

Matanuska-Susitna Borough Air Quality Briefing



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List of Acronyms

DEC	Alaska Department of Environmental Conservation
ALA	American Lung Association
CAA	Clean Air Act
COPD	Chronic Obstructive Pulmonary Disease
DV	Design Value
EPA	Environmental Protection Agency
MOU	Memorandum of Understanding
MSRMC ED	Mat-Su Regional Medical Center Emergency Department
NAAQS	National Ambient Air Quality Standard
NEPA	National Environmental Policy Act
PM	Particulate Matter
PM10	Coarse particulate matter
PM2.5	Fine particulate matter
SIP	State Implementation Plan
SLAMS	State and Local Air Monitoring Station

Executive Summary

In recent years, the air quality monitor in the Butte has documented elevated levels of fine particle matter pollution (PM_{2.5}) and the Environmental Protection Agency (EPA) has warned the Matanuska-Susitna Borough (the Borough) that levels are threatening to exceed federal standards established to protect public health. The monitor located in the Butte has recorded PM_{2.5} concentrations near or above the PM_{2.5} 24-hour NAAQS, with increased number of exceedances in the last three years.

PM_{2.5} pollution has well documented impacts on human health, especially serious for children, the elderly as well as people with respiratory diseases like bronchitis, asthma, emphysema, heart problems, or diabetes. The fine particles that make up PM_{2.5} are small enough to penetrate into the lungs and bloodstream which can cause the heart to work harder to achieve the same rate of transfer. In 2017, approximately 22% (or 22,361 residents) of the Mat-Su Borough's population had a health condition aggravated by exposure to PM_{2.5}, according to the American Lung Association in Alaska. A study done by the McDowell Group to assess the burden and cost of selected respiratory diseases in 2013 identified that there were 645 visits to Mat-Su Regional Medical Center Emergency Department for asthma and chronic obstructive pulmonary disease (COPD) resulting in charges of \$6,587,000 to Medicaid.

Elevated PM_{2.5} levels in the Butte area are exacerbated by inversions in the winter months that trap wood smoke from burn barrels, slash burning, and wood stoves close to the ground. If levels continue to rise, at least a portion of the Borough will be designated as a "nonattainment area" and will face mandatory federal regulations imposed by EPA through the Alaska Department of Environmental Conservation (DEC).

It is important to recognize that the Borough is not yet a "nonattainment area" and this provides the opportunity to make decisions at the local level and avoid state and federal involvement. Right now, any efforts we implement within the Borough are at our community's discretion. However, if we do not address the problem, and our air quality levels in the Butte continue to exceed the national standards, we will be faced with federally mandated consequences that will last at least 20 years.

The first step for the Borough to manage our air quality resources at the local level is to ensure that the Borough has the authority to implement air quality programs. Statewide, this authority is granted to DEC by the legislature and may be granted to a second-class borough through a Memorandum of Understanding (MOU). An MOU does not give DEC any powers it does not already have, rather it gives the Borough the tools to manage local air resources in a way that is sensitive to our community's needs and to try and avoid greater federal and state involvement.

This issue has implications for borough citizen's health, health care costs, regulatory burden for Borough, state and federal projects, federal funding, and industrial and utility infrastructure. This report is intended to provide background on the air quality issue in the Borough and an assessment of the potential impacts from this situation.

Background

Authority

The Clean Air Act is a federal law initially created by Congress in 1963 and then strengthened in 1970 to comprehensively address air pollution. As part of a comprehensive approach to air pollution, Congress also created the Environmental Protection Agency (EPA) and gave it the primary role in carrying out the law. In 1990, Congress revised and expanded the Clean Air Act, providing EPA even broader authority to implement and enforce regulations reducing air pollutant emissions.

Under the Clean Air Act, EPA is required to establish national ambient air quality standards (NAAQS) based on the latest science and requires states to adopt enforceable plans, known as state implementation plans (SIP) to achieve these standards. The Clean Air Act covers the entire country; however, states, tribes, and local governments do a lot of the work to meet the Clean Air Act's requirements. Individual states may have stronger air pollution laws, but they may not have weaker pollution limits than those set by EPA.¹

Alaska Statutory authority for managing air quality is granted to the DEC by the legislature.² A second class borough may administer an air quality program with approval from the department through a cooperative agreement or MOU³. A local program allows a local government to develop targeted solutions for pollution problems that require special understanding of local industries, geography, housing, and other factors. A program implemented solely at either the state or federal level would be less adapted to local needs given the lack of community-level knowledge and resources.⁴

Nonattainment Process

An area that is not violating the NAAQS is considered "in attainment." If the air quality in any region falls short of the NAAQS for a pollutant, then the EPA designates that region as "nonattainment" for that pollutant.⁵ States with nonattainment areas are required to devise and carry out additional measures in its State Implementation Plan in order to improve air quality.⁶ These measures must be implemented locally and must be enforceable. If the state fails to submit or carry out an adequate SIP, or if the EPA disapproves of a submitted plan, then the EPA can restrict the state's use of federal highway funds in the nonattainment area or will require offsetting emissions reductions, at a two-to-one ratio, for industry in the nonattainment area.⁷

