Alaska's 2008 Air Monitoring Network Plan

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1 INTRODUCTION

The State of Alaska has a longstanding program of monitoring air quality. Alaska is a huge state with a small population. It is not possible to monitor the air in every community so the Department of Environmental Conservation 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 Anchorage, Fairbanks, the southern Matanuska-Susitna Valley, and Juneau (260,000, 83,000, 48,000 and 30,000 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 towns with less than 1,000 people. Figure 1.1 shows a map of Alaska.

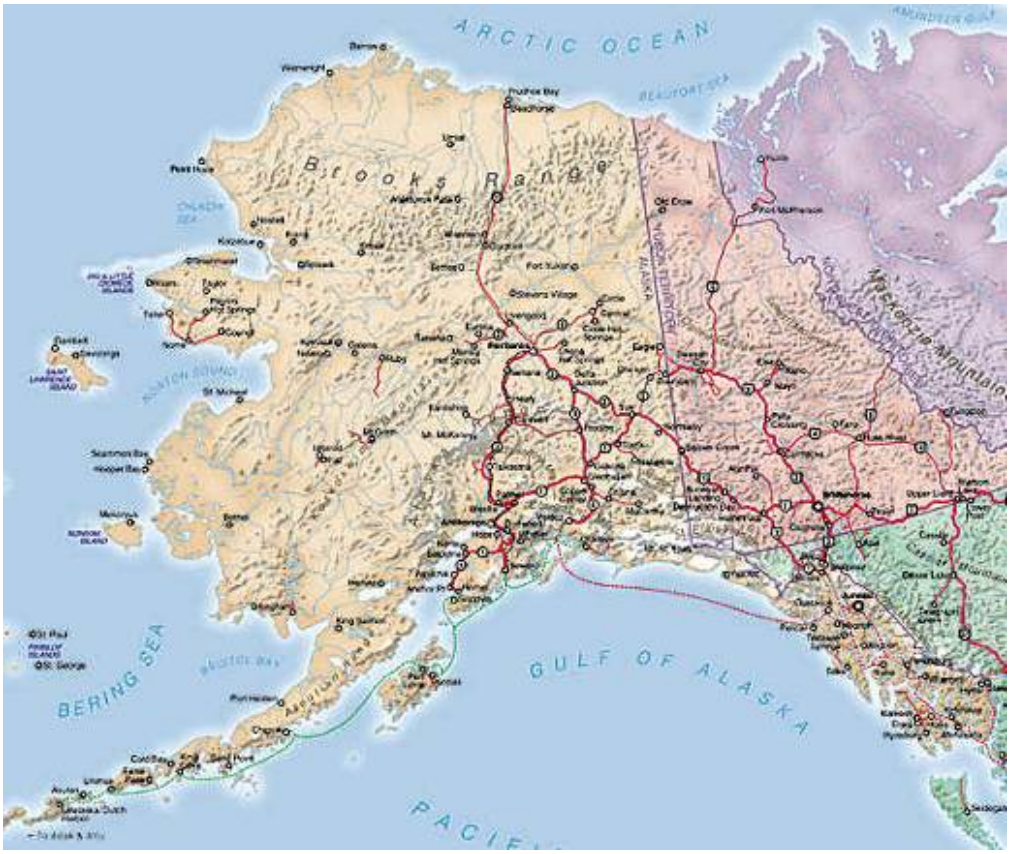


Figure 1.1:1: Map of Alaska. The majority of the Aleutian Islands (west) have been cut off.

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 over 20 acres in size, and receives 40 % of the U.S. fresh water runoff. Figure 1.2 shows a map of Alaska superimposed over a map of the contiguous 48 states.

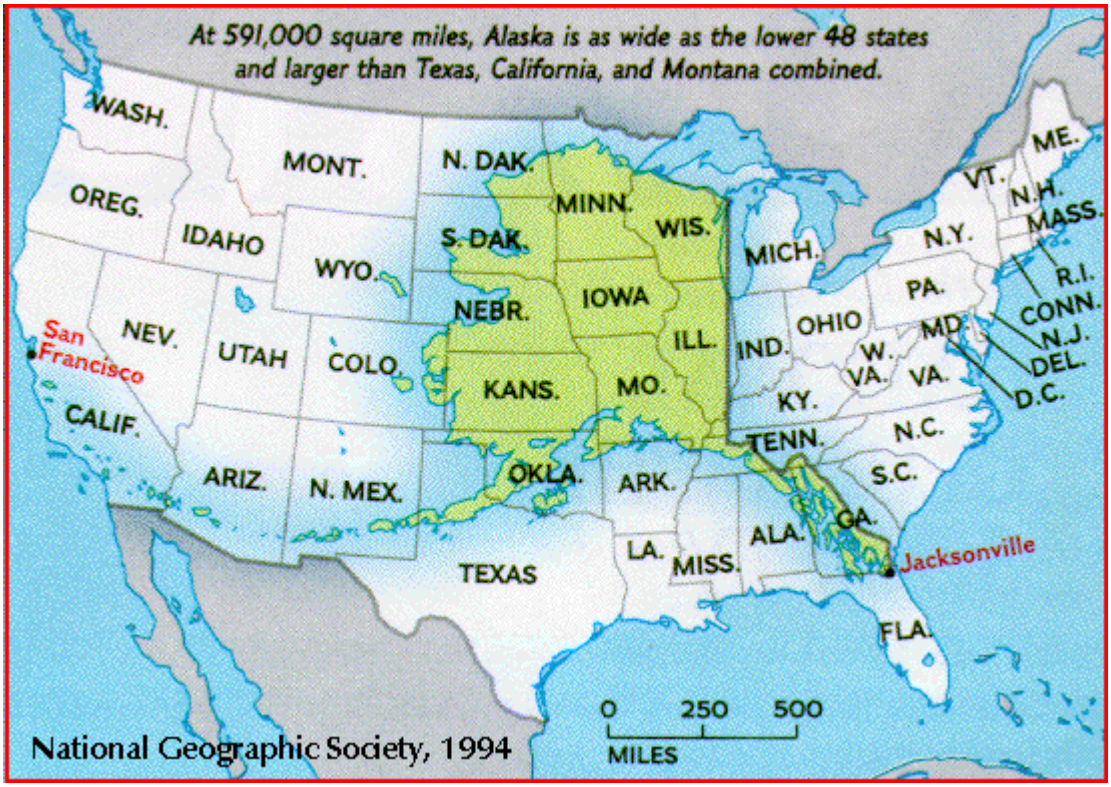


Figure 1.1:2: A map of Alaska superimposed over the contiguous 48 U. S. states.

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. The State's capital, Juneau, is the largest city in the region with a population of approximately 30,000.

The South Gulf Coast is one of the rainiest regions in the world with Yakutat experiencing over 150 inches of non-thunderstorm rain a year and Thompson Pass averaging 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.

Southcentral Alaska is fairly temperate in comparison to the rest of Alaska. Rainfall varies widely across the region, averaging between 15 inches a 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 250,000 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 a 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 8,000 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 high 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, whose features influence a majority of all regional 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 met 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. Three 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. In addition to oil, the Agrium Inc. Chemical Plant in Nikiski converts Cook Inlet natural gas into fertilizer.

2 ALASKA'S 2008 AMBIENT AIR QUALITY MONITORING PLAN

2.1 Introduction

Alaska's air monitoring program focuses on six separate and distinct monitoring issues: 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 ($PM_{2.5}$) – with monitoring in Juneau, Fairbanks, Anchorage and the Mat-Su Valley, Wildland Fire Emissions ($PM_{2.5}$) - with 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) and residential wood smoke (September-March) and Air Toxics Monitoring (special projects) in selected communities statewide. 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. With the revised PM_{10} standard, the state will need to take a more proactive approach in identifying and resolving air quality issues in our rural villages. 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 three monitoring sites, one in east Anchorage, one in south Anchorage and one in west Anchorage near the airport. The Garden site is the oldest CO monitoring site in the network and is located at a church in an older 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 few garages. The Benson & New Seward site was closed down four years ago 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 "background" impacts in that part of town. The Bowman site was shut down after the 2006/7 CO sampling season. The Municipality of Anchorage is in the process of looking for a new location. In December 2005, a CO monitor was added to the Parkgate PM_{10} site in Eagle River. None of the sites above reported violations of the ambient CO standard during the winter of 2006-07.

The Fairbanks CO network consists of three monitoring sites; the Old Post Office, the Hunter School site and the Army National Guard building. The Old Post Office is located in downtown Fairbanks, two blocks south of the Chena River. The Hunter School monitor is located a mile south of downtown near the schools and local hospital. Hunter School is on the edge of an older residential neighborhood. The National Guard Armory site is located in an older downtown residential community west of the Old Post Office site and just south of the Chena River. None of these monitoring sites violated the ambient CO standard during the past three years.

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 fifteen years. Anchorage samples for PM_{10} at the Garden, Tudor Road, and Parkgate monitoring sites - all of which have suffered in the past from occasional exceedances of the PM_{10} standard. Elevated concentrations have primarily been related to ash from volcanic eruptions and re-entrained road sanding materials. Most exceedances occur during high wind events in the spring, winter and fall (40 to100 mph winds). Eagle River is still designated "non-attainment" for PM_{10} despite having over ten years of clean data and the Municipality of Anchorage is considering whether to develop an attainment SIP. The Municipality has a Memorandum of Agreement with DEC, the state DOT and EPA Region 10 to control dust in downtown Anchorage. The Municipality received air quality funding through the congressional delegation in 2005 and is in the process of expanding 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 Matanuska Susitna Valley, located 40 miles northeast of Anchorage, is in the process of transitioning from rural/agricultural to suburban Anchorage. While increased road paving has significantly reduced the road dust levels across the Valley, high winds off the Matanuska River drainage (winter/early spring) and the Knik River drainage (late spring/summer) can still raise dust levels into the very unhealthy range. Two dust monitoring sites were installed in the vicinity of Palmer almost ten years ago, but one of the monitoring trailers was blown over in a wind storm in 2000 and never replaced.

Residents and visitors to the Mat-Su Valley file numerous dust complaints every year. All-terrain vehicles (ATV, 4 - wheelers) with their knobby tires are very efficient in raising enormous dust clouds on gravel and dirt roads. With 4 wheeler sales on the increase, the road dust problem will continue in the future. To help address air quality concerns in this part of the state, the department is working with the Mat-Su Borough and the Municipality of Anchorage to establish two new monitoring sites, one in downtown

Palmer and one at the Wasilla fire station to better address air quality complaints from the valley. The Department is also installing a new monitoring site on the Kenai Peninsula in Soldotna.

The Fairbanks PM_{10} monitoring sites were installed in the late 1980s to investigate wood smoke concerns. Despite monitoring at several locations, the monitoring program did not find significant levels. 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 un-installed in the late 1990s based on low PM_{10} measurements 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 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 the days when the rain stopped, dust would be re-entrained off the road surfaces. On cold clear winter nights woodstoves created a thick smelly smog which 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 at the 150 $\mu g/sm^3$ level, seemed to be effective at 65$\mu g/sm^3$, but will need to be re-evaluated under the new $PM_{2.5}$ standard (35 $\mu g/sm^3$) to remain effective. 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 control the road dust. Despite implementing these control strategies and PM_{10} levels dropping, Juneau was never re-designated and continues to be classified "non-attainment". Although DEC suspected that the Lemon Creek Valley also had a similar dust/wood smoke issue, the problem was never documented.

