www.state.ak.us/dec/

Table of Contents

List of Tables & Figures

5 MATANUSKA-SUSITNA BOROUGH MONITORING SITE DESCRIPTIONS

5.1 General Information

The Matanuska-Susitna (Mat-Su) Borough has a population[1] of 88,995 and covers 24,682 square miles of land and 578 square miles of water. There are three incorporated cities, several unincorporated communities, and twenty-five recognized community councils within the Mat-Su Borough. Average temperatures in the winter range from 6°F to 14°F; in the summer, 47°F to 67°F. Average annual precipitation is 16.5 inches, with an average 58 inches of snowfall.

The State of Alaska has been conducting long-term air quality monitoring investigations into particulate matter concentrations in the Matanuska–Susitna (Mat-Su) Valley since 1998. Monitoring was initiated in response to staff observations and well-documented accounts of wind-blown dust off the Matanuska and Knik River drainages. Particulate matter (PM) is divided into three fractions depending on the size of the particle: PM_{10}, $PM_{2.5}$, and PM_{Coarse}. Monitoring in the Mat-Su Valley began with sampling for PM_{10} which means coarse particulate that is all particulate matter of a particle size less than or equal to 10 micrometers (µm). PM_{10} is usually associated with crustal materials, which in this case is primarily wind-blown glacial silt from the river basins. $PM_{2.5}$ is referred to fine particulate and is particulate matter equal or less than 2.5 µm and usually associated with smoke. PM_{Coarse} is a recent monitoring development to further differentiate PM_{10} from $PM_{2.5}$ and represents the fraction of particles in the size range between PM_{10} and $PM_{2.5}$.

Currently, there are three particulate monitoring sites located near the population centers in the southern Mat-Su Borough. All three sites are operated by DEC staff.

The designated State & Local Air Monitoring Site (SLAMS) is located at Harrison Court in the unincorporated area of Butte. The other two monitoring sites located in Palmer and Wasilla are special purpose monitoring (SPM) sites. The Palmer site is located between E. Dahlia Avenue and E. Elmwood Avenue near S. Gulkana Street. The Wasilla site is located adjacent to Fire Station 61 near the intersection of W. Swanson and Lucille. Figure 5.1:1 provides the map locations for all three monitoring sites.

[1] Population data obtained from 2010 U.S. Census (April 1, 2011).

Table 5.1:1 SLAMS and SPM sites in the Matanuska-Susitna Borough

$PM_{2.5}$					
Site Name	**Location**	**AQS ID**	**Designation**	**Install Date**	**Scale**
Harrison Court	Butte	02-170-0008	SLAMS	1998	Neighborhood
South Gulkana Street	Palmer	02-170-0012	SPM	2010	Neighborhood
100 W Swanson	Wasilla	02-170-0013	SPM	2010	Neighborhood
PM_{10}					
Site Name	**Location**	**AQS ID**	**Designation**	**Install Date**	**Scale**
Harrison Court	Butte	02-170-0008	SPM	1998	Neighborhood
South Gulkana Street	Palmer	02-170-0012	SPM	2010	Neighborhood
100 W Swanson	Wasilla	02-170-0013	SPM	2010	Neighborhood

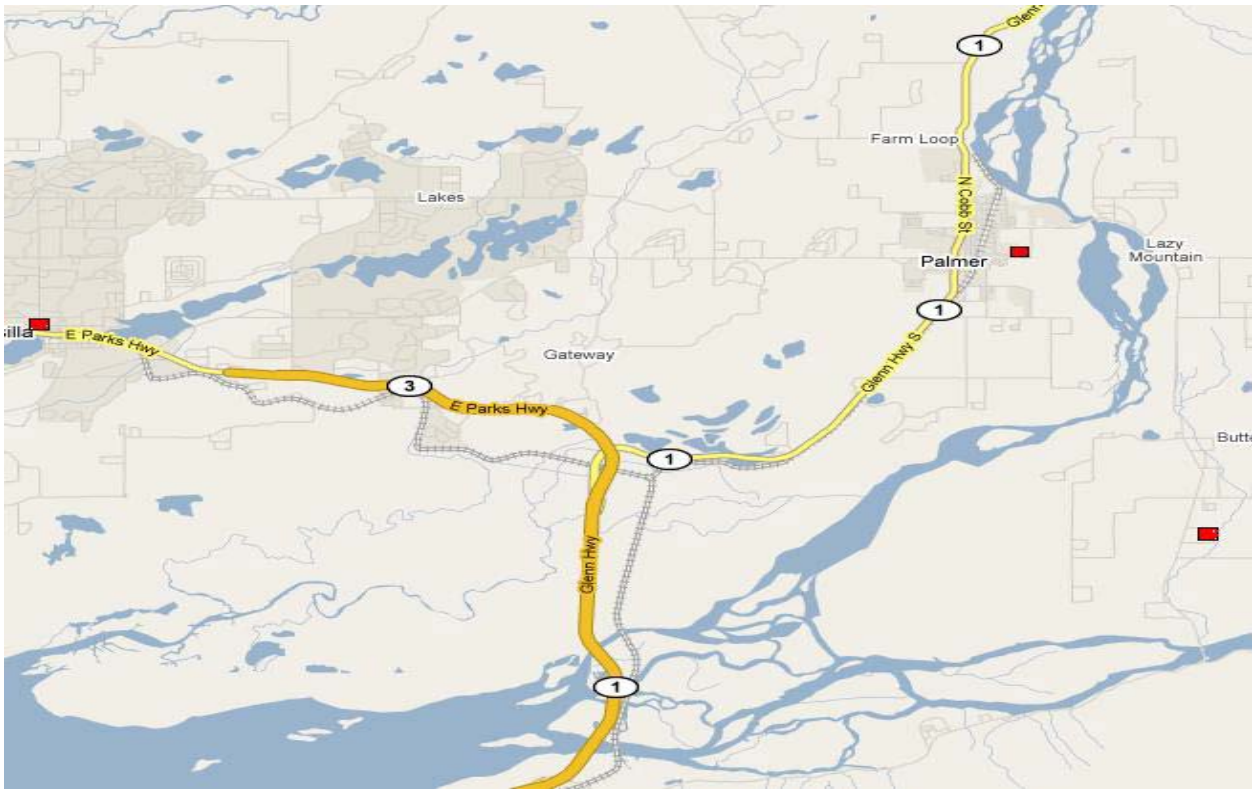


Figure 5.1:1 Map of the Southern Mat-Su Borough area. The red squares indicate the location of the three monitoring sites. (Courtesy of Google Maps)

5.2 Harrison Court (Butte) Site- Matanuska-Susitna Borough

Harrison Court **AQS ID 02-170-0008**
Parameters: PM_{10}, $PM_{2.5}$, PM_{Coarse} **Established: April 11, 1998**

5.2.1 Site Information

This monitoring site is located at the end of the Harrison Court cul-de-sac off of McKechnie Loop. The site coordinates are latitude 61° 32' 2.986" north (61.534163), longitude 149° 1' 53.96" (–149.031655), and elevation of 28 meters (90 feet) above sea level. This site has two manual, FRM samplers (Partisol 2000) and two continuous, FEM monitors (BAM 1020) for $PM_{2.5}$ and PM_{10}. DEC installed the two continuous BAM 1020s in August 2011. DEC changed its primary PM_{10} and $PM_{2.5}$ monitors from the manual Partisol 2000s to the BAM 1020s as of the first quarter of 2012. Figure 5.2:1is a street map of the monitoring site and surrounding area. Harrison Court is a neighborhood PM site.