Once a nonattainment designation is made for an area, the State must submit recommendations to EPA for geographic boundaries for the nonattainment area. The EPA considers each designation on a case-by-case basis, evaluating the recommended boundaries based on five factors (air quality data, emissions and emissions related data, meteorology, geography/topography, and jurisdictional boundaries), striving for national consistency to have legally defensible designations. Historically, EPA is conservative in its approach to determining boundaries, often incorporating larger areas than the state recommends, sometimes looking to broader county (borough) level jurisdictional boundaries.⁸

Once a non-attainment area demonstrates attainment (meets NAAQS), it must continue to demonstrate attainment for 20 years before being considered for a full "attainment area." During that time, the area is responsible for implementing a maintenance plan and reporting to the EPA through the SIP.⁹

Air Quality in the Matanuska-Susitna Borough

Particle Pollution

The Borough experiences particle pollution or particulate matter (PM), which is a complex mixture of extremely small solid or liquid particles in the air. Some particles, such as dust, dirt, soot, or smoke, are large enough or dark enough to be seen with the naked eye and others are so small they can only be detected with a microscope. The size of the particles is directly linked to their potential for causing health problems. Particles less than 10 micrometers in diameter pose a risk to health because they can affect both the lungs and heart. Because of the risk to public health, the EPA is required to set National Ambient Air Quality Standards for PM pollution that specifies a maximum amount of PM to be present in outdoor air¹⁰, and this is measured as either coarse PM (PM₁₀) or fine PM (PM_{2.5}). There are different standards for PM₁₀ and PM_{2.5} (table 1)¹¹.

Table 1 EPA PM National Ambient Air Quality Standards (NAAQS)

Pollutant	Averaging Time	Level	Form
PM _{2.5}	Annual Mean	12 µg/m ³	Annual mean, averaged over 3 years
	24-hour	35 µg/m ³	98 th percentile, averaged over 3 years
PM ₁₀	24-hour	150 µg/m ³	Not to be exceeded more than once per year on average over 3 years

PM₁₀ includes particles that are 10 micrometers in diameter or less and it primarily comes from road dust, agricultural dust, river beds, construction sites, mining operations and similar activities¹². The Borough primarily experiences PM₁₀ as blowing dust. When the Borough experiences high wind events, conditions are dry and low river levels expose large gravel bars and tidal flats (typical in fall and spring), large amounts of glacial silt can be stirred up and carried down the valleys. The Borough issues several air quality alerts per year because of these wind-blown dust events. Because these elevated PM₁₀ levels are from a natural source and often not reasonably controllable, rather than being required to control the sources of dust pollution, we are required to mitigate the impacts through air quality advisories and public education.¹³

PM_{2.5} is less than 2.5 micrometers in diameter and is a product of combustion, primarily caused by burning fuels.¹⁴ Typical sources found in the Borough include outdoor burning of construction debris or trash (burn barrels), land clearing, and wood-fired heating devices. In the winter months, the Butte area can experience extended periods of inversions, where cold, dense air traps smoke close to the ground. This can cause elevated levels of PM_{2.5}.¹³

PM_{2.5} is associated with more severe health consequences: the smaller the particle, the greater the potential because the particles are small enough to slip through our natural defenses in the oral and nasal passages and penetrate farther into the respiratory tract. PM_{2.5} particles can lodge in the very

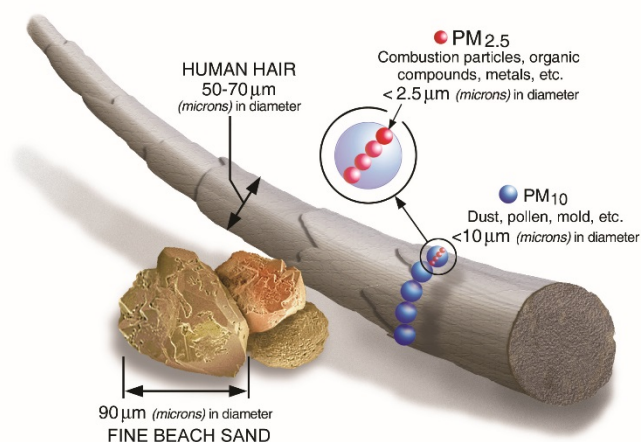


Figure 1 Particulate matter size (<https://www.epa.gov/pm-pollution/particulate-matter-pm-basics>)

small air sacs of the lungs which can slow the transfer of oxygen and carbon dioxide and cause the heart to work harder to achieve the same rate of transfer.¹³ This effect is most noticeable in children and the elderly as well as people with respiratory diseases like bronchitis, asthma, emphysema, or heart problems. However, particulate inhalation can affect all people and adverse effects may only appear after repeated low concentration exposures or exposure to extremely high concentrations.¹⁵

In recent years monitors located in the Butte have recorded PM_{2.5} concentrations near or above the PM_{2.5} 24-hour NAAQS in the winter months, with increased number of 24-hour exceedances in the last 3 years. Compliance with this standard looks at three years of data and is the 98th percentile monitored value (not the maximum value observed).¹⁶ Continued exceedances of the NAAQS will result in mandatory federal regulations imposed by EPA through DEC.

