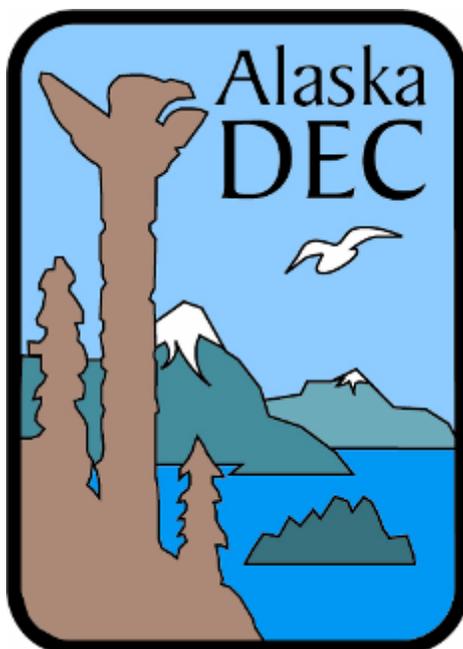


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# Alaska's 2008 Air Monitoring Network Plan

## Chapter 2 – Monitoring Plan



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## **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<sub>10</sub>) – monitoring in the major communities of Juneau, Anchorage and the central Matanuska-Susitna Valley (Mat-Su), Fine Particulate Matter (PM<sub>2.5</sub>) – with monitoring in Juneau, Fairbanks, Anchorage and the Mat-Su Valley, Wildland Fire Emissions (PM<sub>2.5</sub>) - with statewide monitoring during the summer fire season (May – September), Slash Burning (PM<sub>2.5</sub>) 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<sub>10</sub> 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 and the Municipality of

Anchorage to in the process of looking for a new location. In December 2005, a CO monitor was added to the Parkgate PM<sub>10</sub> 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<sub>10</sub>)***

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<sub>10</sub> at the Garden, Tudor Road, and Parkgate monitoring sites - all of which have suffered in the past from occasional exceedances of the PM<sub>10</sub> 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 to 100 mph winds). Eagle River is still designated “non-attainment” for PM<sub>10</sub> 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 increases, 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<sub>10</sub> 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 of either. 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<sub>10</sub> levels below the standard. The last monitor was de-installed in the late 1990s based on low PM<sub>10</sub> measurements and the need to switch focus to PM<sub>2.5</sub>.

Juneau has one active PM<sub>10</sub> 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 µg/sm<sup>3</sup> level, seemed to be effective at 65µg/sm<sup>3</sup>, but will need to be re-evaluated under the new PM<sub>2.5</sub> standard 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<sub>10</sub> 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<sub>2.5</sub>)***

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<sub>2.5</sub> siting criteria, we did not position PM<sub>2.5</sub> samplers to evaluate impacts from summer fire season wood smoke.

The department downsized the Alaska's PM<sub>2.5</sub> 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<sub>2.5</sub> 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<sub>2.5</sub> standard (lowered to 35 µg/sm<sup>3</sup>) 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<sub>2.5</sub> data to the public by the end of December 2007.

Fairbanks has consistently experienced the highest PM<sub>2.5</sub> 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 µg/sm<sup>3</sup>. 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<sub>2.5</sub> levels, Fairbanks had been flirting with exceeding the annual fine particulate standard (set at 15 µg/sm<sup>3</sup>) 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<sub>2.5</sub> 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 a bad summer dust problem. Over the past five years, Kotzebue has recorded more than 25 exceedances of the PM<sub>10</sub> standard and Noorvik (2004) and Noatak (2005) have both recorded at least 10 exceedances with several values reaching 600 µg/sm<sup>3</sup>.

The state believes these high dust levels represent conditions that would be found in other similar sized rural communities if they performed monitoring. Based on the monitoring results, the state believes it must find a solution to rural dust problems or designate affected villages/regions PM<sub>10</sub> non-attainment.

