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June 22, 2011

Dennis McLerran
Regional Administrator
U.S. Environmental Protection Agency, Region 10
1200 Sixth Avenue, Suite 900
Seattle, WA 98101

Dear Mr. McLerran:

Enclosed is a copy of the Alaska 2012 assessment of the State's air quality monitoring network. It is submitted to fulfill the annual review requirement per 40 CFR 58.10. The required 30 day public comment period ended on June 20, 2011. No public comments were received.

Sincerely,

Alice Edwards
Director, Air Quality Division

Enclosures: Attachment A: Alaska's 2012 Air Monitoring Network Plan

cc: Rick Albright, EPA Region 10
Keith Rose, EPA Region 10
John Pavitt, EPA Alaska Operations
Barbara Trost, DEC AMQA Program Manager

Alaska's 2012 Air Monitoring Network Plan

Chapter 1 – Monitoring Plan

Prepared by:

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1. ALASKA'S 2012 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. Title I of the Clean Air Act (CAA) established National Ambient Air Quality Standards to protect public health. National Ambient Air Quality Standards (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; fine particulate matter particles less than 2.5 micrometers in diameter ($PM_{2.5}$) and coarse particulate matter particles 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 set to protect the public welfare and the environment.

Since promulgation of the original Clean Air Act, the EPA has continued to revise the NAAQS based on the 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 1.1.1 presents the NAAQS standards 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 represents 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 30-40,000 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.

In addition to the NAAQS for *criteria pollutants,* Title III of the Clean Air Act 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

[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

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 2011-2012.

Table 1.1 – NAAQS for Criteria Pollutants

	Primary Standards		Secondary Standards	
Pollutant	**Level**	**Averaging Time**	**Level**	**Averaging Time**
Carbon Monoxide	9 ppm (10 mg/m^3)	8-hour[(1)]	None	
	35 ppm (40 mg/m^3)	1-hour[(1)]		
Lead	0.15 µg/m^3 [(2)]	Rolling 3-month Average	Same as Primary	
Nitrogen Dioxide	53 [(3)] ppb	Annual (Arithmetic Mean)	Same as Primary	
	100 ppb	1-hour[(4)]	None	
Particulate Matter (PM_{10})	150 µg/m^3	24-hour[(5)]	Same as Primary	
Particulate Matter ($PM_{2.5}$)	15.0 µg/m^3	Annual[(6)] (Arithmetic Mean)	Same as Primary	
	35 µg/m^3	24-hour[(7)]	Same as Primary	
Ozone	0.075 ppm (2008 std)	8-hour[(8)]	Same as Primary	
	0.08 ppm (1997 std)	8-hour[(9)]	Same as Primary	
	0.12 ppm	1-hour[(10)]	Same as Primary	
Sulfur Oxides	0.03 ppm	Annual (Arithmetic Mean)	0.5 ppm	3-hour[(1)]
	0.14 ppm	24-hour[(1)]		
	75 ppb [(11)]	1-hour	None	

(1) Not to be exceeded more than once per year.

(2) Final rule signed October 15, 2008.

(3) The official level of the annual NO_2 standard is 0.053 ppm, equal to 53 ppb, which is shown here for the purpose of clearer comparison to the 1-hour standard.

(4) To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed o0.100 ppm (effective January 22, 2010).

(5) Not to be exceeded more than once per year on average over 3 years.

(6) To attain this standard, the 3-year average of the weighted annual mean $PM_{2.5}$ concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m^3.

(7) To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m^3 (effective December 17, 2006).

(8) To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor with an area over each year must not exceed 0.075 ppm (effective May 27, 2008).

(9) (a) To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm.
(b) The 1997 standard – and the implementation rules for that standard—will remain in place for implementation purposed as EPA undertakes rulemaking to address the transition from the 1997 ozone standard to the 2008 ozone standard.
(c) EPA is in the process of reconsidering these standards (set in March 2008).

(10) (a)EPA revoked the 1-hour ozone standard in all areas, although some areas have continuing obligation under that standard ("anti-backsliding").

(b) The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is ≤ 1.

(11) (a) Final rule signed June 2, 2010. To attain this standard, the 3-year average of the 99th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 75 ppb.

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 & Borough of Juneau, Seward, and other smaller communities to support and operate the statewide monitoring system. To protect public health and the environment, the 2012 Alaska Monitoring Plan is focused on nine 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
- Nitrogen oxides (NO_x) 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 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 and the lead monitoring program in Noatak do 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 over 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, 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. The communities of Wasilla and Palmer continue to grow and every year the DEC still receives several 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, 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, 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 PM10 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, was never officially designated as non attainment. Instead the Municipality entered into a Memorandum of Understanding with the EPA, committing to develop strategies to control the sources creating the violations, which had occurred between 1985 and 1987. A 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, this 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 is awaiting approval.

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 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 State of Alaska 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 are being collected at three sites within the City limits. The special purpose monitoring program is expected to collect PM_{10} data for a period of at least one year.

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 1996. 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. Pending approval by the EPA, the Municipality plans to discontinue CO monitoring at the west Anchorage site.

The Fairbanks North Star Borough CO monitoring network originally consisted of three monitoring sites. Fairbanks has not exceeded the CO NAAQS since1999. 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 FNSB. Fairbanks currently operates one CO monitoring site and plans to add CO monitoring to the multi-pollutant NCORE site during the summer of 2011.

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 lead NAAQS requires source-oriented monitoring for all facilities that have potential annual emissions equal to, or greater than one ton 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 collect samples for total suspend particulate (TSP). The samples are collected and returned to Anchorage for laboratory analysis at the DEC Environmental Health (EH) laboratory.

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. EPA selected the Merrill Field airport in Anchorage Alaska 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 will collect TSP samples at Merrill Field on a 1-in-6 schedule for a period of one year, beginning no later than December 2011. The DEC EH lab in Anchorage will analyze these samples for lead content.

1.2.5 Ozone Monitoring-O_3

The March 27, 2008 revision of the O_3 NAAQS required the State of Alaska to establish an O_3 monitoring program by April 1, 2010. The regulation requires at least one SLAMS O_3 site in a core based statistical area (CBSA) with a population greater than 350,000. The Anchorage/Mat-Su Valley population forms the only combined 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 MOA's Parkgate site in Eagle River to the Wasilla site in the Mat-Su Valley to be operated by the DEC. These two ozone monitors shall be designated as special purpose monitors until sufficient data can be collected and analyzed to determine the appropriate SLAMS site location. Another O_3 site will be located in Fairbanks with establishment of the NCore site. The US National Park Service operates a CASTNET O_3 monitoring site at the Denali National Park, which is under consideration to provide background regional O_3 concentration data.

1.2.6 Sulfur Dioxide & Nitrogen Dioxide Monitoring – SO_2/NO_2

Over the past year, EPA has finalized changes to the NAAQS for NO_2 (75 FR 6474, February 9, 2010) and SO_2 (75 FR 35520, June 22, 2010). The SO_2 and NO_2 NAAQS revisions were to address the public health studies showing a direct correlation to short-term high concentrations of these pollutants 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 is installing SO_2 and NO_2 monitors to the NCORE multi-pollutant monitoring site located in Fairbanks. Both the SO_2 and NO_2 concentrations will be monitored at trace levels with hourly averages reported in parts per billion (ppb) to one decimal. In additional, the SO_2 NAAQS revision requires that data averages be recorded in 5-minute blocks and that the maximum 5-minute block for the hour be reported in addition to the hourly average.

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 for baseline assessments but not for regulatory purposes.

The State believes the high dust levels reported in the rural communities of Buckland, St Mary's, Kotzebue, Bethel, Kiana, Kivalina and others 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 done in the past few years. Most of the tribal monitoring has been done in the Northwest Arctic Borough but sampling in villages throughout the state support the same conclusion.

This year, the DEC, along with the State of Alaska DOT and the University of Alaska – Fairbanks are working together to identify and test potential dust control strategies for use in rural Alaska. The DEC is involved in the DOT project in that it has the University of Alaska – Fairbanks assessing the efficacy of the palliatives applied for dust control using a sampling vehicle, the "*DustM*." Eight villages that have shown dust problems in the past (values exceeding the PM_{10} NAAQS), have been chosen for a DOT demonstration project. Two of those villages, Galena and Fort Yukon have been selected for air monitoring to assess the efficacy of the palliatives used in the dust control provided by the DOT using the *DustM* (UAF) and TEOM (DEC). In addition to the two villages, North Pole is going to be used as a test site to correlate the *DustM* (UAF) to the TEOM and/or EBAM (DEC). The State might use the FRM Andersen high volume monitors in Ambler and Buckland to assess the use of palliatives in those two villages as well. The State 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.

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, the State 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 fine particulate levels. During the summers of 2004 and 2005, the community suffered through days with particulate 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. The addition of two monitoring staff in 2005 from State general fund dollars has assisted in the protection of the public from smoke impacts. The meteorologist position has direct access to all National Weather Service data and is working closely with state and federal fire suppression staff

to develop smoke forecasts and air quality advisories to better protect public health. This position has also been involved with developing a real-time smoke monitoring capability for taking direct measurements of smoke downwind of the fires. In 2010 DEC placed continuous fine particulate monitors at Fort Yukon and Galena to study smoke impacts from summer fire events in the State's interior.

1.2.9 Other Monitoring Issues

The State has a number of other monitoring projects on which the AMQA staff plan to bring to completion.

Air Toxics

The Kotzebue Air Toxics Monitoring Study was conducted in Northwest Alaska between December 2004 and April 2006. After many logistical and staff related delays, the field monitoring was successfully completed. DEC teamed up with Washington State University (WSU) for analytical services and to help identify compounds of concern. DEC has completed the review and analysis of the analytical data, and is in the process of finalizing the project write-up. Loss of staff involved with this project and re-assignment of monitoring priorities has delayed the completion of the final report.

Rural Diesel Health Study

As part of the low sulfur diesel initiative, DEC evaluated the impact of diesel emissions on the residents of a small rural Alaskan community. After an extensive search, the Native Village of St Mary's was selected as the location for the investigation. The study monitored ambient air down-stream from the village power plant for NO_x, SO_2, and diesel particulates ($PM_{2.5}$ filter analysis using a TEOM with an FDMS module, diesel particulate assessment using a diesel particulate matter (DPM) cassette, and diesel particle analysis using an aethalometer). Field monitoring started in January 2006 and ran through April 2006. The collected data were analyzed and a final draft report has been developed and is undergoing peer review. An unexpected loss of staff and reassignment of monitoring priorities has delayed the final version of this report.

Alaska Air Monitoring Network

The Municipality of Anchorage received additional air quality funding through the congressional delegation in 2005. With this funding MOA replaced an antiquated data collection system and expanded air monitoring within the Upper Cook Inlet to include three continuous particulate matter sites in Anchorage, two in the Mat-Su Valley and one on the upper Kenai Peninsula. Through a cooperative agreement, DEC agreed to operate the Mat-Su Valley and Kenai sites. DEC further expanded the network adding one linked site in Juneau, and two sites in the Fairbanks North Star Borough.

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 monitors to the public and help the Department issue more timely air quality advisories. In 2010 the network included five

linked sites in Anchorage and Eagle River, one in Palmer, one in Wasilla, two in Fairbanks and one in Juneau. DEC is planning to include a Kenai/Soldotna area PM site in 2011, and the Fairbanks North Star Borough intends to integrate a third site in 2011. All continuous monitors at these sites will be integrated with the data acquisition system to allow for real time data access on the Alaska Air Monitoring website (https://fortress.wa.gov/ecy/aaqm/Default.htm).

1.3. Network Modifications

The Municipality of Anchorage will discontinue collection of $PM_{2.5}$ via FRM at the Garden site (AQS ID: 02-020-0018) after 06/30/11. MOA will continue collection of $PM_{2.5}$ data at this site via an FEM BAM1020 monitor which is also designated as SLAMS for $PM_{2.5}$. ADEC, the PQAO for Alaska air monitoring, will continue to operate a collocated $PM_{2.5}$ FEM sampler in Fairbanks at the FNSB State Office Building: (AQS ID: 02-090-0010).

DEC reviews and modifies the State's air monitoring network annually based on the needs of the State, available funding and EPA guidance. The 2011-2012 monitoring network will include expansion of the Fairbanks North Star Borough network. Budget cuts and staff shortages have had a significant impact on the DEC's ability to conduct planned monitoring activities. Except for the above described expansion to the Fairbanks monitoring network, the summer forest fire smoke monitoring, and road dust related sampling activity in support of the Alaska Department of Transportation & Public Facilities, no significant changes to the network are expected. Detailed descriptions of the network monitoring sites follow in Chapters 2 – 7, and a summary table of AQS site identification numbers and site specific input parameters in Appendix C.

Alaska's 2012 Air Monitoring Network Plan

Chapter 2 - Anchorage

Prepared by:

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2 ANCHORAGE MONITORING SITE DESCRIPTION

2.1 *General Information*

The Municipality of Anchorage (MOA) has a population[1] of 291,826 making it the largest city 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 / 52 ºF. 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, it is currently designated as a nonattainment area. The MOA undertook an ambitious paving and road surfacing program in the late-1980s 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 is currently working 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 O_3 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 O_3 formed from precursors generated in the city core. In 2010, concentrations and diurnal variation of O_3 in Eagle River were remarkably similar to that measured in Anchorage.

In April 2011 the O_3 monitor from 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 O_3 sites will be listed as SPM until the data can be evaluated for determination of the appropriate SLAM 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	SPM	Jan, 2009	neighborhood
PM_{10}					
Site Name	**Location**	**AQS ID**	**Designation**	**Install Date**	**Scale**
Garden	Anchorage	02-020-0018	SPM	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	SPM	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-October period when O_3 monitoring is required.

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

[1] MOA will discontinue collection of PM2.5 via FRM sampler at the Garden site after 06/30/11. MOA will continue collection of PM2.5 data at this site via an FEM BAM1020 monitor, which is also designated as SLAMS for PM2.5.

[2] MOA replaced the primary PM10 FRM samplers (operating 1:3) at the Tudor site with a BAM1020 operating continuously, in accordance with 40 CFR, Part 50, Appd. K, Section 3.1 (f). This change was effective on 07-01-2010

[3] MOA will discontinue CO monitoring at the Turnagain site effective 03/31/11, contingent on final approval of EPA's 02-11-11 proposed rule which retains the existing NAAQS for carbon monoxide.

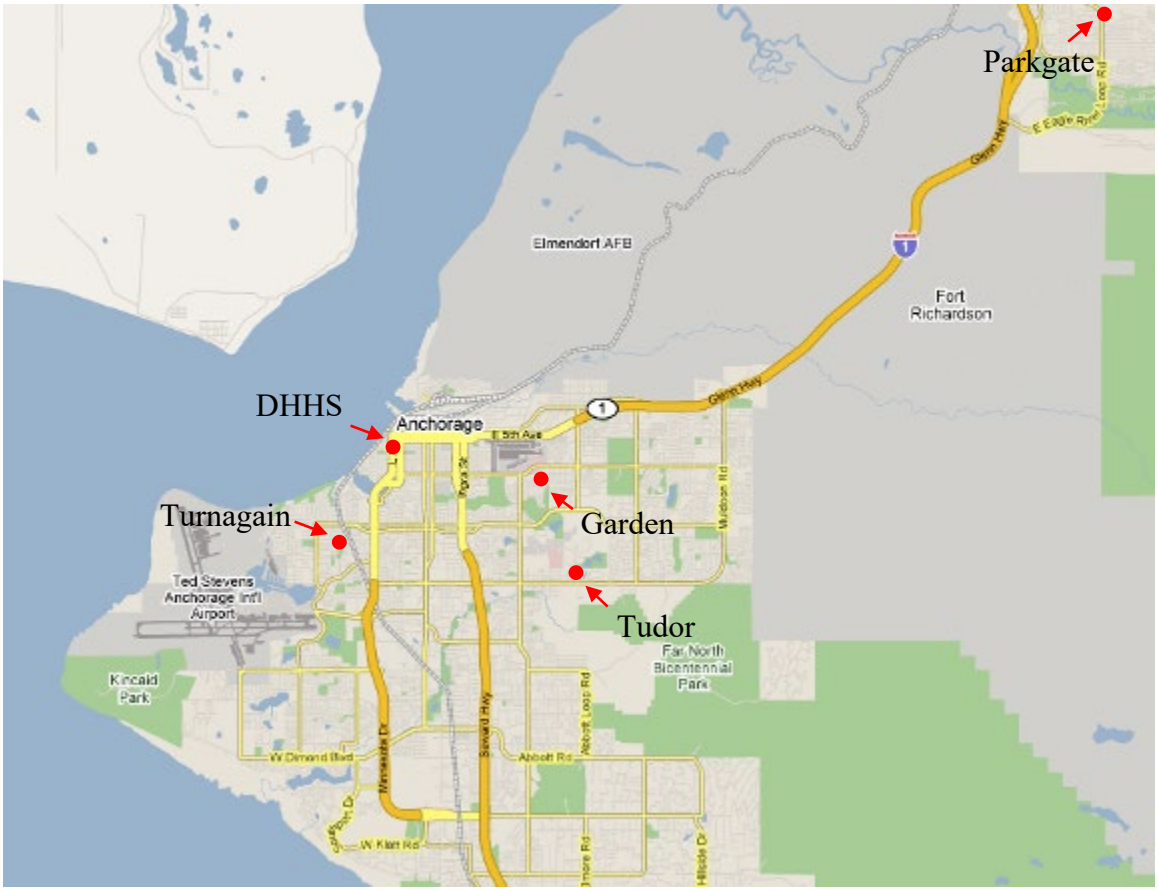


Figure 2.1:1: Map of Anchorage area. Red dots indicate monitoring sites.

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, PM site.