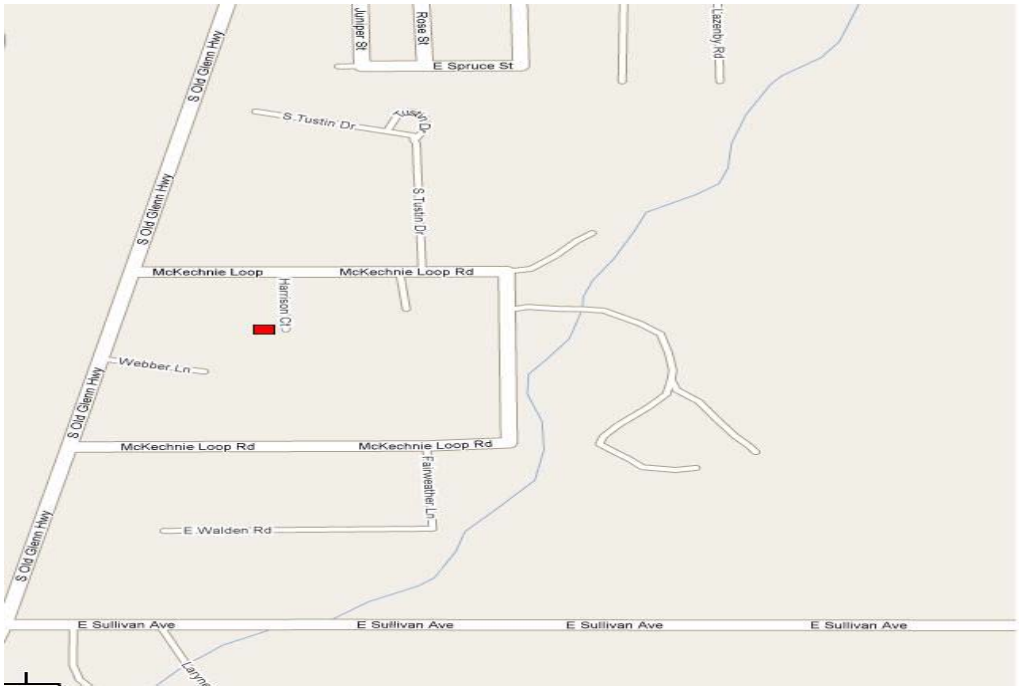


Figure 5.2:1 Map of the Butte area. The red square denotes the Harrison Court site. (Courtesy of Google Maps)

5.2.2 Sources

The major sources of PM_{10} impacting this site are dust from the Knik and Matanuska River basins. Both are glacier fed meandering rivers that deposit glacial silt over wide braided riverbeds and out to the Cook Inlet tidal zone. During times when the gravel bars are exposed (spring through fall), dry windy weather suspends large amounts of silt in the air from the tidal flats and gravel bars. Additionally, within an 8 km (5 miles) diameter area are two small gravel airstrips (activity unknown but expected to be light), a dirt-track motor raceway, farmland, and recreation areas along both river basins. Most land in the area is undeveloped forest. Sources of

$PM_{2.5}$ include residential wood smoke, vehicular exhaust, and forest fires. Typically, several air quality alerts are issued per year during spring and fall months because of wind-blown dust events.

5.2.3 Monitors

The Harrison Court (Butte) Site is currently equipped with:

- $PM_{2.5}$ (SPM) – One Thermo Electron (formerly Rupprecht & Patashnick) Partisol 2000 sampler operated on a 1-in-6 day schedule.
- PM_{10} (SPM) – One Thermo Electron (formerly Rupprecht & Patashnick) Partisol 2000 sampler operated on a 1-in-6 sampling schedule.
- PM_{10} / $PM_{2.5}$ /PM_{Coarse} (SLAMS) – Dual Met-One Inc., BAM 1020X FEM continuous monitors which include one continuous monitor for PM_{10} and one continuous monitor for $PM_{2.5}$. PM_{Coarse} is calculated by subtracting the $PM_{2.5}$ value from the PM_{10} value. DEC uses the data to calculate an Air Quality Index for forecasting local air quality conditions and for reporting to the EPA Air Quality System (AQS) data base.

5.2.4 Siting

The manual samplers are located on the roof of the trailer and the continuous monitors are housed inside the insulated, temperature-controlled trailer. All inlets are at a height of approximately four meters (13 feet) above the ground. There is uninterrupted airflow around the inlets. The monitoring objective of this site is to measure airborne glacial loess raised by high winds on the Knik and Matanuska river beds, as well as measure exposure to fine particulate matter from automobiles and home heating in this rural location. The trailer is on the southwest corner of the unpaved Harrison Court cul-de-sac. Photographs of the Harrison Court site are presented in Figure 5.2:2 (below).

5.2.5 Traffic

There are only three house lots on Harrison Court, and traffic is very light. There are numerous unpaved roadways throughout the area. All main roads are paved. Average daily traffic for the area is 270 vehicles along McKechnie Loop. Annual average daily traffic count along the Old Glenn Highway is 3,004 vehicles.[2]

[2] State Department of Transportation and Public Facilities, 2009 traffic maps

<u>Figure 5.2:2</u> Photographs of the Harrison Court Site

			
From the site looking North	From the site looking East	From the site looking South	From the site looking West
			
Looking toward the site from the North to the South			

5.3 Palmer Site- Matanuska-Susitna Borough

Palmer **AQS ID 02-170-0012**
Parameters: PM_{10}, $PM_{2.5}$ PM_{Coarse} **Established: October 1, 2008**

5.3.1 Site Information

The Palmer monitoring site is located on South Gulkana Street between East Dahlia Avenue and East Elmwood Avenue near the city tennis court and Little League baseball field. The site coordinates are latitude 61° 35.961' north (61.598898), longitude 149°6.217' west (-149.106220). The average elevation for Palmer is 73 meters (239 feet) above mean sea level. The monitoring site is located in the downtown district. The dominant land use within a 400 meter (0.25 mile) radius is residential and commercial buildings with large, open grass-covered areas. Palmer is a neighborhood scale PM site.