Monitor History

DEC began monitoring ambient air quality in Palmer/Butte area in the summer of 1985 in response to smoke generated by fires used to clear land in Point Mackenzie. As a result of this sampling, heavy dust loads were detected, and, by the 1990's Borough complaints about dust in Butte/Palmer had increased, which prompted a two-year study to understand the issue. The sampling results validated public complaints of high dust levels occurred in spring and fall.

DEC established a fixed monitor in the Butte (figure 2) to continue dust monitoring in the zone of maximum impact and worked with the Borough to alert the public. PM_{2.5} monitoring was added in 1999 in response to a new standard for PM_{2.5} set by EPA (65 µg/m³ for PM_{2.5}). At that time little was known about the different sources of PM₁₀ and PM_{2.5}. Since the beginning of measurements PM_{2.5} concentrations at the Butte site have been around 30 µg/m³, which initially was far below the NAAQS. When EPA later tightened the standard in 2006 from 65 µg/m³ to the current NAAQS of 35 µg/m³, the Butte site became a regulatory site per federal requirements¹³.



Figure 2 Butte Air Quality Monitor at its current location(DEC)

In addition to the monitor currently located in Butte, previous sampling locations within the Borough include:

- Palmer Parks and Maintenance Building (1973-78)
- South Big Lake Road (1985- 2003, with PM_{2.5} monitoring from 3/4/2000 to 12/31/2002)
- Kirsten Square - 1451 E Parks Highway (1/1/1986- 7/31/1986)
- Colony School Drive (4/11/1998-12/31/1998)
- Trapper Creek (Established in 2001, still ongoing monitoring for the NPS IMPROVE site, transport site for Denali National Park)
- 100 W Swanson Ave, Wasilla (1/1/2008-9/30/2012)- closed due to budget cuts and low measurement levels
- S Gulkana Street, Palmer-currently operating (since 1/1/2008)

The current monitoring station in Palmer became a year-round monitor in 2011 to provide information about the area and to function as an early warning system for wildland fire smoke moving into Anchorage. The Palmer site meets the requirement for regional background and transport, and also provides data that indicates the air quality issue does not affect the entire Borough.

Federal requirements mandate at least one PM_{2.5} State and Local Air Monitoring Station (SLAMS) for areas with populations between 50,000 and 500,000:

- At least one site must be placed in a location that is expected to have the maximum concentration. (Butte meets this requirement)
- At least one PM_{2.5} monitoring location in an area with a most recent 3-year design value that is ≥85% of any PM_{2.5} National Ambient Air Quality Standard (NAAQS). (Butte exceeds 85%)
- At least one PM_{2.5} site to monitor regional background and regional transport. (Palmer site meets this requirement)¹⁷

Data

Data is collected year-round at the Butte and Palmer sites and is available to the public at <http://dec.alaska.gov/Applications/Air/airtoolsweb/Aq/>.

In recent years, the monitor located in the Butte has recorded PM_{2.5} concentrations near or above the PM_{2.5} 24-hour NAAQS, with increased number of exceedances in the last three years (Table 2). Compliance is determined by the Design Value (DV) which is the three-year average of the annual 98th percentile monitored value (not the maximum value observed averaged over three years of data).

Table 2 Butte PM_{2.5} data 2012-2015. Note: 2015 and 2016 DV are within 1 from NAAQS (DEC)

Year	Number of Exceedances (days)	98 th Percentile (µg/m ³)	Design Value (DV)* (µg/m ³)	Standard (µg/m ³)
2012	4	33.4	33.7	35
2013	3	27.9	30.5	35
2014	8	38.1	33.1	35
2015	8	37.9	34.6	35
2016	2	29.2	35.1*	35
2017	4	26.2**	31.1**	35

*DV>35.5 µg/m³ round down to 35 and are in compliance

** Preliminary Data

Since the start of the PM_{2.5} measurements, the PM_{2.5} concentrations at the Butte site hovered around 30µg/m³, which initially was far below the NAAQS. When EPA later tightened the standard in 2006 from 65 µg/m³ to the current NAAQS of 35 µg/m³, the Butte site became a regulatory site per federal requirements. During this time, the Palmer station has consistently recorded PM_{2.5} levels far below the national standard (figure 3).¹⁷