Portions of rural Alaska may also have PM<sub>2.5</sub> 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<sub>x</sub>, SO<sub>2</sub>, and diesel particulates (PM<sub>2.5</sub> filter analysis using a TEOMS with an FDMS module, diesel particulate assessment using a diesel particulate matter (DPM) cassette, and diesel particle analysis using an Aetholometer). 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<sub>10</sub> standard (dust issues in rural Alaska) and a lowering of the PM<sub>2.5</sub> standard (increased woodstove use statewide). Detailed descriptions of the network monitoring sites follows in Chapters 3 – 6.

### **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<sub>10</sub>/PM<sub>2.5</sub> monitoring sites and will 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 operated four Carbon Monoxide monitoring sites in 2007. The south Anchorage site, installed in 2005, examined potential impacts from residential growth, but did not see high values and was shut down in 2007. The Municipality is looking into expanding their CO monitoring network despite lowering CO values over the past five year, a shift in the National Monitoring Strategy to fewer, more representative fixed sites, and the Municipalities re-designation to attainment.

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Based on the progress made in the past 20 years, the state does not believe there is a need for more than one or two CO sites in this community. The State believes that one fixed site with one or two mobile sites to look at potential hot spots or to respond to complaints would be sufficient.

Anchorage operated one PM<sub>2.5</sub> 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 re-classified as an SPM site in 2007 due to the good air quality of Anchorage's air. The community had four PM<sub>10</sub> sites operating in 2006, but decided to drop the Muldoon Site based on improved air quality. The Tudor PM<sub>10</sub> monitoring site is collocated and runs year round, the Garden Site is the primary monitor in the network with the Parkgate site in Eagle River continuing to run on a 1-in-6 schedule (old non-attainment site) despite having clean data for over 15 years. The state continues to maintain that this site is not needed and should be shut down. We recommend the area automatically be re-designated to attainment.

### **2.8.2 Fairbanks:**

With the revision of the national PM<sub>2.5</sub> standard, Fairbanks faces another designation to non-attainment; this time for fine particulates. To address the needs of a state PM<sub>2.5</sub> 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<sub>2.5</sub> problem. This effort will see the addition of between three and five new monitoring sites operated during the winter months. Borough staff continues to operate the three CO sites although two should be sufficient. The 2007 PM<sub>2.5</sub> network so far only monitored for fine particulates at the State Office Building. PM<sub>10</sub> monitoring in Fairbanks was discontinued in the late 1990s due to low dust levels. 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<sub>2.5</sub> sources.

### **2.8.3 Juneau:**

Juneau remains classified as non-attainment for PM<sub>10</sub> despite having the valley roads paved over 15 year's ago. The PM<sub>10</sub> "wood smoke" problem has been fairly well under control since the implementation of the Juneau woodstove burn ban in the late 1980s. The PM<sub>10</sub> "woodstove" problem actually became a PM<sub>2.5</sub> problem with the promulgation of a national fine particulate PM<sub>2.5</sub> standard in 1997. The state never saw any woodstove related PM<sub>2.5</sub> exceedances despite a lowering of the new standard to 65 µg/sm<sup>3</sup>. With the recent lowering of the standard to 35 µg/sm<sup>3</sup>, 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<sub>10</sub> (manual) and PM<sub>2.5</sub> (manual and continuous). Concerns over new growth in the Valley and the potential for new wood smoke 'hot spots' has resulted in new wood smoke control discussion between the department and the city. The DEC plans to conduct PM<sub>2.5</sub> investigation in the Valley during the winter of 2007/08. The PM<sub>10</sub> monitoring in Juneau should be discontinued based on the past ten years of monitoring results.

**2.8.4 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<sub>10</sub> (dust) with a few pockets of smoke from land clearing and wildland fires. The Mat-Su Valley is known as the farming belt because of the excellent soils which have been deposited over hundreds of years through wind-blown dust deposition. The Mat-Su Borough manages an effective air advisory program which notifies local residents and the school system when dust is expected to present a health threat. The small community of Butte, located south of Palmer, has a high percentage of homes which burn wood and like the rest of Alaska, is expected to increase its consumption of wood as fuel oil and natural gas prices continue to rise.