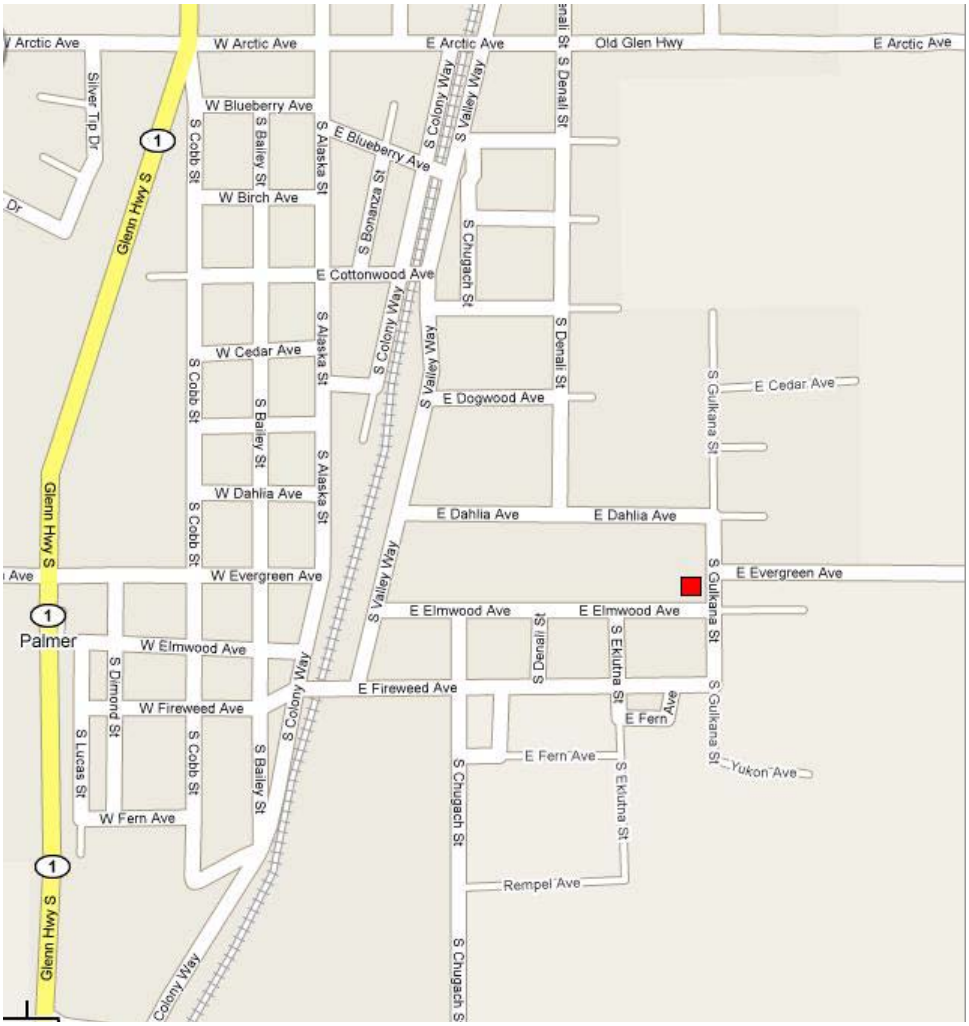


Figure 5.3:1 Map of the City of Palmer. The red square denotes the monitoring site. (Courtesy of Google Maps)

5.3.2 Sources

The major sources of PM_{10} impacting this site are glacial dust from the Knik and Matanuska River basins. Both are glacier fed meandering rivers that deposit glacial silt over wide braided riverbeds and out to the Cook Inlet tidal zone During times when the gravel bars are exposed (spring through fall), dry windy weather suspends large amounts of silt in the air from the tidal flats and gravel bars.. Other local dust sources include road dust from local traffic and fugitive dust from activities in the adjacent ball fields, local farming operations, and recreation areas along the Matanuska River basin. Sources of $PM_{2.5}$ include residential wood smoke, vehicular exhaust, and forest fires. Typically, several air quality alerts are issued per year during spring and fall months because of wind-blown dust events.

5.3.3 Monitors

The Palmer Site is currently equipped with:

PM_{10} / $PM_{2.5}$ /PM_{Coarse} (SLAMS) – Dual Met-One Inc., BAM 1020X FEM continuous monitors which include one continuous monitor for PM_{10} and one continuous monitor for $PM_{2.5}$. PM_{Coarse} is calculated by subtracting the $PM_{2.5}$ value from the PM_{10} value. DEC uses the data to calculate an Air Quality Index for forecasting local air quality conditions and for reporting to the EPA Air Quality System (AQS) data base.

5.3.4 Siting

The continuous PM monitors are housed in an insulated temperature-controlled trailer. All inlets are at a height of approximately four meters (13 feet) above the ground. There is uninterrupted airflow around the inlets. The monitoring objective of this site is to measure the concentration of airborne particulate matter on an urban scale and to evaluate air quality impacts to the community, which has seen major growth over the last decade. Photographs of the Palmer site are presented in Figure 5.3:2.

5.3.5 Traffic

All main roads in the immediate area of the monitoring site are paved. Average daily traffic for the Palmer downtown district ranges from 400 to3,300 vehicles per day. The nearest traffic count site to the monitoring location is 1,390 vehicles per day along E. Dahlia Avenue.[3]

[3]State Department of Transportation and Public Facilities, 2009 traffic maps,

Figure 5.3:2 Photographs of the Palmer Site

North	East	South	West
			
Views in four directions from the Palmer Site			
			
Views from four directions toward the Palmer Site			

5.4 Wasilla Site - Matanuska-Susitna Borough

Wasilla **AQS ID 02-170-0013**
Parameters: PM_{10}, $PM_{2.5}$, PM_{Coarse}, O_3 **Established: October 1, 2008**

5.4.1 Site Information

The Wasilla monitoring site is located in the 100 block of West Swanson Avenue adjacent to Fire Station 61 near the intersection with Lucille Street. The site coordinates are latitude 61° 34.998' north (61.598796), longitude 149° 27.212' west (-149.455255). The average elevation for Wasilla is 104 meters (341 feet) above mean sea level. The monitoring site is located in the downtown district and approximately 200 meters north of the George Parks Highway. The dominant land use is residential and commercial buildings with paved roads, parking lots, and mixed areas of land, both vegetated and graveled. Figure 5.4:1 is a street map of the monitoring site and surrounding area. Wasilla is a neighborhood scale PM site.