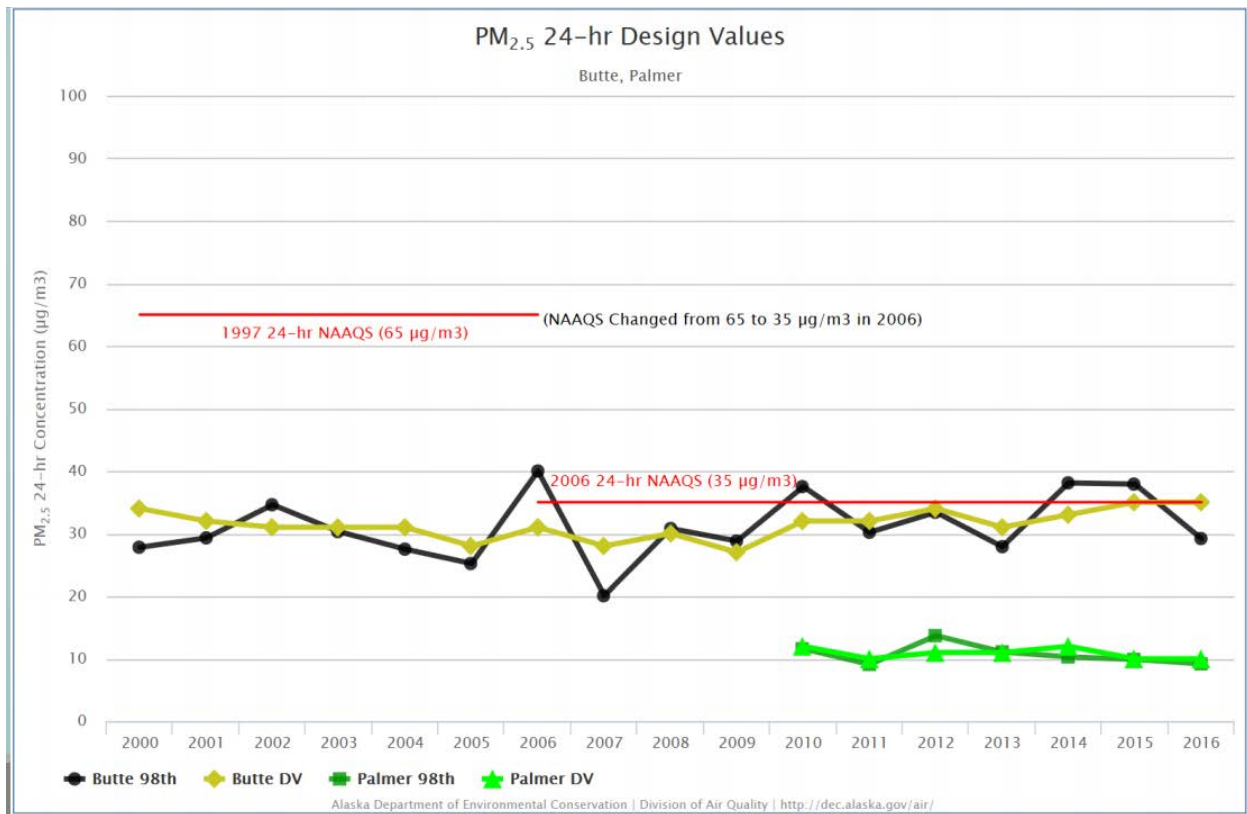


Figure 3 24-hour averaged PM_{2.5} concentrations at Butte and Palmer Monitors (DEC)

In 2017, the preliminary data collected by the Butte monitor show a 98th percentile value of 26.2 µg/m³, resulting in a 2015-2017 preliminary DV of 31.1 µg/m³ (figure 3). This DV is lower than the previous two years and is in compliance for the NAAQS, despite 4 days of exceedances recorded in early 2017 (figure 4).

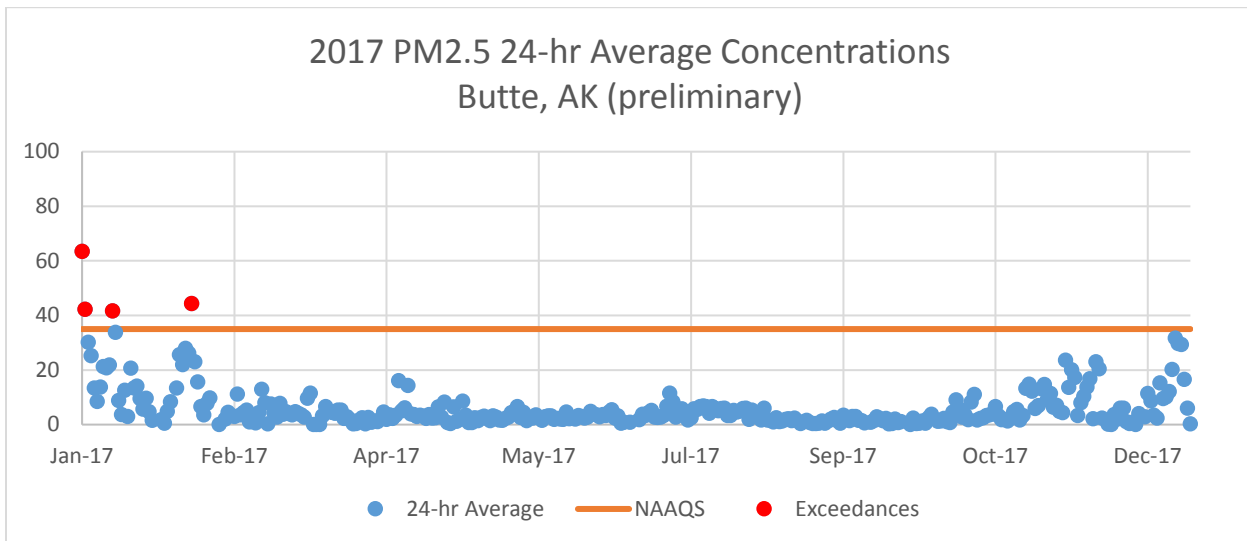


Figure 4 2017 PM_{2.5} Data showing 4 exceedances in early months

So far in 2018, the Butte monitor has not recorded any NAAQS exceedances (figure 5).