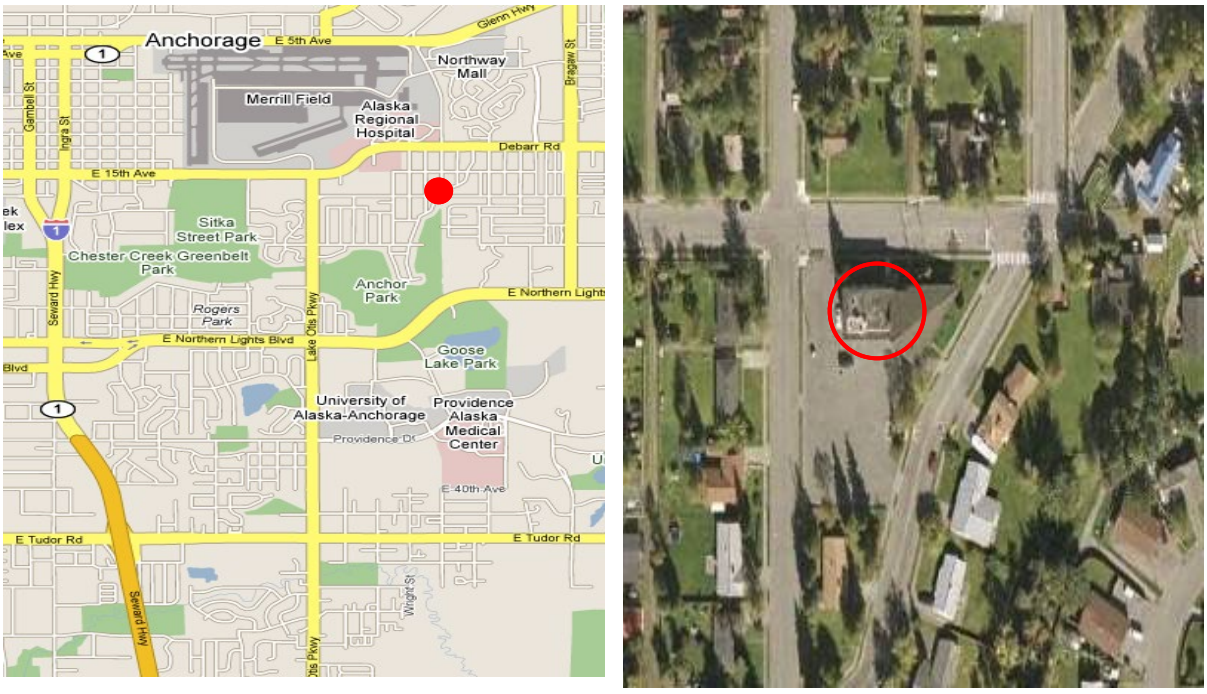


Figure 2.2:1: Street map and satellite image of the Garden monitoring site. The red circles indicate the site's location.

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 (90 and 250 megawatt gas turbines – 5 km west), Chugach Electric (48 MW gas turbine – 6 km southeast), Fort Richardson (18 MW gas turbine – 8 km northeast) and Elmendorf Air Force Base (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:

- $PM_{2.5}$ (SPM) – One Thermo Electron (formerly Rupprecht and Patashnick) Partisol 2000 sampler operates on a 1-in-6 day sampling schedule. [MOA intends to discontinue operation of this sampler after June 2011.]
- PM_{10} (SPM) – One General Metal Works high-volume sampler operates on a 1-in-6 day sampling schedule.
- $PM_{2.5}$, PM_{10}, PM_{Coarse} (SLAMS $PM_{2.5}$, SPM PM_{10} & PM_{Coarse}) – 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 Jan 2009.
- CO (SLAMS) – A single Thermo Electron 48i-TLE CO monitor operates seasonally (October – March).
- O_3 (SPM) – A single Teledyne API 400E O_3 analyzer was installed in March 2010 and is operated seasonally (April – 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 per day. All roads are paved; alleys are usually gravel surface.

Figure 2.2:2: Pictures of the Garden Site

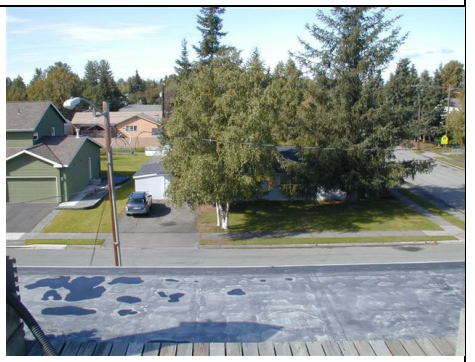
North	East	South	West
			
Views in four directions from the Garden Site			
			
Views in four directions towards the Garden Site			

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.

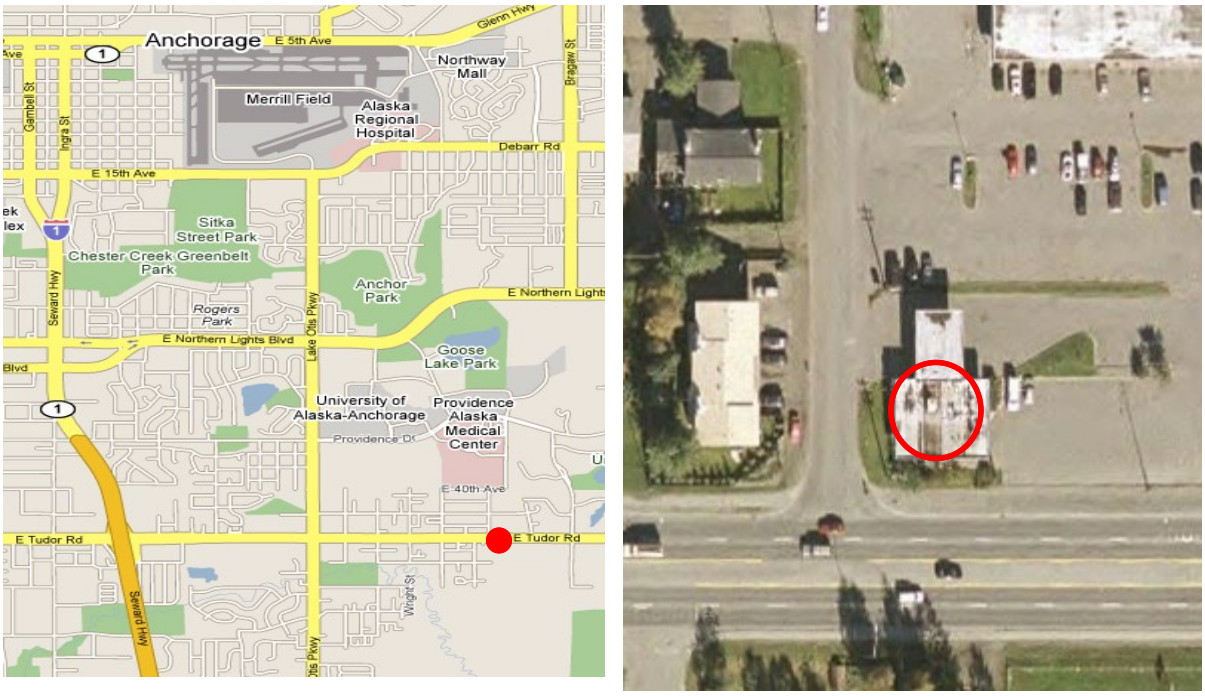


Figure 2.3:1: Street map and satellite image of the Tudor monitoring site. The red circle indicates the sites location.

2.3.2 Sources

The primary source of coarse particulate matter 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 (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 BAM1020 monitor was installed in July 2010 to provide continuous PM10 measurements for fulfillment of the provision in 40 CFR, Part 50, Appendix. K, Section 3.1 (f) for counting the number of expected PM10 exceedances due to periodic sampling. Data from this monitor is also used for evaluating the Air Quality Index.
- PM_{10} (SPM) – A single General Metal Works high-volume sampler operates on a 1-in-6 day sampling schedule for the purpose of evaluating agreement between the FEM and FRM measurements.

2.3.4 Siting

The particulate matter sampler and monitor are 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 samplers and the roadway do not significantly exceed the height of the samplers. The airflow to these samplers is unobstructed. The samplers are 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 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.

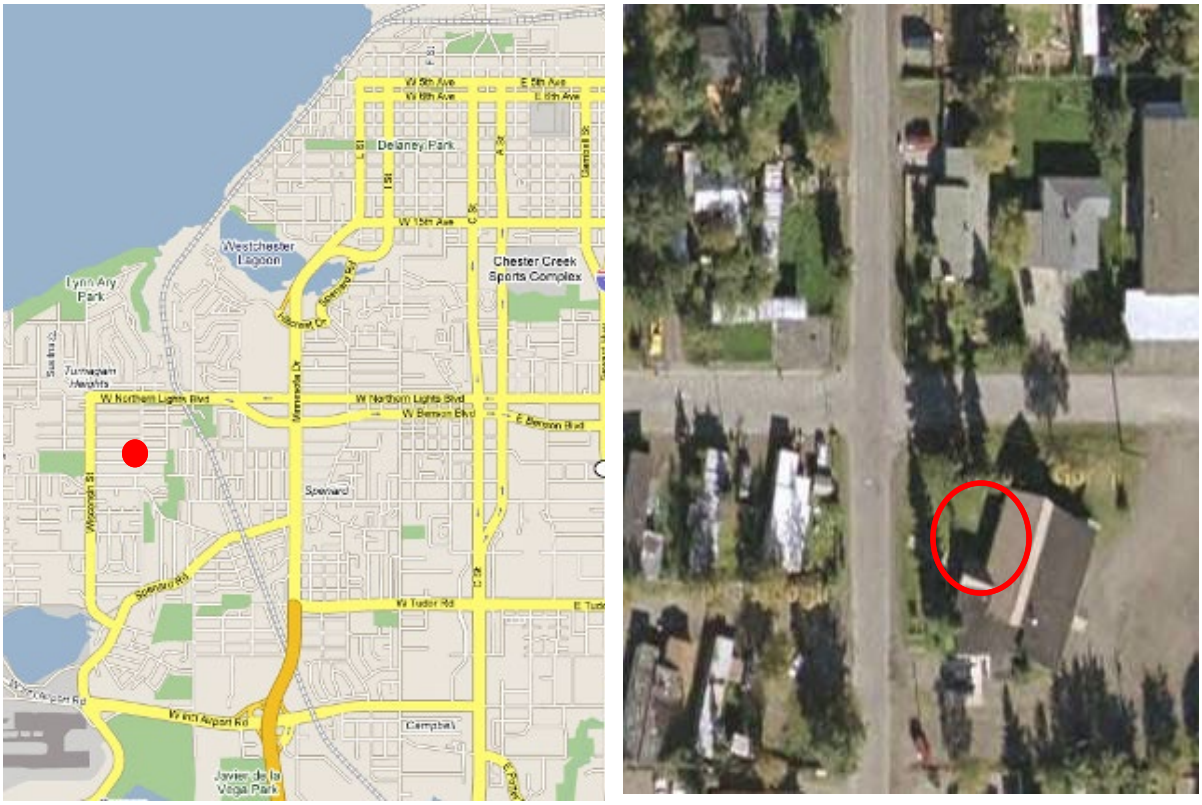


Figure 2.4:1: Street map and satellite image of the Turnagain monitoring site. The red circles indicate the sites location.

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

Pending acceptance of EPA's 02-11-11 proposed rule which retains the existing NAAQS for carbon monoxide, the Municipality of Anchorage intends to discontinue monitoring at this site prior to the next monitoring season which begins on October 1, 2011.

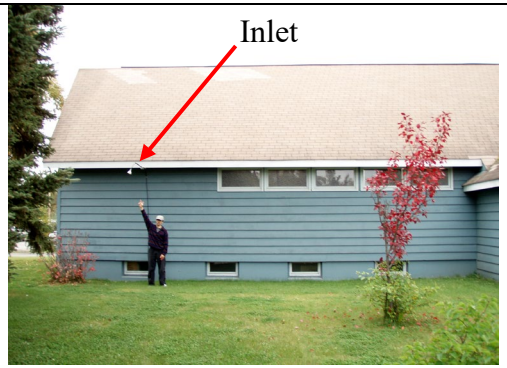
2.4.4 Siting

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 with approximate average daily traffic ranging from 15,000 to 45,000 vehicles per day. 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		
North	**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 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.

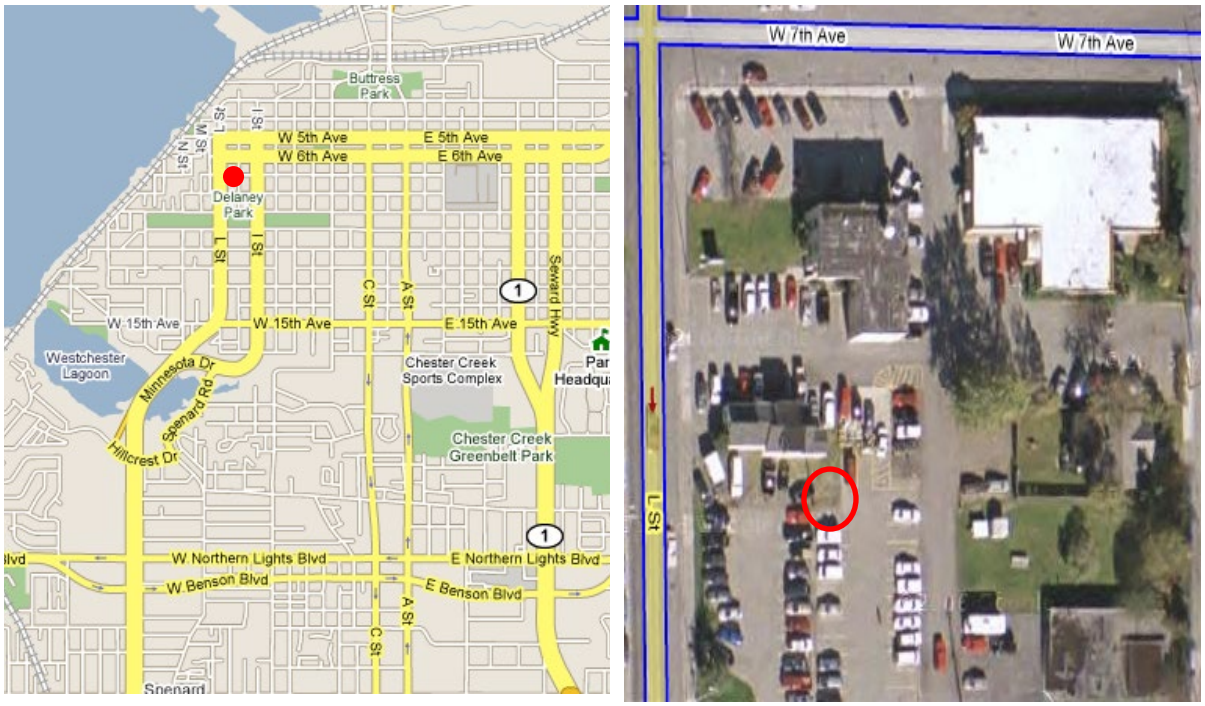


Figure 2.5:1: Street map and satellite image of the DHHS monitoring site. The red circles indicate the sites location.

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. 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 $_{2.5}$, PM_{10}, PM Coarse (SPM) – 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 building 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 per day.

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 100 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 nonattainment 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 O_3 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 for the 2011 monitoring season.

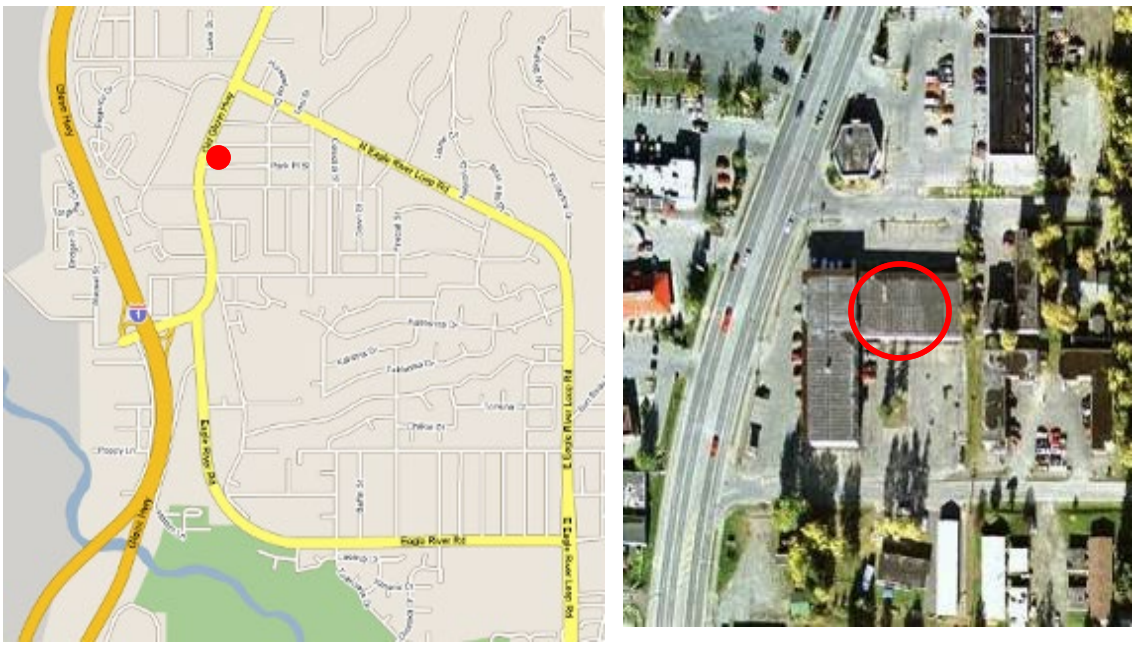


Figure 2.6:1: Street map and satellite image of the Eagle River monitoring site. The red circle indicates the sites location.

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 (2009). Re-entrained roadway dust from this road is a significant source of coarse particulate matter 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:

- PM_{10} (SLAMS) – One General Metal Works high-volume sampler. This sampler is operated on a 1-in-6 day sampling schedule.
- CO (SPM) – A single Thermo Electron 48C CO monitor is operated seasonally (October – March).
- PM_{10} (SLAMS), $PM_{2.5}$ & PM Coarse (SPM) – 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 matter samplers are located on the roof of the first story of the Parkgate Business Center. The roof height is 5 meters (16 feet). There is another section of the building 13 meters (41 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 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			
			
Views in four directions from the Parkgate Site			

Alaska's 2012 Air Monitoring Network Plan

Chapter 3 - Fairbanks

Prepared by:

State of Alaska Department of Environmental Conservation
Division of Air Quality
Air Monitoring and Quality Assurance Section
619 E. Ship Creek Ave. Suite 249
Anchorage, AK 99501

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3 FAIRBANKS MONITORING SITES

3.1 *General Information*

Fairbanks is the second largest city in Alaska (population[1] 31,535), located within the Fairbanks North Star Borough (FNSB; population 97,581). Fairbanks is situated on the banks of the Chena River in the upper Tanana Valley. 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 Aug. 2nd each summer, and less than 4 hours of daylight between Nov. 18th and Jan. 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 five 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. Figure 3-1:1 is a map showing the entire Fairbanks and North Pole area. The red dots indicate the locations of the five monitoring sites. Fairbanks is bordered by hills to the north and west, with the flats opening up to the south and east.