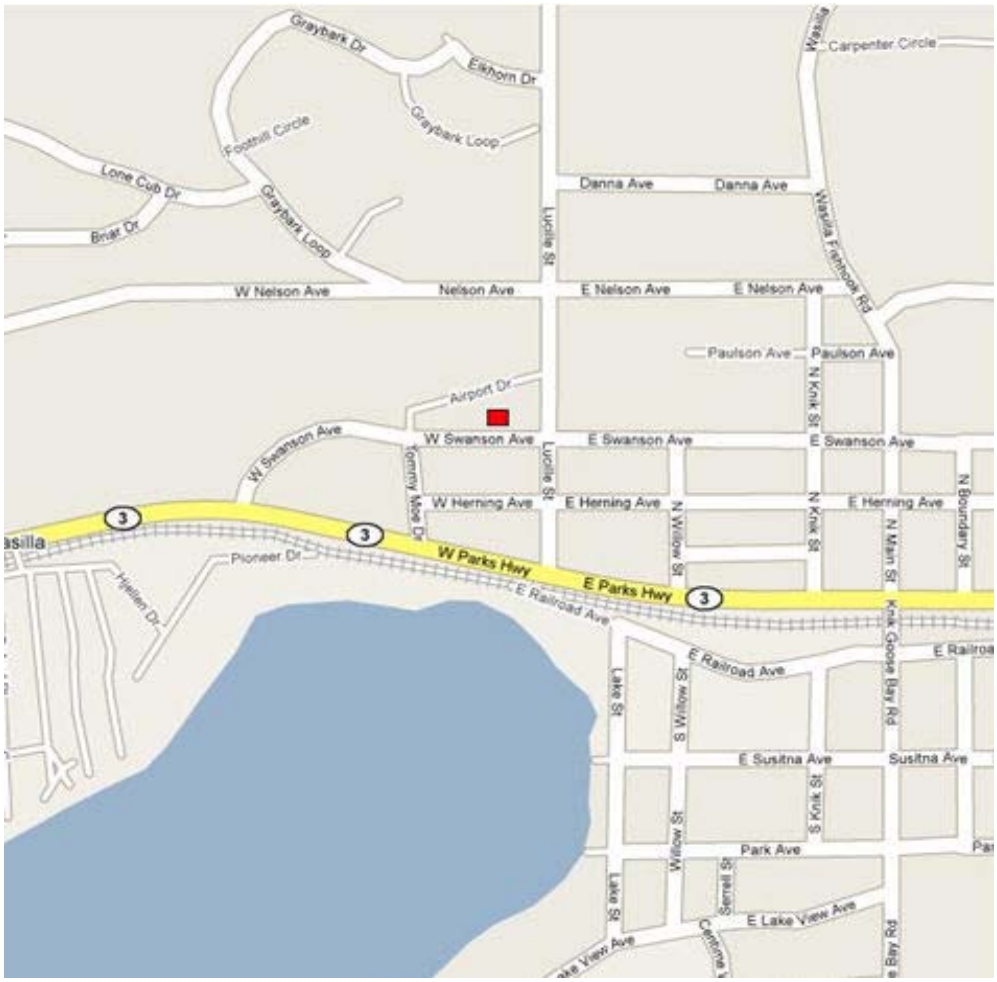


Figure 5.4:1 Map of the City of Wasilla. The red square denotes the monitoring site. (Courtesy of Google Maps)

5.4.2 Sources

The major sources of PM_{10} impacting the Wasilla site are wind-blown dust from unpaved areas, traffic dust and glacial silt from river beds feeding in the northern end of the Cook Inlet. Several air quality alerts are issued per year during spring and fall months because of wind-blown dust events. Sources of $PM_{2.5}$ include residential wood smoke, vehicular exhaust, and forest fires.

5.4.3 Monitors

The Wasilla Site is currently equipped with:

- PM_{10} / $PM_{2.5}$ /PM_{Coarse} (SLAMS) – Dual Met-One Inc., BAM 1020X FEM continuous monitors which include one continuous monitor for PM_{10} and one continuous monitor for $PM_{2.5}$. PM_{Coarse} is calculated by subtracting the $PM_{2.5}$ value from the PM_{10} value. DEC uses the data to calculate an Air Quality Index for forecasting local air quality conditions and for reporting to the EPA Air Quality System (AQS) data base.
- $PM_{2.5}$ (SPM) – A single Thermo Electron (formerly Rupprecht & Patashnick) Partisol 2000 sampler. The manual sampler runs on a 1-in-6 day sampling schedule.
- Ozone (O_3) (SPM) – A single Teledyne API 400E O_3 analyzer was installed March 2011.

5.4.4 Siting

The continuous particulate monitors are housed in an insulated temperature-controlled trailer within a small security fenced area. All inlets are at a height of approximately four meters (13 feet) above the ground. There is uninterrupted airflow around the inlets. The monitoring objective of this site is to measure the concentration of airborne particulate matter on an urban scale and to evaluate air quality impacts to the community, which has seen major growth over the last decade. Photographs of the Wasilla Site are presented in Figure 5.4:2

5.4.5 Traffic

All main roads in immediate area of the monitoring site are paved. Average daily traffic for the area streets is not known. Commuter traffic and summer tourist traffic along the George Parks Highway can be heavy at times with an average daily traffic count of 30,330 vehicles. The annual average daily traffic count at the nearest traffic count along Lucille Street is 7,900 vehicles.[4]

[4] State Department of Transportation and Public Facilities, 2009 traffic maps,

Figure 5.4:2 Photographs of the Wasilla Site

North	East	South	West
			
Views in four directions from the Wasilla Site			
			
Views from four directions toward the Wasilla Site			

Alaska's 2013 Air Monitoring Network Plan

Chapter 6

Kenai Peninsula Borough

Air Quality Division

Air Monitoring
&
Quality Assurance
Program

619 E. Ship Creek Ave. #249
Anchorage, AK 99501

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

www.state.ak.us/dec/

Table of Contents

List of Figures

6 KENAI PENINSULA BOROUGH MONITORING SITE DESCRIPTION

6.1 General information

The Kenai Peninsula Borough has a population[1] of 55,400 and covers 25,600 square miles of land and 9,900 square miles of water. There are six incorporated cities, three unincorporated communities, and thirty-one recognized community councils within the Kenai Peninsula Borough. Average temperatures in the winter range from 14°F to 26°F; in the summer, 52°F to 55°F. Annual precipitation ranges from 18 inches to 66 inches, with 33 inches to 80 inches of snowfall depending on location.

The State of Alaska has been conducting air quality monitoring in the Borough at a site in Soldotna since October 2011. Monitoring was initiated in response to staff observations of dust events and summer wildland fires on the Peninsula. Currently, DEC is monitoring for particulate matter referred to as $PM_{2.5}$ and PM_{10}. $PM_{2.5}$ are fine particles in the size range equal to or less than 2.5 micrometers (µm) usually associated with smoke and other products of combustion. PM_{10} is a slightly larger particle in the size range equal to or less than 10 µm. PM_{10} is produced from the physical breakdown of solid materials. PM_{10} is usually associated with wind-blown dust such as wind-blown glacial silt from a stream bed or traffic along unpaved roads. PM_{Coarse} is a recent monitoring development to further differentiate PM_{10} from $PM_{2.5}$ and represents the fraction of particles in the size range between PM_{10} and $PM_{2.5}$. Currently, there is one particulate monitoring site located in Soldotna operated by DEC.

