Alaska's 2010 Air Monitoring Network Plan

Chapter 1 - Introduction

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1 INTRODUCTION

The State of Alaska has a longstanding program of monitoring air quality. Alaska is a large state (572,000 square miles) with a small population (686,300). It is not possible to monitor the air quality in every community, so the Department of Environmental Conservation (DEC) has taken a three-pronged approach to the monitoring network design:

- Monitoring larger communities to cover the largest possible population exposure.
- Monitoring designated smaller towns that are representative of multiple communities in a region. Generally this monitoring is done with Special Purpose Monitoring Sites (SPM).
- Monitoring in response to air quality complaints. This is performed using SPM samplers.

The largest population centers in Alaska are the Municipality Anchorage, the city of Fairbanks, the Matanuska-Susitna Borough, and Juneau (279,240, 34,500, 76,006 and 30,700 people, respectively). There are no other communities with populations over 10,000. Several towns have populations between 1,000 and 10,000, and there are many communities with less than 1,000 people.

1.1 *Geography*

Alaska comprises one sixth of the United State's landmass, spanning 20 degrees of latitude (51°N – 71°N). Alaska contains 65% of the U.S. continental shelf, more shoreline than the rest of the 49 states combined, 17,000 square mile of glaciers, 3,000,000 lakes that are over 20 acres in size, and receives 40 % of the U.S. fresh water runoff. Figure 1.1 shows a map of Alaska and the diverse climate regions described below.

The **Panhandle** is a temperate rain forest in the southeastern part of Alaska that is mainly comprised of mountainous islands and protected marine waterways. Rainfall exceeds 100 inches per year in many areas. Most communities are small and have less than 5,000 year-round residents. Juneau, the State's capital, is the largest city in the region with a population of approximately 30,700.

The **South Gulf Coast** is one of the wettest regions in the world. Yakutat receives over 150 inches of non-thunderstorm rain per year and Thompson Pass averages over 700 inches of snow annually. The area is covered with rugged mountains and barren shoreline and is the target of many Gulf of Alaska storms. This coastline only contains a handful of small fishing communities.

<u>Figure 1:1</u>: Maps of Alaska - the majority of the Aleutian Islands (west) are omitted.

South-central Alaska is fairly temperate in comparison to the rest of Alaska. Rainfall varies widely across the region, averaging between 15 inches per year in the Matanuska-Susitna (Mat-Su) Valley and 60 inches per year in Seward. This region contains 60% to 70% of the state's population with Anchorage, the state's largest city, home to 279,240 people. Bounded by active volcanoes on the southwest and glacial river plains to the northeast, this sector of the state has experienced 24-hour dust levels in excess of 1,000 $\mu g/m^3$.

The **Alaska Peninsula** and its westward extension, the Aleutian Chain, form the southwestern extension of the mountainous Aleutian Range. This region is comprised of remote islands and small, isolated fishing villages. This area is one of the world's most economically important fishing areas, as well as a vital migratory route and nesting destination for birds.

Southwest Alaska encompasses the vast Yukon-Kuskokwim River Delta, a wide low-lying area formed by two of the state's major river systems and dotted with hundreds of small lakes and streams. This region is heavily impacted by storm systems which rotate northward into the Bering Sea. Communities in this region receive between 40 and 70 inches of precipitation each year. This portion of the state is quite windy, experiencing winds between 15 – 25 miles per hour throughout the year. These winds, coupled with fine delta silt, help to create dust problems for some southwestern communities. Rural villages normally contain fewer than 500 people and are located along the major rivers and coastline. Regional hub communities, such as Galena and Bethel, may have up to 6,300 residents.

Interior Alaska describes the vast expanse of land north of the Alaska Range and south of the Brooks Range. This region contains Fairbanks, Alaska's second largest city, with a population of 32,000 people (84,000 in the borough). The climate varies greatly with clear, windless, -50°F winter weather giving way to summer days with 90°F temperatures and afternoon thunderstorms. Sectors of this region also experience blustery winds and high concentrations of re-entrained particulates from open riverbeds.

The **Seward Peninsula** is the section of Alaska which extends westward into the Bering Sea between Norton Sound and Kotzebue Sound. This hilly region is barren and windswept with 15-25 mile per hour winds common. Rainfall in this region averages between 15 and 24 inches per year. Villages in this region are small except for Nome which has over 3,000 people.

The **North Slope** region, located north of the Brooks Range, is an arctic desert receiving less than ten inches of precipitation annually. Wind flow is bimodal, with the easterlies dominating the meteorological patterns. Winter wind speeds average 15-25 mile per hour dropping off slightly during the summer. The North Slope is extremely flat and supports huge summertime populations of bears, caribou, and migratory birds.

1.2 *Topography*

Alaska is topographically varied. The state contains seven major mountain ranges, which influence the majority of all regional wind flow patterns. The mountains channel flow, create rotor winds, cause up slope and down slope flow, initiate drainage winds, produce wind shear and extreme mechanical turbulence. For air quality impact analyses, Alaska's rugged mountains can only be described as complex; complex terrain making most air quality models unsuited for use in the state. The complexity of most local meteorology renders the use of site specific meteorological data inadequate for control strategy development.

1.3 *Economy*

The Alaskan economy is centered on the oil industry, the mining industry, commercial fishing, logging and tourism. Of the five, only the oil and mining industries provide a year-round source of income to the state and require the full time operation of stationary, power generation equipment. The mining industry is scattered across the state with a lead and zinc mine near Kotzebue, a coal mine at Healy, a silver mine near Juneau, and major gold mine north of Fairbanks. Numerous smaller mining ventures exist across the state.

The state's oil industry operates production wells in Cook Inlet and on the North Slope. North Slope oil is pumped 800 miles through the Trans-Alaska Pipeline System (TAPS) to Valdez for shipment to refineries in the lower 48 states. The TAPS has several pump stations to maintain the flow of oil in the pipeline. The majority of new oil exploration work is being conducted on the North Slope. There are four in-state refineries; Flint Hills Res. LLC. (North Pole) and PetroStar's (Valdez and North Pole) process small amounts of North Slope crude. Cook Inlet crude is processed at the Tesoro refinery in Nikiski, located near Kenai, Alaska.

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Chapter 2 – Monitoring Plan

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2 ALASKA'S 2010 AMBIENT AIR QUALITY MONITORING PLAN

2.1 *Introduction*

The Environmental Protection Agency (EPA) created the Clean Air Act to establish national air quality standards to protect public health. National Ambient Air Quality Standards (NAAQS) were developed for six 'criteria pollutants': Carbon Monoxide, Lead, Nitrogen Dioxide, Particulate Matter, Ozone and Sulfur Oxides. The thresholds for primary standards protect the health of those that are the most sensitive, including those with respiratory conditions, children, and the elderly, while secondary standards are set to protect public welfare and the environment.

Table 2.1: Criteria Pollutants from the EPA[1]

	Primary Standards		Secondary Standards
Pollutant	**Level**	**Averaging Times**	**Level | Averaging Time**
Carbon Monoxide	9 ppm (10 mg/m^3)	8-hour(1)	None
	35 ppm (40 mg/m^3)	1-hour(1)	Same as Primary
Lead	0.15 µg/m^3 (2008 Standard)	Rolling 3-month Average(2)	Same as Primary
Nitrogen Dioxide	0.053 ppm (100 µg/m^3)	Annual (Arithmetic Mean)	Same as Primary
Particulate Matter (PM_{10})	150 µg/m^3	24-hour(3)	Same as Primary
Particulate Matter ($PM_{2.5}$)	15.0 µg/m^3	Annual(4) (Arithmetic Mean)	Same as Primary
	35 µg/m^3	24-hour(5)	Same as Primary
Ozone	0.075 ppm (2008 standard)	8-hour(6)	Same as Primary
	0.12 ppm	1-hour(7) (Applies only in limited areas)	Same as Primary
Sulfur Oxides	0.03 ppm	Annual (Arithmetic Mean)	0.5 ppm | 3-hour(1) (1300 µg/m^3)
	0.14 ppm	24-hour(1)	

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

(2) Final rule signed October 15, 2008

[1] NAAQS criteria table can be found at http://epa.gov/air/criteria.html

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

(4) 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 $\mu g/m^3$.

(5) 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 $\mu g/m^3$ (effective December 17, 2006).

(6) 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.

(7) (a) The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is $\leq$ 1, as determined by appendix H.
(b) As of June 15, 2005 EPA revoked the 1-hour ozone standard in all areas except the fourteen 8-hour ozone non attainment Early Action Compact (EAC) Areas.

Alaska's air monitoring program focuses on three of the six criteria pollutants regulated through the NAAQS: carbon monoxide (CO), and both coarse (PM_{10}) and fine ($PM_{2.5}$) particulate matter. There are six separate and distinct monitoring issues throughout the state associated with these pollutants:

- Carbon Monoxide (CO) – seasonal monitoring in Anchorage and Fairbanks (October through March).
- Coarse Particulate Matter (PM_{10}) – monitoring in the major communities of Juneau, Anchorage and the central Matanuska-Susitna Valley (Mat-Su).
- Fine Particulate Matter ($PM_{2.5}$) – monitoring in Juneau, Fairbanks, Anchorage and the Mat-Su Valley.
- Wildland Fire Emissions ($PM_{2.5}$) - statewide monitoring during the summer fire season (May – September).
- Slash Burning ($PM_{2.5}$) for agricultural and beetle kill (August – May).
- Rural Community/ Tribal Village Dust Monitoring (May-September), Residential Wood Smoke (September-March) and Air Toxics Monitoring (special projects) – selected communities statewide.

The State of Alaska is working with the Municipality of Anchorage to set up ozone monitoring within the Anchorage/Palmer/Wasilla Metropolitan Statistical Area. Monitoring for ozone will start at two sites within the Municipality.
The 2008 revision of the lead standard mandates source oriented monitoring of any sources with emissions of over 1 ton per year, based on the last National Emissions Inventory. In Alaska the only source meeting this criterion is the Red Dog Mine in the North West Arctic Borough. The State is working with EPA to determine the best practical monitoring location for this requirement. Details of both new monitoring projects will be discussed below in Section 2.8.

The state's primary air monitoring network evaluates the level of these criteria air pollutants, following guidance provided in EPA's National Monitoring Strategy, and focuses Alaska's monitoring on our largest communities. Citizen complaints from rural villages have been addressed on an "as available" basis in the past. Resolutions from concerned tribal council leaders in the Northwest Arctic Borough have resulted in that region running the most active air monitoring programs in rural Alaska.

2.2 *Carbon Monoxide (CO)*

The communities of Anchorage and Fairbanks continue to experience strong winter inversions which trap and concentrate air pollution. Anchorage is located at the upper end of the Cook Inlet in south-central Alaska and is bounded by the Turnagain Arm on the west and south, the Knik Arm on the north and the Chugach Mountains to the east. Fairbanks is located in Interior Alaska at the upper end of the Tanana River Valley. Fairbanks experiences some of the strongest winter inversions in the United States. Both communities were designated "Serious Non-attainment" for CO in the late 1990s, but have since collected several years of clean CO data. Both communities requested re-designation to attainment and were placed in "maintenance status" as of October 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 Garden site is the oldest CO monitoring site in the network and is located at a church in an old east Anchorage residential neighborhood. The Turnagain site is located northeast of the Ted Stevens International Airport to look at CO levels in a west Anchorage neighborhood with dense housing and few garages. The Turnagain site is a historical CO hot spot. The Benson & New Seward site was closed down in January 2005 at the request of the new building owner. The monitor was moved to the Bowman School site which is located in south Anchorage and was selected to examine residential community impacts in that part of town. The Bowman site was shut down after the 2006/7 CO sampling season because CO concentrations measured at this site were unremarkable, except that they may typify background conditions. In December 2005, a CO monitor was added to the Parkgate PM10 site in Eagle River. The Municipality of Anchorage is in the process of looking for a new south Anchorage location. A violation of the NAAQS for CO has not been recorded with the Municipality of Anchorage since December 1996.

The Fairbanks CO network currently consists of two monitoring sites; the Old Post Office and the Hunter School site. A third site, located at the Army National Guard building, operated through the winter of 2006-07 and has been temporarily discontinued, to focus staff time on fine particulate matter issues. The Armory site consistently reported the lowest CO concentration of all the Fairbanks sites. The Old Post Office site is located in downtown Fairbanks, two blocks south of the Chena River. The Hunter School site is near an older residential neighborhood, located a mile south of downtown at an elementary/middle/high school complex and a quarter of a mile east of the local hospital. None of these monitoring sites violated the ambient CO standard during the past three years.

Due to the low CO levels in recent years and the need to focus on solving the local air quality issues related to $PM_{2.5}$ non attainment, the Fairbanks North Star Borough and the State request to reduce CO sampling from two locations to one sampling site only. The Old Post Office site has typically recorded higher values, than any other sites in the past and is closest in proximity to the $PM_{2.5}$ SLAMS site. The formal request letter is attached in Appendix E

2.3 *Coarse Particulates (PM_{10})*

The State of Alaska has been monitoring for dust in Anchorage, Juneau and the Mat-Su Valley for over twenty years. The Municipality of Anchorage air quality staff samples for PM_{10} at the Garden, Tudor Road, and Parkgate (Eagle River) monitoring sites; all of which have suffered exceedances of the PM_{10} standard during exceptional events. Exceedances unrelated to an exceptional event have been recorded only at the Parkgate site. Such exceedances date back to 1987 or earlier. Elevated concentrations of PM_{10} in the Municipality of Anchorage have primarily been related to ash from volcanic eruptions and re-entrained road particulates. Most exceedances occur during high wind events (40 to100 mph winds) which can occur in any season. Eagle River is still designated "non-attainment" for $PM_{10.}$ The Municipality of Anchorage has developed a Limited Maintenance Plan for PM_{10} in Eagle River, which is currently at EPA Region 10 for initial review. The Municipality has a Memorandum of Agreement with DEC, Department of Transportation (DOT) and EPA Region 10 to control dust in downtown Anchorage. The Municipality received additional air quality funding through the congressional delegation in 2005 and has expanded the Upper Cook Inlet air monitoring network to include the Mat-Su Valley and upper Kenai Peninsula as part of the Cook Inlet Region Integrated Air Monitoring System (CIRIAMS). This data network will help all of the local communities better protect public health.

The southern Mat-Su 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. While increased road paving has significantly reduced the road dust levels across the Valley, high winds off the Matanuska River and Knik River drainages can still raise dust levels into the very unhealthy range. Dust monitoring is currently performed in the Butte, a small community south of Palmer, in Downtown Palmer and Wasilla.. The latter two sites were installed during the summer of 2008 and became operational October 1, 2008. These sites are part of CIRIMAS network. To better address air quality concerns on the Kenai Peninsula, the Department will be establishing a new air monitoring site in Soldotna by fall of 2009. Site installation earlier this year was delayed, after the Borough decided to construct a parking lot at the designated location. A new location was selected in April 2009 and a Land Use Permit is currently being process by the Kenai Peninsula Borough. This site will be installed as part of the CIRIAMS monitoring network which is intended to provide real-time data to the public and help the Department issue more timely air quality advisories.

The Fairbanks PM_{10} monitoring sites were installed in the late 1980s to investigate wood smoke concerns. Before establishing a $PM_{2.5}$ standard to regulate fine particulate matter, wood smoke was sampled using PM_{10} instrumentation and fell under the PM_{10} standard. Despite sampling at several locations, the monitoring program did not find significant levels of PM_{10}. While monitoring focused on road corridors and subdivisions with higher woodstove use, the City's program to pave roads and cheaper home heating fuel costs may have helped keep PM_{10} levels below the standard. The last monitor was de-installed in the late 1990s based on low PM_{10} concentrations and the need to switch focus to $PM_{2.5}$.

Juneau has one active PM_{10} monitoring site located in the Mendenhall Valley at the Floyd Dryden Middle School. Juneau initially had two particulate problems in the late 1980s. Challenged with rapid growth, a majority of the Mendenhall Valley's residential streets were

unpaved (road dust) and most homes had a woodstove which provided some, if not all, of their home heating. On dry days dust would be re-entrained off the road surfaces. On cold, clear winter nights woodstoves created a thick smelly smog that easily exceeded the 24-hour air quality standard. To address the wood smoke issue, the City and Borough of Juneau set up a burn ban strategy for use when smoke levels were expected to be high. This control strategy worked well for maintaining compliance with the particulate standard at the 150 $\mu g/m^3$ level for PM_{10} and the initial $PM_{2.5}$ standard at 65 $\mu g/m^3$, but will need to be re-evaluated under the new $PM_{2.5}$ standard (35 $\mu g/m^3$). The dust problem was not so easy to control and required a federal Congestion Mitigation Air Quality (CMAQ) funded road paving effort in the early 1990s to effectively control the road dust. Despite implementing these control strategies and PM_{10} levels dropping, Juneau has never been officially re-designated to attainment. Currently the City and Borough of Juneau and DEC are working on a maintenance plan for PM_{10}. Although DEC suspected that the Lemon Creek Valley also had a similar dust/wood smoke issue, sampling did not produce enough data to document or repudiate the problem.