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	Fairbanks	02-090-0010	SLAMS/STN	Oct, 1998	neighborhood
TAC (Peger Rd)	Fairbanks	n/a	SPM	Nov, 2007	neighborhood
North Pole	North Pole	n/a	SPM	Nov, 2008	neighborhood
NCore	Fairbanks	n/a	SPM	Oct, 2009	neighborhood
CO					
Site Name	**Location**	**AQS ID**	**Designation**	**Install Date**	**Scale**
Old Post Office	Fairbanks	02-090-0002	SLAMS	Jan, 1972	micro

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

<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 140 meter (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.

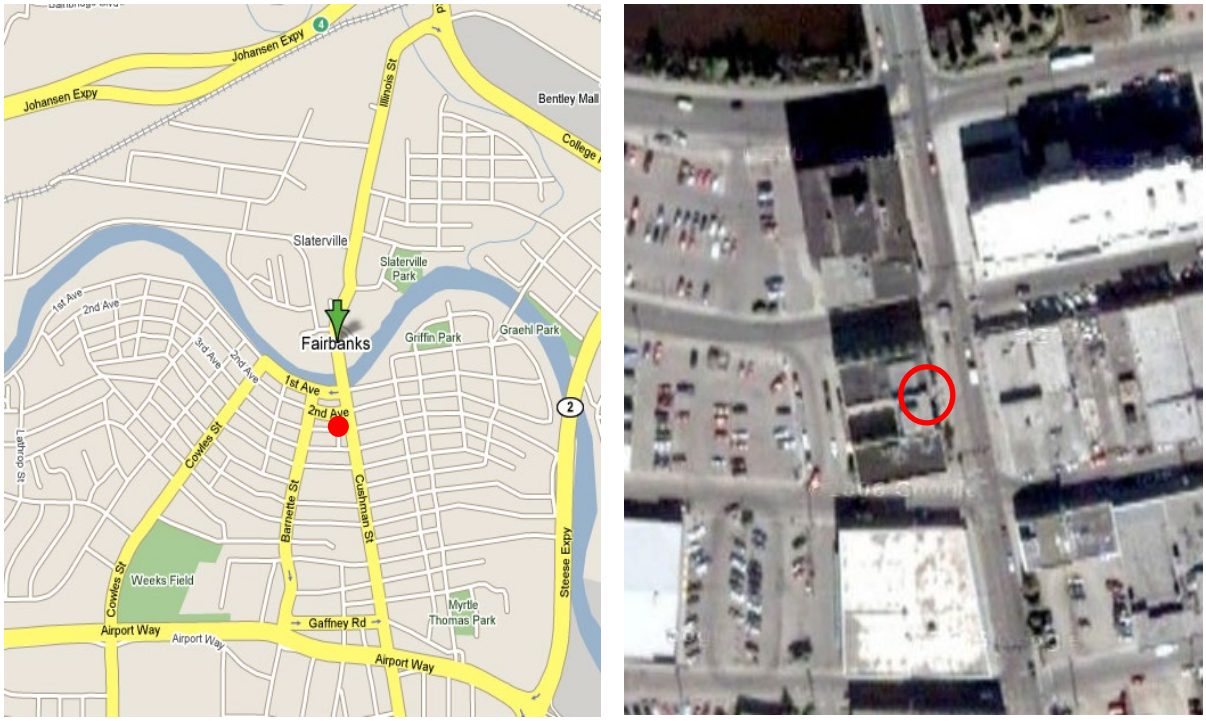

Figure 3.2:1 Map and satellite image of the Old Post Office monitoring site. The red circles indicate the site location.

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 the University of Alaska (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 – 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 (AADT) counts ranging from 1,013 to 9,227 vehicles per day. The nearest traffic count site shown on the Department of Transport 2009 Traffic Map is on Cushman between 1st and 2nd Avenues with an AADT of 8,309 vehicles per day.[2]

[2] State Department of Transportation and Public Facilities, 2009 traffic maps, http://www.dot.state.ak.us/stwdplng/mapping/trafficmaps/2009/Northern/Downtown_2009.pdf

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 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 140 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.

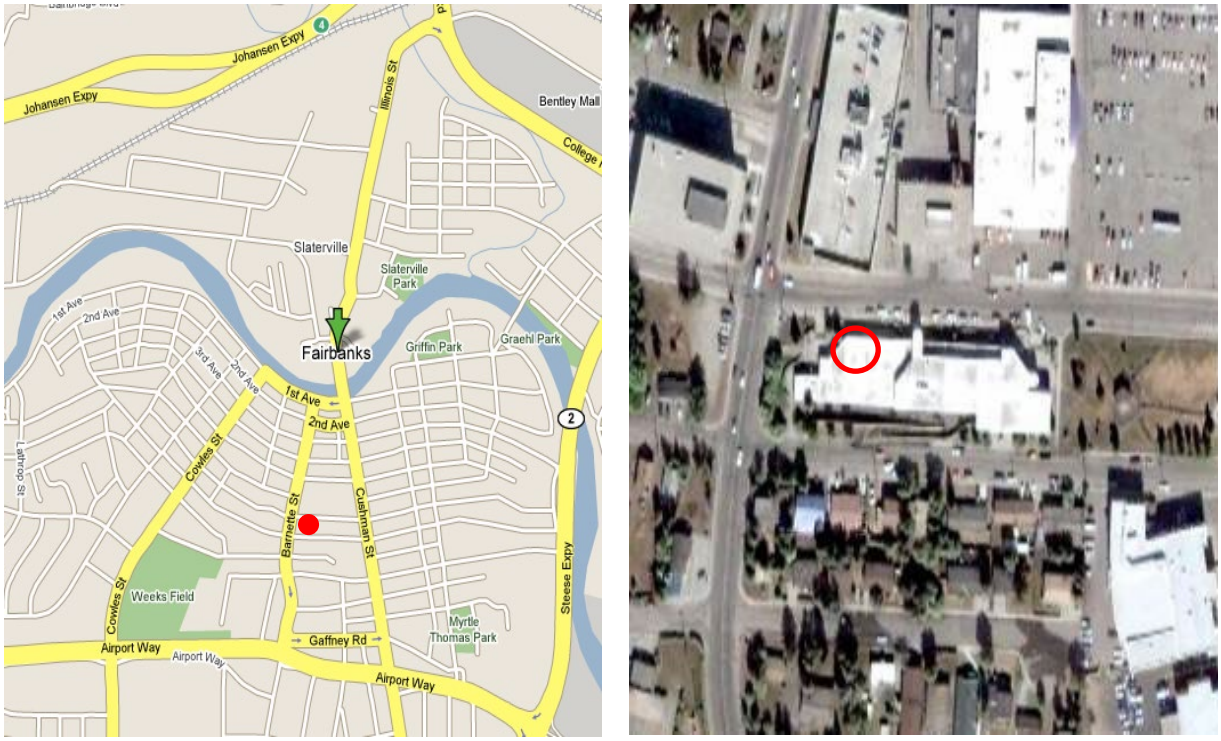

Figure 3.3:1 Map and satellite image of the State Office Building. The red dot and circle indicate the site location.

3.3.2 Sources

The dominant source of fine particulate matter ($PM_{2.5}$) for this site changes season to season. During the long winter months the primary sources of fine particulates are; home heating, vehicle exhaust, and wood smoke. During the summer months, the main source is from 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 Beta Attenuation Monitor (BAM 1020) was installed to provide information in real time for evaluating 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.

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 per day. The nearest traffic count site on 7th Avenue shows an AADT of 1,248 and the traffic count site on Barnette Street near 7th Avenue shows an AADT of 3,868 vehicles per day[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, http://www.dot.state.ak.us/stwdplng/mapping/trafficmaps/2009/Northern/Downtown_2009.pdf

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 64° 50′ 44.6″ north (64.845690), longitude 147° 43′ 38.2″ west (-147.727413), and 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 fine particulate matter ($PM_{2.5}$) for this site changes 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 from 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.
- $PM_{10-2.5}$ (SPM) – A pair of Met-One Beta Attenuation Monitor (BAM 1020) was installed to provide $PM_{2.5}$ and calculated PM coarse (PM_c) data in near real-time for evaluating the Air Quality Index

- Surface meteorology for wind speed/direction (WS/WD), ambient temperature (T) and barometric pressure.

In December 2010, the NCore site 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-September 2011. The additional monitors include:

- carbon monoxide (CO) – Thermo Scientific Model 48i-TLE continuous CO monitor (data collection began August 5, 2011)
- sulfur dioxide (SO_2) - Thermo Scientific Model 43i-TLE continuous SO_2 monitor (data collection began August 5, 2011)
- 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-September)
- 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-September)
- ammonia (NH_3) - Thermo Scientific Model 17i continuous NH_3 monitor (delayed due to instrument problems requiring factory repairs, scheduled for start-up in mid-September)
- ozone (O_3) - Teledyne Model 403E continuous O_3 monitor (data collection began August 5, 2011)
- relative humidity (RH) (scheduled start-up, mid-September)
- $PM_{2.5}$ (STN) – A single Met-One Super SASS Speciation Monitor (scheduled start-up, mid-September)

3.4.1 Siting

ADEC 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 6-10 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 AADT counts ranging from 1,031 to 9,227 vehicles per day with

the closest counting site on First Avenue (directly across the river) at 3,559 vehicles per day[4]. There are parking lots in the vicinity of both adjacent buildings.

[4] State Department of Transportation and Public Facilities, 2009 traffic maps, http://www.dot.state.ak.us/stwdplng/mapping/trafficmaps/2009/Northern/Downtown_2009.pdf .

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 *TAC (PEGER ROAD) SITE - FAIRBANKS*

3175 Peger Road **AQS ID: n/a**
Parameters: $PM_{2.5}$ **Established: Nov. 1, 2007**

3.5.1 Site Information

The site is located at the Transit Administrative Center (TAC) on Peger Road at latitude 64° 49′ 08″ north (64.818889), longitude 147° 46′ 27″ west (-147.774167), and 133 meters (436 feet) above sea level. Figure 3-5 shows a street map of the local area. This is a neighborhood-scale, population-oriented site.

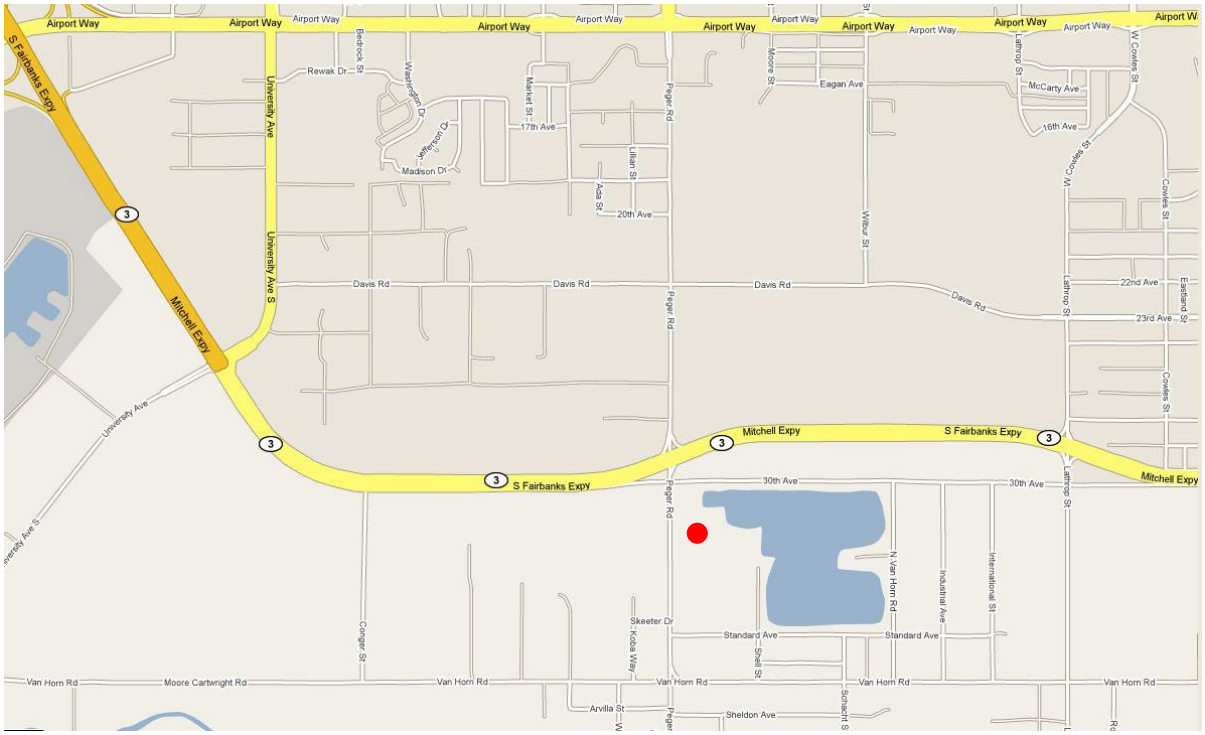

Figure 3.3:1 Map of the TAC (Peger Road) monitoring site. The red dot indicates site location.

3.5.2 Sources

The source of constituent pollutants of $PM_{2.5}$ in Fairbanks is unclear. The FNSB Winter Monitoring Project conducted during the winters of 2008-09, 2009-10, and 2010-11 is to evaluate wintertime pollutant characteristics and develop a strategy to reduce the concentration in Fairbanks.

3.5.3 Monitors

The TAC site is currently equipped with:

- $PM_{2.5}$ (SPM wintertime only) – 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 Beta Attenuation Monitor (BAM 1020) was installed to provide information in real time for evaluating 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.
- Elemental Carbon (SPM wintertime only) – a Magee Scientific Aethalometer with BGI 2.5 µm sharp cut cyclone samples continuously.
- Wind speed/wind direction – One R. M. Young Model 05305VM (Windbird) combined wind vane anemometer. The wind direction and wind speed data is continuously recorded.

3.5.4 Siting

The TAC site is in an industrial area, approximately 222 meters (730 feet) from the Peger Road/Mitchell Expressway intersection. One of the $PM_{2.5}$ Partisol samplers is located approximately 82 meters (270 feet) to the east of the rest of the monitoring equipment and acts as a non-road baseline to compare with the roadway site.

3.5.5 Traffic

This location is in an industrial area near the Mitchell Expressway, the AADT counts along the Mitchell Expressway near Peger Road ranges from 12,485 to 13,285 vehicles per day. The nearest traffic count site on Peger Road shows an AADT of 7,573 vehicles per day.[5] The industrial area includes multiple parking lots with a variety of light and heavy-duty trucks plus other heavy-duty industrial vehicles.

[5] State Department of Transportation and Public Facilities, 2009 traffic maps, http://www.dot.state.ak.us/stwdplng/mapping/trafficmaps/2009/Northern/Fairbanks_2009.pdf .

Figure 3.5:2: Pictures of the TAC (Peger Rd.) site.

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

3.6 *NORTH POLE ELEMENTARY SITE – NORTH POLE*

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

3.6.1 Site Information

The site is located at the North Pole Elementary School on the east side of the parking lot at 64° 45' 8.41" north (64.752336), 147° 20' 49.95" west (-147.347208), and 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.

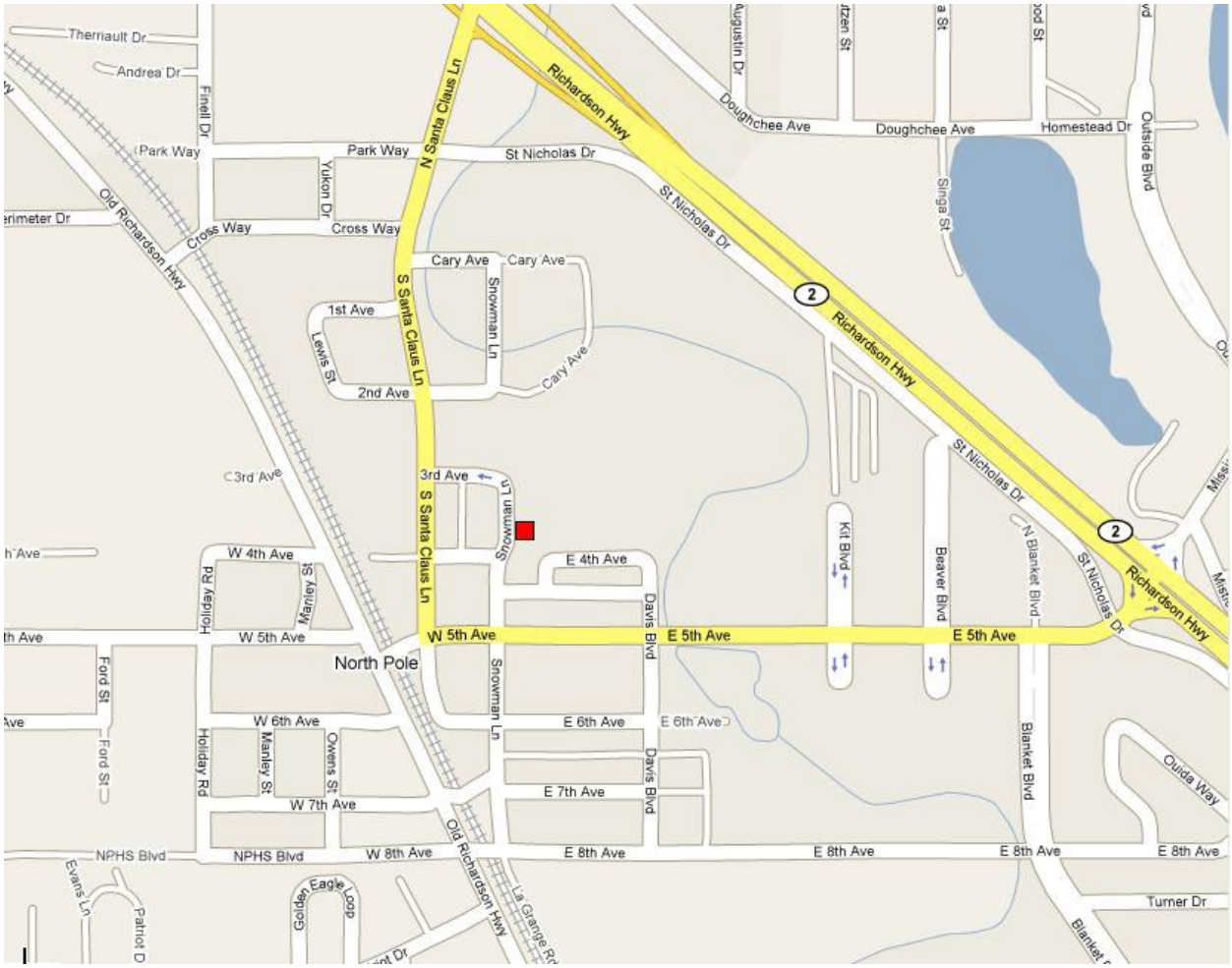

Figure 3.6:1 Map of the North Pole monitoring site. The red square indicates site location.