The Soldotna location is designated as a special purpose monitoring (SPM) site. The Soldotna monitoring site EPA Air Quality System (AQS) ID number is 02-0122-0008.

6.2 Kenai Peninsula Borough Building Site – Soldotna

Soldotna **AQS ID 02-0122-0008**
Parameters: PM_{10}, $PM_{2.5}$, & PM_{Coarse} **Established: October, 2011**

6.2.1 Site information

This monitoring site is located behind the Kenai Peninsula Borough Office at 144 North Binkley Street between the rear parking lot and Shady Lane. Site coordinates are latitude 60° 20’57” North (60.3492°), longitude 150° 59’15” (–150.9877°), at an elevation of 32 meters (105 feet) above sea level. This site has continuous monitors for $PM_{2.5}$ and PM_{10}. Figure 6.1:1 presents a street map of the monitoring site and surrounding area. The dominant land use within a 400 meter diameter area is a mixture of residential housing, a school, the Borough government building, and small business activities.

[1] Population data obtained from 2010 U.S. Census (April 1, 2011).

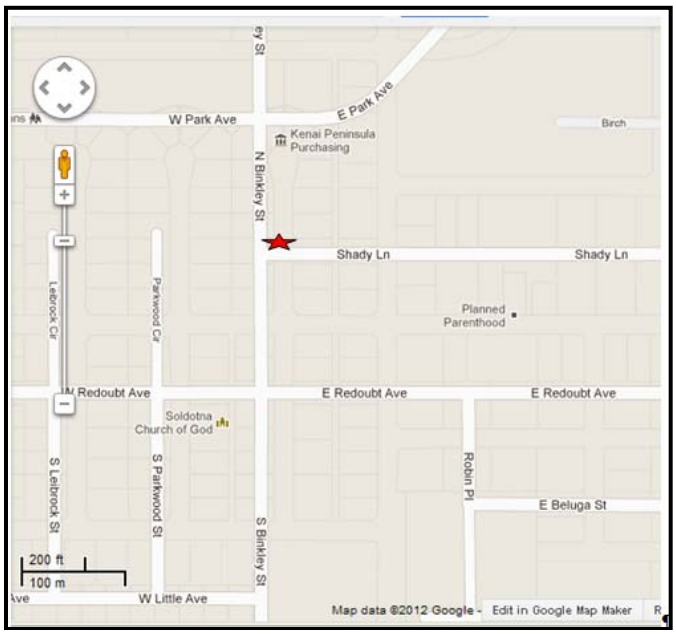


Figure 6.2:1 Map of the Kenai Peninsula Borough monitoring site. The star indicates the location of the site (Courtesy of Google Maps)

6.2.2 Sources

Major sources of PM_{10} matter impacting this site are wind-blown glacial silt from the Kenai River and other stream beds, open un-vegetated ground, and vehicular traffic, especially from unpaved roads. Major sources of $PM_{2.5}$ matter includes wood smoke from residential heating, vehicular exhaust, and especially wildland fires. The Kenai Borough may also be subject to high levels of both PM_{10} and $PM_{2.5}$ resulting from volcanic eruptions.

6.2.3 Monitors

The Soldotna Site is currently equipped with:

- PM_{10} / $PM_{2.5}$ /PM_{Coarse} (SLAMS) – Dual Met-One Inc., BAM 1020X FEM continuous beta attenuation monitors which include one continuous monitor for PM_{10} and one continuous monitor for $PM_{2.5}$. PM_{Coarse} is calculated by subtracting the $PM_{2.5}$ value from the PM_{10} value. DEC uses the data to calculate an Air Quality Index for forecasting local air quality conditions and for reporting to the EPA Air Quality System (AQS) data base.

6.2.4 Siting

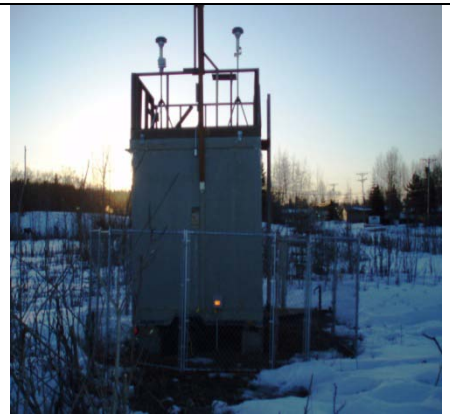
The monitoring objective of this site is to measure the concentration of airborne particulate matter. The continuous monitors are housed inside an insulated, temperature-controlled shelter. All sample inlets extend above the shelter are at a height of approximately four meters (13 feet) above ground level. There are 360 degrees of uninterrupted airflow around the inlets. Photographs of the Soldotna site are presented in Figure 8.2:2 (below).

6.2.5 Traffic

All roads in the area are paved. An average daily traffic at the nearest traffic count site at the intersection of Binkley Street and Redoubt Avenue is 5,320 [2] vehicles. Shady Lane is a side road with lighter traffic than Binkley Street.

[2] Alaska Department of Transportation & Public Facilities, Annual Traffic Volume Report 2009

Figure 6.2:2 Photographs of the Soldotna Site

North	East	South	West
			
			
Views in four directions from Soldotna Site			

Alaska's 2013 Air Monitoring Network Plan

Appendices and Glossary

Air Quality Division

Air Monitoring
&
Quality Assurance
Program

619 E. Ship Creek Ave. #249
Anchorage, AK 99501

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

www.state.ak.us/dec/

Table of Contents

APPENDIX A:

Designations

Non-attainment: any area that does not meet, or that contributes to poor ambient air quality in a nearby area that does not meet, the national primary or secondary ambient air quality standard for any pollutant on the national ambient air quality standards list.

Attainment: any area that meets the national primary or secondary ambient air quality standard for the pollutant.

Unclassifiable: any area that cannot be classified on the basis of available information as meeting or not meeting the national primary or secondary ambient air quality standard for the pollutant.

Maintenance: any area that is going through the transition from being designated a non-attainment area to attainment.

Note: Further information regarding designation can be found at:

http://epa.gov/air/oaqps/greenbk/define.html
http://www.epa.gov/air/caa/

APPENDIX B:

Siting Criteria

The Federal Environmental Protection Agency (EPA) Region 10 requested that the Alaska Department of Environmental Conservation (DEC) staff provide a table which demonstrates that each monitoring site complies with siting criteria identified in 40 CFR Part 58 Appendix E. Included are two tables: one for CO sites and one for PM sites. 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 microscale 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;

Microscale—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 B-1) 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 B-1 CO monitoring sites in Anchorage and Fairbanks.

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
DHHS	Neighborhood	1	3	270 degrees unobstructed	28	None
Parkgate	Neighborhood	1	2.5	180 degrees unobstructed	22	None
Old Post Office	Microscale	1	3	180 degrees unobstructed	3	None

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

For microscale 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.