2.4 Fine Particulate ($PM_{2.5}$)

Alaska originally installed nine fine particulate monitoring sites in 1999/2000 to look at potential impacts from combustion sources in Alaska. The targets were large communities with power plants and automobiles, communities with high woodstove use and background/transport sites. The focus of monitor siting was area-wide, not hot spot. Based on EPA $PM_{2.5}$ siting criteria, we did not position $PM_{2.5}$ samplers to evaluate impacts from summer fire season wood smoke.

The department downsized the Alaska's $PM_{2.5}$ monitoring network in 2004 from nine sites to six. 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 an apparent shift in the National Monitoring Strategy, Alaska began adding continuous $PM_{2.5}$ analyzers to Federal Reference Method (FRM) monitoring sites. The long range plan was to convert all manual samplers to continuous analyzers to provide a more comprehensive monitoring database. The plan called for operators to compare the results of their continuous sampler with data from collocated FRMs to determine if a bias existed. At the same time, on a national basis, it was noticed that the newer technology analyzers were producing significant data disparities. With the revision of the old $PM_{2.5}$ standard (lowered from 65$\mu g/sm^3$ to 35 $\mu g/sm^3$) in October 2006, the monitoring rules shifted monitoring back to the FRM samplers. While continuous analyzers still may be used, their data results must be validated with the EPA FRM sampler. The uses of good quality continuous particulate data is still a priority as they gather data every day, can be used for calculating the daily Air Quality Index (AQI) and provide real-time air quality for use in developing air advisories. Alaska continues to study the accuracy of these samplers. The intent is still to provide real-time $PM_{2.5}$ data to the public by the end of December 2007.

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 2004/05, the community suffered through days with particulate levels that were more than 10 times the old standard of 65 $\mu g/sm^3$. 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 winter inversions have contributed to concentrating local fine particle emissions. Based on winter $PM_{2.5}$ levels, Fairbanks had been flirting with exceeding the annual fine particulate standard (set at 15 $\mu g/sm^3$) for the past seven years. They have also had many values which were over the new 24 hour standard.

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. We are in the process of installing a $PM_{2.5}$ continuous sampler in the downtown area of each community this year to examine 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 being 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 department is currently helping the Northwest Arctic Borough villages of Buckland, Kivalina, 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 three 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 department 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 $\mu g/sm^3$.

The state believes this Region's high dust levels represent conditions that would be found in other similar sized rural communities across the state if they performed PM10 monitoring. Based on the results of recent monitoring, the state is convinced that a dust problem exists in rural Alaska and that it must find an effective solution. The Department of Environmental Conservation is currently working with the State Department of Transportation and the University of Alaska – Fairbanks to identify and test potential dust control strategies for use in rural Alaska. The state is not planning to seek PM_{10} non-attainment designation for rural communities at this time, but may in the future if the more simple solutions are not effective.

Portions of rural Alaska may also have $PM_{2.5}$ wood smoke problem. Strong winter inversions in Interior Alaska coupled with weak economies, higher home heating bills, and easy access to wood have seen woodstove use on the rise. The impact on these small communities is unknown at this time, but can not be overlooked.

2.6 Fire Support/ Slash Burning/Air Toxics

The department is taking a more active role in evaluating impacts from wildland fire smoke. The department funded two monitoring staff in 2005 with state general fund dollars to help protect the public from smoke impacts. Our new meteorologist has direct access to all national weather service and military weather data and will be supporting state and federal fire suppression staff with smoke forecasts, air quality advisories and by taking direct measurements of smoke down wind of the fires. An air quality monitoring technician will provide field support to the meteorologist and fire incident commanders during the fire season. While staff was trained and prepared to go in the summer of 2006, a wetter and cooler summer all but wiped out the fire season. Staff spent time training with the new samplers and providing instrument orientation for federal agency staff. Our meteorologist spent several weeks filling in for the Alaska Fire Service forecaster this past season.

The department completed the monitoring phase of our Kotzebue Air Toxics monitoring project in Northwest Alaska. Originally plagued with difficulties in finding local operators and settling on a workable project schedule with the local tribal environmental staff, we have successfully completed the field monitoring. Our 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 us to scale that project back to monitoring in Kotzebue only. Our eventual start date for the outdoor sampling was December 2004 and the indoor sampling began 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. Staff is currently analyzing the field data and working with WSU staff to interpret the results and expects to have a final report out by late 2007.

2.7 Rural Diesel Health Study

As part of the low sulfur diesel initiative, the department evaluated the impact of diesel emissions on the residents of 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. The report should be released in late 2007.

2.8 2008 - Network Modifications

The department reviews and modifies the state air monitoring network annually based on the needs of the state, available funding and EPA guidance. The 2008 monitoring network will continue to focus on the same pollution sources as in 2007 but may be slightly smaller than in 2007 due to projected cuts in the federal budget. Budget cuts 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 is proceeding with plans to expand the 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 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 supply 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 expected to be online by late 2007.

The Municipality of Anchorage is apparently listed as a Metropolitan Statistical Area (MSA) based on a mis-understanding of the Upper Cook Inlet airshed and while the communities in this area are listed as having a population of over 351,000, this region does not meet the intent of a MSA. The Anchorage MSA includes the Matanuska Susitna Valley 40-50 miles north of Anchorage, Eagle River and Chugiak 15-20 miles north of Anchorage and Girdwood 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. 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 welcomes the opportunity to operate an Ozone monitoring site in the vicinity of Anchorage. The state will proceed with the site selection process as soon as funding for this effort is awarded.

The Municipality of Anchorage operated four Carbon Monoxide monitoring sites in 2007. The South Anchorage site (formerly the Benson & New Seward site), was installed in 2005, to examine potential impacts from residential growth, but did not see high values and was shut down in the spring of 2007. The Municipality is looking for another site for this monitor. 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 believe 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.

Anchorage operated one $PM_{2.5}$ site (Garden) in 2007. This site captured both manual and continuous data although the Municipality still only reports the manual data to AQS through the state. This monitoring site was originally classified as a SLAMS monitoring site 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 had four PM_{10} sites operating in 2005, but decided to drop the Muldoon Site seasonal dust monitoring site based on improved air quality. 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 2007 $PM_{2.5}$ network monitored for fine particulates at the State Office Building, although two additional sites were planned and one installed. With the revision of the national $PM_{2.5}$ standard in December 2006, Fairbanks will again face a non-attainment designation; this time for fine particulates. To address the needs of a new $PM_{2.5}$ State Implementation Plan (SIP), the Fairbanks North Star Borough is expanding their monitoring network to better identify the magnitude, extent and source of their winter $PM_{2.5}$ problem. This effort will see the addition of three to five new monitoring sites operated during the winter months. This monitoring effort will be led by the Borough air program staff with assistance from the state air program and the University of Alaska – Fairbanks Engineering School. The state's speciation monitor was moved to the State Office Building in the fall of 2004 and will provide 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 three 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 Armory site has never shown any high values. To better support impending worked needed for defining the magnitude and extent of a PM2.5 non-attainment area, the Borough has requested that they be allowed to shut down the Armory CO site. The state has reviewed their request and concurs (see attached request to stop monitoring in Appendix D).

Juneau:
Juneau remains classified as non-attainment for PM_{10} despite having the valley roads paved over 15 years ago. The PM_{10} "wood smoke" problem has been fairly well controlled since the implementation of the Juneau woodstove burn ban in the late 1980s. The PM_{10} "woodstove" problem actually became a $PM_{2.5}$ problem with the promulgation of a national fine particulate $PM_{2.5}$ standard in 1997. The state never saw any woodstove related $PM_{2.5}$ exceedances despite a lowering of the new standard to 65 $\mu g/sm^3$ … in part we believe due to a switch from woodstove to oil-fired Toyo stoves. With the recent lowering of the standard to 35 $\mu g/sm^3$, the state is concerned that higher home heating costs may renew the public's interest in wood-fired heaters. 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 Valley and the potential for new wood smoke 'hot spots" have resulted in new wood smoke control discussions between the department and the city. The DEC plans to conduct $PM_{2.5}$ investigation in the Valley during the winter of 2007/08.

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 level 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 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 for 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.

2.8.3 Mat-Su Valley Monitoring:

The Mat-Su Valley monitoring network will see the addition of two new monitoring sites late this summer. The sites are part of the Municipality's CIRIAMS network designed to assess regional particulate levels and better protect public health. The new sites will be 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 it's consumption of wood as fuel oil and natural gas prices continue to rise.

3 ANCHORAGE MONITORING SITE DESCRIPTION

3.1 General Information

The Municipality of Anchorage (MOA) with a population[1] of 275,043 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 6ºF to 20 ºF in the winter and from 50 º F to 70 º F 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 EPA has required that new automobiles emit less environmental pollution, both of which have helped improve the air quality in Anchorage. The Municipality was successfully re-designated as a CO "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 Department of Environmental Conservation, and the US Environmental Protection Agency (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 program currently operates four air monitoring stations in the municipality. Each station can be equipped to monitor for multiple pollutants. The network contains: one State and Local Air Monitoring Site (SLAMS) which monitors for PM_{10}, $PM_{2.5}$, and CO, three Special Purpose Monitoring Sites (SPM) for carbon monoxide and three SPM sites for PM_{10}. 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.

[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	SLAMS	Nov, 1998	neighborhood
PM_{10}					
Site Name	**Location**	**AQS ID**	**Designation**	**Install Date**	**Scale**
Garden	Anchorage	02-020-0018	SPM	Nov, 1998	neighborhood
Muldoon*	Anchorage	02-020-0043	SPM	Apr, 1995	middle
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
Bowman*	Anchorage	02-020-0050	SPM	Jan, 2006	neighborhood
Parkgate	Eagle River	02-020-1004	SPM	Dec,2005	neighborhood

*these sites were recently shutdown.

Since January 2000 four sites have been terminated. The sites are (in order of AQS ID number):

02-020-017 Benson & Spenard (CO)
02-020-037 Benson & Seward Hwy. (CO)
02-020-042 Ocean View (PM_{10})
02-020-049 Jewel Lake (CO)

<u>Figure 3.1:1</u>: 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.