3.6.2 Sources

The source of constituent pollutants of $PM_{2.5}$ in North Pole is unclear. The FNSB Winter Monitoring Project conducted during the winters of 2008-09, 2009-10, and 2010-11 is to evaluate wintertime pollutant characteristics and develop a strategy to reduce the concentration in North Pole.

3.6.3 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 Thermo Electron TEOM/FDMS 1400a/8500 samples continuously.
- Elemental Carbon (SPM) – a Magee Scientific Aethalometer with BGI 2.5 μm sharp cut cyclone samples continuously.
- $PM_{2.5}$ (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 - MetOne Sonic Anemometer Model 50.5H

3.6.4 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.

3.6.5 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 mixture of commercial, industrial, and residential. Annual average daily traffic estimated along the Richardson Highway through North Pole is 10,875 vehicles per day. The AADT along Snowman Lane is unknown but the nearest traffic site along South Santa Claus Lane is 4,126 vehicles per day.[6]

[6] State Department of Transportation and Public Facilities, 2009 traffic maps, http://www.dot.state.ak.us/stwdplng/mapping/trafficmaps/2009/Northern/Northpole_2009.pdf

Figure 4.8.2: **Pictures of the North Pole Site**

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

Alaska's 2012 Air Monitoring Network Plan

Chapter 4 - Juneau

Prepared by:

State of Alaska Department of Environmental Conservation
Division of Air Quality
Air Monitoring and Quality Assurance Section
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Anchorage, AK 99501

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4 JUNEAU MONITORING SITES

4.1 *General Information*

The City and Borough of Juneau are located in Southeast Alaska and include 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 Alaska DEC staff. The AQS ID number for the site is 02-110-0004, Floyd Dryden Middle School (PM_{10} and $PM_{2.5}$). Figure 4.1:1 below indicates the location of the site.

Juneau was designated non-attainment for PM_{10} on November 15, 1990. The two primary sources of PM_{10} 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 PM10 NAAQS since 1994. The EPA has re-designated the City and Borough of Juneau as a PM_{10} Maintenance area. Definitions of designations and siting criteria can be found in Appendix A.

[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 site is located 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.

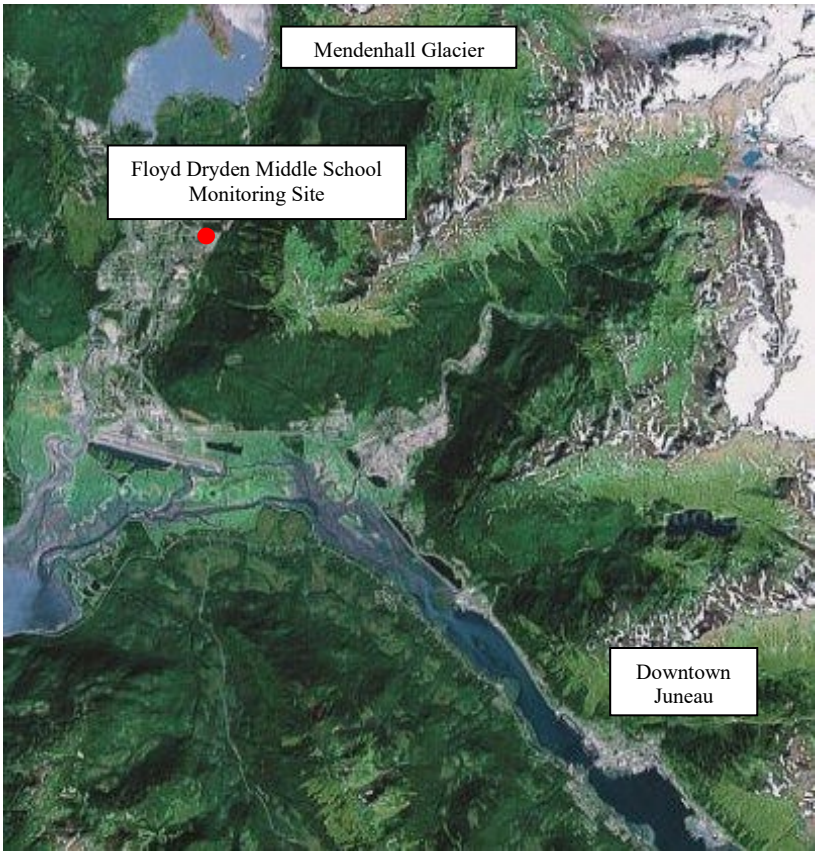


Figure 4.2:1: Satellite Image of Juneau and the Mendenhall Valley. Red circle indicates the monitoring site (Courtesy of Google Maps)

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.

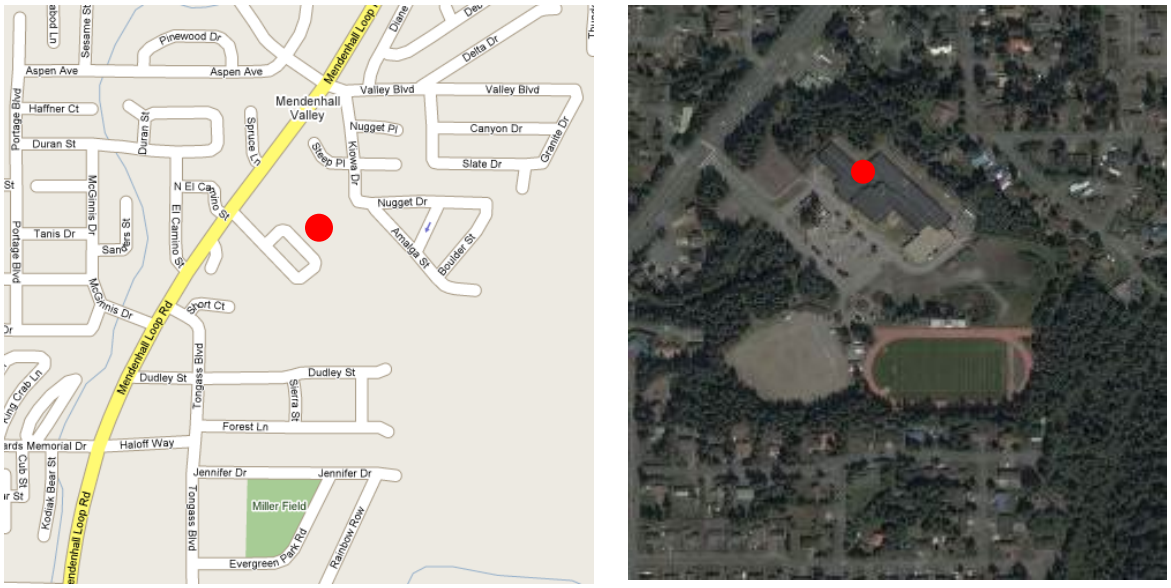


Figure 4.2:2: Map and satellite image of the Floyd Dryden monitoring site. The red circle indicates the monitoring site. (Courtesy of Google Maps)

4.2.3 Monitors

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 Beta Attenuation continuous sampler provides information in near real time for evaluating the Air Quality Index.

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 6 meters (19 feet) to the south of the closest monitor.

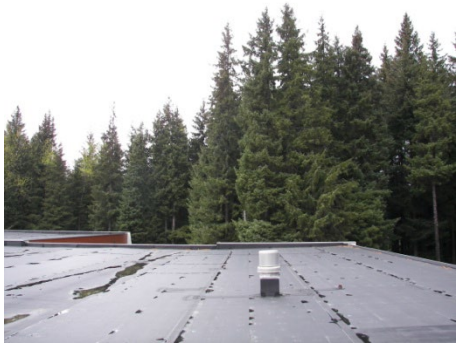
The samplers are installed approximately 65 meters (207 feet) from the nearest traffic lane. A row of 15 meter (48 feet) tall trees are within 25 meters (80 feet) on the northern side of the site. Airflow is generally uninterrupted with the exception of the trees to the north-northeast. These trees are 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.

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 per day. 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, http://www.dot.state.ak.us/stwdplng/mapping/trafficmaps/2009/Southeast/2009_ADT_Juneau_Upper_Valley.pdf

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 2012 Air Monitoring Network Plan

Chapter 5 – Matanuska Susitna Valley

Prepared by:

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5 MATANUSKA-SUSITNA VALLEY MONITORING SITES

5.1 General Information

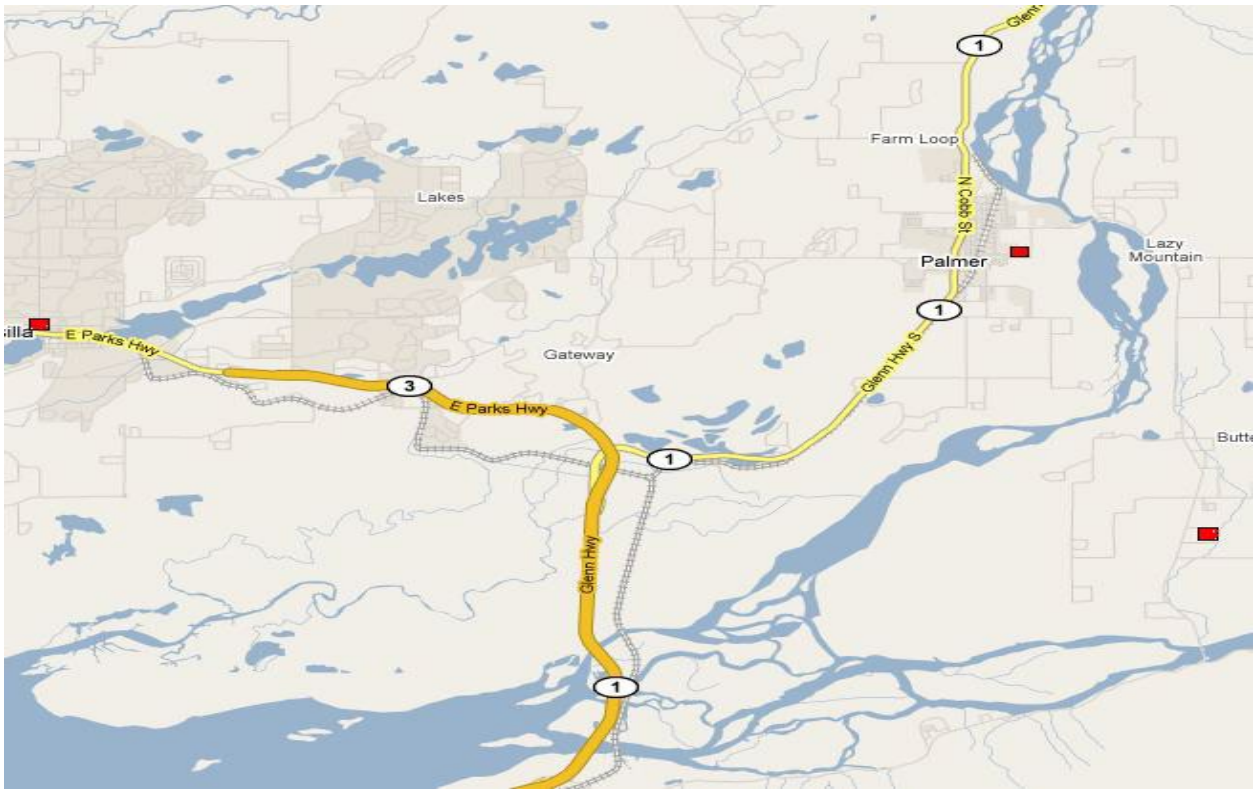
The Matanuska-Susitna Valley (Mat-Su) Borough has a population[1] of 88,995 and covers 24,682 square miles of land and 578 square miles of water. There are three incorporated cities, several unincorporated communities, and twenty-five recognized community councils within the Mat-Su Borough. Average temperatures in the winter range from 6°F to 14°F; in the summer, 47°F to 67°F. Annual precipitation is 16.5 inches, with 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 factions depending on the size of the particle: PM_{10}, $PM_{2.5}$, and PM_{Coarse}. Monitoring in 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 faction 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 Alaska Department of Environmental Conservation, Air Quality Division staff.

The designated State & Local Air Monitoring Site (SLAM) site is located at Harrison Court in the unincorporated area of Butte. The Harrison Court site AQS ID number is 02-0170-0008. 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).



<u>Figure 5.1:1</u> 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}, $PM_{2.5}$ **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 28 meters (90 feet) above sea level. This site has manual samplers for $PM_{2.5}$ and $PM_{10,}$ as well as a continuous monitor. As of December 2010 the continuous monitor at Butte was changed from full time yearly monitoring of PM_{10} to seasonal monitoring of both large and fine particulate monitoring. $PM_{2.5}$ monitoring will commence from the months of the 1st of December to the 30th of April and PM_{10} from the 1st of May or the 30th of November. This sampling schedule will continue until an additional monitor can be installed for real time monitoring of both parameters can occur. This site is scheduled to be upgraded during the summer of 2011by replacing the $PM_{10}/PM_{2.5}$ monitor with two new monitors which allow continuous monitoring of PM_{10}, $PM_{2.5}$, and PM_{Coarse}. Figure 5.2:1is a street map of the monitoring site and surrounding area. Harrison Court is a neighborhood PM site.

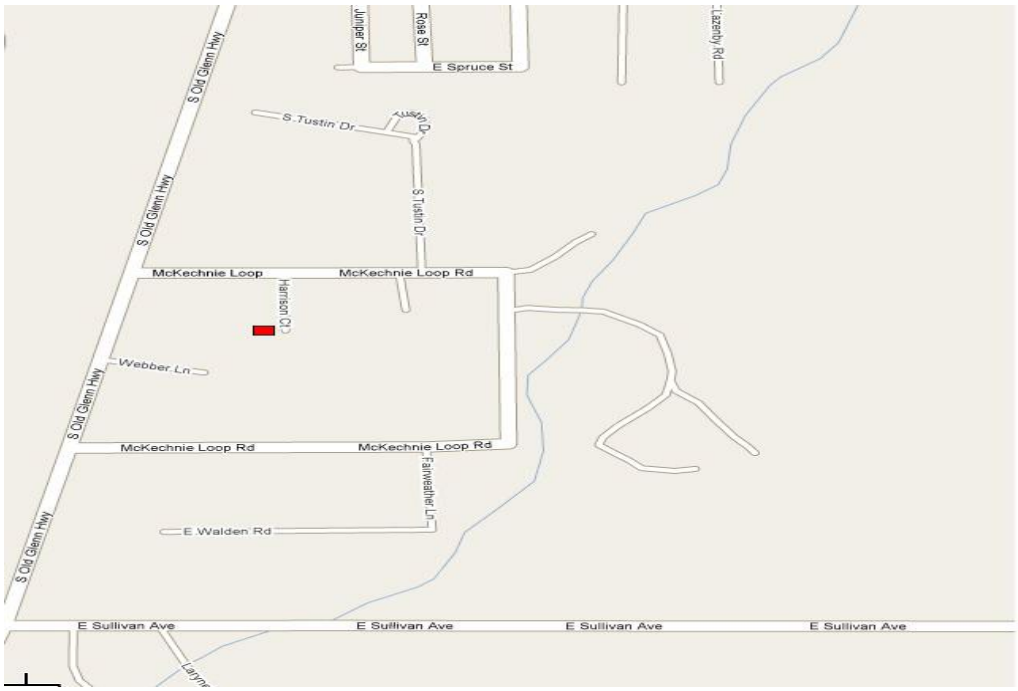


Figure 5.2:1 Map of the Butte area. The red square denotes the Harrison Court site. (Courtesy of Google Maps)

5.2.2 Sources

The major sources of coarse particulate matter 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 river is low

(spring and fall), dry windy weather suspends large amounts of silt in the air from the tidal flats and gravel bars. Additionally, within 8 km (5 miles) 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 fine particulate matter 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:

- $PM_{2.5}$ (SLAMS) – Two Thermo Electron (formerly Rupprecht & Patashnick) Partisol 2000 samplers. Two samplers are operated on alternating 1-in-6 day schedules. This operating mode results with samples collected at the site which are in accordance with the EPA 1-in-3 day air monitoring schedule.
- PM_{10} (SPM) – One Thermo Electron (formerly Rupprecht & Patashnick) Partisol 2000 sampler. Operated on a 1-in-6 sampling schedule.
- PM_{10} / $PM_{2.5}$ (SPM) – A single Met-One BAM 1020 continuous monitor is currently operating to provide information in real time for evaluating the Air Quality Index. The particle size selective inlets are switched on a seasonal basis.
- PM_{10}, $PM_{2.5}$ & PM_{Coarse} (SPM) – One set of two Met-One BAM 1020X particulate monitors to replace the existing single BAM 1020. (Scheduled for summer 2011)

5.2.4 Siting

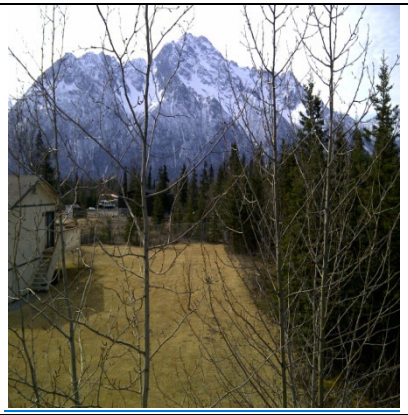
The manual operated equipment is located on the roof of the trailer and the continuous monitor is housed inside the trailer. All inlets are at a height of approximately four meters (13 feet) above the ground. There is uninterrupted airflow around the inlets. The monitoring objective of this site is to 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 per day along the McKechnie Loop. Average daily traffic along the Old Glenn Highway is 3004 vehicles per day.[2]

[2] State Department of Transportation and Public Facilities, 2009 traffic maps, http://www.dot.state.ak.us/stwdplng/mapping/trafficmaps/2009/Central/matsu09.pdf

Figure 5.2:2 Photographs of the Harrison Court Site

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

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 predominant 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.