Microscale 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. TableB-2 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 B-2: PM monitoring sites in Alaska

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	Microscale	3.3	None	7	46,900	
DHHS	Middle	3	None	28	15,120	None
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	1 tree at 10m away
NCore	Neighborhood	4	75 m to 12 m building	~ 100	3559	32 m to 10 m tall trees
North Pole Elementary	Neighborhood	4	>20	~ 300 to Richardson Highway	10,400	Several to east > 30m
North Pole Fire #3	Neighborhood	4	none	23 to Hurst Rd	3730	> 30 m
Floyd Dryden	Neighborhood	6	Furnace flue @ 20m, 4m penthouse @ 15m	65	12,770	12 meter tall @ 25m away
Soldotna	Neighborhood	4	None	~ 30	< 5320	10 m to group of 6 m tall trees

APPENDIX C:

Network Site Summary

State Code	County Code	Site ID	Parameter Code	POC	Method Code	Unit Code	Frequency	Parameter Description	Instrumentation	City Name	Site Name	Notes
02	020	0018	81102	1	063	001	1/6	PM10 Total 0-10um Stp	Anderson Hi-Vol,	Anchorage	GARDEN ST	
02	020	0018	42101	1	055	007	cont	Carbon Monoxide	Thermo 48iTLE	Anchorage	GARDEN ST	Oct - Mar
02	020	0018	44201	1	087	008	cont	Ozone	Teledyne AP1 400E	Anchorage	GARDEN ST	Apr - Oct, (Began 2010)
02	020	0018	88101	3	170	105	cont	PM2.5 - Local Conditions	Met One BAM 1020X	Anchorage	GARDEN ST	
02	020	0018	81102	3	122	001	cont	Pm10 - Stp	Met One BAM 1020X	Anchorage	GARDEN ST	
02	020	0044	81102	2	063	001	1/6	PM10 Total 0-10um Stp	Anderson Hi-Vol	Anchorage	TUDOR RD	Discontinued 01/31/2012
02	020	0044	81102	3	122	001	cont	PM10 – Local Conditions	Met One BAM 1020X	Anchorage	TUDOR RD	Reported since 07/01/2010
02	020	0048	42101	1	054	007	cont	Carbon Monoxide	Thermo 48C	Anchorage	TURNAGAIN ST	
02	020	0050	42101	1	054	007	cont	Carbon Monoxide	Thermo 48C	Anchorage	DHHS	
02	020	0050	88101	3	170	105	cont	PM2.5 - Local Conditions	Met One BAM 1020X	Anchorage	DHHS	
02	020	0050	85101	3	122	001	cont	PM10 - Stp	Met One BAM 1020X	Anchorage	DHHS	
02	020	0051	14129	1	191	001	1/6	TSP - Pb	Anderson Hi-Vol	Anchorage	MERRILL FIELD	Reported since 10/18/2011
02	020	0051	14129	2	191	001	1/6	TSP - Pb	Anderson Hi-Vol	Anchorage	MERRILL FIELD	Reported since 10/18/2011
02	020	1004	85101	1	063	105	1/6	PM10 - Lc	Anderson Hi-Vol	Eagle River	PARKGATE	Discontinued 01/31/2012
02	020	1004	81102	1	063	001	1/6	PM10 - Stp	Anderson Hi-Vol	Eagle River	PARKGATE	Discontinued 01/31/2012
02	020	1004	42101	1	054	007	cont	Carbon Monoxide	Thermo 48C	Eagle River	PARKGATE	
02	020	1004	88101	3	170	105	cont	PM2.5 - Local Conditions	Met One BAM 1020X	Eagle River	PARKGATE	
02	020	1004	85101	3	122	001	cont	PM10 - Stp	Met One BAM 2010X	Eagle River	PARKGATE	
02	020	1004	81102	1	063	001	1/6	PM10 Total 0-10um Stp	Anderson Hi-Vol	Eagle River	PARKGATE	Discontinued 01/31/2012
02	090	0002	42101	1	054	007	cont	Carbon Monoxide	Thermo 48C	Fairbanks	OLD POST OFFICE	

State Code	County Code	Site ID	Parameter Code	POC	Method Code	Unit Code	Frequency	Parameter Description	Instrumentation	City Name	Site Name	Notes
02	090	0010	88101	1	117	105	1/3	PM2.5 - Local Conditions	Partisol 2000	Fairbanks	STATE OFFICE BUILDING	
02	090	0010	88101	2	117	105	1/6	PM2.5 - Local Conditions	Partisol 2000	Fairbanks	STATE OFFICE BUILDING	
02	090	0010	88501	3	733	105	cont	PM2.5 - Local Conditions	Met One BAM FEM	Fairbanks	STATE OFFICE BUILDING	
02	090	0010	88502	6	810	105	1/3	PM2.5 - Local Conditions	Met One SASS	Fairbanks	STATE OFFICE BUILDING	
02	090	0010		6			1/3	PM2.5 - Local Conditions	URG 3000N Speciation Monitor	Fairbanks	STATE OFFICE BUILDING	
02	090	0010	61101	1	061	011	cont	Wind Speed	RM Young Windbird 05305	Fairbanks	STATE OFFICE BUILDING	Not reported to AQS
02	090	0010	61102	1	024	014	cont	Wind Direction	RM Young Windbird 05305	Fairbanks	STATE OFFICE BUILDING	Not reported to AQS
02	090	0034	88101	3	170	105	cont	PM2.5 Total 0-2.5um Lo	Met One BAM 1020X	Fairbanks	NCORE	
02	090	0034	85101	3	122	105	cont	PM10 Total 0-10um lo	Met One BAM 1020X	Fairbanks	NCORE	
02	090	0034	88502	6	810	105	1/3	PM2.5 - Local Conditions	Met One SASS	Fairbanks	NCORE	Not (yet) reported to AQS
02	090	0034	42401	1	560	008	cont	SO_2	Thermo 43I,TLE	Fairbanks	NCORE	
02	090	0034	42601	1	074	008	cont	NO	Thermo 42i,TLE	Fairbanks	NCORE	
02	090	0034	42612	1	574	008	cont	NO_Y	Thermo 42i-Y	Fairbanks	NCORE	
02	090	0034	42604	1	051	008	cont	NH_3	Thermo 17i	Fairbanks	NCORE	
02	090	0034	42101	1	054	008	cont	CO	Thermo 48I,TLE	Fairbanks	NCORE	
02	090	0034	44201	1	087	008	cont	O_3	Teledyne/API 403E	Fairbanks	NCORE	
02	090	0034	To be determined	1			cont	Wind speed/ Direction		Fairbanks	NCORE	
02	090	0034	To be determined	1			cont	Ambient Temperature		Fairbanks	NCORE	
02	090	0034	To be determined	1			cont	Barometric Pressure		Fairbanks	NCORE	
02	090	0033	88101	1	117	105	1/3	PM2.5 - Local Conditions	Partisol 2000	North Pole	NORTH POLE ELEMENTARY SCHOOL	Not (yet) reported to AQS
02	090	0033	88502				cont	Black Carbon	Met One SASS	North Pole	NORTH POLE ELEMENTARY SCHOOL	Not (yet) reported to AQS
02	090	0033	88502	6	810	105	1/3	Pm2.5 - Local Conditions	Met One SASS	North Pole	NORTH POLE ELEMENTARY SCHOOL	Not reported to AQS
02	090	0033	61101	1	061	011	cont	Wind Speed	Met One 50.5H Sonic Anemometer	North Pole	NORTH POLE ELEMENTARY SCHOOL	Not reported to AQS
02	090	0033	61102	1	024	014	cont	Wind Direction	Met One 50.5H Sonic Wind Sensor	North Pole	NORTH POLE ELEMENTARY SCHOOL	Not reported to AQS
02	090	0033	62101	1	NA	017	cont	Ambient Temperature	Met One BX 592-2 Temperature Sensor	North Pole	NORTH POLE ELEMENTARY SCHOOL	Not reported to AQS