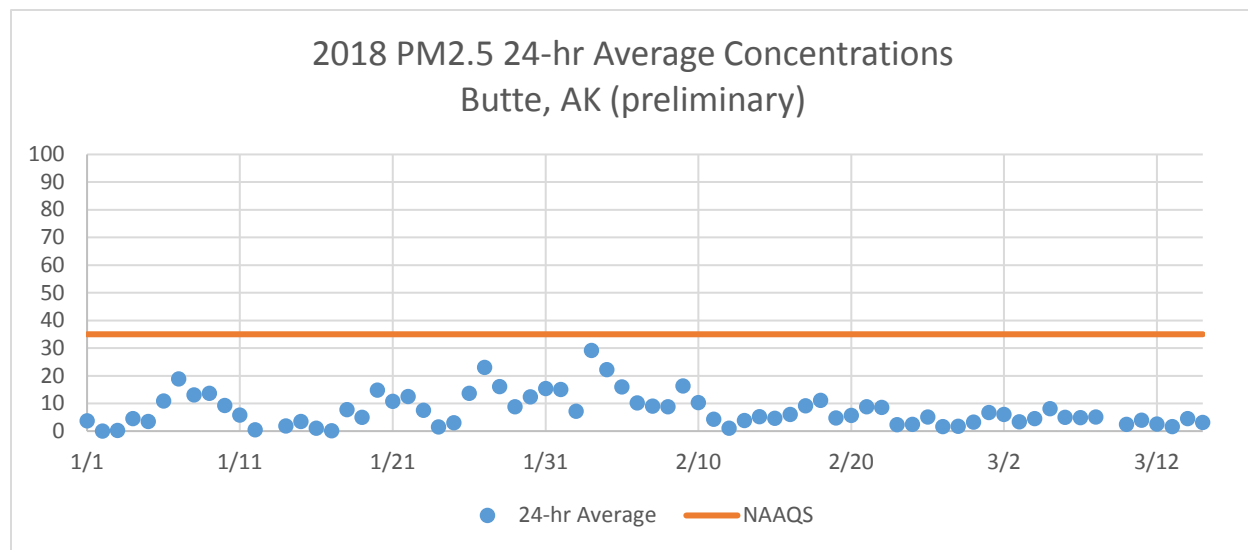


Figure 5 Butte 2018 PM_{2.5} (through March 15, 2018) showing no exceedances

Memorandum of Understanding

As an area that is in “attainment,” the Borough can make decisions regarding air quality locally, without measures being mandated at the federal or state level. The first step for the Borough to manage its air quality resources at the local level is to ensure that the Borough has the authority to implement air quality programs. Statewide, this authority is granted to DEC by the legislature and may be granted to a second-class borough through a MOU. A MOU does not give DEC any powers it does not already have, rather it gives the Borough the tools to manage local air resources in a way that is sensitive to our community’s needs and to try and avoid greater federal and state involvement. Additionally, any federal funding, permitting, or licensing in a nonattainment area must create and get approved a “conformity determination” or analysis to demonstrate that the total emissions projected for a plan, program, or project is within the emissions limits established by the SIP.

The current MOU has been in effect since 2006 and focuses primarily on DEC and the Borough working together to ensure that air monitoring results and health effects are communicated to the public. In this MOU, DEC supplies and operates the monitors and assists the Borough in communicating advisories.¹⁸ It is important to note that these advisories relate not only to PM_{2.5} issues, but also to PM₁₀ and provide critical notification for people that can have major health impacts when air quality is compromised.

The current MOU (2006) does not give the Borough broad powers to create or manage local air quality programs.

Impacts of Nonattainment

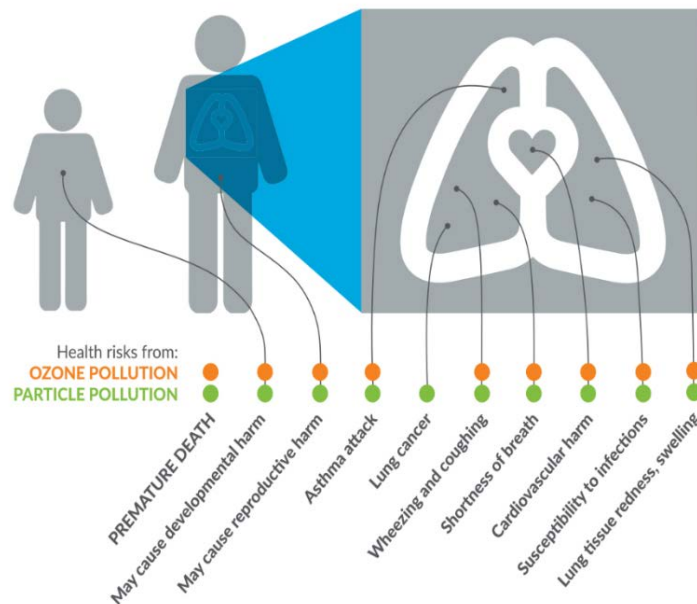
Health Impacts – What are the health effects of PM_{2.5} air pollution?