2.4 *Fine Particulate ($PM_{2.5}$)*

Alaska's original fine particulate monitoring network consisted of nine area wide sites spread out between Fairbanks, Denali National Park, the Mat-Su Valley, Anchorage and Southeast Alaska. The sites were installed between 1999 and 2000 to look at potential impacts from combustion sources in Alaska. The targets were larger communities with power plants and automobiles, communities with high woodstove use and background/transport sites. Based on EPA $PM_{2.5}$ siting criteria, we did not position $PM_{2.5}$ samplers to evaluate woodsmoke impacts from summer wildland fires.

The department downsized the $PM_{2.5}$ monitoring network in 2004 to six sites. The remaining network included one site in Anchorage (Garden), one in Juneau (Floyd Dryden), one in the Mat-Su Valley (Butte), one in Fairbanks (State Office Building) and a set of Special Purpose Monitoring (SPM) sites in Skagway. The special purpose monitoring (SPM) monitoring in Skagway did not identify a problem and was discontinued in April 2005.

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 one has been given federal equivalent method certification, running them collocated with an FRM sampler is still required to validate their performance as significant discrepancies exist and have been documented nationwide. The collocation is important, as good quality, continuous particulate data plays a critical role in calculating daily Air Quality Indices (AQI), which are used to help develop air advisories and protect public health. Alaska continues to study the accuracy of these samplers. The intent is still to provide real-time $PM_{2.5}$ data for the entire network to the public by the end of December 2009.

Fairbanks has consistently experienced the highest $PM_{2.5}$ values measured in the state. During the summer months when wildland fires spread thick, grey smoke over Interior Alaska, the Fairbanks area is 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. During the winter months, Fairbanks' strong temperature inversions have contributed to trapping fine particle emissions in the lowest levels of the atmosphere. Based on winter $PM_{2.5}$ levels alone, Fairbanks had come close to exceeding the annual fine particulate standard (set at 15 $\mu g/m^3$) for the past seven years. Since the strengthening of the $PM_{2.5}$ standard in December 2006, Fairbanks also recorded many values over the new 24 hour standard of 35 $\mu g/m^3$. Based on monitoring results from 2006 on, the City of Fairbanks is in the process of being designated non-attainment for fine particulate and will be required to develop a strategy for bringing the community back into attainment.

The communities of Wasilla and Palmer continue to grow exponentially and the DEC receives several smoke related complaints annually. While major land clearing operations have slowed, there is still enough growth for land clearing operations to smoke out parts of the Palmer-Wasilla area each year. DEC installed a $PM_{2.5}$ continuous sampler in the downtown area of each community. Monitoring of $PM_{2.5}$ began in October 2008 to monitor smoke levels and help local leaders address air quality issues and better protect public health.

2.5 *Tribal Village/ Rural Community Monitoring*

The State provides support to Alaska's rural communities in their efforts to assess local air quality. Because a majority of the citizens (percentages range from 50-95%) in these communities are Alaskan Native, much of the monitoring is supported by EPA's General Assistance Program (GAP) or EPA's Tribal Air Grant process. The GAP program provides limited funding and training which places a large responsibility on the State to ensure that "village" baseline monitoring projects are successful.

The State's "tribal air monitoring" program currently includes active monitoring in three communities, with requests for assistance in ten more. The State expects that this number could double with the recent revisions of the national particulate standard. The DEC is currently helping the Northwest Arctic Borough villages of Kivalina, Ambler and Kotzebue assess dust levels in their communities. The department initially provided support to the Maniilaq Association, but assumed their technical role in 2004 when the Maniilaq monitoring program lost staff. The western Alaska communities of Bethel and St Mary's are the only two communities in that region which have operated dust monitors in the past five years, although as many as 40 other villages have indicated an interest in monitoring for dust.

Village monitoring in rural Alaska has been confirming what the local people have been telling the DEC for years…. "It's dusty out here". Enhanced by increased 4-wheeler use and the systematic affects of global warming, a majority of these communities appear to have bad summer and fall dust problems. Over the past five years, Kotzebue has recorded more than 25 exceedances of the PM_{10} standard and Noorvik (2004) and Noatak (2005) have both recorded at least 10 exceedances with several values reaching 600 $\mu g/m^3$.

The State believes the high dust levels reported in the above mentioned communities represent the conditions that would be found in other similar sized rural communities across the state if they performed PM_{10} monitoring. DEC, along with the State DOT and the University of Alaska – Fairbanks are working together to identify and test potential dust control strategies for use in rural Alaska. 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 more simple solutions 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.

2.6 *Fire Support/ Slash Burning/Air Toxics*

The DEC is taking a more active role in evaluating impacts from wildland fire smoke. 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 weather data and has worked 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. The air quality monitoring technician provides field support to our staff meteorologist and fire incident commanders during the fire season. While staff was trained and prepared to conduct field monitoring during the summers of 2006 and 2007, the wetter and cooler summers all but wiped out the fire season, and the team only deployed once. These mild fire seasons allowed staff time to train with the new samplers and provide instrument orientation for federal agency staff.
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. The initial monitoring plan was to collect indoor and outdoor air toxics data in a regional "hub" community and, for comparison purposes, in a small village in that same region. Funding constraints forced the DEC to scale that project back to monitoring in Kotzebue only. The eventual start date for the outdoor sampling was December 2004 with the indoor sampling beginning in June 2005. The project plan for this sampling was reviewed in house and tentatively approved by EPA. 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 has delayed the completion, and the final report is expected to be out by early 2009.

2.7 *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 was analyzed and a final draft report has been developed and is undergoing peer review. An unexpected loss of staff has delayed the final version of this report, and a new target release date is set for late 2009.

2.8 *2010 - Network Modifications*

DEC reviews and modifies the State air monitoring network annually based on the needs of the State, available funding and EPA guidance. The 2009/10 monitoring network will include two new pollutants (lead and ozone) in addition to the same pollution sources as in 2008/9. Budget cuts, staff turn-over and extended vacancies over the past three years have had a significant impact on the department's ability to conduct field monitoring. The effectiveness of the State's monitoring capability will continue to be challenged by the retention of the PM_{10} standard (dust issues in rural Alaska) and a lowering of the $PM_{2.5}$ standard (increased woodstove use statewide). Detailed descriptions of the network monitoring sites follow in Chapters 3 – 6, and a summary table of AQS site identification numbers and site specific input parameters in Appendix C.

2.8.1 Anchorage

The Municipality of Anchorage is in the process of expanding their local air monitoring network to include sites in the Mat-Su Valley and on the Kenai Peninsula. Federal dollars which were awarded through the congressional delegation are being used to enhance the existing network and make monitoring data more accessible to the public. The Cook Inlet Regional Integrated Air Monitoring System (CIRIAMS) will include seven $PM_{10}/PM_{2.5}$ monitoring sites and provide real-time air monitoring data to the public and air quality/public health decision makers. This upgraded real time data acquisition and reporting system is still being worked on, although selected sites are now available on line. We expect to have a web page with access to the all connected sites and monitors by the end of summer of 2010.

The Department is working with the Anchorage Municipality to establish two ozone monitoring sites. The Municipality of Anchorage is categorized as a Metropolitan Statistical Area (MSA) for air quality purposes based on a population count of the municipality and the lower Matanuska Susitna Valley communities of Wasilla and Palmer. The combine population exceeds the threshold of 350,000, which makes ozone monitoring mandatory. Nonetheless the State believes this region does not meet the intent of a MSA. The Anchorage MSA includes the Mat-Su Valley, located 40-50 miles north of Anchorage, Eagle River and Chugiak which are 15-20 miles north of Anchorage and Girdwood which is located 40 miles south of Anchorage. Because of the local topography, and associated wind flow patterns, it is not appropriate to consider this area as a MSA for air quality purposes, as there is no unified Upper Cook Inlet airshed. The State however agrees that with the lowering of the ozone standard, it is time to conduct monitoring for ozone to establish baseline concentrations in Alaska. The State and the municipal air quality staff are proposing two locations for monitoring ozone, one within the downtown area of Anchorage and one in Eagle River to mimic a maximum impact site, downwind of the main sources. Equipment has been purchased and site installation and operation is to begin with the 2010 season.

The Municipality of Anchorage operated four Carbon Monoxide monitoring sites during the winter of 2008/9, including the new DHHS site near their office. The State and Municipality air staffs have discussed the need for continued operation of a large CO network in light of the shift in the National Monitoring Strategy to fewer, more representative fixed sites, and the Municipality's recent re-designation to attainment for CO. While continued monitoring is part of the maintenance plan, the State's monitoring staff believes a smaller monitoring network can be used to assess continued compliance with the CO standard. The State has suggested that one fixed site with one or two mobile sites to look at potential hot spots or to respond to complaints might be sufficient. The State will continue to work with the Municipality to identify sites which should be shut down. All requests for site shut down will be forwarded to EPA Region 10 for approval.

The Anchorage air quality staff continues to operate the $PM_{2.5}$ site at the Trinity Church. This site captured both manual and continuous data, although the State only reports the manual data to AQS. This monitoring site was originally classified as a State and Local Air Monitoring Site (SLAMS) and funded through the State's 103 grant funding for $PM_{2.5}$.With the December 2006 revision of the $PM_{2.5}$ standard, EPA has placed a lower priority on this site with the decision that it would no longer fund $PM_{2.5}$ monitoring sites with good air quality (maximum values lower than 80% of the new standard). This decision resulted in loss of funding for the Garden site's $PM_{2.5}$ monitor and has resulted in the State requesting it be re-classified as an SPM site based on Anchorage's low $PM_{2.5}$ values.

The community now operates three PM_{10} sites. The Tudor PM_{10} monitoring site is collocated and runs year round, the Garden Site is the primary monitoring site in the network and the Parkgate site in Eagle River (old non-attainment monitoring site) continues to run on a 1-in-6 schedule despite having had clean data for over 15 years. The State continues to maintain that this site is not needed and has made several recommendations in the past that it be shut down and limited resources be shifted to higher priority monitoring. The State believes there needs to be a provision in the particulate matter regulations for automatic reclassification of a site based on demonstrated performance.

2.8.2 Fairbanks:

The 2008/9 $PM_{2.5}$ network monitored for fine particulates at the State Office Building and four winter time Special Purpose Monitoring (SPM) sites: Nordale Elementary School, Sadler's Furniture Store, the Fairbanks North Star Borough's air quality office on Peger Road and a site in North Pole. The additional sites were added by the Borough to address a future non-attainment designation related to the revision of the national $PM_{2.5}$ (fine particulate) standard in December 2006. Plagued by high winter fine particulate levels for the past eight years, the Borough elected to take a proactive stance in determining the magnitude, extent and source of their winter $PM_{2.5}$ problem. This effort may see the operation of several more monitoring sites as the Borough and State prepare for the development of a $PM_{2.5}$ State Implementation Plan (SIP). The primary monitoring effort will be led by the Borough's air program staff with assistance from DEC. The State's speciation monitor was moved to the State Office Building from Anchorage in the fall of 2004, and provides valuable information on potential $PM_{2.5}$

sources. PM_{10} monitoring in Fairbanks was discontinued in the late 1990s due to low dust levels.

The Fairbanks North Star Borough currently operates two CO monitoring sites. Implementation of a strong I&M program in the mid 1980s along with reduced vehicle emissions and vehicle plug-ins have helped reduce the eight hour CO levels to below the ambient air standard of 9 ppm. While the Borough air staff have continued to monitor CO levels in the community and the two main monitoring sites, Old Post office and Hunter School, continue to show CO levels below the standard. The Alaska Army National Guard Armory site never did show high values and was temporarily shutdown. To better support impending work needed for defining the sources and mitigation of the Fairbanks $PM_{2.5}$ non-attainment problem, the Borough requested to temporarily shut down the Hunter School CO site as well. The State supports this request and will forward it to EPA Region 10 for consideration.

Fairbanks was selected as the state's location for the multi pollutant NCORE site. A final location for the site has not yet been selected. Several of the NCORE siting criteria make site selection very complicated. The state is working closely with the Fairbanks North Star Borough on finding the best workable location. Some of the required instrumentation has already been purchased, but a shelter and the bulk of sampling equipment still needs to be funded. It is the intent to have the site installed and operational by 2011.

2.8.3 Juneau:

Juneau remains classified as non-attainment for PM_{10} despite paving the valley roads over 15 years ago. The PM_{10} "wood smoke" problem all but disappeared with the implementation of the Juneau woodstove burn ban program in the late 1980s. The PM_{10} "woodstove" problem actually became a $PM_{2.5}$ problem with the promulgation of a national fine particulate standard in 1997. The State never saw any more woodstove related $PM_{10}/PM_{2.5}$ exceedances even with the $PM_{2.5}$ standard set at 65 $\mu g/m^3$. With the recent revision of the standard to 35 $\mu g/m^3$, the State is concerned that higher home heating costs may renew the public's interest in wood-fired heaters. This belief seems to be supported by a slight increase in $PM_{2.5}$ levels during the winter months, placing Juneau on the edge of being classified non-attainment. The Floyd Dryden monitoring site continues to monitor for PM_{10} (manual) and $PM_{2.5}$ (manual and continuous). Concerns over new growth in the Mendenhall Valley and the potential for new wood smoke 'hot spots" have resulted in a new stringent wood smoke control program operated by the City and Borough of Juneau.

The PM_{10} monitoring program in Juneau was always about emissions from woodstoves. Controlled under the PM_{10} regulations of 1987, wood smoke levels continued to drop in part due to public awareness and pressure, increased effort required for wood gathering, and the City's effective woodstove control program through the mid 1990s. A shift in the winter weather patterns also played a role, but how much is still up for debate.

Efforts to better define the magnitude of the wood smoke problem in the Valley resulted in the discovery that PM_{10} dust levels occasionally exceeded the standard. The dust issue was effectively corrected through a road paving project which was expanded to include the

neighboring Lemon Creek Valley. The mid Mendenhall Valley PM_{10} site was shut down in the mid 1990s in recognition of the effectiveness of the road paving project, but the Floyd Dryden site has continued to monitor for PM_{10}. The Mendenhall Valley monitoring sites have shown that the dust problem was effectively controlled over 15 years ago. The State continues to maintain that this site is not needed and recommends it be shut down. The State believes there needs to be a provision in the particulate matter regulations for automatic reclassification of a site based on demonstrated performance.

2.8.4 Mat-Su Valley Monitoring:

The Mat-Su Valley monitoring network was expanded last fall . The two additional sites are part of the Municipality's CIRIAMS network designed to assess regional particulate levels and better protect public health. The new sites are located in downtown Palmer and Wasilla. As usual, the main focus for the Mat-Su Valley is PM_{10} (dust) with a few pockets of smoke from land clearing and wildland fires. The Mat-Su Valley is known as the farming belt because of the excellent soils which have been deposited over hundreds of years through wind-blown dust deposition. The Mat-Su Borough manages an effective air advisory program which notifies local residents and the school system when dust is expected to present a health threat. The small community of Butte, located south of Palmer, has a high percentage of homes which burn wood and like the rest of Alaska, is expected to increase its consumption of wood as fuel oil and natural gas prices continue to rise.

2.8.5 Kenai Peninsula Borough

The Kenai Peninsula Site is part of the CIRIAMS network designed to assess regional particulate levels and better protect public health. The new site will be located in Soldotna, behind the Kenai Peninsula Borough Building. Site installation will begin this summer. Similar to other CIRIAMS site, it will house continuous PM_{10} and $PM_{2.5}$ samplers. The monitors will be integrated with the DR DAS data acquisition system to allow for real time data access.

2.8.6 Lead Monitoring

The revision to National Air Quality Standards for Lead in November 12, 2008 substantially strengthened the standards for lead. The revised standard is intended to improve health protection for at-risk groups, especially children. As part of the revision, the states are required to conduct source oriented monitoring for stationary sources which can emit more than 1 ton of lead per year, based on the National Emissions Inventory. In Alaska there is only one such source, which is the Red Dog Mine, a zinc and lead mine in the North West Arctic Borough.