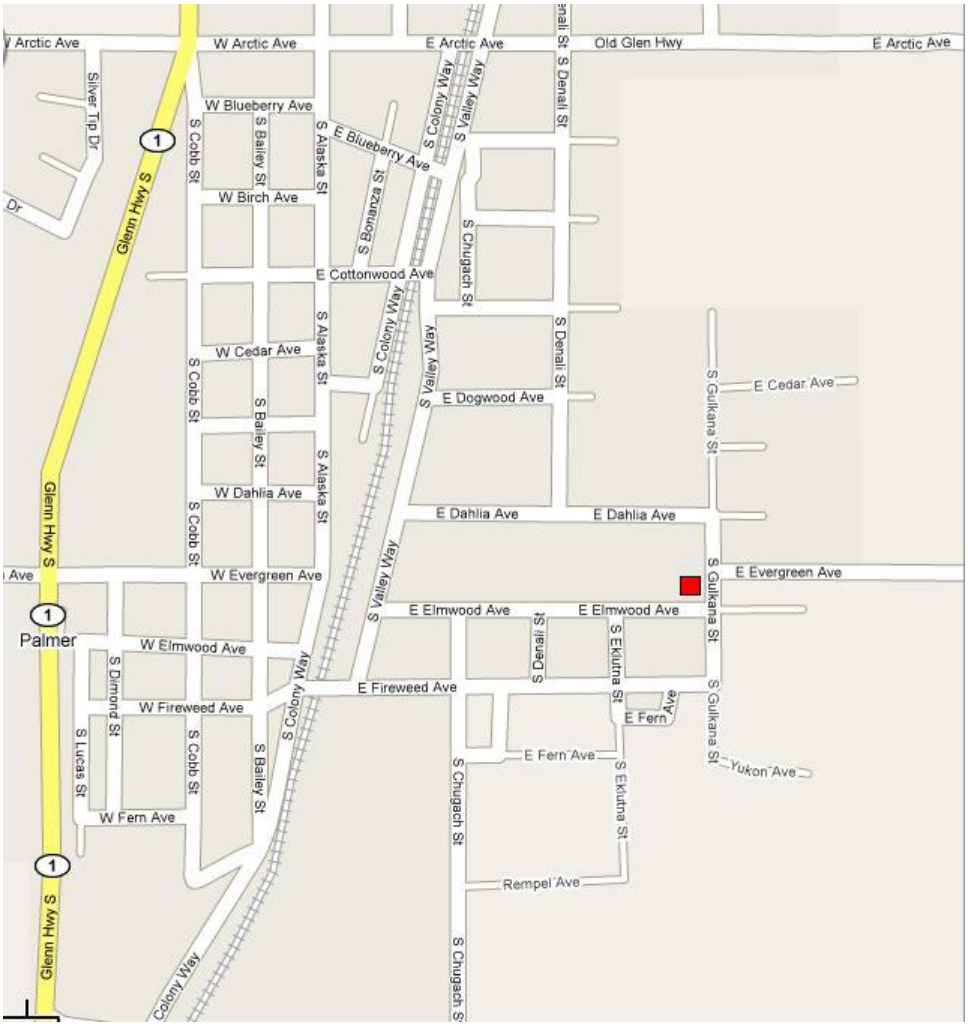


Figure 5.3:1 Map of the City of Palmer. The red square denotes the monitoring site. (Courtesy of Google Maps)

5.3.2 Sources

The major sources of coarse particulate matter 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 rivers are low (spring and fall) dry, windy weather suspends large amounts of silt in the air from the tidal flats and gravel bars. Additionally, within 8km (5 miles) is one small paved airport (activity unknown but expected to be light), a dirt-track motor raceway, farmland and recreation areas along the Matanuska River basin. Sources of fine particulate matter 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:

- $PM_{2.5}$, PM_{10}, PM_{Coarse} (SPM) – One MetOne BAM1020 $FRM_{2.5}$. This includes one BAM1020 for continuous monitoring of PM_{10} and one BAM1020 for continuous monitoring of $PM_{2.5}$ and give real time data for evaluating the Air Quality Index.
- Meteorological sensors for wind speed, wind direction, and ambient temperature.

5.3.4 Siting

The continuous particulate 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 coarse particulate from airborne glacial silt raised by high winds on the Knik and Matanuska river beds, as well as measure exposure to fine particulate matter from vehicular exhaust, wood smoke from residential heating and forest fires and then compare the emissions coarse versus fine particulates for PM difference. Photographs of the Palmer site are presented in Figure 5.3:2.

5.3.5 Traffic

All main roads in 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, http://www.dot.state.ak.us/stwdplng/mapping/trafficmaps/2009/Central/matsu09.pdf

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 the Station 61 Fire Station 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 predominant 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.

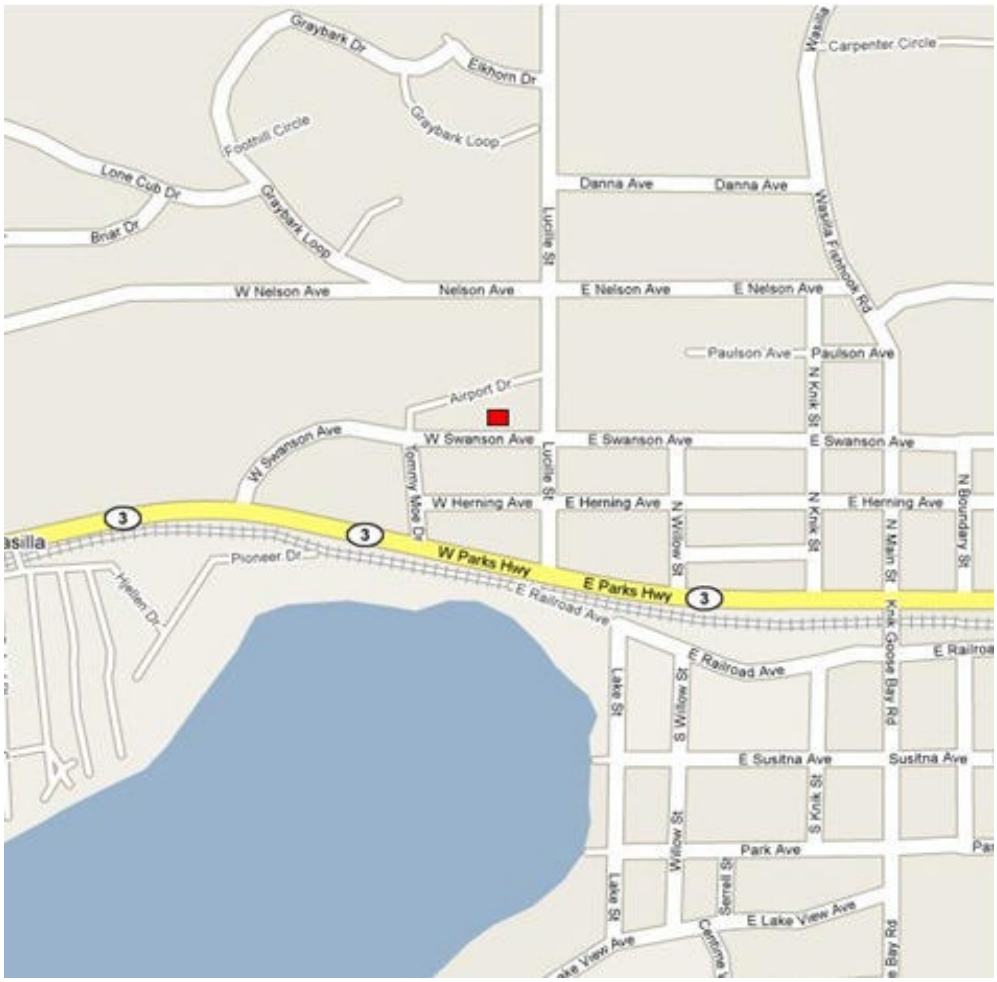


Figure 5.4:1 Map of the City of Wasilla. The red square denotes the monitoring site. (Courtesy of Google Maps)

5.4.2 Sources

The major sources of coarse particulate matter 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 fine particulate matter include residential wood smoke, vehicular exhaust, and forest fires.

5.4.3 Monitors

The Wasilla Site is currently equipped with:

- PM $_{2.5}$, PM_{10}, PM_{Coarse}, (SPM) – One MetOne BAM1020 $FRM_{2.5}$. This includes one BAM1020 for continuous monitoring of PM_{10} and one BAM1020 for continuous monitoring of $PM_{2.5}$ and give real time data for evaluating the Air Quality Index.
- $PM_{2.5}$ (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 coarse particulate from airborne road dust, glacial loess raised by high winds on exposed ground and river beds, as well as measure exposure to fine particulate matter from vehicular exhaust, wood smoke from residential heating and forest fires and then compare the emissions course versus fine particulates. 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 per day. The average daily traffic for the nearest traffic count along Lucille Street is 7,900 vehicles per day.[4]

[4] [4]State Department of Transportation and Public Facilities, 2009 traffic maps, http://www.dot.state.ak.us/stwdplng/mapping/trafficmaps/2009/Central/matsu09.pdf

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 2012 Air Monitoring Network Plan

Chapter 6 – Noatak Lead Monitoring

Prepared by:

State of Alaska Department of Environmental Conservation
Division of Air Quality
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6 NOATAK LEAD MONITORING SITE

6.1 General Information

The EPA established the original NAAQS for lead in 1978 at 1.5 micrograms per cubic meter ($\mu g/m^3$). Between 1978 and now, more than 6000 studies have repeatedly shown the deleterious health effects from exposure to lead in the environment. Of primary importance is the finding that lead can cause neurological defects and learning disabilities in children at lower levels than previously thought. Low levels of lead can result in decreases in IQ and memory, slower learning and changes in behavior. On October 15, 2008 the EPA revised the NAAQS for lead from 1.5 $\mu g/m^3$ to 0.15 $\mu g/m^3$. As a requirement under the revised NAAQS, the EPA required monitoring to be conducted in all of the states to ascertain compliance with the new standard.

The overall objective of the monitoring program in the Native Village of Noatak is to determine Alaska's compliance status with the October 15, 2008 revision to the NAAQS for lead. The Red Dog Mine is the only entity in the state of Alaska that has the potential to emit over one ton of lead per year and; therefore, requires a source-oriented monitoring site under the revised NAAQS. The mine is located in a remote area of northwestern Alaska in the Northwest Arctic Borough which has an area of 40,762 square miles or about the size as the state of Indiana. The ambient air boundary of mine is located in extremely rugged terrain with no road access. The closest population center to the mine is Noatak, a village of approximately 514 residents[1] located approximately 30 miles to the south. Figure 6.1:1 is a satellite image of the Northwest Arctic Borough showing Noatak and other villages in relation to the Red Dog Mine.

Area temperatures in the winter range from -45°F to 25°F and in the summer, 25°F to 75°F.

The samples are collected by drawing ambient air, at a known volume and rate, through a glass fiber filter. Any dust or particulate matter in that volume of air is captured onto the filter. Samples are collected over a 24-hour period. Samples are collected in accordance the EPA National Ambient Air Monitoring schedule. The airborne dust is referred to as total suspended particulate (TSP) matter. The samples are shipped to Anchorage for laboratory analysis to determine the lead (Pb) content of the airborne dust collected on the filter. The sampling and analysis method is referred to as TSP-Pb.

The sampling program in Noatak began in January 2010. The Alaska Department of Environmental Conservation, Air Quality Division staff was conducting the sampling with the assistance of local site operators contracted through the Native Village of Noatak IRA. Near the end of the second quarter (June 2010), the site operators decided not to continue with the sampling effort and the Native Village of Noatak IRA decided to discontinue the contract with DEC. No further samples were collected for the remainder of 2010. DEC has continued to search for a villager to act as independent contractor and restart the sampling program but to date has not been successful. The search is on going and DEC hopes to restart the program during the summer of 2011.

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

Figure 6.1:1: Satellite image of the Northwest Arctic Borough area. The stars indicate Noatak, the Red Dog Mine, and other area villages. (Courtesy of Google Maps)

6.2 Native Village of Noatak Site - Northwest Arctic Borough

Noatak, Alaska **AQS ID N/A**
Parameters: TSP *Pb* **Established: January 15, 2010**

6.2.1 Site Information

Currently there is one collocated State and Local Air Monitoring Systems (SLAMS) site in Noatak, Alaska located near the center of the village. The site coordinates are: latitude 67° 34.2' north (67.5701), longitude 162 °, 58.1' west (-162.9680). Site elevation is approximately 26 meters (85 feet) above sea level.

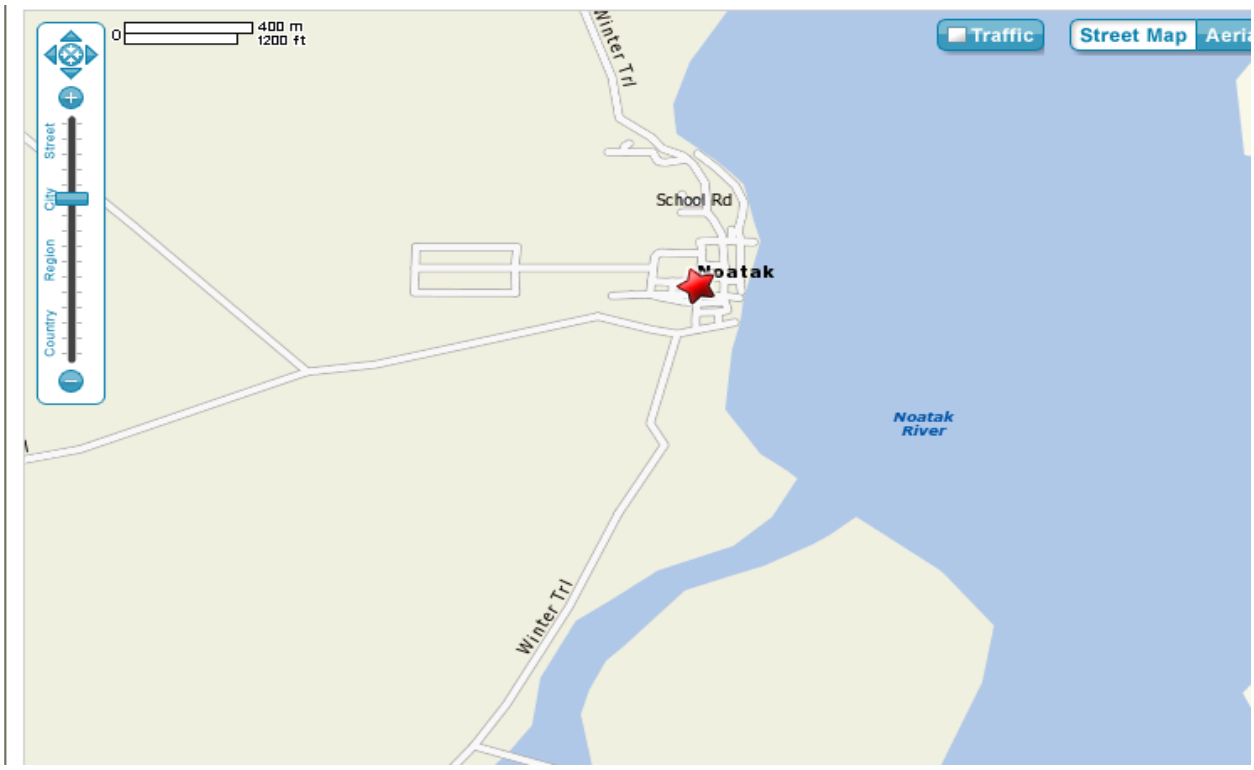


Figure 6.2:1 shows the map location of the Noatak monitoring site. (Courtesy of Google Maps)

6.2.2 Sources

Sources of particulate matter containing lead that may impact this site would be fugitive dust transported over a great distance from the Red Dog Mine or from wind-blown soils with naturally occurring lead. The Noatak River feeds out of the Brooks Range depositing fine glacial silt throughout the meandering river basin. During times when the river is low (spring and fall) dry, windy weather suspends large amounts of silt in the air resulting with wind-blown dust events. Other sources of air-borne dust result from trucks and 4-wheeler all terrain vehicles run over unpaved village roads. Sources of fine particulate matter that may contain lead are engines which still burn leaded fuel like piston-engine aircraft. As with other communities in Alaska, strong wintertime temperature inversions increase air pollution concentrations.

6.2.3 Monitors

The Noatak monitoring site is currently equipped with:

- TSP-*Pb* (SLAMS) – Two General Metal Works TSP high-volume samplers, equipped with electronic mass flow controllers, and operated on a 1-in-6 day sampling schedule.

6.2.4 Siting

The manual operated samplers are located on a scaffolding platform. All inlets are at a height of approximately 3 meters (9-10 feet) above the ground. There is uninterrupted airflow around the

inlets. The platform was expanded in the summer of 2010 to meet siting criteria for collocated samplers.

The monitoring objective of this site is to measure the lead content of total suspended particulate. Photographs of the Noatak site are presented in Figure 6.2.2.

6.2.5 Traffic

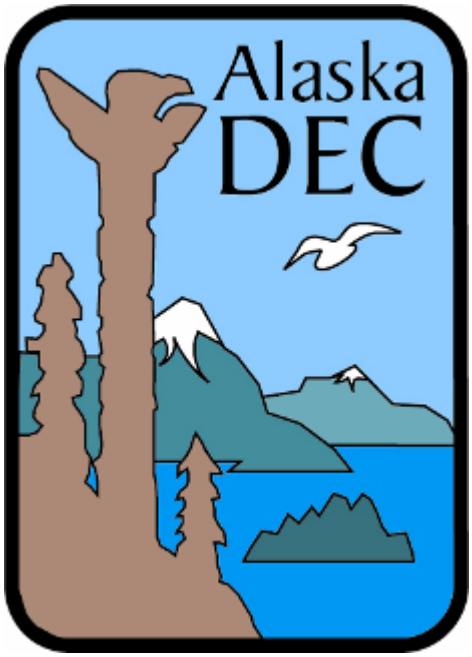
All the roads in the village are unpaved. Average daily traffic for area roads is not known but is a mixture of automobiles, trucks, but mostly four wheeled all terrain vehicles (ATVs). In the wintertime the traffic is mostly snow machines.