General Background

Particulates are known to have health impacts on humans. Human bodies have natural defenses to help cough or sneeze larger particles out of bodies, but those defenses don't keep out smaller particles.

PM_{2.5} is associated with more severe health consequences: the smaller the particle, the greater the potential to impact health because they are small enough to slip through our natural defenses in the oral and nasal passages and penetrate farther into the respiratory tract and even enter the bloodstream. PM_{2.5} particles can lodge in the very small air sacs of the lungs which can slow the transfer of oxygen and carbon dioxide and cause the heart to work harder to achieve the same rate of transfer. These are similar to the health effects caused by the particles in cigarette smoke. This effect is most noticeable in children and the elderly as well as people with respiratory diseases like bronchitis, asthma, emphysema, or heart problems. However, particulate inhalation can affect all people and adverse effects may only appear after repeated low concentration exposures or exposure to extremely high concentrations.¹³

Air pollution can lead to illness and premature death.



Exposure to such particles can affect both the lungs and heart (figure 6). Numerous scientific studies have linked particle pollution exposure to a variety of problems, including:

Figure 6 Particulate matter impacts to children and adults shown in green (American Lung Association¹⁹)

- premature death in people with heart or lung disease
- nonfatal heart attacks
- irregular heartbeat
- aggravated asthma
- decreased lung function
- increased respiratory symptoms, such as irritation of the airways, coughing or difficulty breathing
- increased risk for cardiovascular disease for people with diabetes¹⁹

Air Quality Impacts for Borough citizens

According to the American Lung Association's (ALA) 2017 "State of the Air" report for the Borough, about 22% of the Borough's population has a health condition that is aggravated by exposure to PM_{2.5}. These conditions include asthma, chronic obstructive pulmonary disease (COPD), lung cancer, cardiovascular disease, and diabetes. In 2017 this included more than 22,361 citizens.²⁰

Related, an electronic survey from the ALA was created and distributed to Borough residents to measure their concerns about air quality. Of the 39 respondents, 85% indicated outdoor air quality as a concern for people with asthma and/or COPD.²¹

Research on Impacts of PM on Humans

1. Research showing impacts of PM on health from Libby, Montana; interesting note on Libby wood stove change-out program showing improvements in local health outcomes. "In a comparable intervention in the community of Libby, Montana, older wood heaters were exchanged with new, less polluting models during the winter of 2006-07. Concentrations of fine particulate matter (PM_{2.5}) fell from a mean of 27.2 µg/m³ in the two winters before the intervention to 19.7 µg/m³ for two winters after. The respiratory health of children was assessed by repeated annual surveys of their parents. A reduction of 5 µg/m³ in PM_{2.5} was associated with a 27% reduction in wheeze and even larger reductions in respiratory infections, including flu and throat infections."²²
2. A study in Australia showed statistically significant reduction in health impacts from reductions in outdoor biomass smoke pollution. Specifically, improved air quality was correlated to reductions in annual mortality in males from cardiovascular and respiratory mortality.²³
3. In a cohort study of 8111 adults in six U.S. cities over a 14-16-year period, researchers found PM_{2.5} significantly associated with deleterious health effects after controlling for individual risk factors like smoking. This is known as the "Harvard Six Cities Study."²⁴
4. In a follow-up to the Harvard Six Cities Study. A group of adults living in six cities in the United States was followed from 1974 to 2009 to estimate the effects of air pollution on mortality. The main finding was that a 2.5 µg/m³ decrease in the annual average level of PM_{2.5} was associated with a 3.5% reduction in all-cause mortality. Results show associations between chronic exposure to PM_{2.5} and all-cause, cardiovascular and lung cancer mortality, with health effects seen at any PM concentration.²⁵

Regulatory Impacts- *What are the potential regulatory burdens for the Borough and citizens from nonattainment status?*

If a jurisdiction is designated as an air quality nonattainment area, it goes through several regulatory steps:

1. The state must submit a SIP for EPA review and approval. The SIP details enforceable steps that state and local governments will take to bring the air contaminant back into NAAQS compliance under the authority of the Clean Air Act. These steps may include stricter controls on industrial facilities and additional planning requirements for transportation sources. The SIP must be submitted to EPA within three years after the Agency's final designation as nonattainment becomes effective. Attainment deadline is five years from this designation. If the state fails to

implement a control program the EPA may sanction the state, and/or develop a Federal Implementation Plan to protect the health of citizens.⁷

2. Nonattainment areas must meet “conformity.”

If a jurisdiction is in nonattainment status for NAAQS, any project within that jurisdiction receiving Federal funds must meet “conformity” before receiving approval or funding. Conformity requirements are found in Clean Air Act 176(c)(1)²⁶:

“No department, agency, or instrumentality of the Federal Government shall engage in, support in any way or provide financial assistance for, license or permit, or approve, any activity which does not conform to an implementation plan after it has been approved or promulgated...” Any project that receives federal funds or is subject to a federal action or approval, such as roads funded with federal funds, or a project requiring a federal permit, must meet “conformity”.