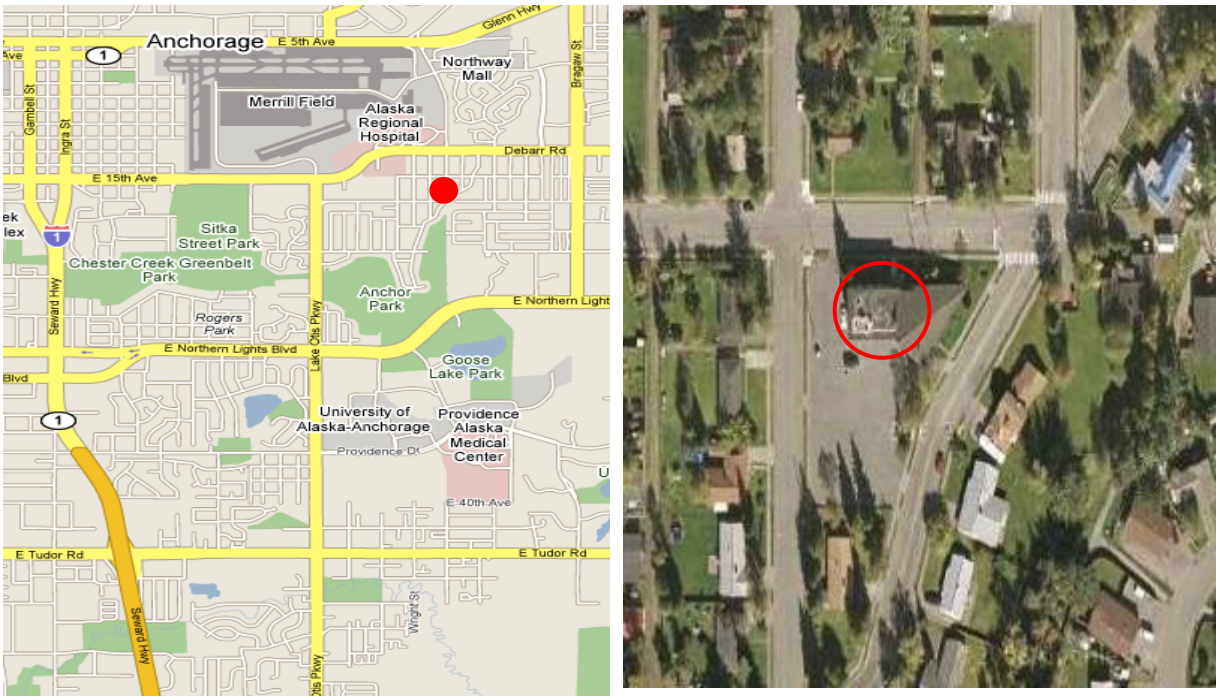


Figure 3.2:1: Street map and satellite image of the Garden monitoring site. The red circles indicate the sites location.

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: Merrill Field Airfield (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:

- $PM_{2.5}$ (SLAMS) – Three Thermo Electron (formerly Rupprecht and Pattashnick) Partisol 2000 samplers. Two samplers run on a 1-in-6 day alternating sampling schedule resulting in a 1-in-3 day sampling frequency. The third sampler operates as a collocated monitor.
- PM_{10} (SPM) – One General Metal Works high-volume sampler.
- $PM_{2.5}$ (SPM) – A single Thermo Electron TEOM 1400a continuous monitor was installed to provide information in real time for evaluating the Air Quality Index.
- CO (SLAMS) – A single Thermo Electron 48C CO monitor operates seasonally (October – March) with an inlet approximately three meters (9.5 feet) above the ground.

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 10 meters (32 feet) south of the nearest traffic lane of 16th 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 MULDOON SITE - ANCHORAGE

1100 Muldoon Road **AQS ID 02-020-0043**
Parameters: PM_{10} **Established: April 15, 1995**
Decommissioned: June 30, 2005

3.3.1 Site Information

The Muldoon PM_{10} monitoring site was located at the First National Bank of Anchorage building on Muldoon Road at latitude 61° 12' 42", longitude –149° 43' 53" and 262 feet (80 meters) above sea level. Figure 3.3:1 shows a street map of the east Anchorage Muldoon area and a satellite picture of the monitoring site. The site was located in a suburban, commercial location. Muldoon was a middle scale, population-oriented site. Because of the primary source of course particulate matter this site was only operated seasonally during the summer months.

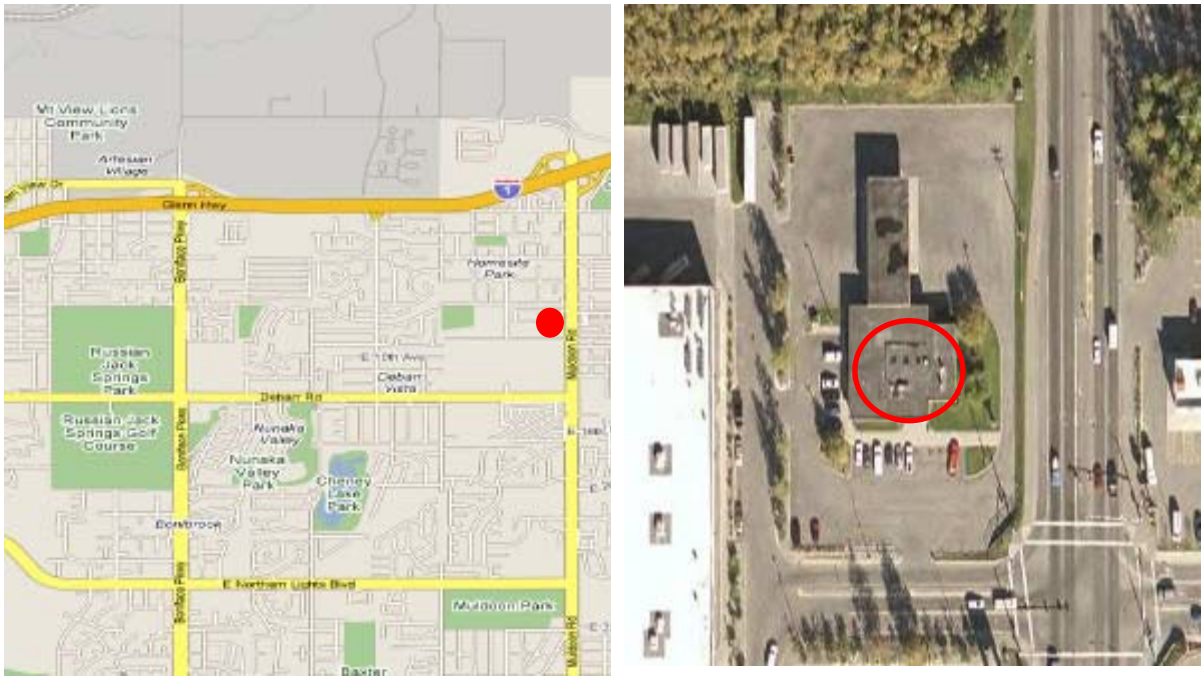


Figure 3.3:1: Street map and satellite image of the Muldoon monitoring site. The red circle indicates the sites location.

3.3.2 Sources

The primary source of course particulate matter at this site was from automobile activity. Roadways are sanded for traction during winter months and the sand gets re-entrained in the air during the dry summer days. Within five miles are Merrill Field (a small plane airport), Municipal Light and Power (90 and 250 megawatt gas turbines), and Elmendorf Air Force Base (22 MW gas turbine). The Alaska Railroad passes within three 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 Muldoon Site was equipped with:

- PM_{10} (SPM) – Two General Metal Works high-volume sampler. These samplers were operated seasonally on a 1-in-2 day schedule, when meteorological conditions were warm and dry enough to indicate that traction sand from the roadways might become airborne in late winter and spring, but had not yet been effectively swept up. Sampling was usually performed starting mid April to mid June.

3.3.4 Siting

The particulate matter samplers were located on the roof at the east end of the bank. The roof height is 3.5 meters (11 feet), and there were no other structures. No trees in the vicinity significantly exceed the height of the samplers. The airflow to these samplers was unobstructed. The samplers were approximately 24 meters (76 feet) west of the nearest traffic lane of Muldoon Road.

3.3.5 Traffic

There were three major roadways within two miles with approximate average daily traffic ranging from 19,000 to 54,000 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 3.3:1: Pictures of the Muldoon Site

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

3.4 TUDOR SITE - ANCHORAGE

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

3.4.1 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 3.4:1 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.

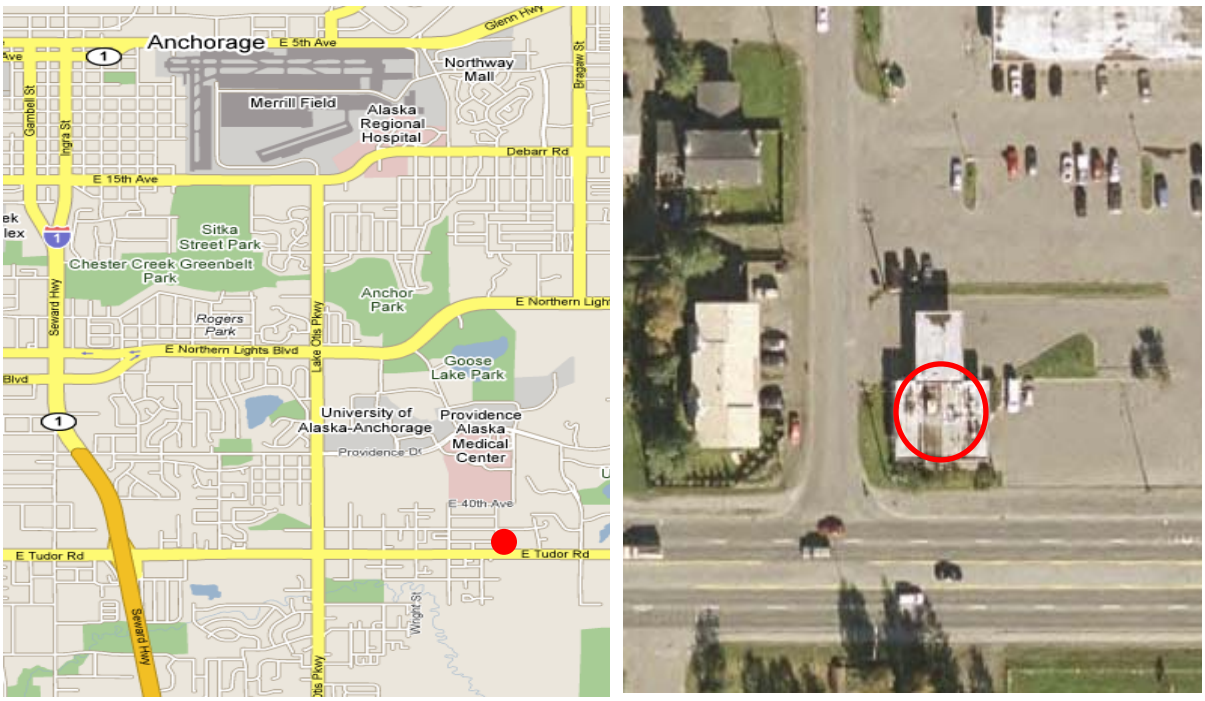


Figure 3.4:1: Street map and satellite image of the Tudor monitoring site. The red circle indicates the sites location.

3.4.2 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 the dry summer days. 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.

3.4.3 Monitors

The Tudor Site is currently equipped with:

- PM_{10} (SPM) – Three General Metal Works high-volume sampler. The Hi-Vol samplers are operated on a 1-in-3 day sampling schedule. Collocated samples are collected at this site 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.

3.4.4 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.

3.4.5 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 3.4:1: Pictures of the Tudor Site

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

3.5 TURNAGAIN SITE - ANCHORAGE

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

3.5.1 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 3.5:1 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.