The Red Dog Mine is in very remote and rugged terrain, making monitoring surrounding the mine site extremely difficult and expensive. The State and EPA have agreed to conduct lead monitoring in one of the communities closest to the mine, rather than attempting to sample outside the ambient air boundary. The State will determine which of the communities, Kivalina

or Noatak are best suited for the monitoring site. It is the intent to set up a collocated site and hire and train local site operators so that sampling can begin at the mandatory January 1, 2010 deadline.

Alaska's 2010 Air Monitoring Network Plan

Chapter 3 - Anchorage

State of Alaska Department of Environmental Conservation
Division of Air Quality
Air Monitoring and Quality Assurance Section
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3 ANCHORAGE MONITORING SITE DESCRIPTION

3.1 *General Information*

The Municipality of Anchorage (MOA) with a population[1] of 275,240 is the largest city in Alaska. Anchorage 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 temperatures range from 6 ºF to 20 ºF in the winter and from 50 ºF to 70 ºF in the summer. Annual precipitation is 15.9 inches, with 69 inches of snowfall.

Anchorage was designated non-attainment for CO on November 15, 1990. The community developed a rigorous Inspection and Maintenance (I&M) program to reduce tail pipe emissions from automobiles and US Environmental Protection Agency (EPA) has required that new automobiles emit less environmental pollution, both of which have helped improve the air quality in Anchorage. The Municipality was re-designated from CO, "serious non-attainment area" to "maintenance" area on July 23, 2004. Appendix A lists the definitions of each designation.

Plagued by springtime dust and residual volcanic ash from erupting Cook Inlet volcanoes in the late 1980s and in the early 1990s, the Municipality of Anchorage was flirting with a PM_{10} problem. On December 5, 1995, the Municipality of Anchorage, the Alaska DEC, and the EPA entered into a memorandum of agreement to reduce dust impacts and avoid a PM_{10} non-attainment designation. A control strategy was developed and agreed to by all parties with the implementation responsibility placed on the Municipality. The control strategies were made part of a community's long range transportation plan.

The Municipality of Anchorage's (MOA) air quality program currently operates five air monitoring stations in the municipality. Each station can be equipped to monitor for multiple pollutants. The network pollutant monitors have designations for both State and Local Air Monitoring Site (SLAMS) and Special Purpose Monitoring Sites (SPM). The municipality's SLAMS and SPM sites are described below in Table 3-1. Figure 3.1:1 is a map showing the entire Anchorage monitoring network. Appendix B lists siting criteria.

Due to the lowering of the ozone standard and the population of the Upper Cook Inlet airshed, ozone monitoring will begin with the 2010 season. The State and the Municipality of Anchorage air quality staff are in the process of selecting the most representative sites for ozone monitoring. Using at least two sites will likely best represent the complexity of the airshed; one site is proposed in Eagle River and one within the Anchorage bowl. Ozone monitors were purchased in April 2009.

[1] Population data from 2005 U. S. Census.

Table 3-1: 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	SPM	Nov, 1998	neighborhood
PM_{10}					
Site Name	**Location**	**AQS ID**	**Designation**	**Install Date**	**Scale**
Garden	Anchorage	02-020-0018	SPM	Nov, 1998	neighborhood
Tudor	Anchorage	02-020-0044	SPM	Oct, 1996	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
Turnagain ‡	Anchorage	02-020-0048	SPM	Oct, 1998	neighborhood
DHHS	Anchorage	02-020-0052	SPM	Sept, 2007	neighborhood
Parkgate	Eagle River	02-020-1004	SPM	Dec,2005	neighborhood

† The PM2.5 SPM monitor at the Garden site is a Partisol 2000 FRM sampler. MOA intends to re-assign a BAM1020 monitor as the Garden PM2.5 SPM monitor after two years of collocation with the FRM and determination of the precision and bias statistics of the PM2.5 data from the BAM1020 monitor with respect to the FRM.

†† The PM10 SLAMS monitor at the Parkgate site is a GMW-1200 FRM sampler. MOA intends to re-assign a BAM1020 monitor as the Parkgate PM10 SLAMS monitor after two years of collocation with the FRM and determination of the precision and bias statistics of the PM2.5 data from the BAM1020 monitor with respect to the FRM.

‡ Because the Turnagain site CO monitor records the highest CO concentrations in the Anchorage network and data from this monitor is used to determine the CO design value for the Anchorage MSA, MOA has changed the Turnagain site designation from SPM to SLAMS for CO.

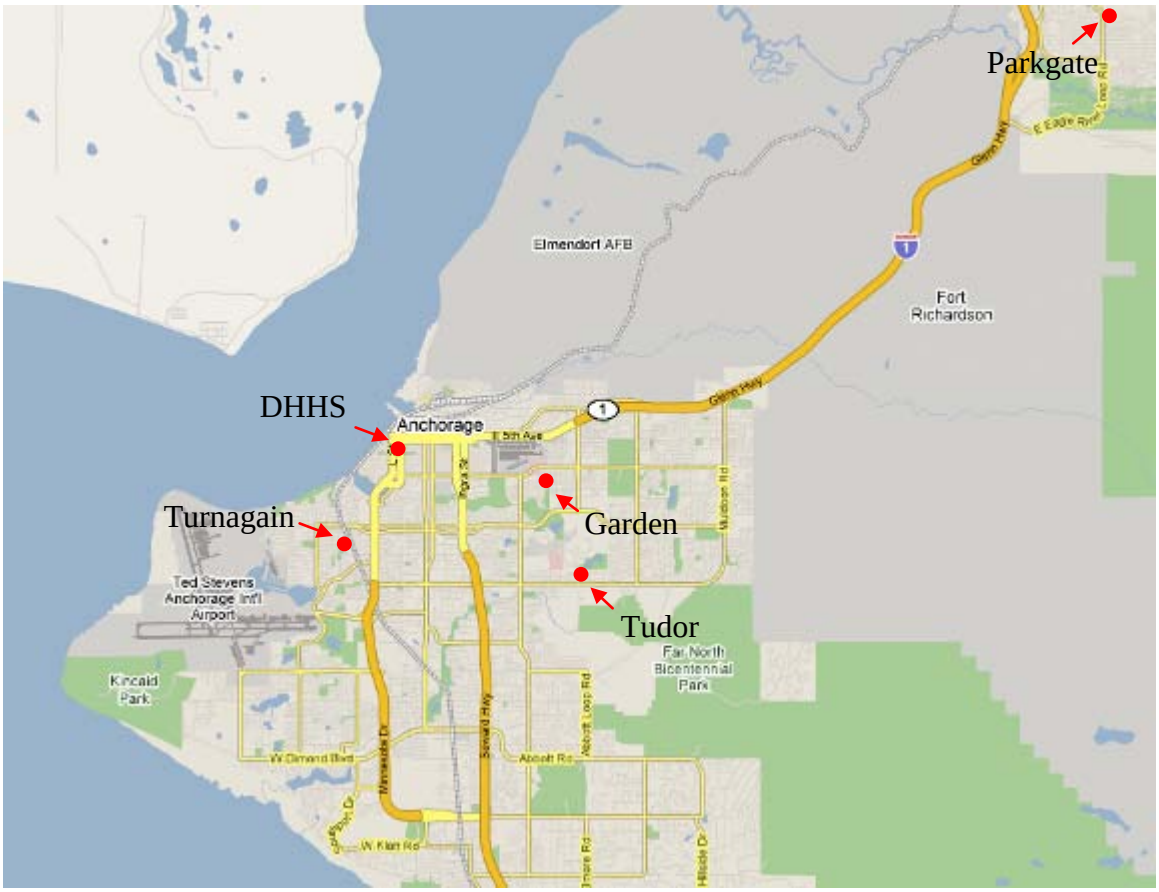


Figure 3.1:1: Map of Anchorage area. Red dots indicate monitoring sites.

3.2 *GARDEN SITE - ANCHORAGE*

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

3.2.1 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' 25", longitude –149° 49' 15", and 128 feet (39 meters) above sea level. Figure 3.2:1 shows a street map of the central Anchorage area and a satellite image of the area. The site is located in a suburban, residential area. Garden is a neighborhood, population-oriented CO and PM site.

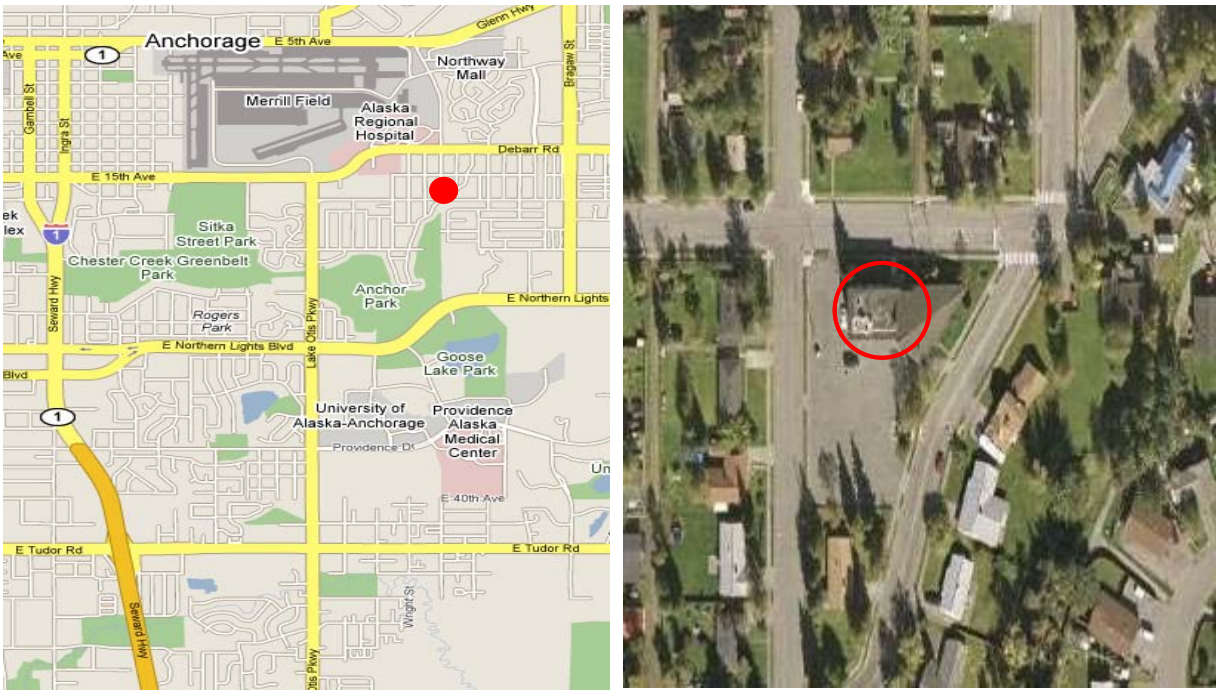


Figure 3.2:1: Street map and satellite image of the Garden monitoring site. The red circles indicate the sites location.

3.2.2 Sources

Carbon monoxide levels are closely associated with automobile activity and combustion from local residential heating systems in the area. Other sources in the Anchorage Bowl which might have influence on this site for CO are: the Municipal Light and Power (90 and 250 megawatt gas turbines – 3.5 miles west), Chugach Electric (48 MW gas turbine – 3.5 miles northeast), Fort Richardson (18 MW gas turbine – five miles northeast) and Elmendorf Air Force Base (22 MW gas turbine – 3.5 mile northwest). Fine and course particulate matter can 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 (one mile north) and the Alaska Railroad (two miles northwest). Anchorage is seasonally affected by wind-blown glacial loess, and occasionally impacted by wildfire smoke and ash from volcanic eruptions.

3.2.3 Monitors

The Garden Site is currently equipped with:

- $PM_{2.5}$ (SPM) – Three Thermo Electron (formerly Rupprecht and Patashnick) Partisol 2000 samplers were operated at the site until October 2008. Two samplers ran on a 1-in-6 day alternating sampling schedule resulting in a 1-in-3 day sampling frequency. The third sampler operated as a collocated monitor. Two samplers were removed in October 2008. The one remaining sampler operates on a 1-in-6 day sampling schedule.
- PM_{10} (SPM) – One General Metal Works high-volume sampler.
- $PM_{2.5}$ (SPM) – A single Thermo Electron TEOM 1400a continuous monitor was installed by ADEC in 2003 to provide real-time PM2.5 data for evaluating the Air Quality Index. MOA operated the TEOM from 2004 -2008 and removed it in 2009.
- $PM_{2.5}$, PM_{10}, PM Coarse (SPM) – Two Met One BAM 1020X continuous monitors were installed in June 2008, and were tested for measurement of $PM_{2.5}$, PM_{10} and PM Coarse, and for proper integration within a DR DAS internet-based network. MOA has begun submitting $PM_{2.5}$ and PM_{10} data from these monitors to AQS, starting with first quarter 2009.
- CO (SLAMS) – A single Thermo Electron 48i CO monitor operates seasonally (October – March), but will operate continuously throughout 2009 to collect data in support of EPA's Community Scale Air Toxics Program.
- PAH (SPM) – Two Tisch Environmental, TE-1000PUF high-volume, Poly Urethane Foam (PUF) samplers. The primary and collocate samplers were installed in October 2008. Starting in November 2008, MOA began 1-in-6 day operation of these samplers for a planned one year measurement of Polycyclic Aromatic Hydrocarbons (PAHs) in support of EPA's Community Scale Air Toxics Program.

3.2.4 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 from 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 16^{th} Avenue.

The CO monitor is installed in the church. The inlet probe is approximately three meters (9.5 feet) above the ground. The inlet probe is 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.

3.2.5 Traffic

There are six other major roadways within two miles with approximate average daily traffic ranging from 14,000 to 54,000 vehicles per day. All roads are paved; alleys are usually dirt roads.

Figure 3.2:2: 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 3.2:3: View of CO probe at Garden Site. The red circle indicates where the probe is located.

3.3 *TUDOR SITE - ANCHORAGE*

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

3.3.1 Site Information

The Tudor monitoring site is located at the Allstate Insurance Company building on Tudor Road at latitude 61° 10' 56", longitude –149° 48' 50", and 164 feet (50 meters) above sea level. Figure 3.3:1 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, population-oriented site.

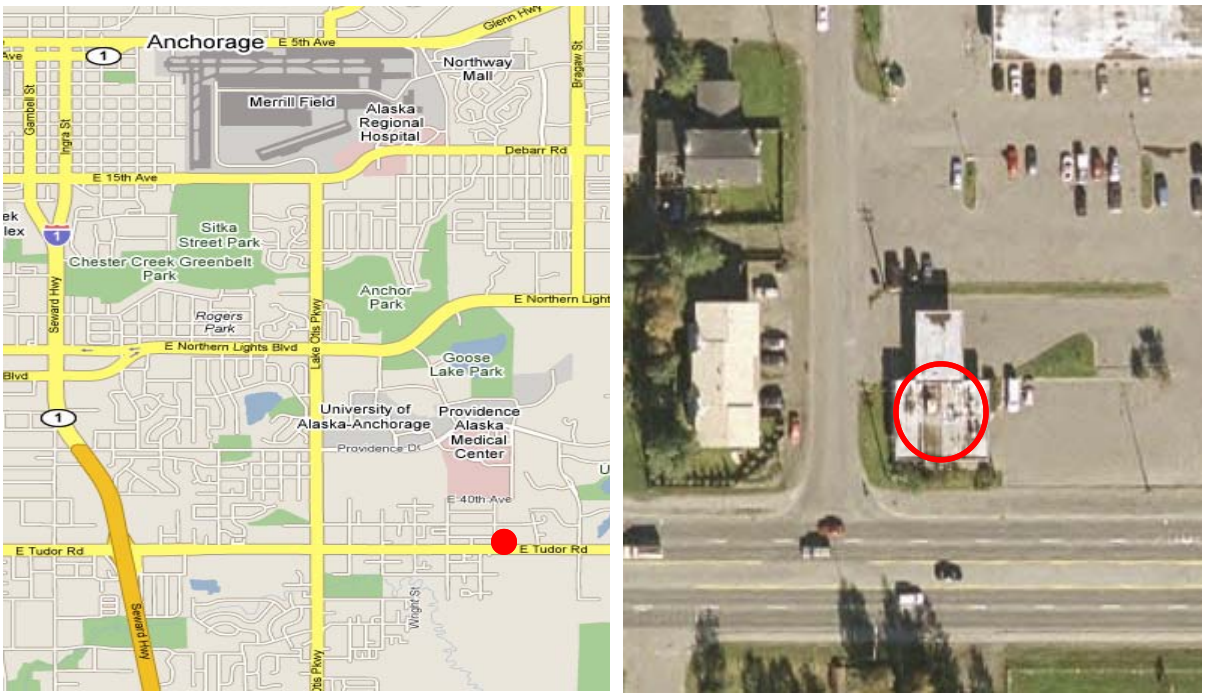


Figure 3.3:1: Street map and satellite image of the Tudor monitoring site. The red circle indicates the sites location.