Figure 6.2:1: Photographs of the Noatak Site

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

Alaska's 2012 Air Monitoring Network Plan

Chapter 7 – Seward



Prepared by:

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7. SEWARD MONITORING SITES

7.1. General Information

Seward, Alaska is a small city situated at the head of Resurrection Bay on the Kenai Peninsula. Founded in 1903 as the marine terminus for what is now the Alaska Railroad, Seward is a year-round, deep-water, ice-free port providing an entry point and transportation link for moving products, materials, and people to the State's interior and major population centers. Seward also serves as a terminal for exporting Alaska's resources to international locations along the Pacific Rim. The Seward Highway, completed in 1951, connects Seward to the Sterling Highway which runs to the remainder of the Kenai Peninsula. The Seward Highway then turns north over Turnagain Pass and into Anchorage. In addition to transportation, Seward supports a major commercial fishing industry and maintains an industrial center for marine vessel servicing. Because of the natural scenic beauty of the Chugach Mountains and Resurrection Bay, Seward has become a world renowned tourist destination offering day cruises into the Kenai Fjords National Park, hiking, kayaking, wildlife viewing, and sports fishing. From late spring to early fall, Seward serves as a major destination for the cruise ship industry.

The population of the City of Seward is 2,693 with another 2,114 residents living in the adjacent areas of Bear Creek, Lowell Point, and Primrose[1]. Located at the end of Resurrection Bay, Seward is surrounded by high mountains on both sides of the bay. Retreating glaciers and streams fed by the Harding Icefield have deposited glacial debris and alluvial soils with a high percentage of fine particles (glacial silt). The annual average temperature for Seward is 39.9°F with an average maximum temperature of 62.3°F in July and an average minimum temperature of 20.3°F in January. The average annual precipitation is 68.1 inches per year with an annual snowfall of 83.1 inches[2]. Seward can only be characterized as a windy city. The predominant wind directions are north/south, with the greater percentage from the north. This follows with the alignment of the high mountain ridges on either side of the fjord. For the period from May 2010 through April 2011, the average wind speed was 8.3 mph with the highest sustained wind speed at 39 mph recorded in January. The highest recorded gusting wind was 56 mph recorded in November[3]. Figure 7.1:1 presents a satellite image of the Seward area showing the City location in relative to Resurrection Bay and the ridges of either side of the fjord.

The air quality monitoring program in Seward was established in January 2011 to evaluate the ambient air concentration of wind-blown dust categorized as particulate matter equal to or less than 10 micrometers (PM_{10}). The monitoring program was prompted by mounting complaints from local residents received by City officials and DEC over the last several years. The concern was not only wind-blown dust from natural sources but also coal dust from the Seward Coal Terminal, which stockpiles large quantities of coal for export to locations along the Pacific Rim. In 2010, the City requested assistance from DEC to establish a monitoring program to evaluate the dust levels and determine if further control strategies were necessary. The monitoring program is a cooperative effort between the City of Seward, the Qutekcak Native Tribe (QNT),

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

[2] Western Regional Climate Center, Period of Record: September 1949 to December 2005. wrcc@dri.edu

[3] Historical wind data for May 2010 - April 2011 was obtained from Weather Underground, http://www.wunderground.com/history/airport/PAWD/2010/5/1/MonthlyHistory.html

the Alaska Native Tribal Health Consortium (ANTHC) and DEC. The City provided the land and access to the monitoring sites, QNT is providing the site operators, ANTHC provided funding for the site installations and site operators, and DEC is providing the sampling equipment, materials, laboratory services, reporting, and technical oversight.

The monitoring program consists of a network of three sites. The three sites were selected to represent the overall air quality for the City of Seward. Designated as special purpose monitors (SPM), the sites will measure air quality on a neighborhood scale. One site is located in the downtown district, another located downwind of commercial and industrial activities of the Seward Coal Terminal and small boat harbor, and a third in a residential area near the Seward High School/Middle School Complex. The monitoring program will collect at least 12 months of valid data, operating on an EPA 1-in-6 day sampling schedule. The site locations are shown in Figure 7.1:2. More detailed information on the site descriptions are provided in the following sections.

Figure 7.1:1 Satellite Image of terrain surrounding Seward, Resurrection Bay, and the fjord. (Courtesy of Google Maps)

Figure 7.1:2 Satellite image of the Seward monitoring sites. The red squares indicate the locations. (Courtesy of Google Maps).

7.2. *Seward Community Library Site*

Seward Community Library, 238 5th Avenue **AQS ID n/a**

Parameters: PM_{10} **Established: January 13, 2011**

7.2.1. SITE INFORMATION

This monitoring site is located in the Seward Downtown district at the southeast corner of 5th Avenue and Adam Street. The site coordinates are latitude 60° 06' 08.90" North (60.102472), longitude 149° 26' 19.70" West (–149.438806), and 13 meters (43 feet) above sea level. This site has two collocated mechanical high volume (Hi-Vol) samplers. The PM_{10} concentrations collected from the collocated samplers will be statistically compared to evaluate data precision

for the Seward network. Figure 7.2:1 is a satellite image of the Seward downtown district showing the location of the Library Site.

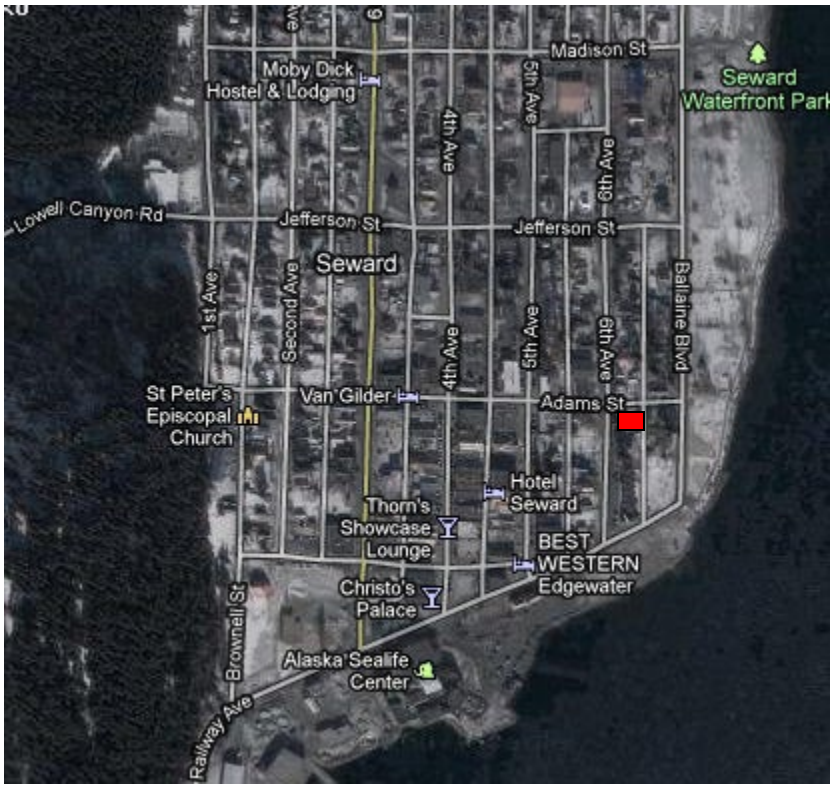


Figure 7.2:1 Satellite image of the Seward Downtown District: The red square denotes the location of the Seward Community Library site. (Courtesy of Google Maps)

7.2.2. SOURCES

The major sources of coarse particulate matter impacting this site are anticipated to be wind-blown dust entrained into the air from glacial silt in the local soil (open un-vegetated areas), breakdown of road surfaces, road sanding materials used in the winter, stockpiles of materials such as aggregate for road maintenance, and the Seward Coal Terminal. The library site is located approximately 2.2 kilometers (1.4 miles) from the Seward Coal Terminal stockpiles.

7.2.3. MONITORS

The Library site is currently equipped with:

- PM_{10} (SPM) – Two Thermo Environmental Instrument (formerly General Metal Works) Hi-Vol samplers, operated on the EPA 1-in-6-day sampling schedule.

7.2.4. SITING

The manually operated equipment is located on the roof of the Seward Community Library. All inlets are at a height of approximately four meters (13 feet) above the ground level on 5th

Avenue. There is uninterrupted airflow around the inlets. The monitoring objective of this site is to measure airborne dust. Photographs of the Library site are presented in Figure 7.2:2.

7.2.5. TRAFFIC

Traffic in the Seward downtown district is relatively light. Annual average daily traffic counts range from 2,732 vehicles per day along 3rd Avenue to 640 vehicles per day along Railway Avenue. All the main streets and commercial parking lots are paved. The alleyways between blocks are unpaved.

Figure 7.2:2 Photographs of the Seward Community Monitoring Site with Collocated Samplers

From the North looking toward the samplers	From the North-northeast looking toward the samplers	From the South-southwest looking toward the samplers	From the West looking toward the samplers
			
Looking to the North from the samplers	**Looking to the East from the samplers**	**Looking to the South from the samplers**	**Looking to the West from the samplers**
			

7.3. Ballaine Boulevard Site

Ballaine Boulevard Lift Station **AQS ID n/a**
Parameters: PM10 **Established: January 13, 2011**

7.3.1. SITE INFORMATION

The Ballaine Boulevard monitoring site is located near the beach adjacent to the Seward City campgrounds. The monitoring platform and sampler were installed within the fence line of the Ballaine Boulevard Lift Station. The site coordinates are latitude 60° 06' 43.87" North (60.112186), longitude 149° 26' 13.12 West (-149.436978). The elevation for the site is approximately 6 meters (20 feet) above mean sea level. Figure 7.3:1 shows the location of the monitoring site.

Figure 7.3:1 Satellite image of the Ballaine Boulevard monitoring site and surrounding area - The red square denotes the monitoring site location. (Courtesy of Google Maps)

7.3.2. SOURCES

The major sources of coarse particulate matter impacting this site are anticipated to be wind-blown dust entrained into the air from glacial silt in the local soil, breakdown of road surfaces, road sanding materials used in the winter, stockpiles of materials such as aggregate for road maintenance, and the Seward Coal Terminal. The site is surrounded by un-vegetated ground in the City campground and other adjacent lots. The monitoring site is located downwind of the Seward Coal Terminal at a distance of 1.33 kilometers (0.8 miles).

7.3.3. MONITORS

The Ballaine Boulevard site is currently equipped with:

- PM_{10} (SPM) – One Thermo Environmental Instrument (formerly General Metal Works) Hi-Vol sampler operated on the EPA 1-in-6-day sampling schedule.

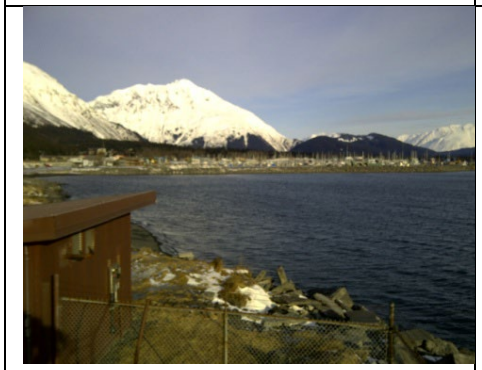
7.3.4. SITING

The sampler inlets are at a height of approximately three meters (9 feet) above the ground. There is uninterrupted airflow around the inlet. The monitoring objective of this site is to measure coarse particulate from airborne dust. Photographs of the Ballaine Boulevard site are presented in Figure 7.3:2.

7.3.5. TRAFFIC

All main streets in the immediate area of the monitoring site are paved; however, local parking lots for the adjacent camping area are not. Annual average daily traffic for that section of Ballaine Boulevard is 1600 vehicles per day.

Figure 7.3:2 Photographs of the Ballaine Boulevard Monitoring Site

Looking from the North toward the sampler	Looking from the East toward the sampler	Looking from the South toward the sampler	Looking from the South-southwest toward the sampler
			
Looking from the sampler to the North	**Looking from the sampler to the East**	**Looking from the sampler to the South**	**Looking from the sampler to the West**
			

7.4. *Seward Mountain Manor Site*

Seward Mountain Manor 2203 Oak Street **AQS ID n/a**
Parameters: PM10 **Established: January 13, 2011**

7.4.1. SITE INFORMATION

This monitoring site is located at Mountain Manor, a senior nursing and assisted living facility owned and operated by Providence Health & Services. The sampler is located on the roof of the main building of the complex. The site coordinates are latitude 60° 07' 54.24" North (60.131733), longitude 149° 26' 35.28" West (-149.443133). The average elevation for Mountain Manor is approximately 43 meters (140 feet) above mean sea level. The monitoring site is located in a residential area of Seward on the hillside above the Seward High School/Middle School and upwind of the Seward Coal Terminal. Figure 7.4:1 is a satellite image of the monitoring site and surrounding area.

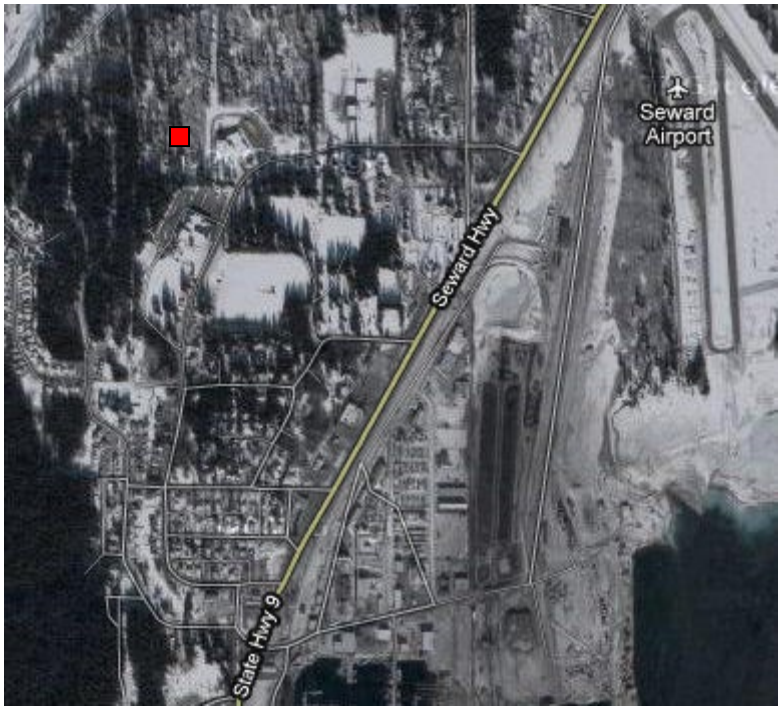


Figure 7.4:1 Satellite image of the Mountain Manor monitoring and surrounding area - The red square denotes the monitoring site location. (Courtesy of Google Maps)

7.4.2. SOURCES

The major sources of coarse particulate matter impacting this site are wind-blown dust from unpaved areas, traffic dust, and glacial silt from river beds feeding into 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 fine particulate matter include residential wood smoke, vehicular exhaust, and forest fires.

7.4.3. MONITORS

The Mountain Manor site is currently equipped with:

- PM_{10} (SPM) – One Thermo Environmental Instrument (formerly General Metal Works) Hi-Vol sampler operated on the EPA 1-in-6-day sampling schedule.

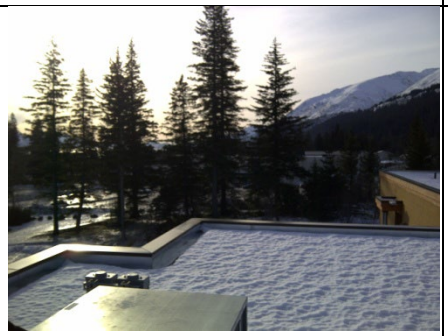
7.4.4. SITING

The sampler inlet is 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 coarse particulate from airborne dust. Photographs of the Mountain Manor Site are presented in Figure 7.4:2.

7.4.5. TRAFFIC

The average daily traffic for Oak Street is not specifically known but the nearest traffic count site along Swetman Avenue is 160 vehicles per day. The Seward High School and Middle School complex are down the hillside from the Mountain Manor along Swetman Avenue. Many of the roads in the immediate area of the monitoring site are not paved, including Oak Street; however, the drive and parking lot for the Mountain Manor are paved. During the school year there is bus and other vehicle traffic for student drop off and pick up.

Figure 7.4:2 Photographs of the Mountain Manor Monitoring Site

Looking from the North toward the sampler	Looking from the East toward the samplers	Looking from the South toward the sampler	Looking from the West toward the sampler
			Not available because of the sampler's close proximity to the edge of the roof
Looking from the sampler toward the North	**Looking from the sampler toward the East**	**Looking from the sampler toward the South**	**Looking from the sampler toward the West**
			

Alaska's 2012 Air Monitoring Network Plan

Appendices and Glossary

Prepared by:

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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

In the 2000 network assessment the Garden Site was stated to be "micro" scale based on the probes vicinity to the roadway. After further review of Appendix E and Appendix D of EPA 40 CFR 58, EPA-450/3-75-077, and further discussion within DEC, we are now classifying this site as "neighborhood" scale.