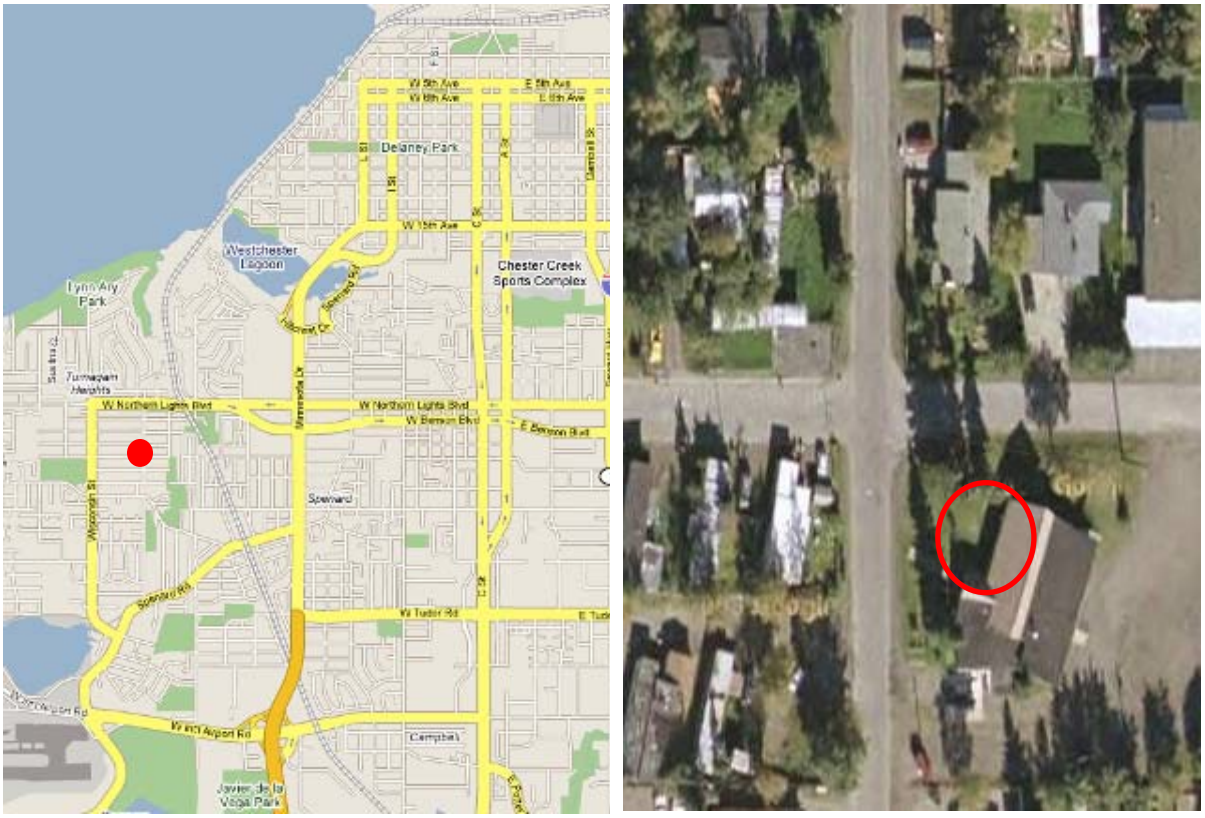


Figure 3.5:1: Street map and satellite image of the Turnagain monitoring site. The red circles indicate the sites location.

3.5.2 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).

3.5.3 Monitors

The Turnagain Site is currently equipped with:

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

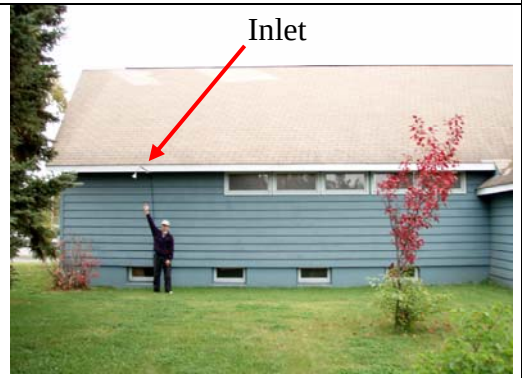
3.5.4 Siting

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 St are several tall white spruce trees. The church itself obstructs air flow from the south and east.

3.5.5 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 3.5:1: 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		

3.6 BOWMAN SITE - ANCHORAGE

11700 Gregory Rd. **AQS ID 02-020-0050**
Parameters: CO **Established: January 1, 2006**
Decommissioned: April 1, 2007

3.6.1 Site Information

The Bowman carbon monoxide monitoring site was located at the end of Gregory Rd. at latitude 61º 6' 53.97", longitude –149º 50' 45.98", and 225 feet (69 meters) above sea level. Figure 3.6:1 shows a street map of the southern part of Anchorage and a satellite picture of the Bowman site and surrounding area. The site was located in a suburban location. Bowman was a neighborhood scale, population-oriented site.

Figure 3.6:1: Street map and satellite image of the Bowman monitoring site. The red circles indicate the sites location.

3.6.2 Sources

There were no significant point sources to this site. This site was established by the Municipality of Anchorage as a background site for CO.

3.6.3 Monitors

The Bowman Site was equipped with:

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

3.6.4 Siting

The monitor was installed at the Bowman elementary school. The inlet probe was approximately three meters (9.5 feet) above the ground. There were taller trees between the samplers and the roadway but they were far enough away from the probe to not pose a problem. The probe was located along the east side of the school and airflow was generally unobstructed.

3.6.5 Traffic

There was one major roadway within 500 meters (1600 feet) with approximate average daily traffic around 26,000 vehicles per day. There are residential streets and alleys in the vicinity.

Figure 3.6:1: Pictures of the Bowman Site

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

3.7 PARKGATE, EAGLE RIVER- ANCHORAGE

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

3.7.1 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 all the way back to the late 1980s when the parking lot of the Parkgate Building was dirt and the monitor was placed right above the entrance to a Municipal Office. Failure to resolve the localize dust problem resulted in Eagle River being declared non-attainment for PM_{10}. 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 15 years. Eagle River has applied for re-designation to "attainment" status and is classified as a "maintenance" area.

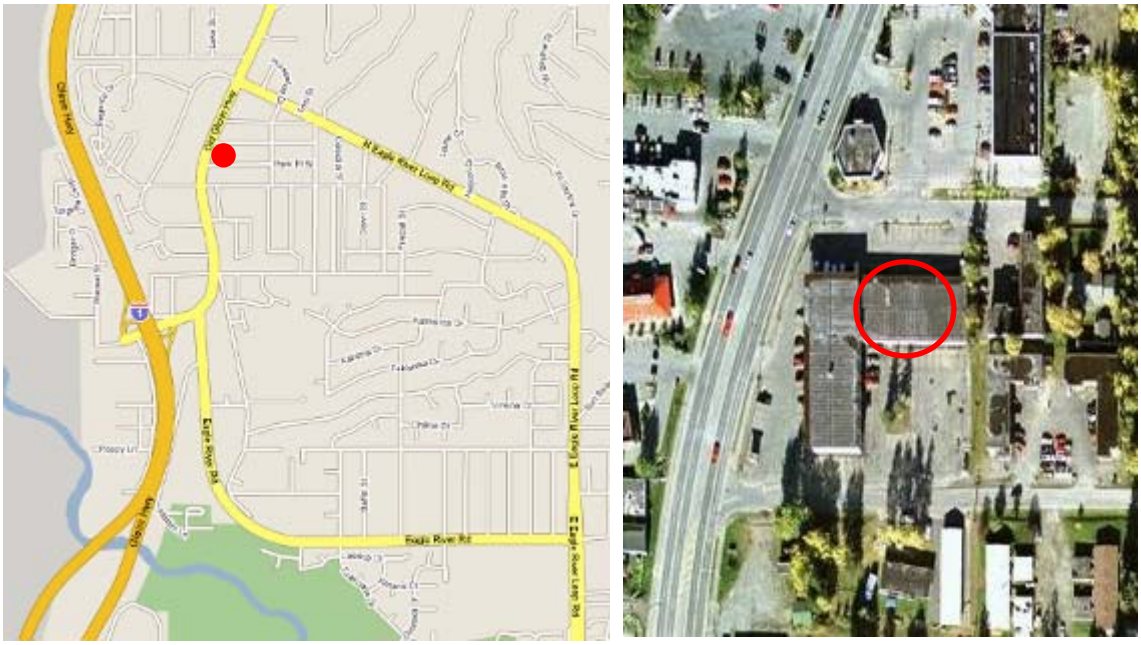


Figure 3.7:1: Street map and satellite image of the Eagle River monitoring site. The red circle indicates the sites location.

3.7.2 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.

3.7.3 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).

3.7.4 Siting

The particulate matter sampler is 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 sampler is approximately 44 meters east of the nearest traffic lane of the Old Glenn Highway and 23 meters (73 feet) south of Easy Street.

3.7.5 Traffic

There are two major roadways within 2 miles ranging from 14,000 to 54,000 vehicles per day. There are typical residential and commercial streets and alleys in the vicinity. All roads are paved and alleys are unpaved.

Figure 3.7:1: 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			

4 FAIRBANKS MONITORING SITES

4.1 General Information

Fairbanks is the second largest city in Alaska (population[2] 31,324). The city of Fairbanks is 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 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 Fairbanks North Star Borough Air Program operates and manages four monitoring stations: two State and Local Air Monitoring Site (SLAMS) for CO and one SLAMS for $PM_{2.5}$ and one Special Purpose Monitoring Site (SPM) for carbon monoxide. The FNSB SLAMS and SPM sites are identified below in Table 4-1. Appendix B- list siting criteria.

The Fairbanks 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.

[2] 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
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
Armory	Fairbanks	02-090-0023	SPM	Oct, 2003	neighborhood

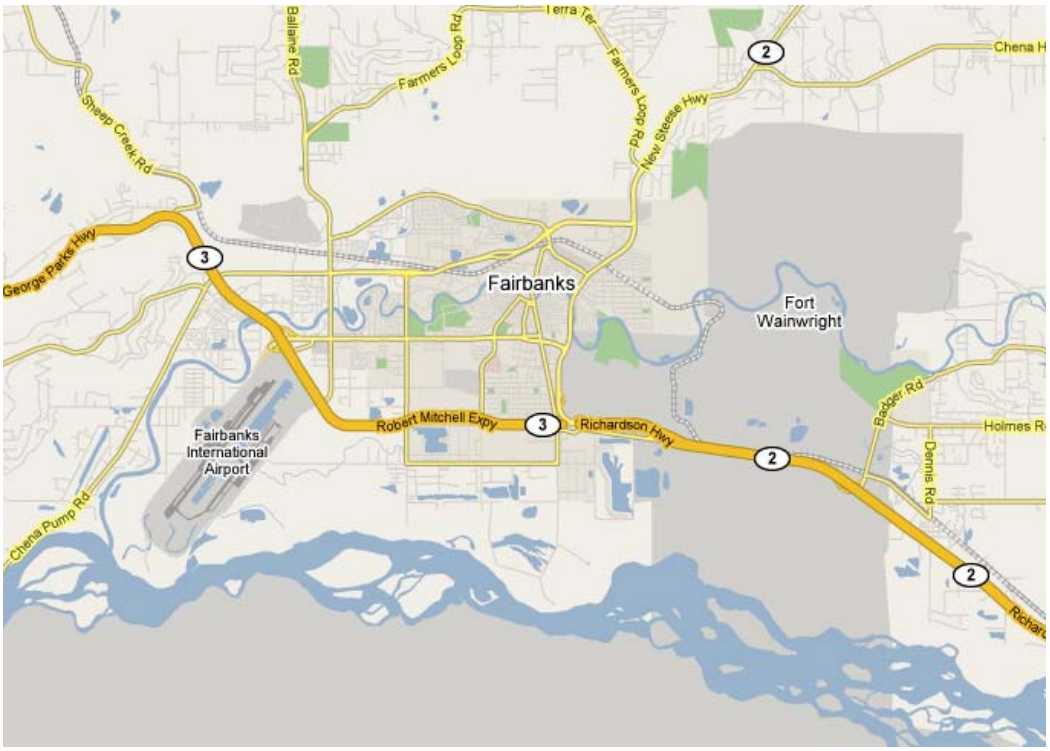


Figure 4.1:1: **Map of Fairbanks area**

Figure 4.1:2: Satellite photo of Fairbanks. Red circles indicate (in order from top down) the (1) Old Post Office, (2) The Armory, (3) State Office Building, and (4) Hunter Elementary School sites.