3.3.2 Sources

The primary source of course particulate matter at this site is from automobile activity. Roadways are sanded for traction and are abraded by studded tires during winter months and the fine particles get re-entrained in the air during the dry summer days, in the fall, winter and especially during the spring melt. Within five miles is Merrill Field (a small plane airport) and the Alaska Railroad passes within six miles of the site. Anchorage is seasonally affected by wind-blown glacial loess, and occasionally affected by wildfire smoke and volcanic eruptions.

3.3.3 Monitors

The Tudor Site is currently equipped with:

- PM_{10} (SPM) – Three General Metal Works high-volume samplers. The Hi-Vol samplers are operated on a 1-in-3 day sampling schedule. Alternating samples are run in collocation at this site every fifteen days for precision determination.
- PM_{10} (SPM) – A single Thermo Electron TEOM 1400a continuous monitor was installed in April 2005 to provide information in real time for evaluating the Air Quality Index.
- $PM_{2.5}$ (SPM) – samplers were removed from the site end of December 2002.

3.3.4 Siting

The particulate matter samplers are located on the roof near the southeast edge. The roof height is 3.3 meters (10.5 feet), and there are no other structures. Twenty foot 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 seven meters north of the nearest traffic lane of Tudor Road.

3.3.5 Traffic

There are three major roadways within two miles with approximate average daily traffic ranging from 30,000 to 54,300 vehicles per day. There are typical residential and commercial streets and alleys in the vicinity. All roads are paved; alleys are usually dirt roads.

Figure 3.3:2 : Pictures of the Tudor Site

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

3.4 *TURNAGAIN SITE - ANCHORAGE*

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

3.4.1 Site Information

The Turnagain carbon monoxide monitoring site is located at the corner of Turnagain Street and 32nd Avenue at latitude 61° 11' 32", longitude –149° 56' 9", and 69 feet (21 meters) above sea level. Figure 3.4:1 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.

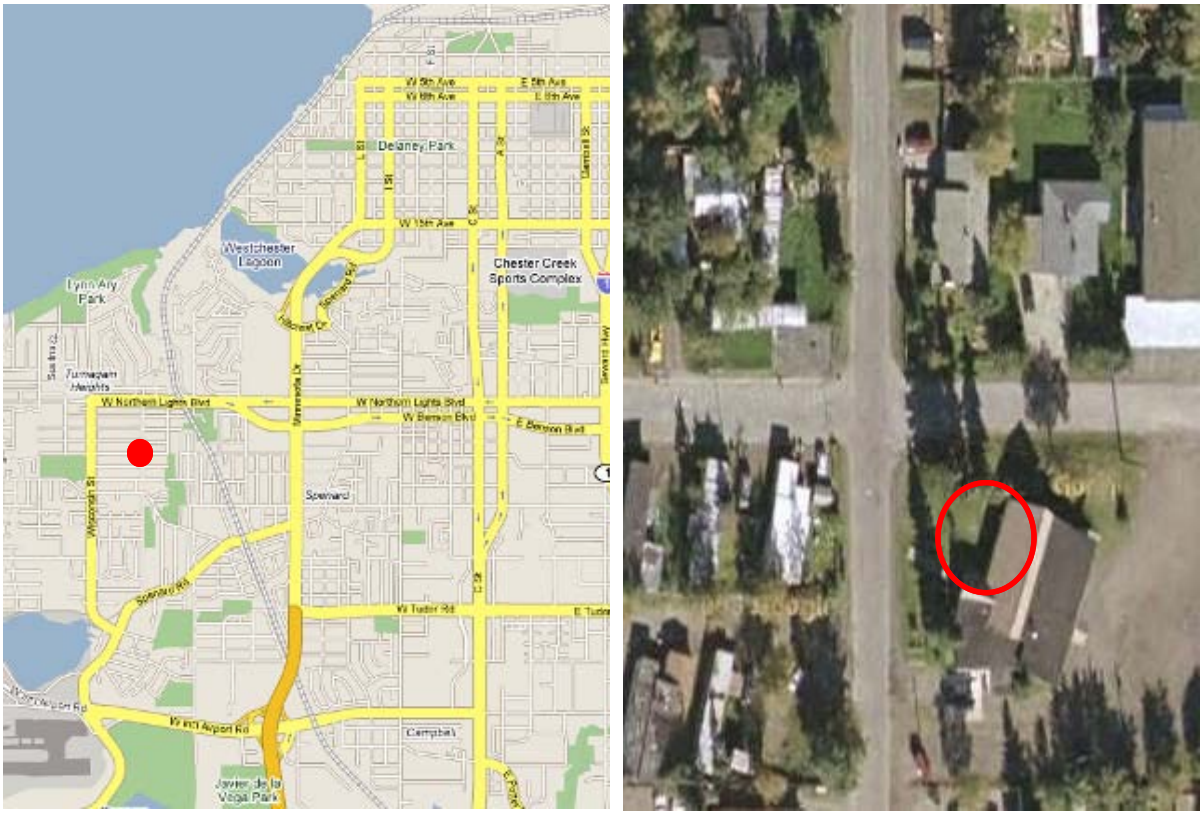


Figure 3.4:1: Street map and satellite image of the Turnagain monitoring site. The red circles indicate the sites location.

3.4.2 Sources

Advisory carbon monoxide levels are closely associated with automobile activity and combustion from local residential heating systems in the area. Other sources in the Anchorage Bowl which might have influence on this site for CO are: the Anchorage International Airport (including a lake for small float planes) is a half mile to the southwest, Municipal Light and Power (90 and 250 megawatt gas turbines), Chugach Electric (48 MW gas turbine), and Elmendorf Air Force Base (22 MW gas turbine).

3.4.3 Monitors

The Turnagain Site is currently equipped with:

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

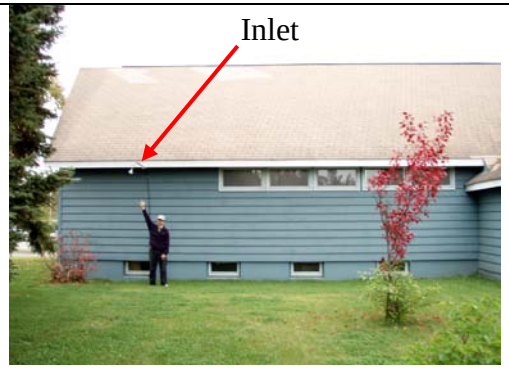
3.4.4 Siting

The monitor is installed in the Unitarian church. The inlet probe is approximately three 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.

3.4.5 Traffic

There are five major roadways within 2 miles with approximate average daily traffic ranging from 18,000 to 54,000 vehicles per day. There are residential streets and alleys in the vicinity.

Figure 3.4:2: 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		

3.5 *DHHS - ANCHORAGE*

727 L Street. **AQS ID 02-020-0052**
Parameters: CO **Established: September 27, 2007**

3.5.1 Site Information

The Department of Health and Human Services (DHHS) carbon monoxide monitoring site is located in the employee parking lot for DHHS at latitude 61º 12' 56", longitude – 149º 54'03", and 115 feet (35 meters) above sea level. Figure 3.5:1 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 community scale, representing a dimensional area up to 0.5 km.

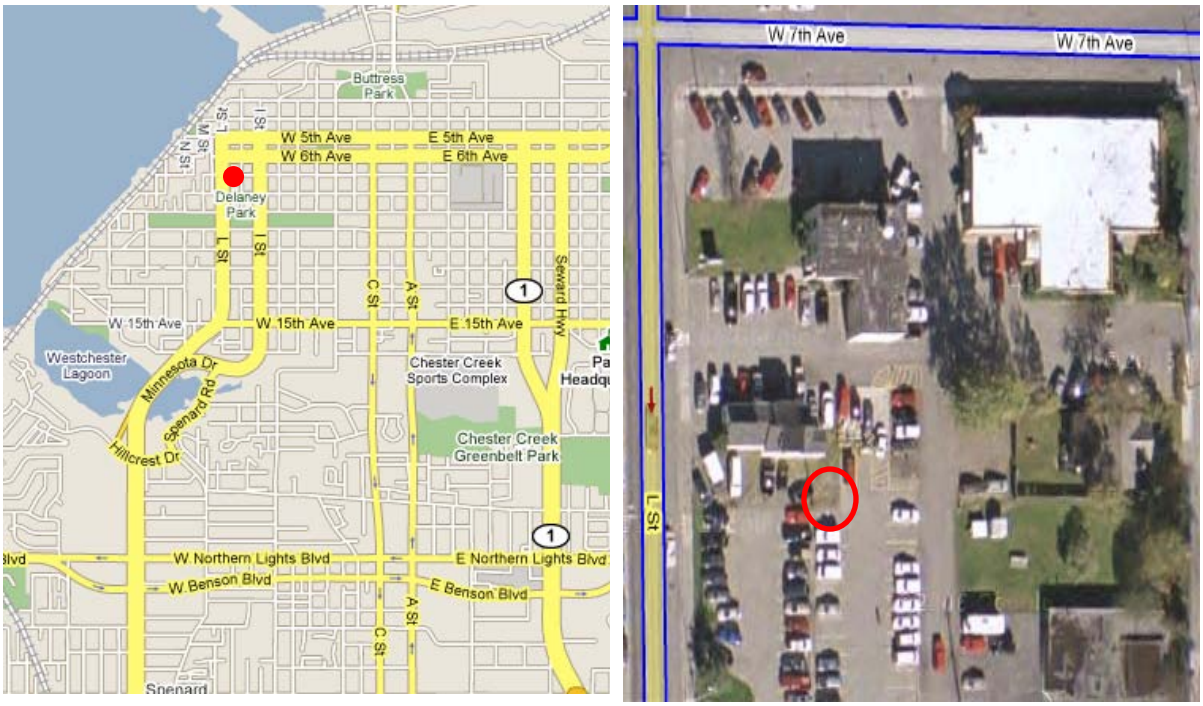


Figure 3.5:1: Street map and satellite image of the DHHS monitoring site. The red circles indicate the sites location.

3.5.2 Sources

The Alaska Railroad passes within 0.5 mile of this site and the rail yard, where locomotives commonly idle, is located approximately one mile to the northeast. This site was established by the Municipality of Anchorage in September 2007 to represent typical exposure in the downtown business district.

3.5.3 Monitors

The DHHS Site is equipped with:

- CO (SPM) – A single Thermo Electron 48C CO monitor which operated seasonally (October – March).
- PM $_{2.5}$, PM_{10}, PM Coarse (SPM) – Two Met One BAM 1020X continuous monitors were installed in September 2008 and were integrated into the DR DAS network. MOA commenced AQS reporting of PM_{10} and $PM_{2.5}$ from these monitors starting with the first quarter of 2009.

3.5.4 Siting

The monitors are installed in a small shed building located at 727 L Street.. The CO inlet probe is approximately three 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 one meter above the shed roof with two meters of separation between them. This site has sufficient separation distance from surrounding buildings to meet EPA siting criteria.

3.5.5 Traffic

There are four major roadways within one mile with average daily traffic counts ranging from 11,830 to 15,120 vehicles per day.

Figure 3.5:2: 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			

3.6 *PARKGATE, EAGLE RIVER- ANCHORAGE*

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

3.6.1 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 well within the Municipality) at latitude 61° 19' 27.5", longitude –149° 33' 15", and 328 feet (100 meters) above sea level. Figure 3.13 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 with monitoring site 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}, and the State SIP required the Municipality of Anchorage to pave almost all of Eagle River's dirt roads. Since paving most of the surrounding gravel roads, the air quality has improved to the point that no violations of the national ambient air quality standards 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}.

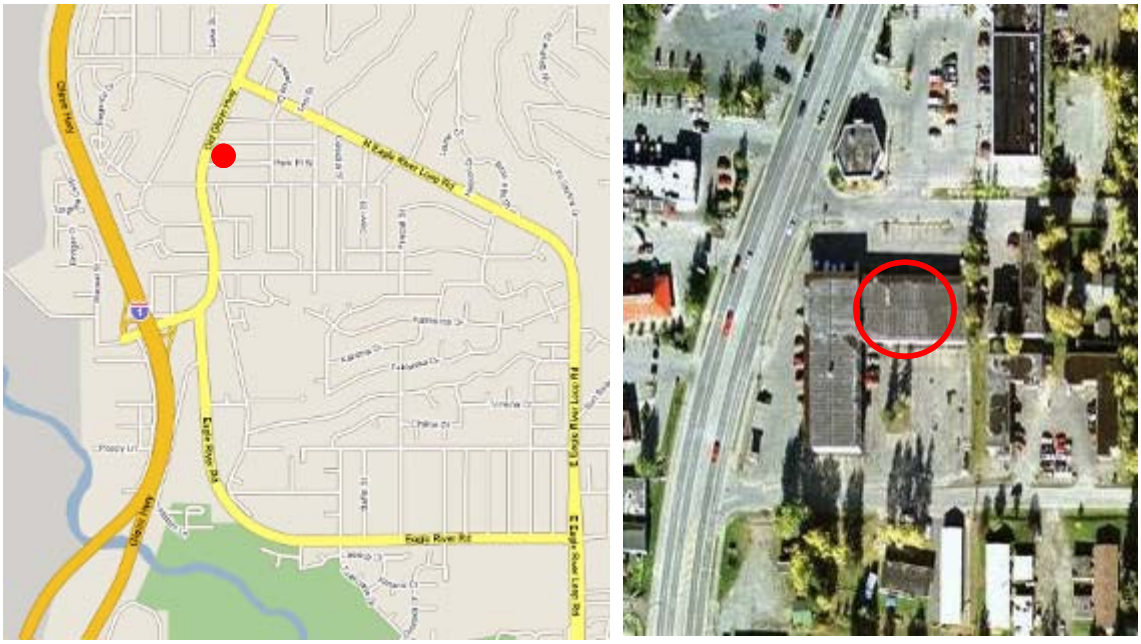


Figure 3.6:1: Street map and satellite image of the Eagle River monitoring site. The red circle indicates the sites location.

3.6.2 Sources

The primary source of course particulate matter at this site is from automobile activity. Roadways are sanded for traction during winter months and the sand gets re-entrained in

the air during dry summer days. The Alaska Railroad passes within 3 miles of the site. Eagle River is seasonally affected by wind-blown glacial loess, and occasionally affected by wildfire smoke and volcanic eruptions.

3.6.3 Monitors

The Eagle River Site is currently equipped with:

- PM_{10} (SLAMS) – One General Metal Works high-volume sampler. The Hi-Vol sampler is operated on a 1-in-6 day sampling schedule.
- CO (SPM) – A single Thermo Electron 48C CO monitor operates seasonally (October – March).
- $PM_{2.5}$, PM_{10}, PM Coarse (SPM) – Two Met One BAM 1020X continuous monitors were installed in October 2008 and were integrated into the DR DAS network. MOA commenced AQS reporting of PM_{10} and $PM_{2.5}$ from these monitors starting with the first quarter of 2009.

3.6.4 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 three 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.

3.6.5 Traffic

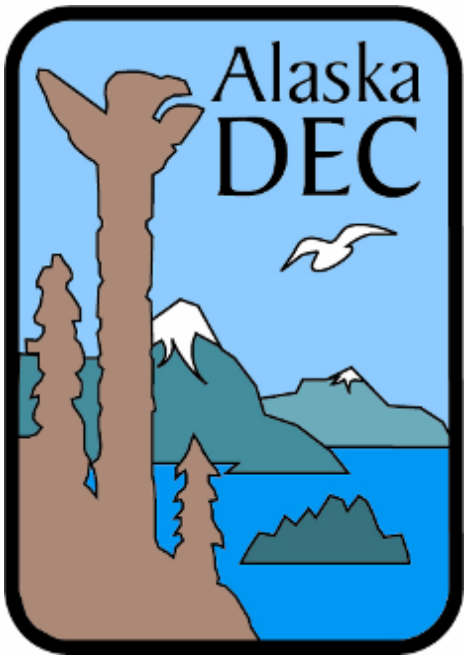
There are two major roadways within 2 miles ranging from 15,500 to 29,000 vehicles per day. There are typical residential and commercial streets and alleys in the vicinity. All roads are paved and alleys are unpaved.