Conformity ensures that federal funding and approvals are given to those projects that are consistent with air quality goals. It is intended to help the air quality SIP achieve its goal of attaining NAAQS. To release Federal funding for a project, the local jurisdiction must create and get approved a “conformity determination” or an applicability analysis, documents that demonstrate that the total emissions projected for a plan, program, or project is within the emissions limits established by the SIP. Projects receiving federal funding, or occurring on federal land that require a federal permit, would trigger a National Environmental Policy Act (NEPA) review. NEPA includes an air quality impact analysis, and for nonattainment areas, the analysis would be more complex. For example, any LNG project for the Port MacKenzie area requiring a Federal Energy Regulatory Commission permit could be impacted by this.

3. EPA guidelines suggest set their attainment and nonattainment area boundaries based on the boundaries of metropolitan boundaries. EPA says states should consider these factors in assigning nonattainment areas, called “five-factor analysis”:

- air quality data – for a 3-year period.
- emissions and emissions-related data – identifies sources of PM_{2.5} in area.
- Meteorology – determines the effect of source and transport of PM_{2.5}.
- geography/topography – landscape features that affect the formation and distribution of PM_{2.5}.
- jurisdictional boundaries – examples of such include counties, air districts, metropolitan planning organizations, and existing nonattainment areas.¹

EPA must approve the state’s proposed nonattainment status boundaries.

Economic and Fiscal Impacts- *What are the potential costs of air quality nonattainment status?*

Federal Projects

A nonattainment designation would delay any additional federal funding, permitting, or licensing until conformity with an air quality SIP could be demonstrated and, ultimately, any federal highway funds could be withheld if the SIP is not implemented or if the EPA does not approve of the SIP.

Analysis by the Borough transportation planner shows that an average of \$48,978,052 of federal funds have been spent on Borough road projects annually from 2001 through 2015, for a total of about \$735 million dollars (\$734,670,783).

It is important to note that a “conformity determination” would apply not only to the federal highway fund example above but for any project receiving federal funding or requiring a federal permit, which can add significant time and effort to a project.

Industry and Utilities

If a jurisdiction is designated as an air quality nonattainment status area, industrial and utility facilities could be required to:

- install pollution control equipment
- take limits on production
- find emission reductions by “offsetting” in order to expand

New facilities wanting to locate in the area could be required to install pollution controls or take stringent operational limits. The State Implementation Plan would drive these restrictions. Clean Air Act Sections 165 and 172(c).

Health Costs

In 2013 the American Lung Association in Alaska, in partnership with the McDowell Group, produced an analysis report on Mat-Su Regional Medical Center Emergency Department (MSRMC ED) usage by patients with asthma and chronic obstructive pulmonary disease (COPD). There were 321 visits to the MSRMC ED for asthma, resulting in in hospital facility charges to Medicaid of \$1,658,000 (not including physician fees). Likewise, there were 324 MSRMC ED visits for COPD, resulting in hospital facility charges of \$4,929,00 (not including physician fees) (figure 7).

In total there were 645 visits to the MSRMC ED where either asthma or COPD were the primary diagnoses, incurring hospital facility charges to Medicaid of \$6,587,000 in 2013.²⁷

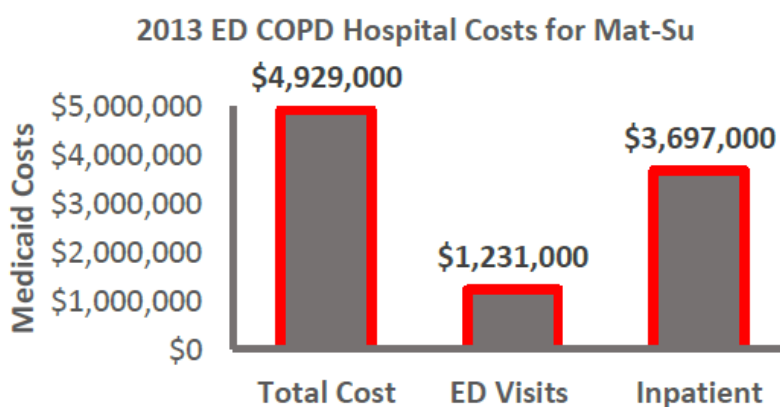
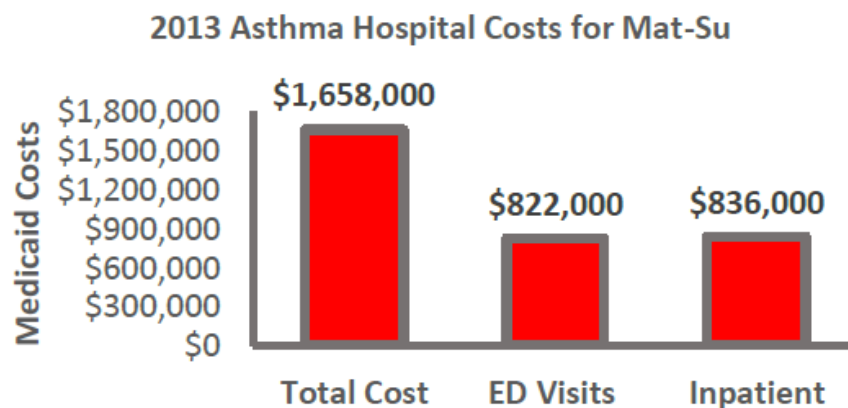