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.

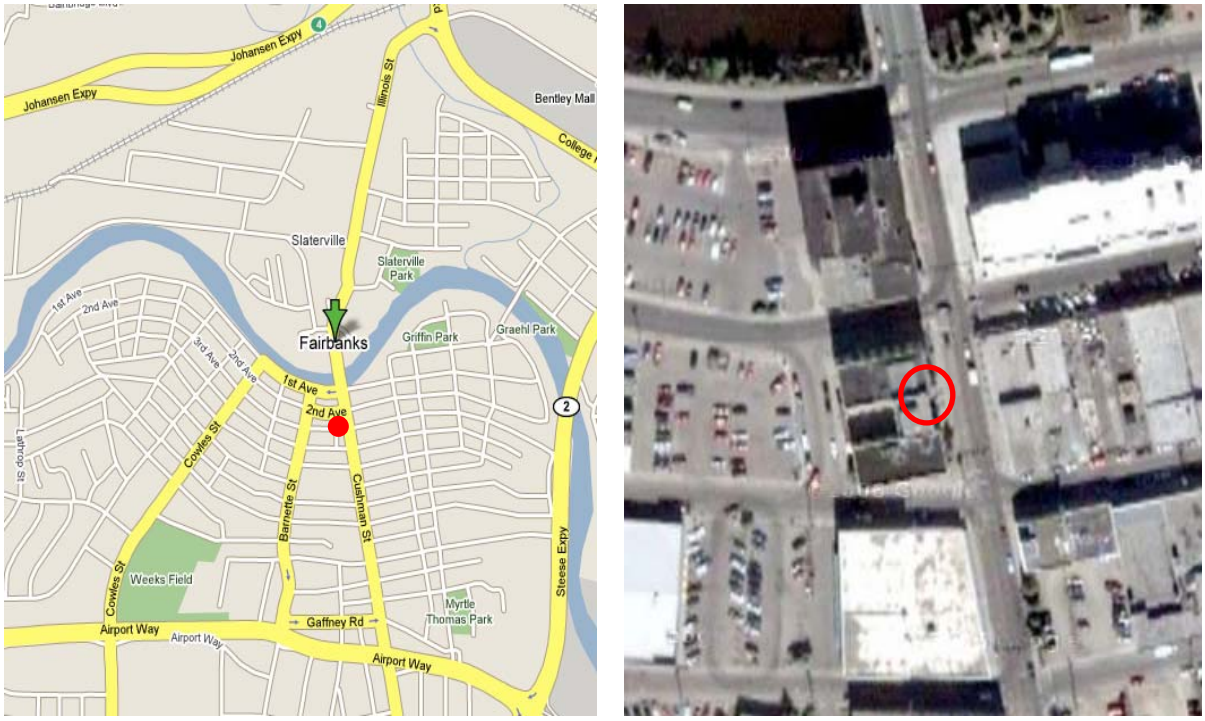


Figure 4.2:1: Map and satellite image of the Old Post Office monitoring site. The red circles indicate the sites location.

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 from 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 Avenue 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 10 meters (32 feet) from intersection at Second Avenue. There are no parking lots in the vicinity of the probe, but there is parallel parking on both Second and Third 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 Seventh 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.

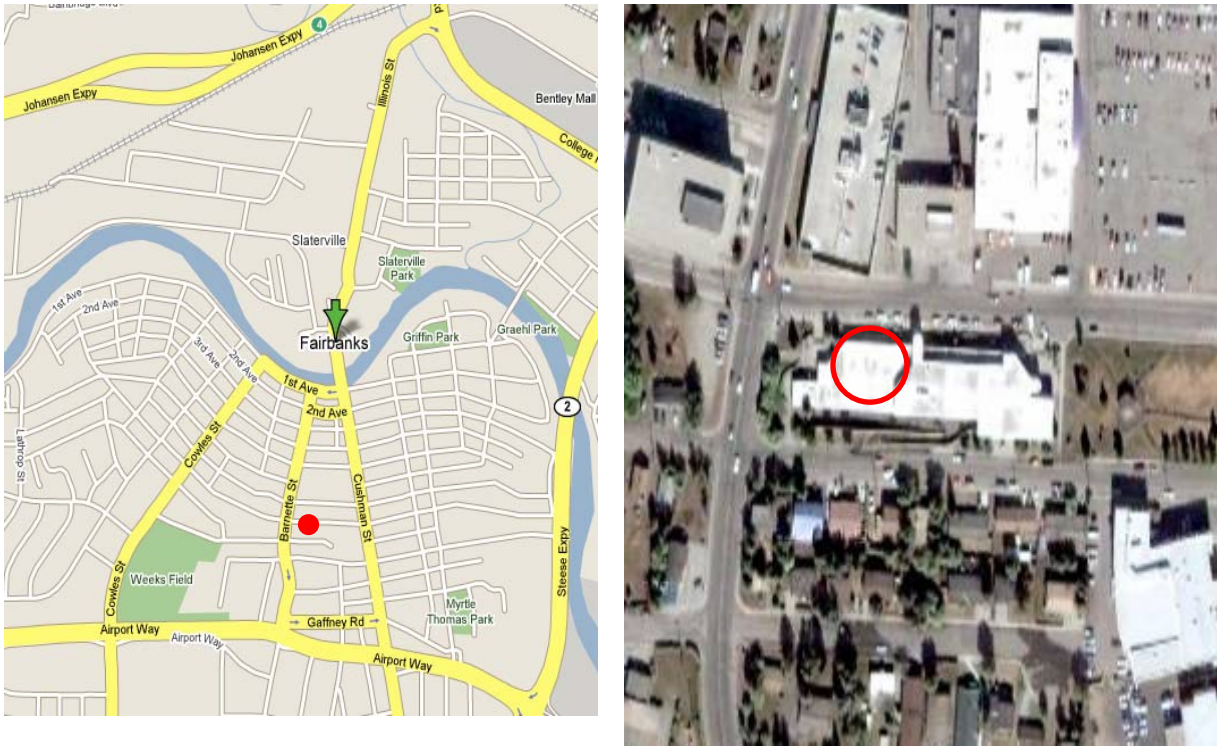


Figure 4.3:1: Map and satellite image of the State Office Building. The red circles indicate the sites location.

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, automobile exhaust, and wood smoke and during the summer months it 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 Beta SASS Speciation Monitor. This multi filter sampler is set to sample on a 1-in-3 day sampling schedule.

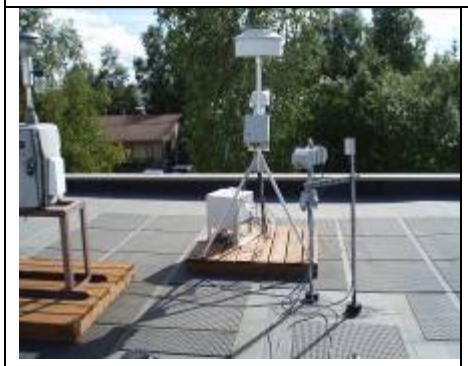
4.3.4 Siting

The equipment is located on the west end of the State Office Building's first story roof. The inlets for all samplers are approximately 6 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 30 meters west of the samplers. There is a birch tree approximately 10 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 Seventh 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			

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.

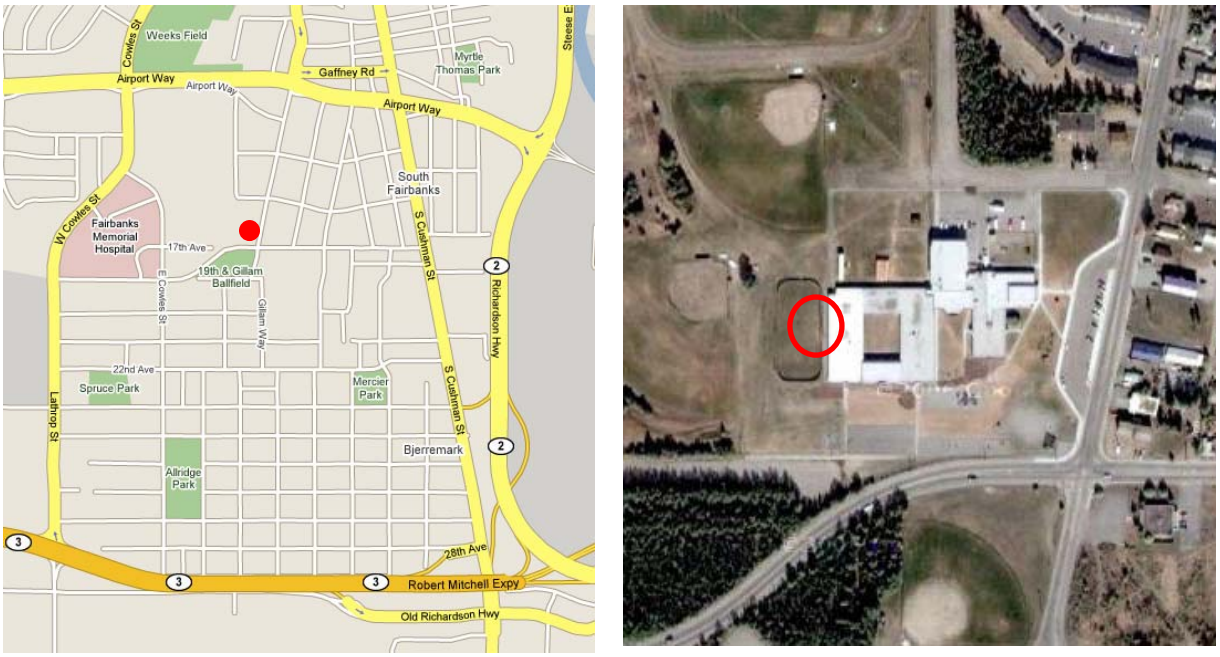


Figure 4.4:1: Map and satellite image of the Hunter Elementary site. The red circles indicate the sites location.

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 then 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 of 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 ARMORY SITE - FAIRBANKS

202 Wien Street & 2nd Ave **AQS ID 02-090-0023**
Parameters: CO **Established: March 1, 2002**

4.5.1 Site Information

The site is located at the Alaska Army National Guard Armory on the corner of 2nd Avenue and Wien St. at latitude 64° 50′32″, longitude –147° 45°′03″, and 446 feet (136 meters) above sea level. Figure 4.5:1 shows a street map of the local area and a satellite picture of the Armory site. This is a neighborhood scale, population oriented site.