Figure 3.6:2: 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 Air Monitoring 2010 Network Plan

Chapter 4 - Fairbanks



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4 FAIRBANKS MONITORING SITES

4.1 *General Information*

Fairbanks is the second largest city in Alaska (population[1] 34,500), located within the Fairbanks North Star Borough (FNSB; population 87,560). 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 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. Fairbanks was re-designated to CO "maintenance" status on July 23, 2004. Appendix A- lists the definitions of each designation.

The FNSB Air Program operates and manages seven monitoring stations: two State and Local Air Monitoring Site (SLAMS) for CO, one SLAMS for $PM_{2.5}$ and four Special Purpose Monitoring Sites (SPM) for $PM_{2.5}$. The FNSB SLAMS and SPM sites are identified below in Table 4-1. 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 4.1:1 is a map showing the entire Fairbanks area and surrounding geographical features. Figure 4.1:2 is a satellite map indicating locations of the four monitoring sites. Fairbanks is bordered by hills to the north and west, with the flats opening up to the south and east.

[1] Population data from 2005 US Census.

Table 4-1: 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	Oct, 1998	neighborhood
Sadler's	Fairbanks	n/a	SPM	Nov, 2006	neighborhood
Nordale	Fairbanks	n/a	SPM	Nov, 2006	neighborhood
TAC (Peger Rd)	Fairbanks	n/a	SPM	Nov, 2007	neighborhood
North Pole	North Pole	n/a	SPM	Nov, 2008	neighborhood
CO					
Site Name	**Location**	**AQS ID**	**Designation**	**Install Date**	**Scale**
Hunter School	Fairbanks	02-090-0020	SLAMS	Jan, 1979	neighborhood
Old Post Office	Fairbanks	02-090-0002	SLAMS	Jan, 1972	micro

Figure 4.1:1: Map of Fairbanks and North Pole area. The red squares indicate monitoring sites.

Figure 4.1:2: Satellite photo of Fairbanks. Red circles indicate monitoring sites (in order from top down) (1) Old Post Office, (2) State Office Building, (3) Hunter Elementary School, (4) Sadler, (5) TAC (Peger Rd), and (6) Nordale School sites.

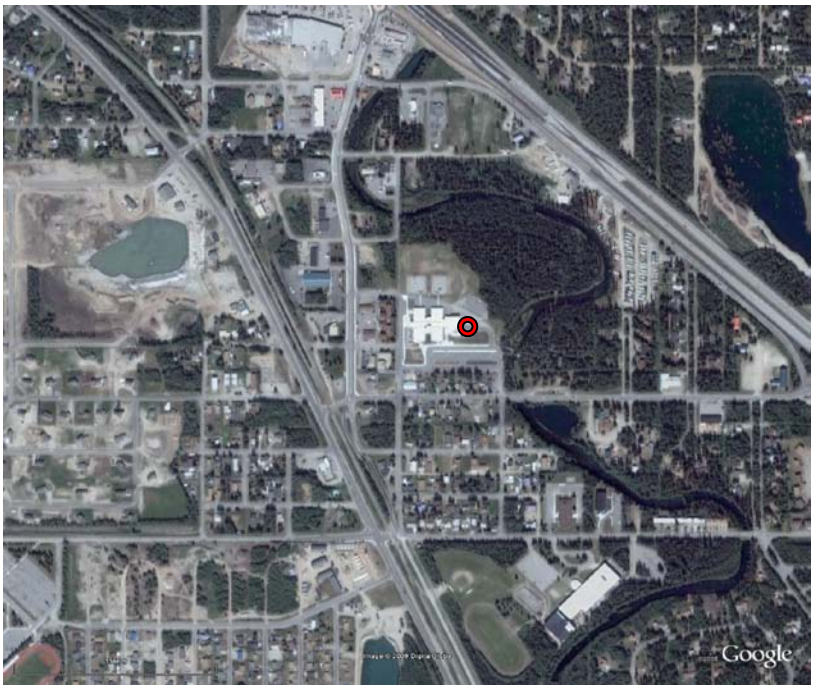


Figure 4.1:3: Satellite photo of North Pole. The red circle indicates the monitoring site at North Pole Elementary School.

4.2 *OLD POST OFFICE SITE - FAIRBANKS*

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

4.2.1 Site Information

The site is located in the Old Post Office building at 250 Cushman Street at latitude 64° 50' 43", longitude –147° 43' 16", and 460 feet (140 meters) above sea level. Figure 4.2:1 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.

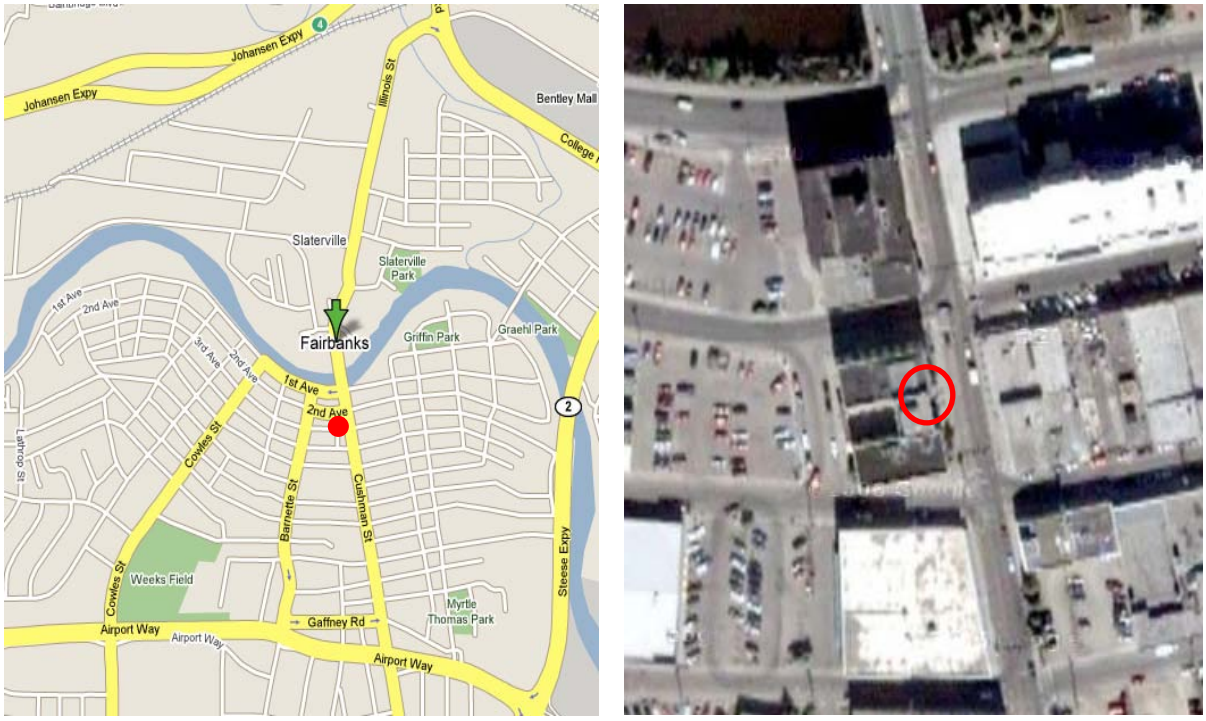


Figure 4.2:1: Map and satellite image of the Old Post Office monitoring site. The red circles indicate the site location.

4.2.2 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 occasionally impacted by wildland fire smoke in the summer months.

4.2.3 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.

4.2.4 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.

4.2.5 Traffic

This site is located at one of the busiest intersections in downtown Fairbanks. Traffic within one mile of the site sees daily traffic counts ranging from 3,700 to 7,400 vehicles per day.

Figure 4.2:2: 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		

4.3 *STATE OFFICE BUILDING*

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

4.3.1 Site Information

The site is located on the State Office Building at 675 7th Avenue. The latitude is 64° 50' 27", longitude is –147° 43' 23", and 460 feet (140 meters) above sea level. Figure 4.3:1 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.

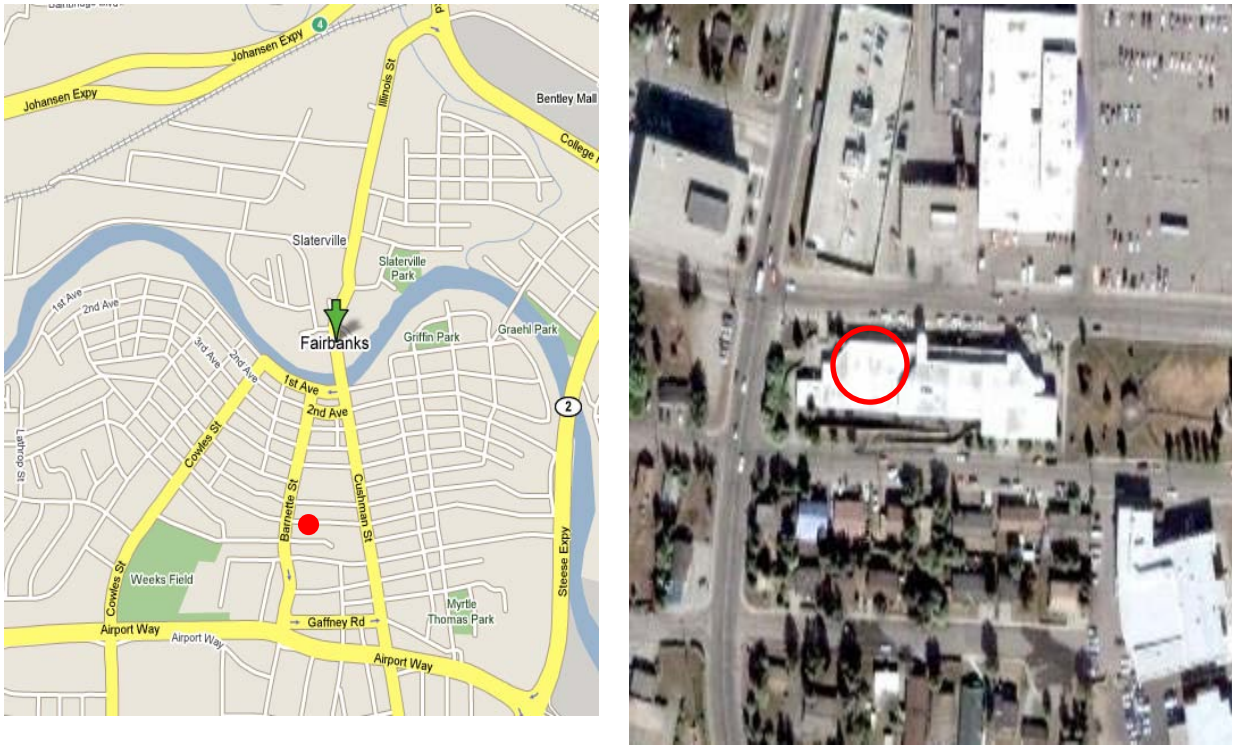


Figure 4.3:1: Map and satellite image of the State Office Building. The red circles indicate the sites location.

4.3.2 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.

4.3.3 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 alternating sampling schedule with the second operating as a collocated monitor.
- $PM_{2.5}$ (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) – A single Met-One Super SASS Speciation Monitor. This multi filter sampler is set to sample on a 1-in-3 day sampling schedule.

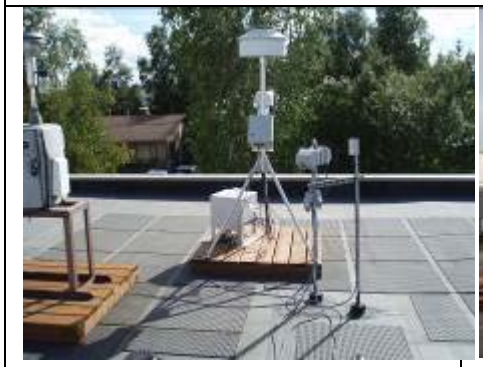
4.3.4 Siting

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 whose height exceeds that of the inlets.

4.3.5 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 3,700 to 7,400 vehicles per day. There are no parking lots in the vicinity of the probe, but there is parallel parking on 7th Ave.

Figure 4.3.2: Pictures of the State Office Building

North	East	South	West
			
Views in four directions from the State Office Building			
			
Views in four directions towards the State Office Building Site			

4.4 *HUNTER ELEMENTARY SCHOOL SITE - FAIRBANKS*

1630 Gillam Way **AQS ID 02-090-0020**
Parameters: CO **Established: January 1, 1979**

4.4.1 Site Information

The site is located at Hunter Elementary School, on the corner of 17th Avenue and Gillam Way. The latitude is 64° 49' 58", longitude is –147° 43' 53", and 446 feet (136 meters) above sea level. Figure 4.4:1 shows a street map of the local area and a satellite picture of the Hunter site. This is a neighborhood-scale, population-oriented site.

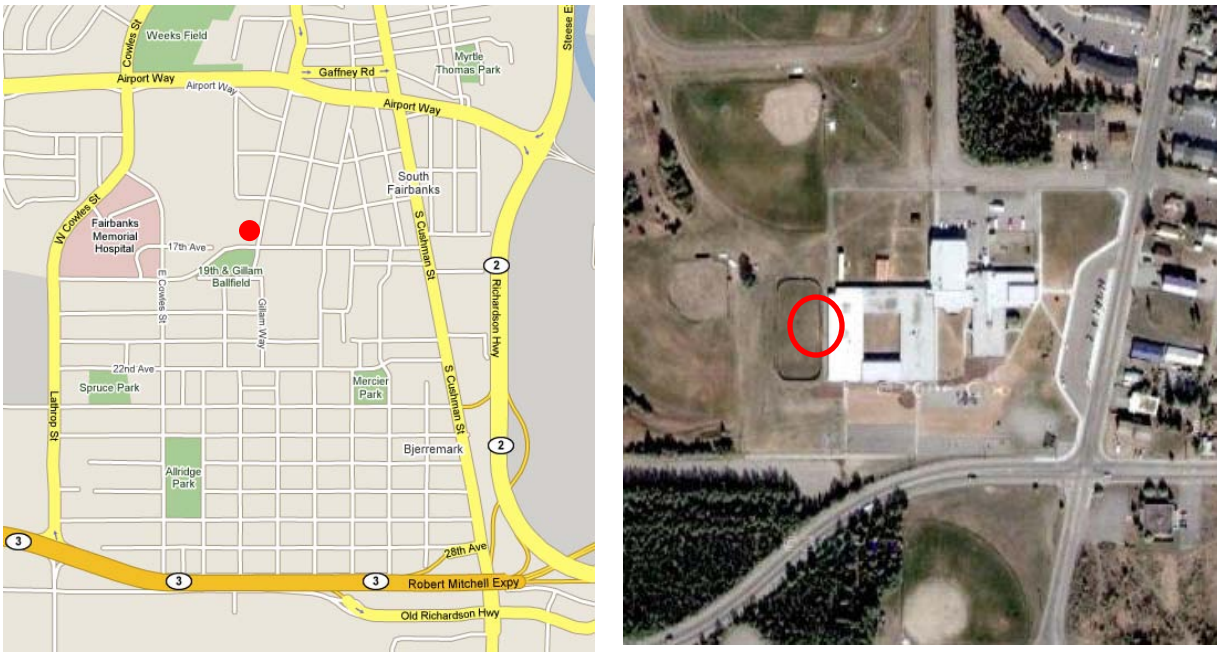


Figure 4.4:1: Map and satellite image of the Hunter Elementary site. The red circles indicate site location.

4.4.2 Sources

The dominant source of CO emissions for this site is from vehicle exhaust. Within 200 meters of the site, land use is predominantly single family dwellings, small businesses (generally medical practices and small offices) and public schools. Many houses have chimneys and may be using wood stoves in the winter for supplemental heat.

Other sources of CO may be from the Fairbanks Memorial Hospital (less than one quarter mile west), the Aurora Energy coal fired power plant (one mile north), and the coal-fired power plants operated by the University of Alaska (two to three miles northwest) and Fort Wainwright Army Post (one mile east).

4.4.3 Monitors

The Hunter Elementary site is currently equipped with:

- CO (SLAMS) – A single Thermo Electron 48C CO monitor operates seasonally (October – March) with an inlet approximately 2.5 meters above the ground.