State Code	County Code	Site ID	Parameter Code	POC	Method Code	Unit Code	Frequency	Parameter Description	Instrumentation	City Name	Site Name	Notes
02	090		88101	1	117	105	1/3	PM2.5 - Local Conditions	Partisol 2000	North Pole	NORTH POLE-FIRE STATION	Not reported to AQS
02	090		85101	3	733	105	cont	PM2.5 - Local Conditions	Met One BAM 1020	North Pole	NORTH POLE FIRE STATION	Not (yet) reported to AQS
02	090		88502	6	810	105	1/3	PM2.5 - Local Conditions	Met One SASS	North Pole	NORTH POLE FIRE STATION	Not (yet) reported to AQS
02	090		61101		061	011	cont	Wind Speed	Met One 50.5H Sonic Anemometer	North Pole	NORTH POLE FIRE STATION	Not reported to AQS
02	090		61102		024	014	cont	Wind Direction	Met One 50.5H Sonic Wind Sensor	North Pole	NORTH POLE FIRE STATION	Not reported to AQS
02	090		62101		NA	017	cont	Ambient Temperature	Met One BX 592-2 Temperature Sensor	North Pole	NORTH POLE FIRE STATION	Not reported to AQS
02	110	0004	81101	3	170	105	cont	PM2.5 Local Conditions	Met One BAM FEM	Juneau	F DRYDEN	
02	110	0004	85101	1	126	105	1/6	PM10 – Local Conditions Primary	Partisol 2000	Juneau	F DRYDEN	
02	170	0008	88501	1	122	105	cont	PM2.5 Total 0-2.5um Lo	Met One BAM	Mat-Su Valley	BUTTE	
02	170	0008	85101	1	122	105	cont	PM10 Total 0-10um lo	Met One BAM	Mat-Su Valley	BUTTE	
02	170	0008	88101	1	117	105	1/6	PM2.5 - Local Conditions	Partisol 2000	Mat-Su Valley	BUTTE	
02	170	0008	81102	1	126	105	1/6	PM10 – Std Conditions	Partisol 2000	Mat-Su Valley	BUTTE	
02	170	0012	88101	1	170	105	cont	PM2.5 - Local Conditions	Met One BAM 1020X	Mat-Su Valley	PALMER	
02	170	0012	85101	1	122	105	cont	PM10 – Local Conditions	Met One BAM 1020X	Mat-Su Valley	PALMER	
02	170	0013	88101	1	170	105	cont	PM2.5 - Local Conditions	Met One BAM 1020X	Mat-Su Valley	WASILLA	
02	170	0013	85101	1	122	105	cont	PM10 – Local Conditions	Met One BAM 2010X	Mat-Su Valley	WASILLA	
02	170	0013	88101	1	117	105	1/6	PM2.5 - Local Conditions	Partisol 2000	Mat-Su Valley	WASILLA	
02	170	0013	44201	1	087	008	cont	Ozone	Teledyne AP1 400E	Mat-Su Valley	WASILLA	
02	122	0008	88101	1	170	105	count	PM2.5 - Local Conditions	Met One BAM 1020X	Kenai Peninsula	SOLDOTNA	Not (yet) reported to AQS
02	122	0008	85101	1	122	105	count	PM10 – Local Conditions	Met One BAM 1020X	Kenai Peninsula	SOLDOTNA	Not (yet) reported to AQS

APPENDIX D:

Glossary

Air Quality Index (AQI) - The AQI is an index for reporting daily air quality and what associated health concerns the public should be aware of. The AQI focuses on health effects that might happen with in a few hours or days of breathing polluted air. The AQI rates the air quality in 6 steps from good to hazardous.

BAM 1020: Beta Attenuation Monitor Model 1020 continuous particulate monitoring instrument manufactured by Met-One Inc. This sampler can be configured to sample either course or fine particulate matter. Often a pair of the BAM monitoring are configured to simultaneously measure both PM_{10} and $PM_{2.5}$, and then calculate the PM_{Coarse}.

Clean Air Act (CAA) – Enacted by Congress in 1970, the CAA defines EPA's responsibilities for protecting and improving the nation's air quality and the stratospheric ozone layer. Congress amended the CAA twice, the first time in 1977 and again in 1990. The 1977 amendment added authority to regulate industrial emissions for the prevention of significant deterioration to existing ambient air quality referred to as PSD. The 1990 amendments added authority to regulate hazard air pollutants (HAPs), often referred to as air toxics.

Hazardous Air Pollutants (HAPs) – A list of 186 toxic air pollutants established in the 1990 amendments to the CAA

Microgram per cubic meter ($\mu g/m^3$) – Unit of measurement often used to quantify air pollutant concentrations. Since the concentration involves the volumetric measurement of a gas, the units may be corrected to standard conditions for pressure and temperature or expressed at local conditions for the actual pressure and temperature at the time of measurement.

National Air Monitoring Station (NAMS) - NAMS are a subset of the SLAMS network with emphasis on urban and multi- source areas. There are no current NAMS-designated monitors in the monitoring network.

National Ambient Air Quality Standards (NAAQS) – Under authority of the original Clean Air Act of 1970, the EPA established standards for ambient air quality concentrations to protect public health and welfare. Standards were developed for six *criteria pollutants* which included; particulate matter (PM), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), ozone (O_3), and lead (Pb). Over the years, the EPA has amended the NAAQS based on scientific evaluation of air pollutant levels as correlated human health effects and damage to the environment.

Particulate matter ($PM_{2.5}$) – particulate matter in a particle size range less than or equal to 2.5 micrometers

Particulate matter (PM_{10}) – particulate matter in a particle size range less than or equal to 10 micrometers in size

Particulate matter (PM_{Coarse}) – particulate matter in a particle size range greater than 2.5 micrometers but less than 10 micrometers

Particulate matter (TSP) – particulate matter as total suspended particulate typically in a particle size range equal to or less than 40 micrometers. The measurement is now associated with the NAAQS for lead referred to as (TSP-Pb)

Parts per million (ppm) - Unit of measurement used to often to quantify air pollutant concentrations. The units may be expressed based on volumetric measurements or mass units.