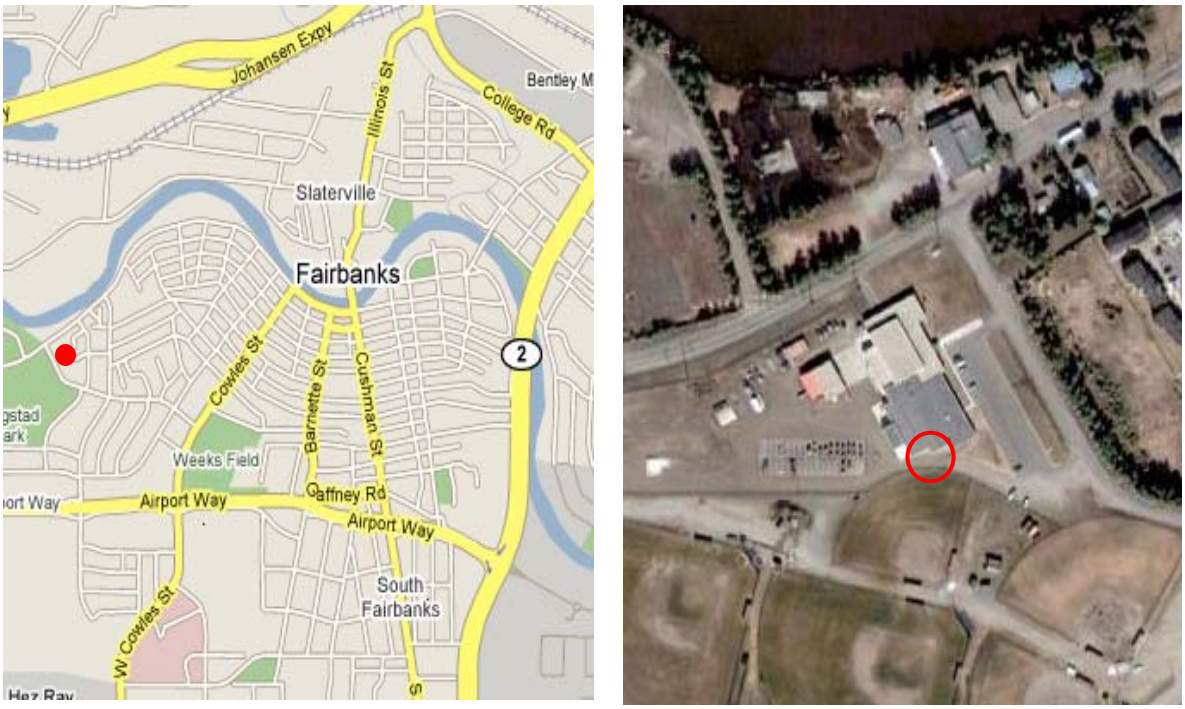


Figure 4.5:1: Map and satellite image of the Alaska Army National Guard Armory monitoring site. The red circles indicate the sites location.

4.5.2 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 housing and apartments to the east and south and recreational/industrial to the west and north. Downtown Fairbanks lies ¼ mile east of the armory. Many of the older houses have chimneys and may be using wood stoves in winter for supplemental heat.

Other potential sources of CO within a mile of the site are; the Golden Heart Utilities Water Treatment Plant (northeast), the Alaska Railroad (north), and the Fairbanks Memorial Hospital (south). Within three miles of the site there are three coal-fired power

plants: University of Alaska Fairbanks (west northwest), Aurora Energy (north) and Fort Wainwright (east southeast).

4.5.3 Monitors

The Armory site is currently equipped with:

- CO (SLAMS) – A Monitor Lab8830 monitor operates seasonally (October-March) with and inlet approximately 2.5 meters above the ground.

4.5.4 Siting

The armory site is located on the corner of 2nd Avenue and Wien St. The CO inlet is 738 meters from the nearest traffic lane of Wien St. The probe extends 1.5 meters through the western exterior wall at a height of 3 meters. There are numerous baseball fields to the south of the probe. The main parking lot is east of the building and is paved. There is a small parking in vicinity of the probe on the southwest side of the building, and is paved.

4.5.5 Traffic

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

Figure 4.5:2: Pictures of the Armory Site

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

5 JUNEAU MONITORING SITES

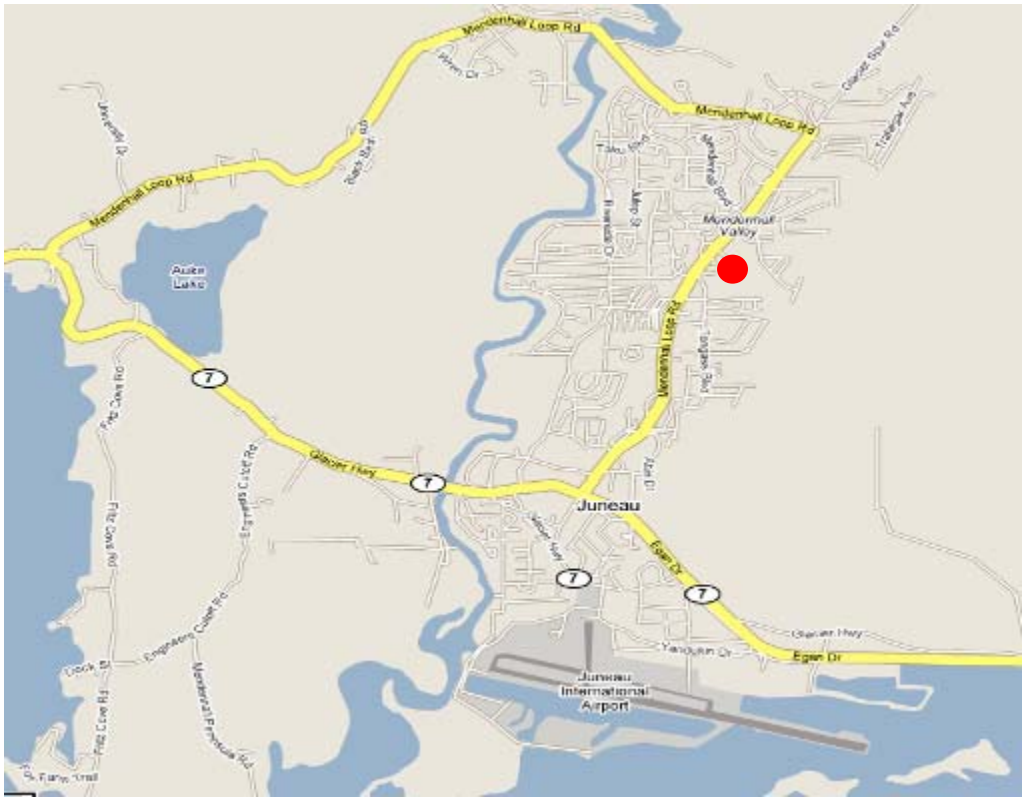
5.1 General Information

The City and Borough of Juneau is located in Southeast Alaska on the mainland side of the Gastineau Channel 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[3] of the Juneau-Douglas area is 30,987.

Currently, there is one particulate matter monitoring site in Juneau which is operated by Alaska Department of Environmental Conservation 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 sites location.

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 of Juneau and the Alaska Department of Environmental Conservation are currently in the process to re-designate Juneau as a maintenance area with the US Environmental Protection Agency. Definitions of designations and siting criteria can be found in Appendix A

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



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

As of October 2001 one site has been terminated. The site is (with AQS ID number):

02-110-26 Lemon Creek ($PM_{2.5}$)

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 St. and Spruce Ln. at latitude 58º 23'30', longitude -134 º33'30", and 45 meters (143 feet) above sea level. Figure 5.2:1 shows a street and satellite image of the site and surrounding area 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.

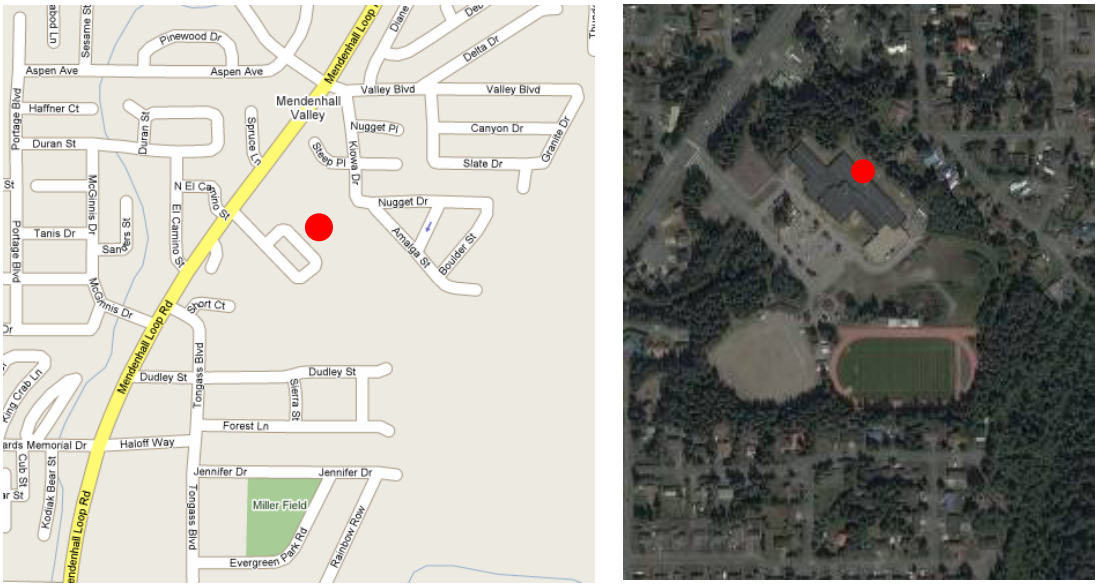


Figure 5.2:1: Map and satellite image of the Floyd Dryden monitoring site. The red circle indicates the monitoring site.

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 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 (1050 passengers' daily average) 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 favorable meteorological conditions. On occasion wildfire smoke from Western Canada has been known to impact the Mendenhall Valley, carried by long range transport.

5.2.3 Monitors

The Floyd Dryden Site is currently equipped with:

- $PM_{2.5}$ (SLAMS) – Two Thermo Electron (formerly Rupprecht and Pattashnick) 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. 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

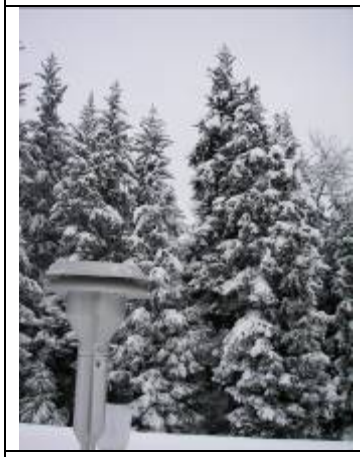
The samplers are installed on the roof of Floyd Dryden Middle School, approximately six meters (19 feet) above the ground. There is a furnace flue approximately 20 meters (64 feet) to the East of the sampler roof location. There is also a nearby dryer vent coming out of the building on the ground level 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. There is a row of trees approximately 25 meters (80 feet), at the closest point, skirting the northern exposure of the site. The trees are approximately 15 meters (48 feet) tall, and come nearest to the monitoring site to the north at 25 meter distance. 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 sites on the north side of the school 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			

6 MATANUSKA-SUSITNA VALLEY MONITORING SITES

6.1 General Information

The Mat-Su Borough has a population[4] 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.