4.4.4 Siting

The school is between 16th Avenue and 17th Avenue on the west side of Gillam Way. The CO inlet is 50 meters from the nearest traffic lane on 17th Avenue, and approximately 30 meters from the nearest traffic lane on 16th Avenue. The probe extends 1.5 meters through the western exterior wall at a height of 2.9 meters. On the west side of the school is a grass strip of land and a hockey rink. There are no streets or parking areas in the vicinity of the probe.

The school parking lot is on the east side of the building and is paved. A smaller, paved, faculty parking lot is on the north side of the building. A small unpaved lot provides supplementary parking near the faculty lot, but is used very little. All parking lots have plug-ins for automobile head-bolt heaters in winter.

4.4.5 Traffic

Average daily traffic for this location is unknown at this time, but is expected to be below 5,000 vehicles per day.

Figure 4.4:2: Pictures of the Hunter Elementary School Site

North	West	South
		
Views in three directions from the Hunter Elementary School Site		
North	**East**	**South**
		
Views in three directions towards the Hunter Elementary School Site		

4.5 *SADLER SITE - FAIRBANKS*

610 Cushman, St. **AQS ID: n/a**
Parameters: $PM_{2.5}$, SO_2, NO_X, Black Carbon **Established: Nov. 1, 2006**

4.5.1 Site Information

The site is located at the Sadler's Furniture Store on the corner of 6th Avenue and Cushman St. at latitude 64° 50′26″, longitude –147° 43′19″, and 446 feet (136 meters) above sea level. Figure 4.6:1 shows a street map of the local area. This is a neighborhood-scale, population-oriented site.

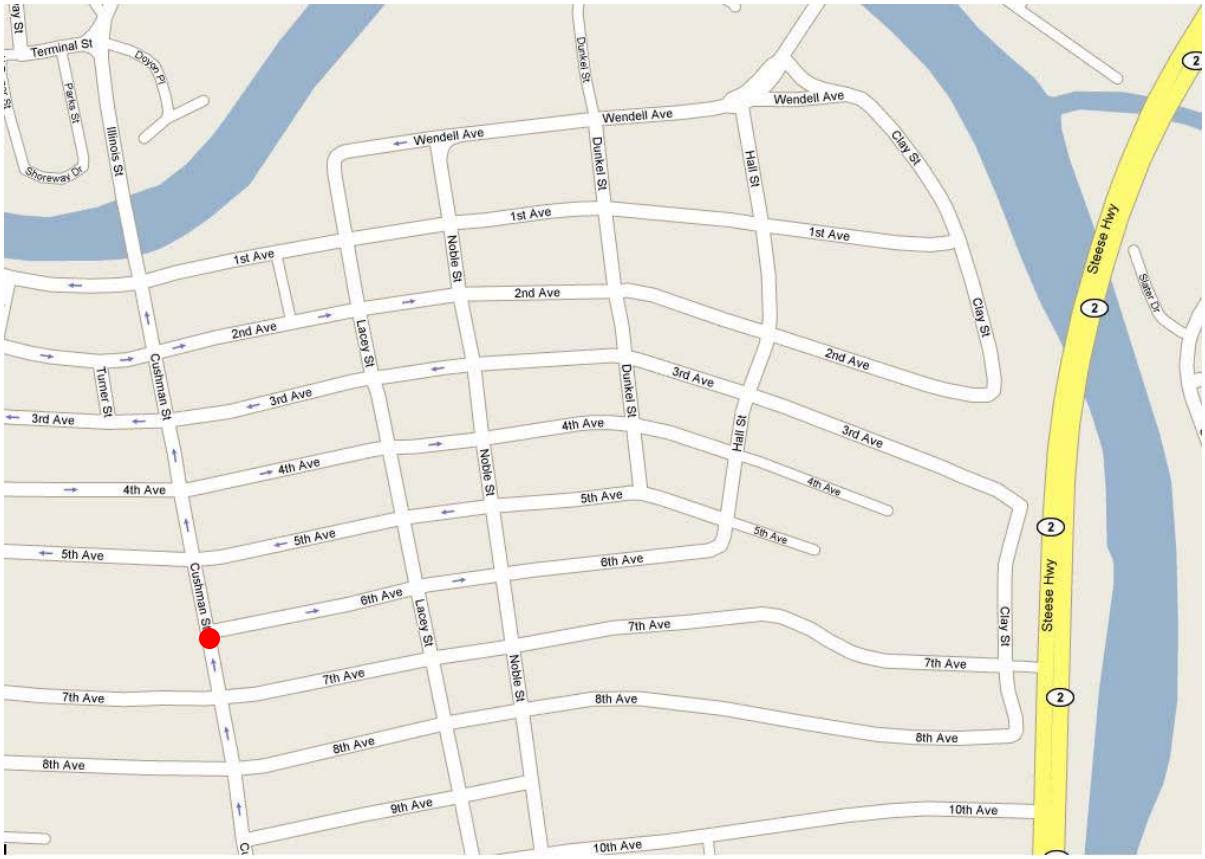


Figure 4.5:1: Map of the Sadler monitoring site. The red circle indicates site location.

4.5.2 Sources

The source of the NAAQS pollutants in Fairbanks is unclear. The FNSB Winter Monitoring Project conducted during the winters of 2008-09 and 2009-10 is to evaluate wintertime pollutant characteristics and develop a strategy to reduce the concentration in Fairbanks.

4.5.3 Monitors

The Sadler site is currently equipped with:

- $PM_{2.5}$ (SLAMS) – One Thermo Electron (formerly Rupprecht & Patashnick) Partisol 2000 sampler operating 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 – a Magee Scientific Aethalometer with GBI 2.5 μm sharp cut cyclone samples continuously.
- NO_X – A TECO Model 42C samples continuously.
- SO_2 - A TECO Model 43C samples continuously.

4.5.4 Siting

The Sadler site is located in the Sadler's Furniture store parking lot in downtown Fairbanks. The parking lot is paved, and is located very near Cushman Street.

4.5.5 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 3,700 to 7,400 vehicles per day.

Figure 4.5.2: Pictures of the Sadler site

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

4.6 *TAC (PEGER ROAD) SITE - FAIRBANKS*

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

4.6.1 Site Information

The site is located at the Transit Admin Center (TAC) on Peger Road at latitude 64° 49′08″, longitude –147° 46′27″, and 436 feet (133 meters) above sea level. Figure 4.7:1 shows a street map of the local area. This is a neighborhood-scale, population-oriented site.

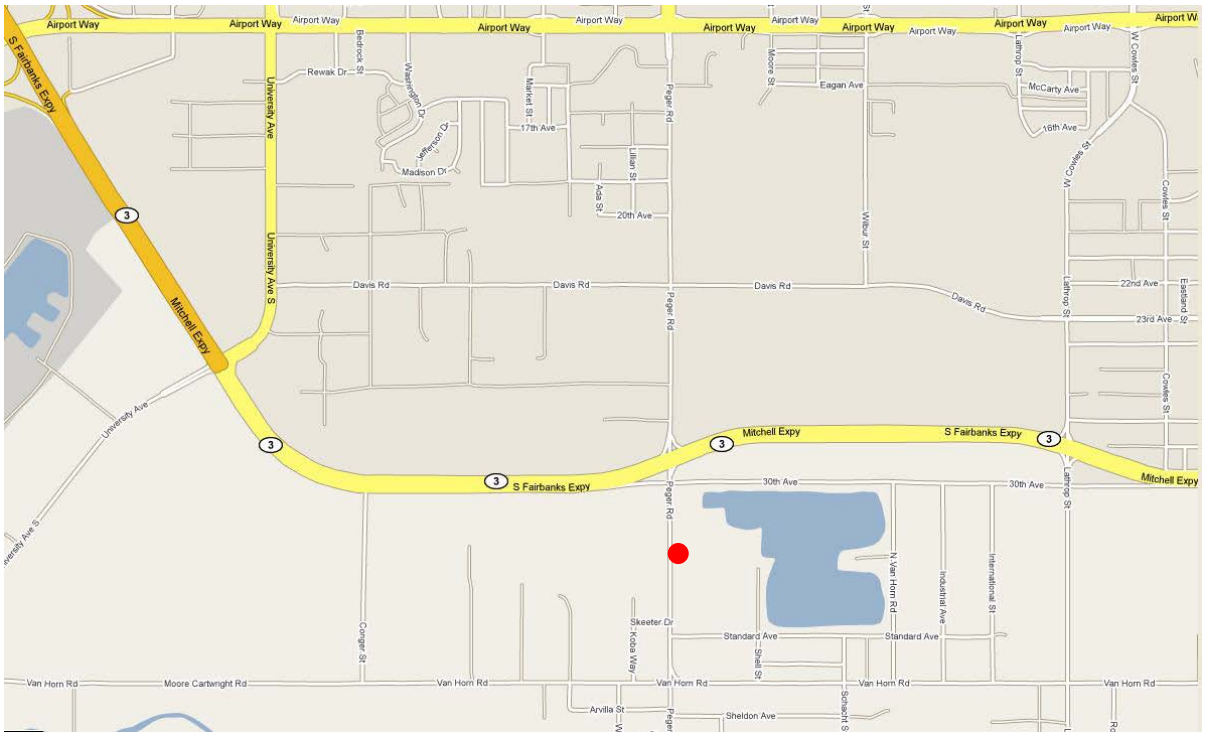


Figure 4.6:1: Map of the TAC (Peger Road) monitoring site. The red circle indicates site location.

4.6.2 Sources

The source of the NAAQS pollutants in Fairbanks is unclear. The FNSB Winter Monitoring Project conducted during the winters of 2008-09 and 2009-10 is to evaluate wintertime pollutant characteristics and develop a strategy to reduce the concentration in Fairbanks.

4.6.3 Monitors

The TAC site is currently equipped with:

- $PM_{2.5}$ (SLAMS) – 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) – A single Met-One Super SASS Speciation Monitor. This multi filter sampler is set to sample on a 1-in-3 day sampling schedule.
- $PM_{2.5}$ (SPM) – A single Thermo Electron TEOM 1400a samples continuously.

4.6.4 Siting

The TAC site is in an industrial area, approximately 222 meters (730 feet) from the Peger Road/Mitchell Expressway intersection. One of the PM2.5 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.

4.6.5 Traffic

Average daily traffic for this location is unknown at this time, but this location is in an industrial area near the Mitchell Expressway.

Figure 4.6:2: Pictures of the TAC (Peger Rd.) site.

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

4.7 *NORDALE SCHOOL SITE - FAIRBANKS*

397 Hamilton Avenue **AQS ID: n/a**
Parameters: $PM_{2.5}$, Black Carbon **Established: Nov. 1, 2006**

4.7.1 Site Information

The site is located at the Nordale School on the corner of Hamilton Avenue and Eureka Avenue at latitude 64° 50′45″, longitude –147° 41′35″, and 446 feet (136 meters) above sea level. Figure 4.7:1 shows a street map of the local area. This is a neighborhood-scale, population-oriented site.

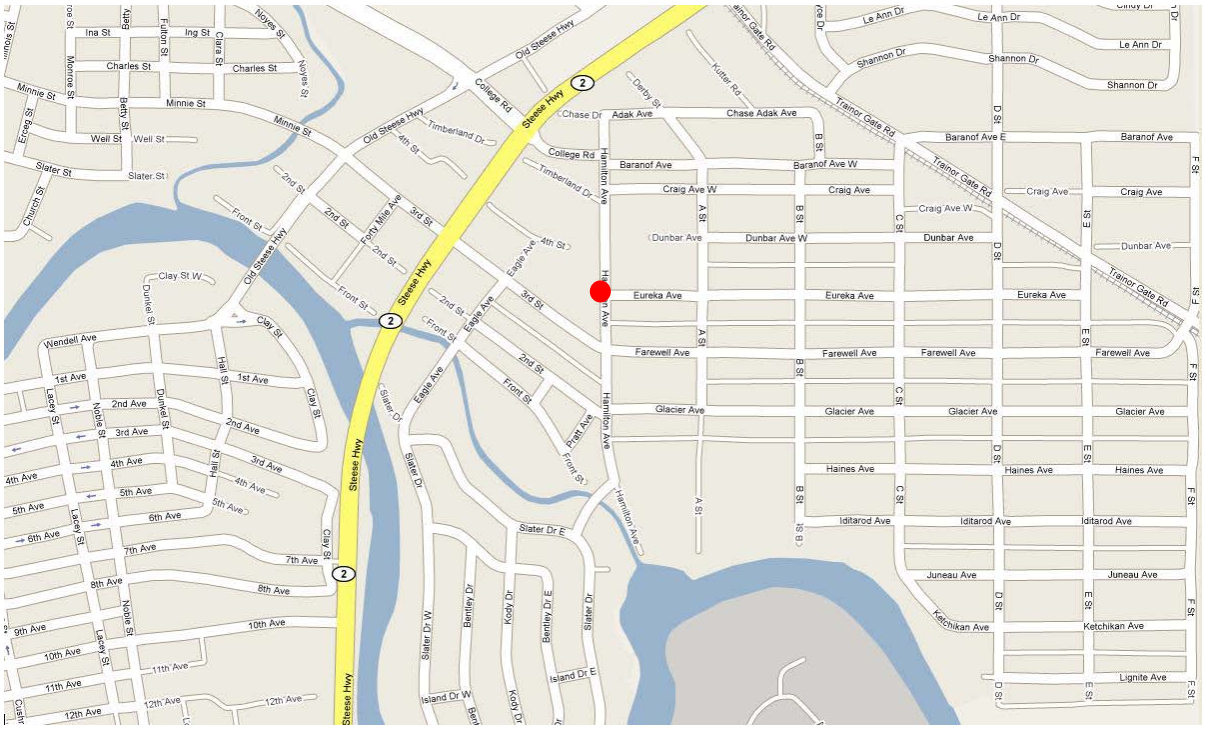


Figure 4.7:1: Map of the Nordale School monitoring site. The red circle indicates site location.

4.7.2 Sources

The source of the NAAQS pollutants in Fairbanks is unclear. The FNSB Winter Monitoring Project conducted during the winters of 2008-09 and 2009-10 is to evaluate wintertime pollutant characteristics and develop a strategy to reduce the concentration in Fairbanks.

4.7.3 Monitors

The Nordale site is currently equipped with:

- $PM_{2.5}$ (SLAMS) – One Thermo Electron (formerly Rupprecht & Patashnick) Partisol 2000 samplers 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 – a Magee Scientific Aethalometer with GBI 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.

4.7.4 Siting

The Nordale site is located in the parking lot of Nordale Elementary School on Hamilton Avenue.

4.7.5 Traffic

Average daily traffic for this location is unknown at this time, but is expected to be below 5,000 vehicles per day. The Nordale site is located in a residential neighborhood called Hamilton Acres, east-northeast of the downtown area.

Figure 4.7:2: Pictures of the Nordale School Site

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

4.8 *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

4.8.1 Site Information

The site is located at the North Pole Elementary School on the East side of the parking lot at N64° 45.122' W147° 20.842′, and 479 feet (146 meters) above sea level. Figure 4.8:1 shows a street map of the local area. This is a neighborhood-scale, population-oriented site.