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
TAC (Peger Road)	Neighborhood	2.5	> 60	222	7651	None
North Pole	Neighborhood	4	>20	~ 300 to Richardson Highway	10,400	Several to east > 30m
Floyd Dryden	Neighborhood	6	Furnace flue @ 20m, 4m penthouse @ 15m	65	12,770	12 meter tall @ 25m away

APPENDIX C:

Network Site Summary

State Code	County Code	Site ID	Parameter Code	POC	Method Code	Unit Code	Frequency	Parameter Description	Instrumentation	City Name	Street Address	Notes
02	020	0018	88101	1	117	105	1/6	Pm2.5 - Local Conditions	Partisol 2000	Anchorage	TRINITY CHRISTIAN CHURCH/3000 E 16TH	
02	020	0018	81102	1	063	001	1/6	Pm10 Total 0-10um Stp	Anderson Hi-Vol	Anchorage	TRINITY CHRISTIAN CHURCH/3000 E 16TH	
02	020	0018	42101	1	054	007	cont	Carbon Monoxide	Thermo 48C	Anchorage	TRINITY CHRISTIAN CHURCH/3000 E 16TH	
							cont	Ozone	Teledyne AP1 400E	Anchorage	TRINITY CHRISTIAN CHURCH/3000 E 16TH	Not (yet) reported to AQS
							cont	Pm2.5 - Local Conditions	Met One BAM 1020X	Anchorage	TRINITY CHRISTIAN CHURCH/3000 E 16TH	Not reported to AQS
							cont	Pm10 – Local Conditions	Met One BAM 1020X	Anchorage	TRINITY CHRISTIAN CHURCH/3000 E 16TH	Not reported to AQS
02	020	0044	81102	2	063	001	1/6	Pm10 Total 0-10um Stp	Anderson Hi-Vol	Anchorage	3335 E TUDOR RD ANCHORAGE AK 99508	
02	020	0044	85101	1	063	105	1/6	Pm10 - Lc	Anderson Hi-Vol	Anchorage	3335 E TUDOR RD ANCHORAGE AK 99508	
							cont	Pm10 – Local Conditions	Met One BAM 1020X	Anchorage	3335 E TUDOR RD ANCHORAGE AK 99508	Not reported to AQS
02	020	0048	42101	1	054	007	cont	Carbon Monoxide	Thermo 48C	Anchorage	3201 TURNAGAIN STREET	
02	020	0050	42101	1	054	007	cont	Carbon Monoxide	Thermo 48C	Anchorage	727 L STREET	
02	020	0050	81101	3	170	105	cont	Pm2.5 - Local Conditions	Met One BAM 1020X	Anchorage	727 L STREET	
02	020	0050	85101	1	122	105	cont	Pm10 – Local Conditions	Met One BAM 1020X	Anchorage	727 L STREET	
02	020	1004	85101	1	063	105	1/6	Pm10 - Lc	Anderson Hi-Vol	Eagle River	PARKGATE-EAGLE RIVER, EAGLE RIVER	
02	020	1004	42101	1	054	007	cont	Carbon Monoxide	Thermo 48C	Eagle River	PARKGATE-EAGLE RIVER, EAGLE RIVER	
			81101	3	170	105	cont	Pm2.5 - Local Conditions	Met One BAM 1020X	Eagle River	PARKGATE-EAGLE RIVER, EAGLE RIVER	
			85101	1	122	105	cont	Pm10 – Local Conditions	Met One BAM 2010X	Eagle River	PARKGATE-EAGLE RIVER, EAGLE RIVER	
02	020	1004	81102	1	063	001	1/6	Pm10 Total 0-10um Stp	Anderson Hi-Vol	Eagle River	PARKGATE-EAGLE RIVER, EAGLE RIVER	
02	090	0002	42101	1	054	007	cont	Carbon Monoxide	Thermo 48C	Fairbanks	FEDERAL BLDG/2ND & CUSHMAN	
02	090	0010	88101	1	117	105	1/3	Pm2.5 - Local Conditions	Partisol 2000	Fairbanks	STATE OFFICE BUILDING/675 7TH AVE	

State Code	County Code	Site ID	Parameter Code	POC	Method Code	Unit Code	Frequency	Parameter Description	Instrumentation	City Name	Street Address	Notes
02	090	0010	88101	2	117	105	1/6	Pm2.5 - Local Conditions	Partisol 2000	Fairbanks	STATE OFFICE BUILDING/675 7TH AVE	
02	090	0010	88501	3	731	105	cont	Pm2.5 - Local Conditions	Met One BAM FEM	Fairbanks	STATE OFFICE BUILDING/675 7TH AVE	
02	090	0010	88502	6	810	105	1/3	Pm2.5 - Local Conditions	Met One SASS	Fairbanks	STATE OFFICE BUILDING/675 7TH AVE	
							1/3	Pm2.5 - Local Conditions	URG Speciation Monitor	Fairbanks	STATE OFFICE BUILDING/675 7TH AVE	
							1/3	Pm2.5 - Local Conditions	Partisol 2000	Fairbanks	TAC/3175 PEGER RD	Not reported to AQS
							cont	Pm2.5 - Local Conditions	Met One BAM 1020	Fairbanks	TAC/3175 PEGER RD	Not reported to AQS
							1/3	Pm2.5 - Local Conditions	Met One SASS	Fairbanks	TAC/3175 PEGER RD	Not reported to AQS
							cont	Black Carbon	Magee Scientific Aethalometer	Fairbanks	TAC/3175 PEGER RD	Not reported to AQS
							cont.	Wind Speed/ Direction	RM Young 05305 Windbird	Fairbanks	TAC/3175 PEGER RD	Not reported to AQS
								Pm2.5 Total 0-10um Lo	Met One BAM 1020X	Fairbanks	809 PIONEER ROAD (NCORE)	Not reported to AQS
								Pm10 Total 0-10um lo	Met One BAM 1020X	Fairbanks	809 PIONEER ROAD (NCORE)	Not reported to AQS
							1/3	Pm2.5 - Local Conditions	Partisol 2000	North Pole	NORTH POLE ELEMENTARY SCHOOL 250 SNOWMAN LANE	Not reported to AQS
							cont	Pm2.5 Raw Data	Thermo TEOM/FTMS	North Pole	NORTH POLE ELEMENTARY SCHOOL 250 SNOWMAN LANE	Not reported to AQS
							cont	Black Carbon	Magee Scientific Aethalometer	North Pole	NORTH POLE ELEMENTARY SCHOOL 250 SNOWMAN LANE	Not reported to AQS
							1/3	Pm2.5 - Local Conditions	Met One SASS	North Pole	NORTH POLE ELEMENTARY SCHOOL 250 SNOWMAN LANE	Not reported to AQS
								Wind Speed/ Direction	Met One 50.5H Sonic Anemometer	North Pole	NORTH POLE ELEMENTARY SCHOOL 250 SNOWMAN LANE	Not reported to AQS
02	110	0004	81101	3	170	105	cont	Pm2.5 Local Conditions	Met One BAM FEM	Juneau	F DRYDEN JR HIGH/MENDENHALL LOOP RD	
02	110	0004	85101	1	126	105	1/6	Pm10 – Local Conditions Primary	Partisol 2000	Juneau	F DRYDEN JR HIGH/MENDENHALL LOOP RD	
02	170	0008	88501	1	122	105	cont	Pm2.5 Total 0-10um Lo	Met One BAM	Mat-Su Valley	HARRISON COURT/BUTTE	Seasonally Switched
02	170	0008	85101	1	122	105	cont	Pm10 Total 0-10um lo	Met One BAM	Mat-Su Valley	HARRISON COURT/BUTTE	Seasonally Switched
02	170	0008	88101	1	117	105	1/3	Pm2.5 - Local Conditions	Partisol 2000	Mat-Su Valley	HARRISON COURT/BUTTE	

State Code	County Code	Site ID	Parameter Code	POC	Method Code	Unit Code	Frequency	Parameter Description	Instrumentation	City Name	Street Address	Notes
							cont	Pm2.5 - Local Conditions	Met One BAM 1020X	Mat-Su Valley	PALMER	Not reported to AQS
							cont	Pm10 – Local Conditions	Met One BAM 1020X	Mat-Su Valley	PALMER	Not reported to AQS
							cont	Pm2.5 - Local Conditions	Met One BAM 1020X	Mat-Su Valley	WASILLA	Not reported to AQS
							cont	Pm10 – Local Conditions	Met One BAM 2010X	Mat-Su Valley	WASILLA	Not reported to AQS
							1/6	Pm2.5 - Local Conditions	Partisol 2000	Mat-Su Valley	WASILLA	Not reported to AQS
							cont	Ozone	Teledyne AP1 400E	Mat-Su Valley	WASILA	Not (yet) reported to AQS
							1/6	TSP-Pb Stp	General Metal Works High-Vol	Noatak	NOATAK	Not (yet) reported to AQS
							1/6	TSP-Pb Stp	General Metal Works High-Vol	Noatak	NOATAK	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.

TEOM – FDMS: Thermo Election Inc. Tapered Element Oscillating Microbalance Filter Dynamic Measurement System continuous monitoring sampler. This sampler can sample for coarse or fine particulate matter.

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 2010 -2008

Alaska Monitoring Design Values for $PM_{2.5}$ as µg/m^3

$PM_{2.5}$ Monitoring Sites	98th Percentile			Weighted Mean			2010-2008 Design Value	
	2010	2009	2008	2010	2009	2008	24-hour	Annual
Trinity Christian Church	23.2	23.9	17.3	6.1	7.1	5.5	21	6.3
DHHS Site	17.2	15.3		4.8	5.3		16	5.0
Parkgate Site	17.0	22.4		5.5	6.3		20	5.9
Harrison Court (Butte) Site	37.5	28.8	30.8	7.5	7.8	6.2	32	7.2
State Office Building Site	51.8	51.0[1]	46.7	12.5	11.5	11.3	50	11.7
Floyd Dryden Site	27.3	29.0	30.2	8.8	7.0	7.1	29	7.6
South Gulkana Street	13.6			4.9			14	4.9

[1] The 2009 $PM_{2.5}$ 98th percentile value, and the 2008-10 design value (DV), provided in the tables for the Fairbanks State Office Building Site are contingent on EPA concurring on the five high flagged exceptional event days for 2009. Presently, without EPA's approval of these exceptional events, the 2009 98th percentile value for this site is 89.7 µg/m^3, and the 2008-10 DV is 63 µg/m^3.

APPENDIX F

NCORE Self Assessment Form

NCore Readiness Self-Assessment for State/local/Tribal Agencies

Agency Name: ADEC **Date Prepared:** May 4, 2011 **By:** Bob Morgan

A. Network Design

a. Proposed NCore Station #1 ___NEW SITE X EXISTING SITE AQS # AQS # Not Established
b. Proposed NCore Station #2 ___NEW SITE ___EXISTING SITE AQS #_____
c. Proposed NCore Station #3 ___NEW SITE ___EXISTING SITE AQS #_____

	Item	Criteria	Status	Next Steps
1	Urban or Rural	Largest MSA(s) covered by urban station.	Determined – Fairbanks, AK	
2	Scale of Representation	Neighborhood X Urban __ Regional __ Other__	Neighborhood	Neighborhood scale or larger as recommended.
3	Population Oriented	Yes X No __		Population oriented monitoring as recommended.
4	Proximity to local emissions sources	No biasing local sources within 500 meters for urban stations. No biasing sources or large urban population centers within 50 km for rural stations.	Site established in down-town Fairbanks where $PM_{2.5}$ exceedances have been recorded	
5	Suitability for meteorological measurements	Distance from obstructions is 10x height of obstruction above station. See Volume IV: Meteorological Measurements Version 2.0(Final)	A 10 meter tower has been installed adjacent to the new monitoring shelter	Selected site in an open area, any influence from distance obstructions are anticipated to be insignificant
6	Information (including site photographs) provided for AMTIC NCore web site	Photographs in 8 cardinal directions needed.	Photos of existing site provided in the 2012 Monitoring Plan, Section 3.4	
7	Station Coordinates	Determined by GPS	latitude 64.845690 longitude -147.727413	
8	Site visited by EPA in past 3 years	Meets applicable Appendix D and E criteria.	No EPA inspections to date.	Schedule an inspection once the new shelter and instrumentation have been installed.

NCore Readiness Self-Assessment for State/local/Tribal Agencies

Agency Name: ADEC **Date Prepared:** May 4, 2011 **By:** Bob Morgan

	Item	Criteria	Status	Next Steps
9	Network leveraging	Collocation with other networks encouraged: STN__ Supplemental CSN__ NATTS __ CASTNET __ IMPROVE __ NADP __ PAMS __ Other __	Other network location not readily available	
10	Applicable site fields updated in AQS including coordinates	Consider setting additional monitor type to "Proposed NCore" (station should also be categorized as SLAMS).	Not yet available	
	LOGISTICAL CONSIDERATIONS			
11	Site access	Access for at least five years is suggested.	Site established with new shelter in place to measure $Pm_{10}/PM_{2.5}$ and Met for WS/WD amb Temp, and BP	Installation is currently under way for additional parameters SO_2. NO_Y, NO, O_3, CO, NH_3, $PM_{2.5}$ Speciation, and RH. Anticipated startup in summer 2011.
12	Power requirements and availability	200A service suggested. 240vac service typically needed for a/c. Key power outlets protected by UPS units.	Electrical power in place for new shelter according to bid specs.	
13	Telecommunications	Minimum dial-up service. Broadband service suggested for polling of 1-minute data.	DR DAS web-based system data acquisition in place and operational.	
14	A/C cooling capacity	Minimum 18,000BTU a/c capacity.	New shelter in place to accommodate temperature control issues for Sub-Arctic location	
15	Interior space	Sufficient for minimum of two 19" inner dimension, 6' tall instrument racks and related equipment and accessories, or equivalent shelf space.	New shelter in place, analyzers to be installed in instrument racks.	Interior design requirements according to bid specs.

NCore Readiness Self-Assessment for State/local/Tribal Agencies

Agency Name: ADEC **Date Prepared:** May 4, 2011 **By:** Bob Morgan

	Item	Criteria	Status	Next Steps
16	Exterior space (roof and accompanying platforms)	Allow for: a) 1m spacing of low-volume PM sampler inlets – up to seven* required plus PEP audit sampler. b) 1m spacing between low-volume PM sampler inlets and gas manifold cane or Teflon tubing. Facilitate usage of TTP audit vehicle or trailer.	Design features in accordance with bid specs.	
17	10m tower compatibility	Required for meteorological equipment, NO_y converter. Room to drop tower for calibrations and audits.	10 meter in place	

*Notes

NCore Readiness Self-Assessment for State/local/Tribal Agencies

Agency Name: ADEC **Date Prepared:** May 4, 2011 **By:** Bob Morgan

B. REQUIRED PARAMETER/METHODOLOGICAL EVALUATION

d. Proposed NCore Station #1 ___NEW SITE _X EXISTING SITE AQS #_AQS # Not Established__
e. Proposed NCore Station #2 ___NEW SITE ___EXISTING SITE AQS #_____
f. Proposed NCore Station #3 ___NEW SITE ___EXISTING SITE AQS #_____

	Parameter	Existing Measurements Sampling Began	Method	Future Measurements Date Expected	New or Relocated	Notes
1	Ozone			2/1/2011	Teledyne API Model 400E EQOA-0992-087 Purchased new	Year-round operation (not seasonal)
2	Sulfur dioxide			2/1/2011	Thermo Electron Model 43i EQSA-0486-060 Purchased new	High sensitivity
3	Carbon monoxide			2/1/2011	Thermo Electron. Model 48 RFCA-0981-054 Purchased relocated	High sensitivity
4	Nitrogen oxides (NO_Y/NO/NO_2)*			2/1/2011	Thermo Electron. Model 42i-Y RFNA-1289—074 Purchased new	High sensitivity External converter mounted at 10m
5	Lead (Pb)			na	TSP-Pb by ICP-MS	Not required
6	PM2.5 mass	10/29/09	Thermo Electron Partisol 2000 RFPS-0498-117			1-in-3 day FRM/FEM integrated
8	PM2.5 Elemental Carbon	10/29/09	Magee Scientific Aethalometer/BGI 2.5 VSCC			
9	PM10-2.5 mass				Met-One BAM 1020X	Integrated samplers continuous monitor

NCore Readiness Self-Assessment for State/local/Tribal Agencies

Agency Name: ADEC **Date Prepared:** May 4, 2011 **By:** Bob Morgan

	Parameter	Existing Measurements Sampling Began	Method	Future Measurements Date Expected	New or Relocated	Notes
10	PM2.5 speciation				Met-One Super SASS	Details to be provided later on sampling requirements.
11	Wind speed and direction**				New	At 10 m
12	Ambient temperature**				New	At 2 m
	Barometric Pressure				New	At 2 m
13	Relative humidity**				New	At 2-m Planned for installation summer 2011
14	Optional – Vertical wind speed, solar radiation, precipitation, barometric pressure, delta-T for 2-10m.					(Not planned at this time)
15	Optional – Ammonia and nitric acid			4/1/2011	Thermo Electron Model 17i Ammonia Analyzer	Planned for installation summer 2011

Notes

* Although the measurement of NO_y is required in support of a number of monitoring objectives, available commercial instruments may indicate little difference in their measurement of NO_y compared to the conventional measurement of NOx, particularly in areas with relatively fresh sources of nitrogen emissions. Therefore, in areas with negligible expected difference between NOy and NOx measured concentrations, the Administrator may allow for waivers that permit high-sensitivity NO_X monitoring to be substituted for the required NOy monitoring at applicable NCore sites.

** EPA recognizes that, in some cases, the physical location of the NCore site may not be suitable for representative meteorological measurements due to the site's physical surroundings. It is also possible that nearby meteorological measurements may be able to fulfill this data need. In these cases, the requirement for meteorological monitoring can be waived by the Administrator.

NCore Readiness Self-Assessment for State/local/Tribal Agencies

Agency Name: ADEC **Date Prepared:** May 4, 2011 **By:** Bob Morgan

C. **SUPPORTING EQUIPMENT EVALUATION**

a. Proposed NCore Station #1 ___NEW SITE _X EXISTING SITE AQS # AQS # Not Established
b. Proposed NCore Station #2 ___NEW SITE ___EXISTING SITE AQS #_____
c. Proposed NCore Station #3 ___NEW SITE ___EXISTING SITE AQS #_____

	Item	Criteria	Status	Next Steps
1	Calibrator (field)	Suitable for trace-level dilutions, see Appendix A audit concentrations. Capable of automated QC checks. Internal O3 generator – photometer preferred.	Environics Model 9100 Multi-gas calibration with certified ozone generator Purchased	Installation and startup anticipated for summer 2011
2	Calibrator (lab or field)	Suitable for generation of MDL-level concentrations	See note above	Installation and startup anticipated for summer 2011
3	Zero Air Source	Compliant with TAD recommendations. Ultra-pure air cylinder recommended for occasional comparison to zero air source. Capacity for 20+ LPM of dilution air.	Purchased (Teledyne API 701 zero air system)	Installation and startup anticipated for summer 2011
4	Data acquisition system	Digital-capable system	DR DAS web based system in place and operational	
5	Gas cylinder standards	Suitable for trace-level dilutions, see Appendix A audit concentrations, EPA Protocol certifications. Special low-level standards needed for MDL concentrations (CO, SO_2, NO_y)	EPA Protocol Calibration Gases for SO_2, NO_X, and CO with Certificates of Analysis	
6	Meteorological calibration devices	Provide NIST traceability of required meteorological parameters.	Calibration devices in-house	NIST traceability available for temperature devices. Need to investigate NIST traceability for WS/WD.
7	Sampling manifold	Per Appendix E. Residence time <20 seconds, only glass or Teflon materials, probe and monitor inlets acceptable heights.		Sampling manifold to be included with bid package for new monitoring shelter.