Special Purpose Monitors (SPM) - Special Purpose monitors are not permanently established and can be adjusted to accommodate changing needs and priorities for special studies needed by the State and local agencies. The SPM are used to supplement the fixed monitoring network as circumstances require.

State and Local Air Monitoring Station (SLAMS) - The SLAMS consist of a network or roughly 4000 monitoring station nation-wide. Distribution depends largely on the needs of the State and local air pollution control agencies to meet their respective State Implementation plan (SIP) requirements. The SIPs provide for the implementation, maintenance and enforcement of the NAAQS in each air quality control region with in a state. The State of Alaska monitoring network currently has 8 SLAMS sites for carbon monoxide and PM.

U.S. Environmental Protection Agency (EPA) - The mission of EPA is to protect human health and the environment. The EPA is responsible for establishing regulations to implement, uphold, and enforce federal environmental laws such as the CAA.

APPENDIX E

Alaska 2011 Monitoring Plan - PM Design Data for 2009-2011

Alaska Monitoring Design Values for $PM_{2.5}$ as µg/m^3										
	98th Percentile				Weighted Annual Mean				2011-2009 Design Value	
$PM_{2.5}$ Monitoring Sites	2011	2010	2009		2011	2010	2009		24-hour	Annual
Trinity Christian Church (MOA)	17.3	23.2	23.9		5.2	6.1	7.1		21	6.2
DHHS (MOA)	11.6	17.2	15.3		3.9	4.8	5.3		15	4.7
Parkgate Site (MOA)	15.7	17.0	22.4		4.6	5.5	6.3		18	5.4
Harrison Court (Butte)	30.3	37.5	28.8*		6.4	7.5	7.8*		32	7.3
S Gulkana St (Palmer)	9.1	11.6*	*		4.1	4.9	*		10	3.6
100 W Swanson (Wasilla)	15.1				6.3				15	6.3
State Office Building (FNSB)	38.0	51.8	51.0		10.8	13	16.4		47	11.5
809 Pioneer (NCore FNSB)	39.8	50.7	44.1		11.1	12.6	22.7*			
Floyd Dryden Site (Juneau)	24.8	27.3	29.0*		7.1	8.8	7.0*		29	7.6
144 N Binkley (Soldotna)	8.2*				2.9*					

* Annual values not meeting completeness criteria

APPENDIX F:

Visibility and Regional Haze Monitoring 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:

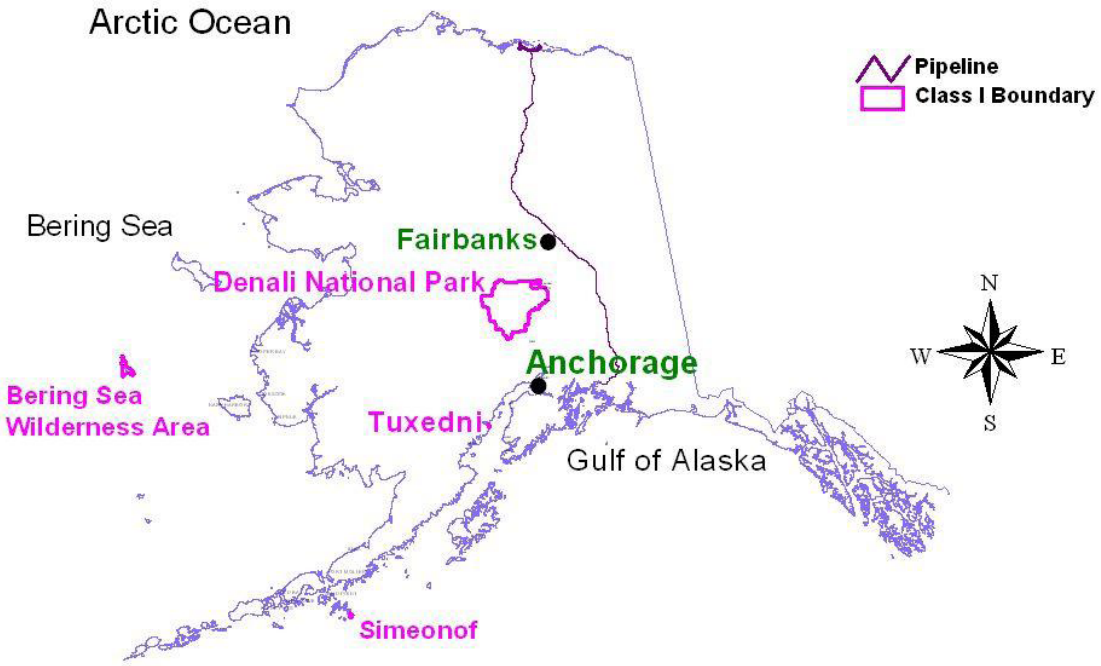
> *The prevention of any future, and the remedying of any existing, impairment of visibility in mandatory Class I Federal areas which impairment results from manmade air pollution. (Section 169A)*

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 IMPROVE Monitoring Network

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 were initiated specifically in response to Regional Haze rule requirements. There is no air monitoring being conducted for the Bering Sea Wilderness Area due to its remote location.

Denali National Park and Preserve

Denali National Park and Preserve 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- acre clearing. During the park season, mid-September to mid-May, 70 buses and approximately 560 private vehicles per day traverse the road loaded with park visitors. 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 originally

the 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 CASTNet (Clean Air Status and Trends Network) monitor is located near the Denali Headquarters IMPROVE site.

Simeonof Wilderness Area

Simeonof Wilderness Area consists of 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 from marine traffic in the Gulf of Alaska and the community of Sand Point.

The Fish and Wildlife Service has 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 off of 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 has 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 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

viable data is available from that effort. No IMPROVE monitoring is currently planned for 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

One of the monitoring issues that Alaska has identified is the logistical difficulty of monitoring at remote locations. Remote locations make it challenging to provide power for instrumentation. If a monitor is located at the nearest power source, such as a town, it is also near local sources of emissions, and therefore less likely to be representative of the Class I area. Remote sampling in Class I areas may be needed to verify that data from an off-site IMPROVE monitor are representative. DRUM aerosol impactor sampling may provide an opportunity to verify impacts at remote Class I areas like Simeonof and Tuxedni. The challenges for ongoing air and visibility monitoring in Alaska are transportation and site maintenance. Sites are remote, access may be only by air or water, and electrical power may be lacking. In many places winter temperatures are extreme, often dipping well below zero Fahrenheit for weeks at a time.

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 proved to be quite problematic with mechanical and pump issues in winter conditions. They ran intermittently between February/March 2006 and April 2009.

Alaska will continue to evaluate as resources allow their portable sampling platforms for use in remote environments.