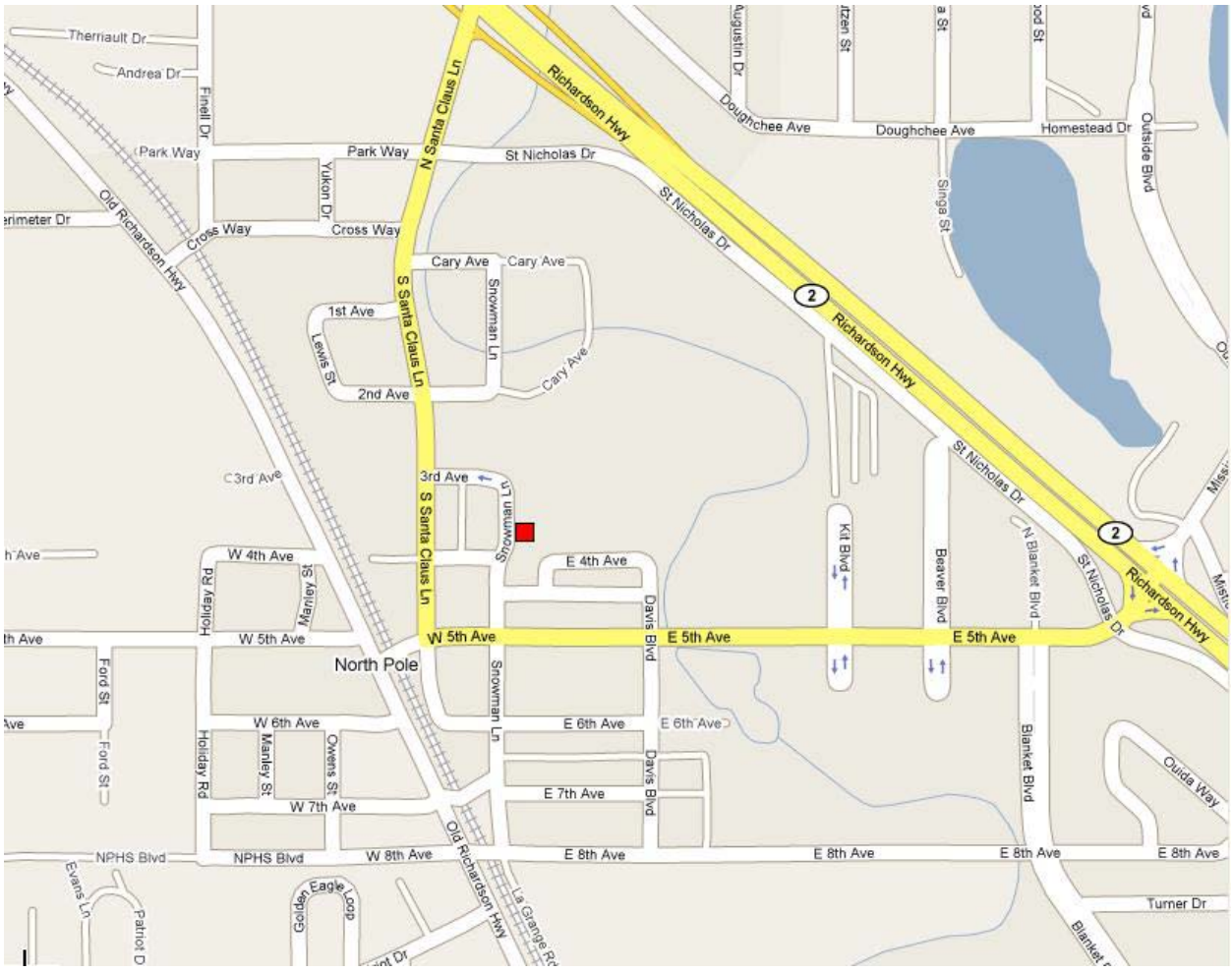


Figure 4.8:1: Map of the North Pole monitoring site. The red circle indicates site location.

4.8.2 Sources

The source of the NAAQS pollutants in North Pole is unclear. The FNSB Winter Monitoring Project conducted during the winters of 2008-09 and 2009-10 is to evaluate wintertime pollutant characteristics and develop a strategy to reduce the concentration in North Pole.

4.8.3 Monitors

The North Pole Elementary site is currently equipped with:

- $PM_{2.5}$– 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 – a Magee Scientific Aethalometer with GBI 2.5 μm sharp cut cyclone samples continuously.
- $PM_{2.5}$ (SPM) – 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

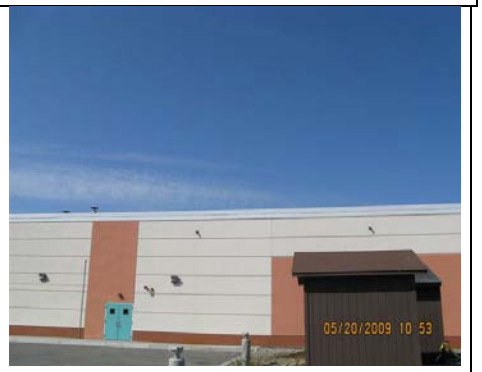
4.8.4 Siting

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.

4.8.5 Traffic

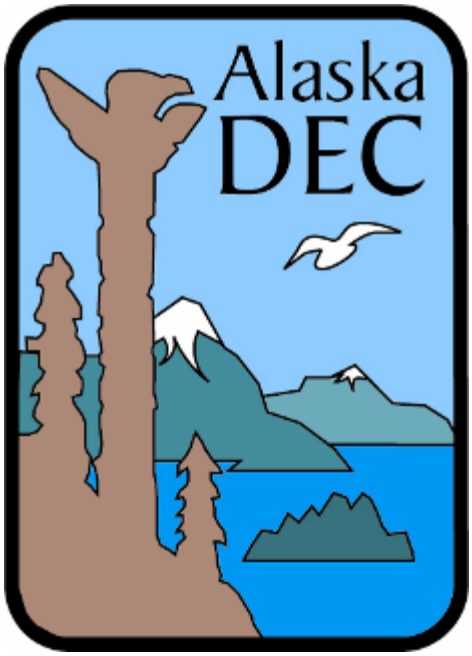
Average daily traffic for this location is unknown. The site is within approximately 1000 feet (300 meters) from the Richardson Highway. Land use within a ¼-mile radius of the site is mixture of commercial, industrial, and residential. Annual average daily traffic along the Richardson Highway through North Pole is 10,400 vehicles per day. The daily traffic along Snowman Lane is unknown but expected to be less than 5,000 vehicles per day.

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 Air Monitoring 2010 Network Plan

Chapter 5 - Juneau



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5 JUNEAU MONITORING SITES

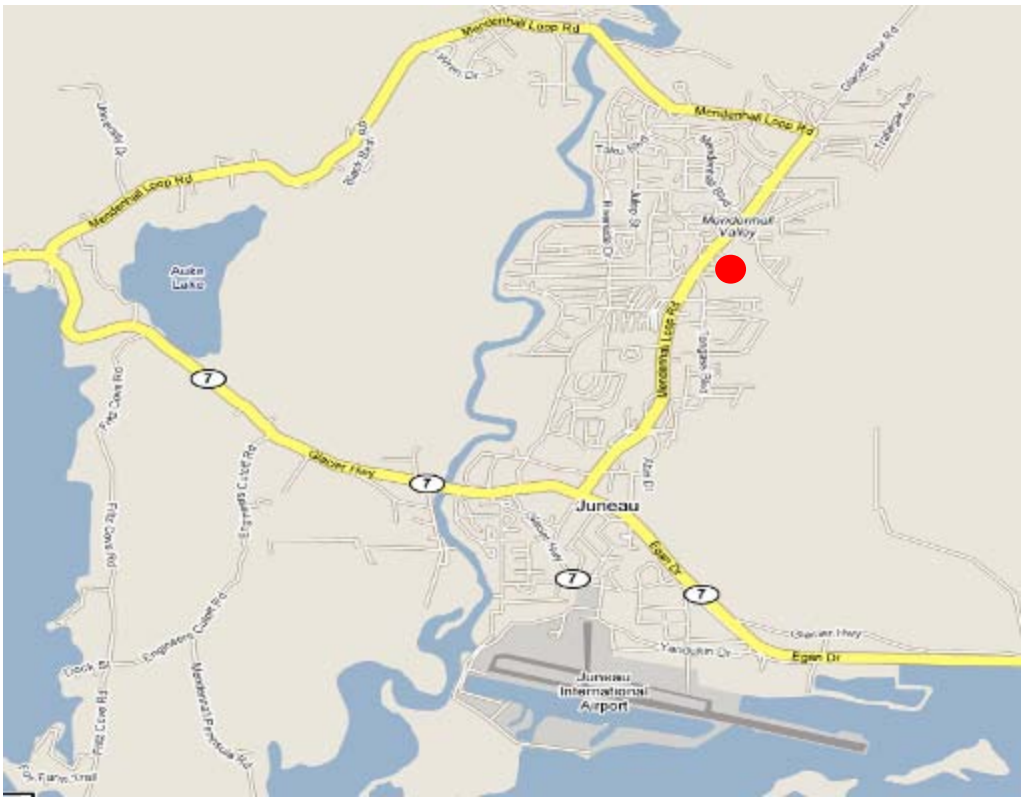
5.1 *General Information*

The City and Borough of Juneau is located in Southeast Alaska, on the mainland side of the Gastineau Channel and across from Douglas Island. The borough encompasses 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 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 west. Snowfall averages 101 inches at the airport. The population[1] of the Juneau-Douglas area is 30,700.

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 5.1:1 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} required the community to develop two separate action plans to minimize the exceedance of the standard. The first was to start paving roads to minimize the impact of dust and the second was to issue notices when people could use their woodstoves to reduce the impact from smoke. The City and Borough of Juneau and the Alaska DEC are currently in the process to re-designate Juneau as a PM_{10} maintenance area with the US EPA. Definitions of designations and siting criteria can be found in Appendix A

[1] Population data 2005 U.S. Census.



<u>Figure 5.1:1</u>: Street map of Mendenhall Valley. Red circle indicates the monitoring site.

5.2 *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**

5.2.1 Site Information

The Juneau site is located on the roof of the Floyd Dryden Middle School in the Mendenhall Valley, off of Mendenhall Loop Road between North El Camino Street and Spruce Lane. The latitude is 58º 23'30', longitude is -134 º33'30", and the site is located 45 meters (143 feet) above sea level. Figure 5.2:1 is a satellite image of the site and map of the surrounding area. The site is located in the middle of a residential area. Floyd Dryden is a neighborhood-scale, population-oriented site.

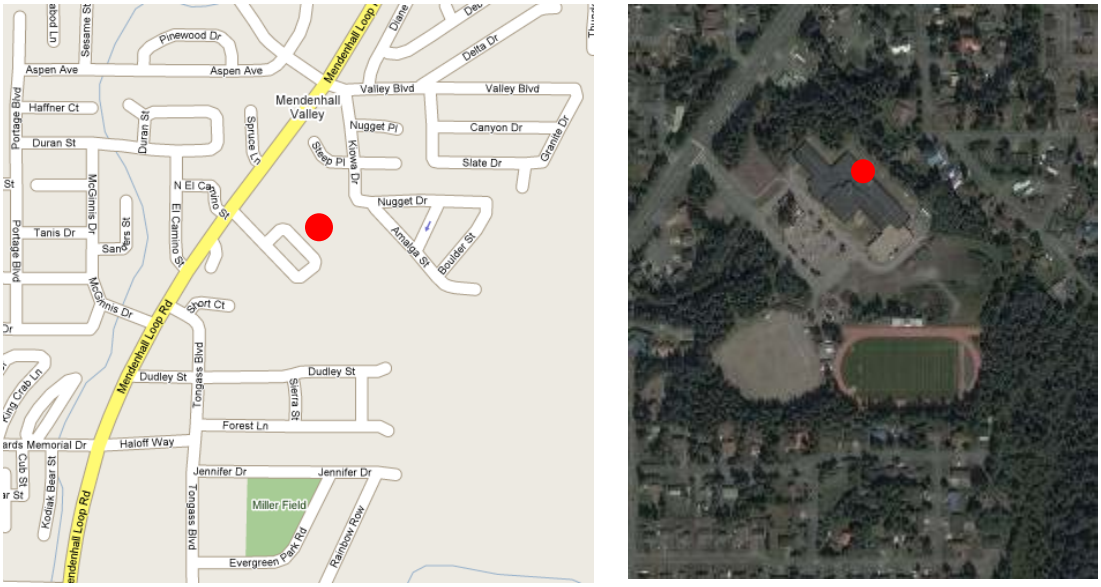


Figure 5.2:1: Map and satellite image of the Floyd Dryden monitoring site. The red circle indicates the monitoring site.

5.2.2 Sources

The Mendenhall Valley is located northwest of Juneau and separated from the Lemon Creek Valley by the north-south oriented Heintzelman Ridge. With the exception of wildfire smoke from Canada, 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 and playgrounds, automobile exhaust, fugitive dust from construction/land clearing and smoke from open burning.

Juneau International Airport (average of 1050 passengers daily) is two miles away at the south end of Mendenhall Valley, and may affect the Floyd Dryden site when winds are from the south. Within five miles are a gravel pit and the Mendenhall Glacier, both of

which may cause crustal material to be re-entrained during particular meteorological conditions. On occasion, wildfire smoke, carried by long range transport from Western Canada, has been known to impact the Mendenhall Valley.

5.2.3 Monitors

The Floyd Dryden Site is currently equipped with:

- $PM_{2.5}$ (SLAMS) – Four Thermo Electron (formerly Rupprecht and Patashnick) Partisol 2000 samplers. On April 1, 2008 the sampling schedule changed from 1-in-3 day to a 1-in-1 day schedule.
- PM_{10} (SPM) – One General Metal Works High-Volume sampler. Running on a 1-in-6 day sampling schedule.
- $PM_{2.5}$ (SPM) – A single Thermo Electron TEOM 1400a continuous monitor was installed to provide information in real time for evaluating the Air Quality Index.

5.2.4 Siting

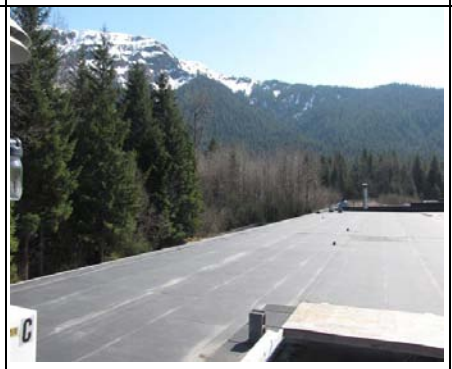
The samplers are installed on the roof of Floyd Dryden Middle School, approximately six meters (19 feet) above the ground. There is a furnace flue approximately 20 meters (64 feet) to the East of the sampler roof location. There is also a nearby dryer vent coming out of the building on the ground level 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.

5.2.5 Traffic

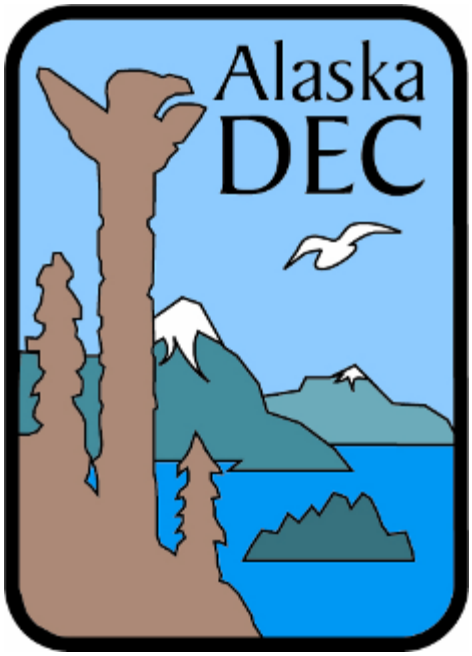
The Floyd Dryden site is approximately 65 meters east of Mendenhall Loop Road (the main roadway into the valley; 12,770 vehicles per day). The roads are paved and, in the winter, sanded for traction.

Figure 5.2:2: 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 Air Monitoring
2010 Network Plan

Chapter 6 – Matanuska Susitna Valley



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6 MATANUSKA-SUSITNA VALLEY MONITORING SITES

6.1 General Information

The Mat-Su Borough has a population[1] of 76,006 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 air quality monitoring investigations into PM_{10} concentrations in the Matanuska–Susitna (Mat-Su) Valley for over five years. Monitoring was initiated in response to staff observations and well-documented accounts of wind-blown dust off the Matanuska and Knik River drainages.

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.