Currently, there is one particulate monitoring site in the Mat-Su Borough which is operated by Alaska Department of Environmental Conservation staff. The site's AQS ID number is 02-0170-0008, Harrison Court, Butte ($PM_{2.5}$ & PM_{10}).

Figure 6.1:1: Map of Palmer and Butte area. The red circle indicates the Harrison Court site.

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

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.

As of December 2002 one site has been terminated. The site is (with AQS ID number):

02-170-0004 Big Lake Elementary ($PM_{2.5}$)

6.2 HARRISON COURT 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.

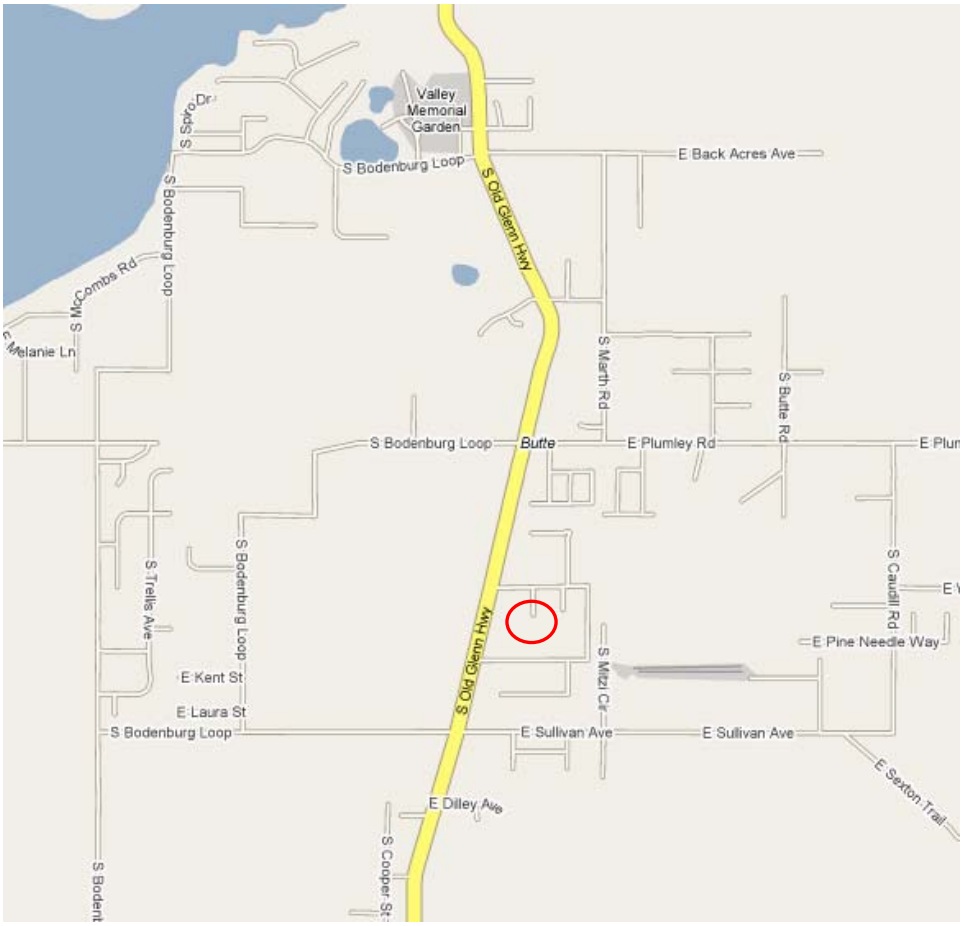


Figure 6.2:1: Map of the Butte area. The Harrison Court site is circled.

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 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, automobile 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) – One Thermo Electron (formerly Rupprecht & Patashnick) Partisol 2000 sampler. Operated on a 1-in-6 sampling schedule. This sampler is on same sample day schedule as the high-volume sampler.
- 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.

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: Pictures 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			

APPENDIX A:

Designations

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

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

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

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

Note: Further information regarding designation can be found at:
http://epa.gov/air/oaqps/greenbk/define.html
http://www.epa.gov/air/caa/

APPENDIX B:

Siting Criteria

The Federal Environmental Protection Agency (EPA) Region 10 requested that the Alaska Department of Environmental Conservation (DEC) staff provide a table which demonstrates that each monitoring site complies with siting criteria identified in 40 CFR Part 58 Appendix E. Included are two tables: one for CO sites and one for PM sites. Certain sites have been found to have had their monitoring scale mis-designated. A discussion of the monitoring scale changes follows each table.

Carbon Monoxide Sites

Carbon monoxide (CO) inlet probes should be at least 1 meter away, both vertically and horizontally, from any supporting structure of wall. For microscale sites the probe height must be between 2.5 and 3.5 meters, whereas for other scale sites the probe must be between 3 and 15 meters high.

A probe must have unrestricted airflow for at least 270 degrees, or 180 degrees if it is located on the side of a building. Obstructions must be a minimum distance away equal to twice the distance by which the height of the obstruction exceeds the height of the probe. Trees should not be present between the dominant CO source or roadway and the inlet probe.

The following is a list with definitions on monitoring site scaling;

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

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

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

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

The following table (Table A-1) lists all CO monitoring sites in Anchorage and Fairbanks (including SPM) and how they fit the siting criteria from Appendix E of 40 CFR Part 58.

Table A-1 CO monitoring sites in Anchorage and Fairbanks.

Site Name	Monitoring Scale	Probe Distance from Wall (in meters)	Height (in meters)	Spacing from Obstructions	Spacing from Roadway (in meters)	Trees
Garden	Neighborhood	1	3	180 degrees unobstructed	7	Yes
Turnagain	Neighborhood	1	3	180 degrees unobstructed	12 meters from 500 VPD roadway	Yes
Bowman	Neighborhood	1	2.5	180 degrees unobstructed	500	Yes
Parkgate	Neighborhood	1	2.5	180 degrees unobstructed	22	None
Old Post Office	Microscale	1 meter	3 meters	180 degrees unobstructed	3 meters	None
Hunter Elementary School	Neighborhood	1 meter	3 meters	180 degrees unobstructed	>30 meters (<10,000 VPD)	None
Armory	Neighborhood	1 meter	3 meters	180 degrees unobstructed	500m	None

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

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

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

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

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

TableA-2 lists all PM monitoring sites in Alaska (including SPM) and how they fit the siting criteria from Appendix E of 40 CFR Part 58.

Table A-2: PM monitoring sites in Alaska

Site Name	Monitoring Scale	Height (in meters)	Spacing from Obstructions	Spacing from Roadway (in meters)	Traffic (VPD)	Trees
Garden	Neighborhood	10	12m to 5m tall penthouse	10	< 5,000	None
Muldoon	Middle	3.5	None	24	32,500	None
Tudor	Microscale	3.3	None	7	46,900	
Parkgate	Neighborhood	6	13m to 4m tall penthouse	44	11,000	None
Harrison Court	Neighborhood	4 meters	None	150 meters	< 5,000	None
State Office Building	Neighborhood	6 meters	30 meters to 3.75 meter tall penthouse	20 meters	2,400	1 tree at 10 meters away
Floyd Dryden	Neighborhood	6 meters	Furnace flue @ 20 meters, 4 meter penthouse @ 15 meters	65 meters	12,770	12 meter tall @ 25 meters away

APPENDIX C: Network Site Summary Table

State Code	County Code	Site ID	Parameter Code	POC	Method Code	Unit Code	Frequency	Parameter Description	Instrumenation	City Name	Street Address	Notes
02	020	0018	88101	1	117	105	1/3	Pm2.5 - Local Conditions	Partisol 2000	Anchorage	TRINITY CHRISTIAN CHURCH/3000 E 16TH	
02	020	0018	85101	1	063	105	1/6	Pm10 - Lc	Anderson Hi-Vol	Anchorage	TRINITY CHRISTIAN CHURCH/3000 E 16TH	
02	020	0018	81102	1	063	001	1/3	Pm10 Total 0-10um Stp	Anderson Hi-Vol	Anchorage	TRINITY CHRISTIAN CHURCH/3000 E 16TH	
02	020	0018	42101	1	054	007	cont	Carbon Monoxide	Thermo 48C	Anchorage	TRINITY CHRISTIAN CHURCH/3000 E 16TH	
02	020	0018	88501	3	732	105	cont	Pm2.5 - Local Conditions	Met One BAM	Anchorage	TRINITY CHRISTIAN CHURCH/3000 E 16TH	not in AQS
02	020	0018	88501	3	722	105	1/3	Pm2.5 Raw Data	Thermo TEOM	Anchorage	TRINITY CHRISTIAN CHURCH/3000 E 16TH	not in AQS
02	020	0044	81102	2	063	001	1/6	Pm10 Total 0-10um Stp	Anderson Hi-Vol	Anchorage	3335 E TUDOR RD ANCHORAGE AK 99508	
02	020	0044	88101	1	117	105	1/3	Pm2.5 - Local Conditions	Partisol 2000	Anchorage	3335 E TUDOR RD ANCHORAGE AK 99508	
02	020	0044	85101	1	063	105	1/6	Pm10 - Lc	Anderson Hi-Vol	Anchorage	3335 E TUDOR RD ANCHORAGE AK 99508	
02	020	0044	81102	1	063	001	1/3	Pm10 Total 0-10um Stp	Anderson Hi-Vol	Anchorage	3335 E TUDOR RD ANCHORAGE AK 99508	
02	020	0044	85101	1	079	105	cont	Pm10 - Lc	Thermo TEOM	Anchorage	3335 E TUDOR RD ANCHORAGE AK 99508	not in AQS
02	020	0048	42101	1	054	007	cont	Carbon Monoxide	Thermo 48C	Anchorage	3201 TURNAGAIN STREET	
02	020	0050	42101	1	054	007	cont	Carbon Monoxide	Thermo 48C	Anchorage	11700 GREGORY RD	
02	020	1004	85101	1	063	105	1/6	Pm10 - Lc	Anderson Hi-Vol	Eagle River	PARKGATE-EAGLE RIVER, EAGLE RIVER	
02	020	1004	42101	1	054	007	cont	Carbon Monoxide	Thermo 48C	Eagle River	PARKGATE-EAGLE RIVER, EAGLE RIVER	
02	020	1004	85101	1	063	105	1/6	Pm10 - Lc	Anderson Hi-Vol	Eagle River	PARKGATE-EAGLE RIVER, EAGLE RIVER	
02	020	1004	81102	1	063	001	1/3	Pm10 Total 0-10um Stp	Anderson Hi-Vol	Eagle River	PARKGATE-EAGLE RIVER, EAGLE RIVER	
02	020	1004	81102	1	063	001	1/6	Pm10 Total 0-10um Stp	Anderson Hi-Vol	Eagle River	PARKGATE-EAGLE RIVER, EAGLE RIVER	
02	090	0002	42101	1	054	007	cont	Carbon Monoxide	Thermo 48C	Fairbanks	FEDERAL BLDG/2ND & CUSHMAN	
02	090	0010	88101	2	117	105	1/6	Pm2.5 - Local Conditions	Partisol 2000	Fairbanks	STATE OFFICE BUILDING/675 7TH AVE	
02	090	0010	88101	1	117	105	1/3	Pm2.5 - Local Conditions	Partisol 2000	Fairbanks	STATE OFFICE BUILDING/675 7TH AVE	
02	090	0010	88501	3	732	105	cont	Pm2.5 - Local Conditions	Met One BAM	Fairbanks	STATE OFFICE BUILDING/675 7TH AVE	not in AQS
02	090	0010	88502	6	810	105	1/3	Pm2.5 - Local Conditions	Met One SASS	Fairbanks	STATE OFFICE BUILDING/675 7TH AVE	
02	090	0020	42101	1	054	007	cont	Carbon Monoxide	Thermo 48C	Fairbanks	HUNTER ELEM/17TH & GILLIAM WY	
02	090	0023	42101	1	066	007	cont	Carbon Monoxide	Thermo 48C	Fairbanks	202 WIEN ST, NATIONAL GUARD ARMORY	
02	110	0004	88501	3	722	105	cont	Pm2.5 Raw Data	Thermo TEOM	Juneau	F DRYDEN JR HIGH/MENDENHALL LOOP RD	
02	110	0004	85101	1	063	105	1/6	Pm10 - Lc	Anderson Hi-Vol	Juneau	F DRYDEN JR HIGH/MENDENHALL LOOP RD	
02	110	0004	85101	1	063	105	1/6	Pm10 - Lc	Anderson Hi-Vol	Juneau	F DRYDEN JR HIGH/MENDENHALL LOOP RD	
02	110	0004	88101	1	117	105	1/3	Pm2.5 - Local Conditions	Partisol 2000	Juneau	F DRYDEN JR HIGH/MENDENHALL LOOP RD	
02	110	0004	81102	1	063	001	1/3	Pm10 Total 0-10um Stp	Anderson Hi-Vol	Juneau	F DRYDEN JR HIGH/MENDENHALL LOOP RD	
02	170	0008	81102	1	063	001	1/6	Pm10 Total 0-10um Stp	Anderson Hi-Vol	Mat-Su Valley	HARRISON COURT	
02	170	0008	88101	1	117	105	1/3	Pm2.5 - Local Conditions	Partisol 2000	Mat-Su Valley	HARRISON COURT	
02	170	0008	85101	1	063	105	1/6	Pm10 - Lc	Anderson Hi-Vol	Mat-Su Valley	HARRISON COURT	
02	170	0008	81102	1	063	001	1/6	Pm10 Total 0-10um Stp	Anderson Hi-Vol	Mat-Su Valley	HARRISON COURT	
02	170	0008	85101	1	117	105	1/6	Pm10 - Lc	Partisol 2000	Mat-Su Valley	HARRISON COURT	not in AQS
02	170	0008	85101	1	122	105	cont	Pm10 - Lc	Met One BAM	Mat-Su Valley	HARRISON COURT	