8	Auditing equipment	Independent calibrator, zero air source and gas standards compatible with trace level specifications. Independent meteorological and flow standards, it not already available.	Audit equipment already available and NIST traceability of reference devices will be provided.	

D. ORGANIZATIONAL FACTORS

	Item	Criteria	Status	Next Steps
1	Training considerations	Key monitoring personnel have attended OAQPS provided monitoring workshops or equivalent training.		
2	Monitoring station documentation	NCore station(s) described in Annual Monitoring Network Plan.		Included in an addendum to the 2011 network plan. Presented in the appendices for the 2012 network plan..
3	Section 103 funds received and obligated for equipment purchases			Work with EPA Regional contacts.

APPENDIX G

FAIRBANKS NORTH STAR BOROUGH NCORE SITE SELECTION RATIONALE:

The Alaska Department of Environmental Conservation (ADEC) decided to locate the NCore site in Fairbanks, because this community was dealing with the most significant air quality impacts in the state. Locating the additional samplers for the NCore site at the already established PM2.5 SLAMS State Office Building site (SOB) was not an option, because space on the building roof is limited.

In late 2006 and 2007 Gerry Guay, ADEC Air Monitoring and Quality Assurance Program Manager, and Jim Conner, Air Quality Manager for the Fairbanks North Star Borough (FNSB) surveyed the Fairbanks air shed, to evaluate the PM2.5 sources as well as the overall flow patterns governing the downtown area, see Figure 1.

ADEC selected several possible NCORE sites at that time and started a plan to enhance our knowledge the next winter with a moveable site (the RAMS system) to fill in the holes in our knowledge. At the same time ADEC and EPA were also in negotiations regarding the boundaries of the Non-Attainment area. Using the RAMS trailer (about 4 different sites) and additional fixed sites (the Transportation Admin Center on south Peger southwest of downtown, Nordale Elementary School east of downtown, and the RAMS sites-north, west, southeast, and northwest of town) ADEC surrounded the Fairbanks bowl for 2-3 week periods, see Figure 2. In addition FNSB equipped a vehicle with a DataRAM 4000 and made mobile measurements (called the *"sniffer"* vehicle) to verify assumptions about the hot spots and general background areas including the North Pole area and south all the way to Eielson AFB. These surveys and the subsequent met analyses for the definition of the non-attainment area indicated that the downtown Fairbanks area is quite representative for the greater Fairbanks area, and when the NAAQS for PM2.5 was exceeded in Fairbanks, it was exceeded in North Pole as well. That said, the accumulation of smoke can be highly localized in neighborhoods and unhealthy levels can exist in local pockets, and not downtown. To address this FNSB used the *"sniffer"* vehicle to "map" the area with the intention to derive a correlative factor that could be used to estimate the values in the neighborhoods based on the downtown measurements. The correlated emission factor map is a work in progress at this time.

To find the most appropriate site, many factors were considered: the general meteorology, specifically airflow/drainage; the local emission sources such as commercial/industrial and neighborhood; the availability of space and suitable siting criteria such as trees and buildings; logistics such as power, communications, cost of any long term leasing, and access.

ADEC tentatively selected the NCORE location after review of the RAMS data and continued to investigate and confirm the selection with several seasons of *"sniffer"* data. Compilation and analysis of the data suggests for following conclusions:

- East of downtown, ADEC/FSNB found the Nordale Elementary/Hamilton Acres neighborhood site to represent neighborhood solid fuel burning only. However, when

present, the general airflow/drainage moves pollution to the west and into the downtown area.

- This was true of the other sites to the north and to the west of downtown. The sites were only impacted by solid fuel burning and subsequent drainage feeds into the downtown area from the North.

- From the west, again primarily solid fuel pollution from the Goldstream Valley and the community of Ester, both of which drain into the downtown area or South/Southwest through the Wood River/University west down through Watershed Elementary and down the river away from downtown. This air is relatively clean, concentrations on the order of 10 $\mu g/m^3$, and has the effect of diluting pollutant concentrations.

- From the south, ADEC/FSNB located the RAMS trailer between North Pole and Fairbanks. Emissions were attributed to commercial buildings and vehicles; mostly Solid Fuel Burning Devices (SFBDs) that were warming businesses and local emissions from mobile home parks. The general flow is to the west down the river or just south of south Fairbanks.

- Directly south/southwest, at the Transportation Admin Center on South Peger Road, ADEC/FSNB found significant SFBDs as well as mobile source emissions. It was felt that this site would over estimate the mobile sources and was not representative but was a good indication of mobile sources. The Peger Road site, as it turns out, has a similar percentage of SFBD smoke as downtown (~60-70%) but the mobile sources from the busy arterial road is as much as 15-25% and ADEC estimates the downtown mobile sources component at around 5-10%.

- North Pole sites were also considered, but the sites were likely not impacted by industrial emissions. The North Pole industrial sources are located on the west side of town and emissions are transports down the valley, away from North Pole and Fairbanks.

The downtown site is located where the drainage from the north, east, and sometimes the west flow into town. The industrial/commercial activities to the north, east, and sometimes the west will impact monitors at the state office building and the NCORE site. Additionally, the downtown/NCORE sites are the best location to catch emissions from the northeast and east from business that combust used lubricating oil for space heating. The typical airflow diagram below shows the drainage/air flow into the downtown area (Figure 1).

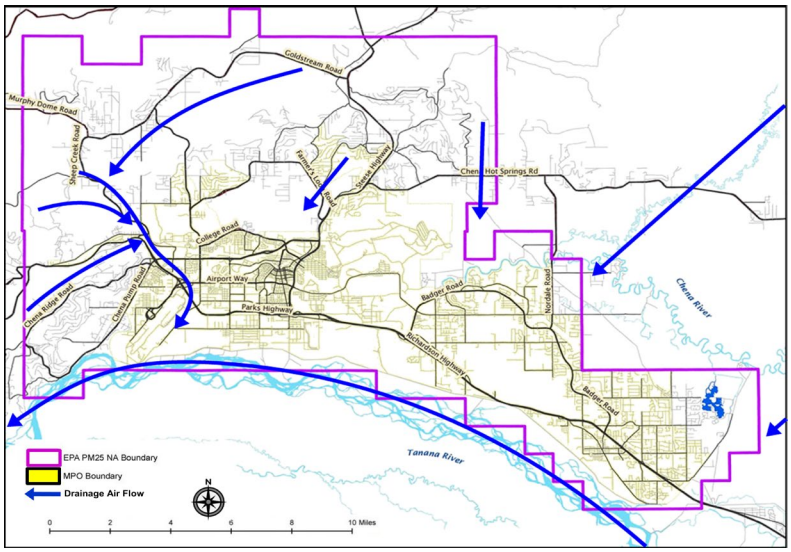

Figure 1: Drainage Flow impacting the non-attainment area

The map in Figure 2 shows all the sites where PM2.5 was measured for 2-3 week periods. The red lines indicate the mobile *"sniffer"* routes that were travelled routinely over a two year period.

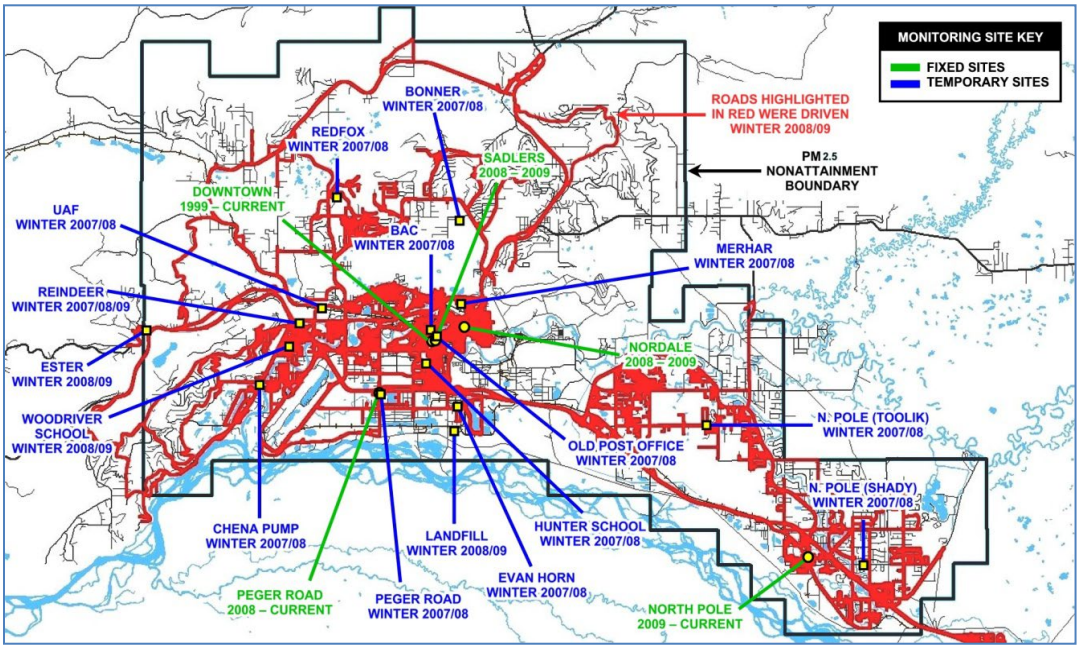

Figure 2: Fairbanks Monitoring sites and *"sniffer"* routes traveled during the winter of 2008/9

FNSB have continued the *"sniffer"* measurements into the present and used the surveys to construct a map of the typical concentration distribution on poor air quality days. The map in Figure 3 shows three particularly bad areas ADEC has identified as the "hot zones" with the downtown/NCORE area in the middle of the center hot zone.

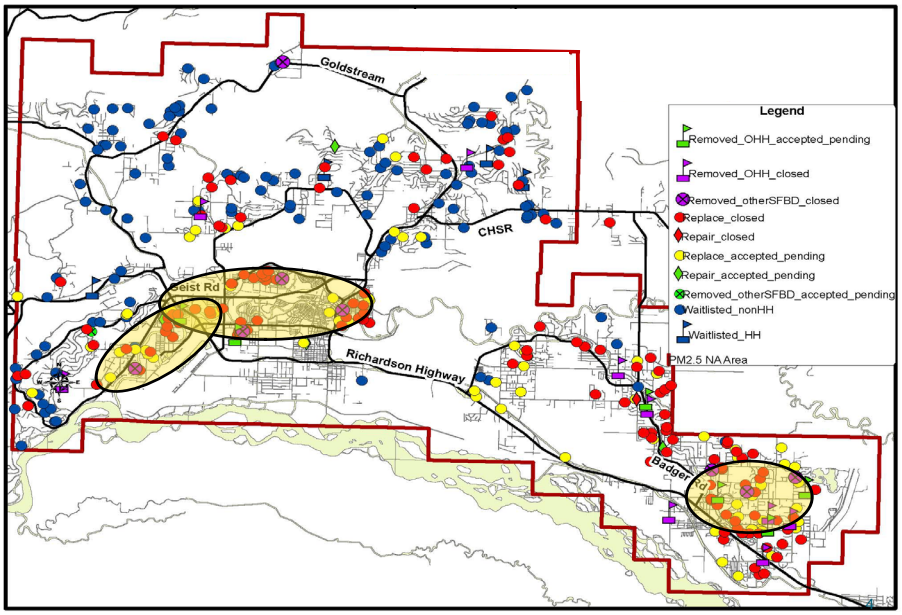

Figure 3: Areas of elevated fine particulate matter (hot spots) in the non-attainment area

The preliminary CMB modeling results, coupled with the ^{14}C and levoglucosan results, support that woodsmoke is the major contributor to the ambient $PM_{2.5}$ in the Fairbanks airshed during the winter months, see Figure 4. Analysis for the first 3 months of 2009 at multiple sites, finds similar distributions, with wood smoke making up 40-80% of the particulate mass.

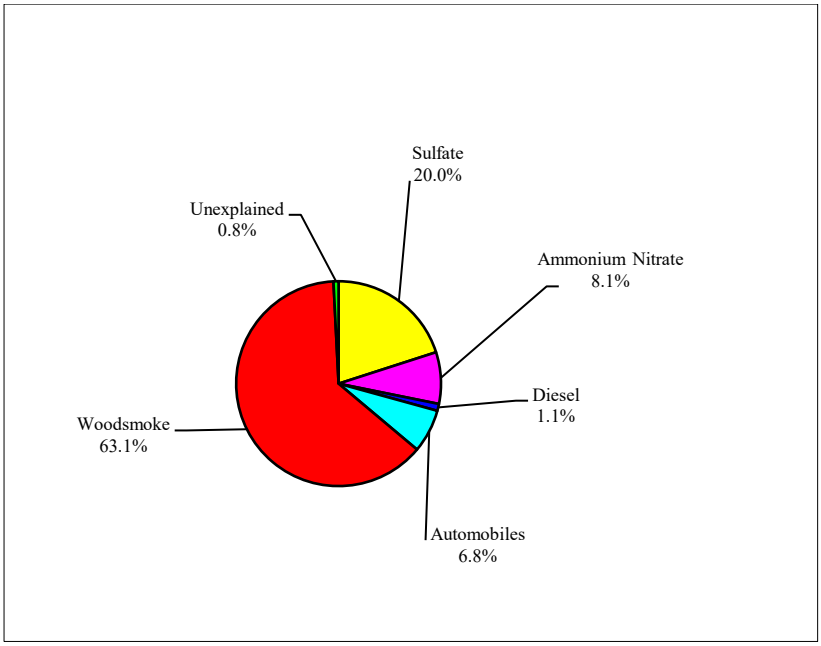

Figure 4: Chemical Mass Balance results for the 2008/9 winter using speciated PM2.5 data from the SOB SLAMS site

A comparison of the SLAMS PM2.5 FRM data at the Fairbanks SOB with the new NCORE site for 2010 shows a very good correlation, see Figure 5 below. It is ADEC's hope to eventually eliminate the SOB site and replace it with the NCORE site. The close correlation of both sites leads ADEC to believe that both sites are similarly influenced by wood smoke. The downtown SOB monitoring site is located inside a downtown business and shopping district, which is surrounded by small residential neighborhoods. The NCore site is located approximately 0.5 miles from the SOB site across the Chena River. The NCore site is located next to some commercial buildings, which abut residential neighborhoods. So far no speciation data has been collected for the NCore site. FNSB plans to have a Met One Super SASS operational at this site by mid-September, 2011.

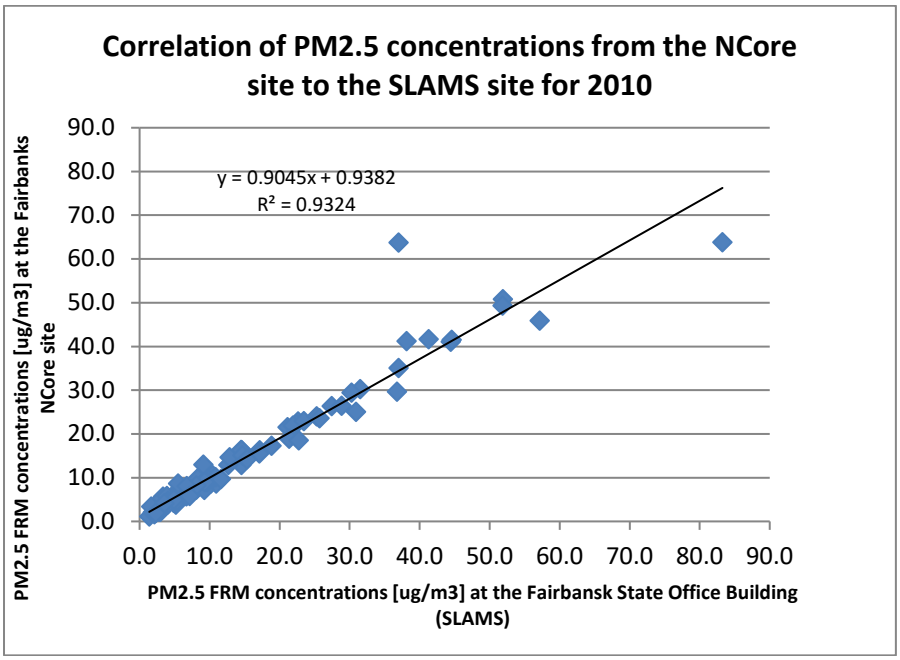

Figure 5: Correlation of PM2.5 concentrations measured at the NCore site in 2010 to the SLAMS site at the State Office Building

A question which is still under investigation is the source of sulfur. The speciation data shows a stoichiometric discrepancy between the elemental sulfur results from the XRF analysis and the sulfate results through Ion Chromatography. ADEC/FNSB are currently investigating the various sources of sulfur and the chemical pathways. One potential source is stack emissions from the nearby Chena River coal-fired power plant owned by Aurora Energy. So far, there is no indication of downward mixing of the stack plumes into the surface layer inversion, which typically coincides with exceedance events. ADEC believes that home heating plays a major role, but still need to await the results from several studies which are currently on-going.

ADEC does not know the degree to which the NCore site might be impacted by other nearby power plants. This is an area of active research that is being undertaken. However, it is ADEC's current opinion that many other locations within the urban area are just as likely to be similarly impacted by either this source or by other nearby power plant sources.

ADEC believes that the NCore site is located in a representative location for a large area inside the Fairbanks non attainment area. If after one year of comparison between the speciation data from the SOB and the NCore site it becomes clear that the site is not adequately sited, ADEC will start looking for alternate locations and work with EPA to find a more representative location.

APPENDIX H:

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.