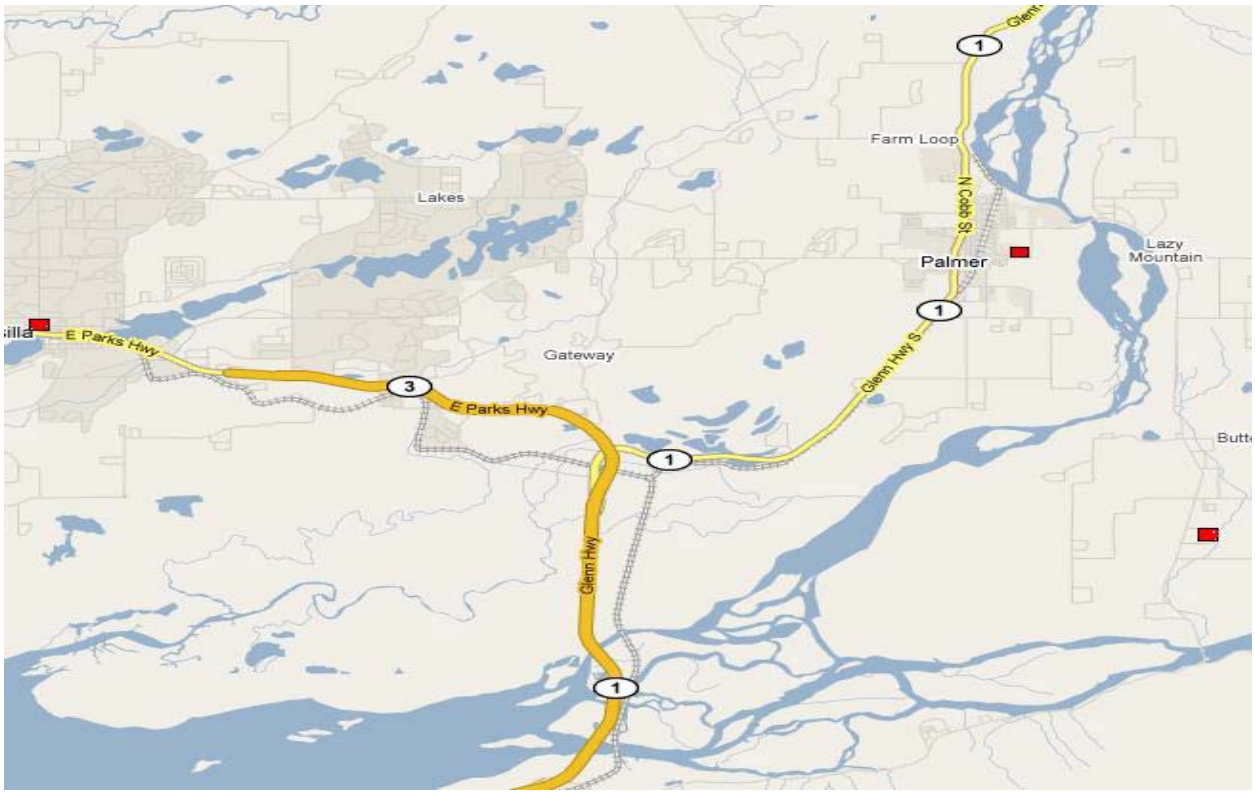

Figure 6.1:1: Map of the Southern Mat-Su Borough area. The red squares indicate the location of the three monitoring sites.

[1] Population data 2005 U.S. Census.

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 behind Fire Station 61 near the intersection of W Swanson and Lucille.

6.2 HARRISON COURT (BUTTE) SITE- MATANUSKA-SUSITNA BOROUGH

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

6.2.1 Site Information

The Harrison Court monitoring site is located on a cul-de-sac at the end of Harrison Court, latitude 61° 32' 02.986", longitude –149° 01' 53.958", 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 for $PM_{10.}$ Figure 6.2:1 is a street map of the monitoring site and surrounding area. Harrison Court is a neighborhood PM site.

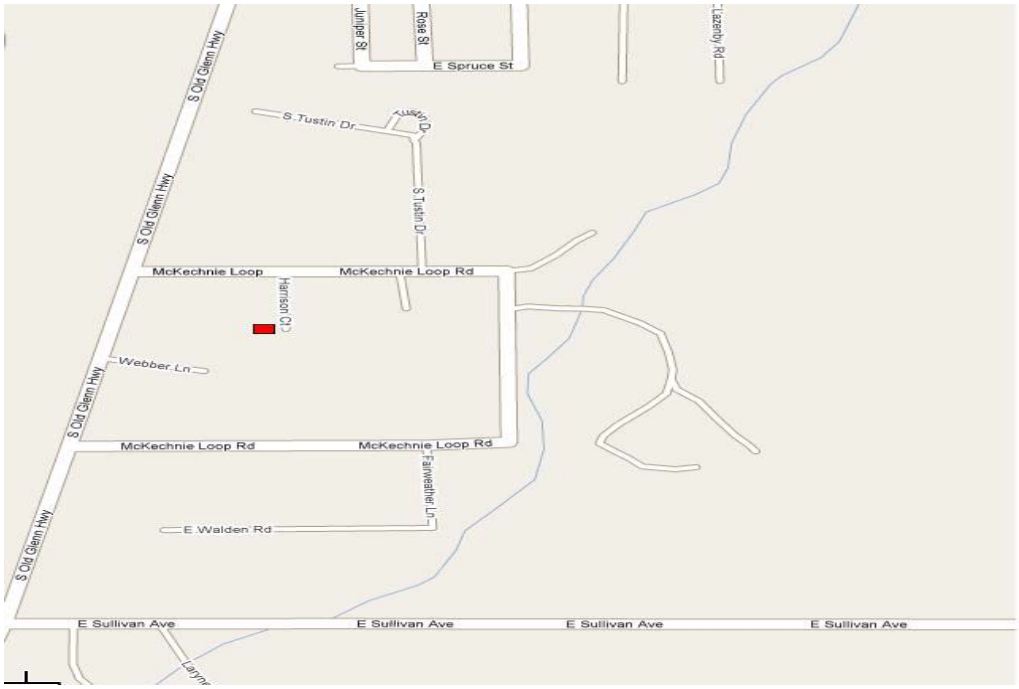

Figure 6.2:1: Map of the Butte area. The red square denotes the Harrison Court site.

6.2.2 Sources

The major sources of coarse particulate matter impacting this site are dust from the Knik and Matanuska Rivers. Both are glacier fed meandering rivers that deposit glacial silt. During times

when the river is low (spring and fall) dry, windy weather suspends large amounts of silt in the air. Several air quality alerts are issued per year during spring and fall months because of wind-blown dust events. Additionally, within five miles are two small gravel airstrips (activity unknown but expected to be light), a dirt-track motor raceway, and many acres of farmland. Most land in the area is undeveloped forest. Sources of fine particulate matter include residential wood smoke, vehicular exhaust, and forest fires.

6.2.3 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 run on a 1-in-6 day alternating sampling schedule resulting in a 1-in-3 day sampling frequency.
- PM_{10} (SPM) – One General Metal Works high-volume sampler. Operated on a 1-in-6 sampling schedule.
- PM_{10} (SPM) – A single Met-One BAM 1020 continuous monitor was installed to provide information in real time for evaluating the Air Quality Index.

6.2.4 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 6.2.2.

6.2.5 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 streets is not known.

Figure 6.2:2: 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			

6.3 PALMER SITE- MATANUSKA-SUSITNA BOROUGH

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

6.3.1 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, longitude 149° 06.217' west. The average elevation for Palmer is 239 feet above mean sea level. The monitoring site is located approximately 600 meters due east of the central downtown district. The predominant land use in a ¼-mile area is residential and commercial buildings with large, open grass-covered areas.

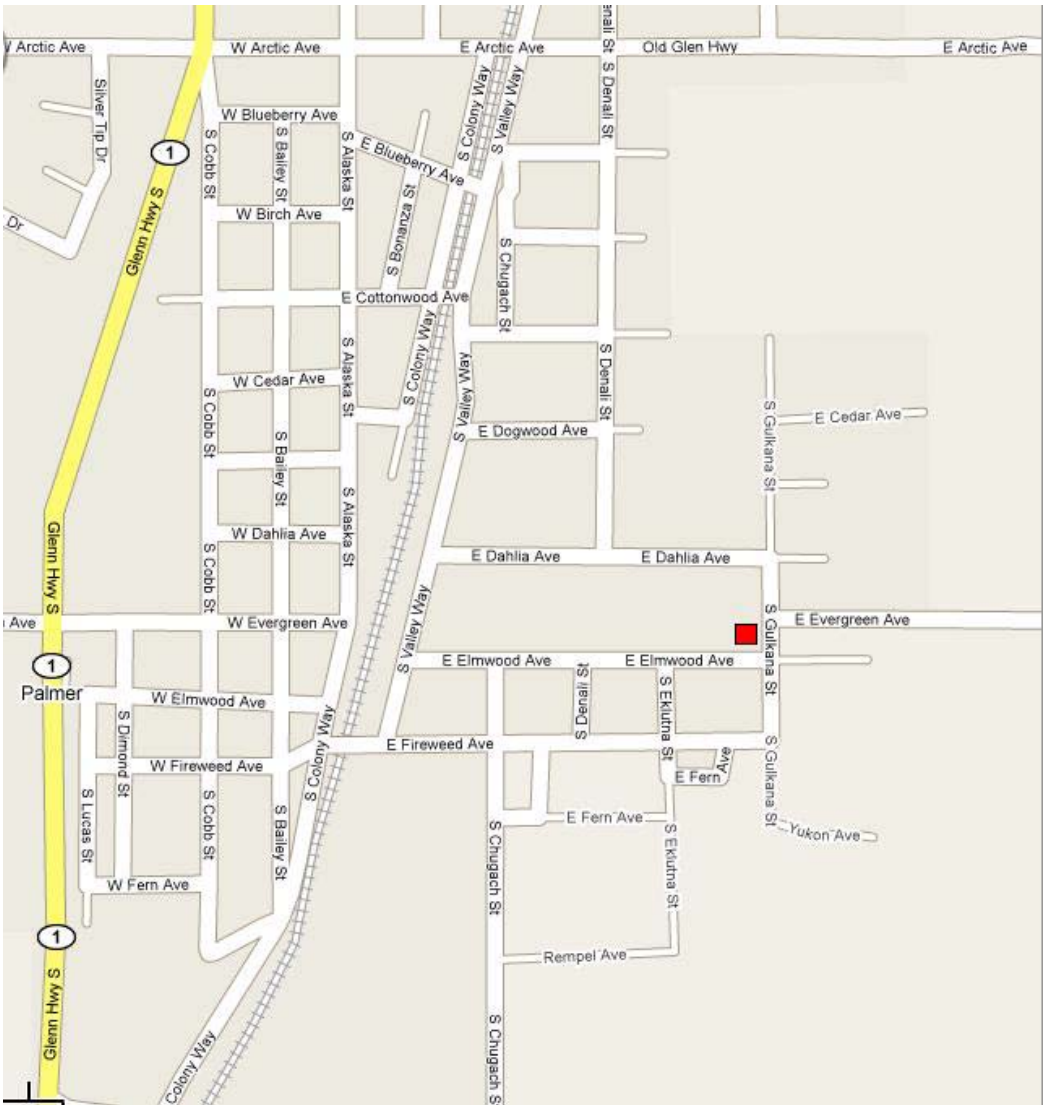

Figure 6.3:1: Map of the City of Palmer. The red square denotes the monitoring site.

6.3.2 Sources

The major sources of coarse particulate matter impacting the Palmer site are dust from the Knik and Matanuska Rivers. Both are glacier fed meandering rivers that deposit glacial silt. During times when the river is low (spring and fall) dry, windy weather suspends large amounts of silt in the air. Several air quality alerts are issued per year during spring and fall months because of wind-blown dust events. Other minor sources of course particulate are road dust from the local paved road and dust from the Little League ballpark infield. Sources of fine particulate matter include residential wood smoke, vehicular exhaust, and forest fires.

6.3.3 Monitors

The Palmer Site is currently equipped with:

- PM_{10} (SPM) – A single Met-One BAM 1020 continuous monitor was installed to provide information in real time for evaluating the Air Quality Index.
- $PM_{2.5}$ (SPM) - A single Met-One BAM 1020 continuous monitor was installed to provide information in real time for evaluating the Air Quality Index.
- Meteorological sensors for wind speed, wind direction, and ambient temperature.

6.3.4 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 course particulate from airborne glacial loess 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 course versus fine particulates. Photographs of the Palmer site are presented in Figure 6.3.2.

6.3.5 Traffic

All main roads in immediate area of the monitoring site are paved. Average daily traffic for the area streets is not known.

Figure 6.3.2: 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			

6.4 WASILLA SITE - MATANUSKA-SUSITNA BOROUGH

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

6.4.1 Site Information

The Wasilla monitoring site is located in the 100 block of West Swanson Avenue behind the Station 61 Fire Station near the intersection with Lucille Street. The site coordinates are latitude 61°34.998' north, longitude 149° 27.212' west. The average elevation for Wasilla is 341 feet above mean sea level. The monitoring site is located approximately 500 meters west-northwest of the central downtown district and approximately 200 meters north of the George Parks Highway. The predominant land use in a ¼-mile area is residential and commercial buildings with paved roads, parking lots, and mixed areas of land, both vegetated or graveled.

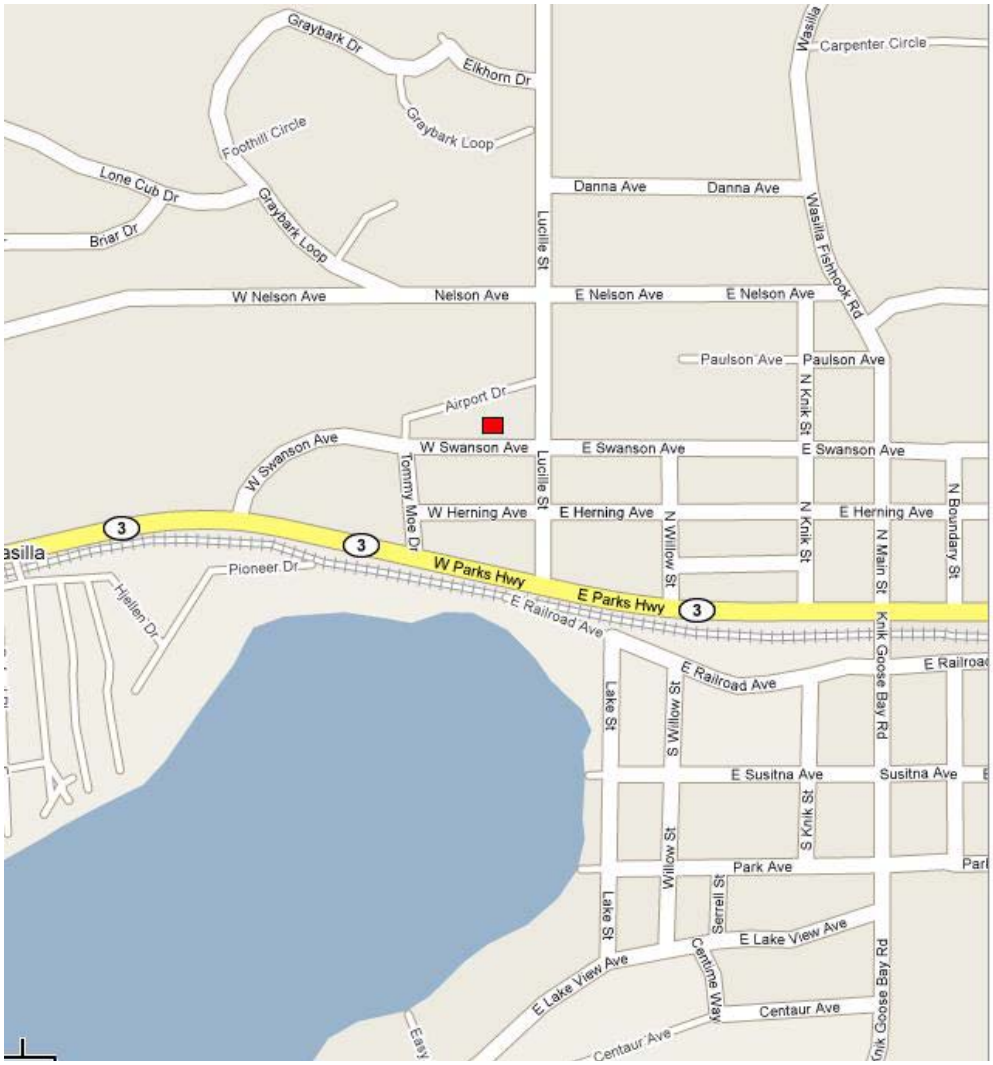

Figure 6.4.1: Map of the City of Wasilla. The red square denotes the monitoring site.

6.4.2 Sources

The major sources of coarse particulate matter impacting the Wasilla site are wind-blown dust from unpaved areas, traffic dust and a somewhat lesser impact of 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.

6.4.3 Monitors

The Palmer Site is currently equipped with:

- PM_{10} (SPM) – A single Met-One BAM 1020 continuous monitor was installed to provide information in real time for evaluating the Air Quality Index.
- $PM_{2.5}$ (SPM) - A single Met-One BAM 1020 continuous monitor was installed to provide information in real time for evaluating the Air Quality Index.
- $PM_{2.5}$ (SPM) – A single Thermo Electron (formerly Rupprecht & Patashnick) Partisol 2000 samplers. The manual samplers run on a 1-in-6 day sampling schedule.

6.4.4 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 course 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 6.4.2

6.4.5 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. The annual average daily traffic for the Park's Highway west of Fishhook Road was 16,494 in 2005 (as recorded by Alaska DOT).

Figure 6.4.2: 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			