APPENDIX D:

DEC LETTER TO EPA IN REGARDS TO THE SHUTDOWN OF THE ARMORY SITE IN FAIRBANKS, AK

STATE OF ALASKA

DIVISION OF AIR QUALITY
AIR MONITORING & QUALITY ASSURANCE

Sarah Palin, GOVERNOR
619 East Ship Creek Ave, Suite 249
Anchorage, Alaska 99501
PHONE: (907) 269-6249
FAX: (907) 269-7508
http://www.state.ak.us/DEC/

October 25, 2007

Mr. Keith Rose
EPA Region 10
Seattle WA

Re: Fairbanks CO monitoring site closure

Dear Mr. Rose,

The State of Alaska, Department of Environmental Conservation's Air Quality Division has received a request from the Fairbanks North Star Borough (FNSB) to discontinue monitoring for carbon monoxide at their Alaska Army National Guard site. This request was made because they believe the two primary sites at the Old Post Office Building and Hunter School are sufficient to track CO levels in Fairbanks. In addition, the Armory CO site was established to determine if CO concentrations were elevated to the west of the downtown area. After fours year's of monitoring, this site has not documented elevated levels of CO with the highest eight hour CO value being 3.7 ppm. The Borough is requesting that they be allowed to shut the site down and place their limited resources and staff time on PM2.5 monitoring.

The state has reviewed the Borough's request, including the site's performance since 2002, and agrees that the Armory CO site is not providing a worthwhile role in assessing CO levels in Fairbanks. While relocating this monitor to another location is a possibility, the state believes that the existing two sites are more than sufficient to track progress in this community. The state believes that in light of the Borough's impending designation as a PM2.5 non-attainment area, the community would be better served by using limited funding and staff to help identify the magnitude and aerial extent of the PM2.5 problem.

The state recommends that the Armory CO monitoring in Fairbanks be allowed to shut down and the Borough be directed to use their EPA 105 Grant funding to conduct additional monitoring of particulates.

Gerald Guay
Program Manager
Air Monitoring and Quality Assurance

Enclosure

Clean Air

Fairbanks North Star Borough Department of Transportation
809 Pioneer Road • PO Box 71267 • Fairbanks, Alaska 99707-1267 • (907) 459-1345 FAX 459-1330

October 1, 2007

Barbara Trost
Division of Air Quality, Field Monitoring Section Manager
Department of Environmental Conservation
555 Cordova St.
Anchorage, AK 99501
Phone: 907-269-6249

RE: Shut down of AIRS # 02-090-0023 Carbon Monoxide monitoring site

Dear Ms. Trost,
The Fairbanks North Star Borough (FNSB) Air Quality Division requests approval to shut down the carbon monoxide air monitoring site at the National Guard Armory (AIRS # 02-090-0023). The FNSB has not experienced a violation/exceedance of the ambient CO standard since February of 2000 and we have never had an exceedance at the Armory. The Armory site consistently measures lower concentrations than each of the main primary sites in our Carbon Monoxide monitoring network and the highest value ever recorded at this site was 3.7 ppm in February 2003 (see chart 1 below). The Armory CO analyzer will be used as a backup for the analyzers at the other two sites. Staff time spent operating this CO site will be shifted to the new PM2.5 monitoring study which is necessary to identify the areal extent and magnitude of our PM2.5 problem. Because air advisories for CO have in the past been based on data from the two primary sites, we do not anticipate any impact on the protection of public health as a result of shutting this site down.

Chart 1. Monthly Maximum 8-hour average (ppm) by site

	2002			2003						2004					
Month	10	11	12	1	2	3	10	11	12	1	2	3	10	11	12
Armory	2.0	3.0	3.0	3.5	3.7	2.3	1.4	1.6	1.1	-		1.5	1.8	0.1	-
PO	3.0	5.0	4.0	4.9	5.2	3.3	1.9	2.9	6.4	4.4	5.4	2.5	2.3	3.6	3.2
Hunter	4.0	4.0	6.0	5.2	5.4	3.6	2.3	1.9	5.2	3.8	6.1	2.4	2.6	4.1	3.1

	2005						2006					
Month	1	2	3	10	11	12	1	2	3	10	11	12
Armory	-	-	1.6	1.0	1.8	3.2	3.3	2.2	1.5	1.2	2.0	1.8
PO	4.1	4.5	2.1	1.9	2.4	4.7	4.7	4.0	2.4	2.1	2.8	3.4
Hunter	4.3	3.7	1.9	1.6	2.2	4.9	4.9	3.5	1.7	2.1	2.8	3.8

10/1/2007

In Chart 2, below, I provide a comparison of the three year monthly averages of the 8-hour averages for all three sites. At no time has the monthly average, in the individual years (not shown), at the Armory site exceeded that of either of the other two sites.

Chart 2

	Average of last three year's Monthly 8-hr Averages (ppm)					
	Jan 04-06	Feb 04-06	Mar 04-06	Oct 04-06	Nov 04-06	Dec 04-06
Armory	1.0	0.7	0.5	0.3	0.6	0.9
PO	1.3	1.4	0.8	0.5	0.9	1.2
Hunter	1.2	1.2	0.6	0.5	0.8	1.1

Please let me know if you have any objections to this shut down or any additional requirements or needs in order to justify this shut down.

Sincerely,

Dr. James Conner
Air Quality Specialist, FNSB Transportation Dept.
3175 Peger Rd.
Fairbanks, AK 99709
Tele: 907-459-1325 Fax: 907-459-1006

Glossary:

SLAMS: State and local monitoring station
The SLAMS consist of a network or roughly 4000 monitoring station nation wide. Distribution depends largely on the needs of the State and local air pollution control agencies to meet their respective State Implementation plan (SIP) requirements. The SIPs provide for the implementation, maintenance and enforcement of the NAAQS in each air quality control region with in a state. The State of Alaska monitoring network currently has 13 SLAMS sites for carbon monoxide and PM. .

NAMS: national air monitoring station
The NAMS are a subset of the SLAMS network with emphasis on urban and multi- source areas. There are no current NAMS*-designated monitors in the monitoring network

SPMS: special purpose monitoring station
Special Purpose monitoring stations are not permanently established and can be adjusted to accommodate changing needs and priorities for special studies needed by the State and local agencies. The SPMS are used to supplement the fixed monitoring network as circumstances require.

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

$\mu g/sm^{3:}$ micro-gram per standard cubic meter.

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

BAM 1020: Met-One Inc. Beta Attenuation Monitor model 1020 continuous monitoring sampler. This sampler can sample for course and fine particulate matter.

Course particulate matter: PM_{10} – particulate matter less than or equal to 10 microns in size.

Fine particulate matter: $PM_{2.5}$ – particulate matter less than or equal to 2.5 microns.

National Ambient Air Quality Standards (NAAQS):

The Clean Air Act, which was last amended in 1990, requires EPA to set National Ambient Air Quality Standards for pollutants considered harmful to public health and the environment. The Clean Air Act established two types of national air quality standards. Primary standards set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings.

The EPA Office of Air Quality Planning and Standards (OAQPS) has set National Ambient Air Quality Standards for six principal pollutants, which are called "criteria pollutants."

The Criteria Pollutants[5]

Pollutant	Primary Stds.	Averaging Times	Secondary Stds.
Carbon Monoxide	9 ppm (10 mg/m^3)	8-hour(1)	None
	35 ppm (40 mg/m^3)	1-hour(1)	None
Lead	1.5 µg/m^3	Quarterly Average	Same as Primary
Nitrogen Dioxide	0.053 ppm (100 µg/m^3)	Annual (Arithmetic Mean)	Same as Primary
Particulate Matter (PM_{10})	Revoked(2)	Annual(2) (Arith. Mean)	
	150 µg/m^3	24-hour(3)	
Particulate Matter ($PM_{2.5}$)	15.0 µg/m^3	Annual(4) (Arith. Mean)	Same as Primary
	35 µg/m^3	24-hour(5)	
Ozone	0.08 ppm	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 (Arith. Mean)	-------
	0.14 ppm	24-hour(1)	-------
	-------	3-hour(1)	0.5 ppm (1300 µg/m^3)

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

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

(2) Due to a lack of evidence linking health problems to long-term exposure to coarse particle pollution, the agency revoked the annual PM_{10} standard in 2006 (effective December 17, 2006).

(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 $\mu g/sm^3$ (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 ≤ 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.