Figure 7 Analysis of Asthma and COPD Hospital Costs for the Mat-Su Regional Medical Center Emergency Department²⁷

Staffing Burden for Borough Tax Payers

Nonattainment status could increase Borough staff workload and presumably trigger additional staffing costs. For example, the Fairbanks North Star Borough Air Quality Division has 9 full-time equivalent staff dedicated to air quality issues.²⁸

Civil litigation and penalties

- a. Section 113(b) Clean Air Act: civil judicial lawsuit fines up to \$37,500 per day per violation, including violations of any requirement or prohibition. It also allows for higher penalties and imprisonment for criminal violations.²⁹
- b. Section 113(d) of the Clean Air Act: civil administrative penalty powers up to \$37,500 per day of violation, with total penalty sought not exceeding \$290,000.²⁹
- c. Section 304 Clean Air Act: Allows citizens to bring civil suit against a “person” to compel compliance by facilities that may be violating Clean Air Act requirements. Section 302 defines “person” as an individual, corporation or other business entity such as a partnership, a state or local government, or the federal government. Courts are authorized to impose civil penalties in

lawsuits brought under the citizen suit provisions, and direct up to \$100,000 to be used for mitigation projects that enhance public health and the environment.³⁰

Summing it up:

Many communities around the country face wood smoke PM_{2.5} issues. As outlined by the potential health, regulatory, and fiscal impacts earlier, there are many advantages to proactively managing air quality to avoid violating NAAQS and triggering nonattainment status and all the potential costs associated with such. Indeed, many areas facing these issues have wisdom to share in charting actions that create fewer problems and better outcomes. The passage below from the Idaho Department of Environmental Quality shares such wisdom, and clarifies the benefits of taking action to maintain good air quality:

“States strive to achieve attainment with state and federal air quality standards for a number of reasons. First and foremost, remaining in compliance **helps protect public health**, a key element of DEQ's mission. In addition, **compliance contributes to economic growth**. Nonattainment status can potentially limit production capabilities of existing industries and preclude siting of new industries that provide job opportunities. Attainment of air quality standards also **helps avoid a potential loss of federal highway funding** that can result from nonattainment status. Lastly, **it is costly and time-consuming to develop and implement plans to re-attain attainment status.**” (underlining and bolded emphasis added)³¹

Conclusion

The Borough is currently in compliance with the PM_{2.5} standards and is considered in attainment. This gives the Borough an opportunity to make decisions at the local level and potentially avoid state and federal involvement and improve air quality for residents. Right now, any efforts we implement within the Borough are at our community's discretion. However, if we do not address the problem, and our air quality levels in the Butte continue to exceed the national standards, there will be implications for borough citizen's health, health care costs, and regulatory burden for Borough, state and federal projects, federal funding, and industrial and utility infrastructure that will have consequences for the next 20 years.

References

- ¹Information accessed on March 15, 2018 at https://www.epa.gov/sites/production/files/2015-05/documents/caa_nutshell.pdf
- ²[AS 46.03](#) ; [AS 46.14](#)
- ³[AS 46.14.400](#)
- ⁴Information accessed on March 15, 2018 at <https://www.epa.gov/sites/production/files/2015-08/documents/peg.pdf>
- ⁵U.S. Code: [§7407\(d\)](#)
- ⁶U.S. Code: [§7502](#)
- ⁷U.S. Code: [§7503](#), [7509](#)
- ⁸U.S. Code: [§7407](#)
- ⁹U.S. Code: [§7505\(a\)](#)
- ¹⁰U.S. Code: [§7409](#)
- ¹¹Information accessed on March 15, 2018 at <https://www.epa.gov/criteria-air-pollutants/naaqs-table>
- ¹²Information accessed on March 15, 2018 at <https://www.epa.gov/pm-pollution/particulate-matter-pm-basics>
- ¹³Alaska DEC, Air Quality Monitoring at Harrison Court, Butte, Alaska 1999-2010, 2011
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- ¹⁵World Health Organization, Effects of Particulate Matter, 2013
- ¹⁶Information accessed on March 15, 2018 at <http://dec.alaska.gov/air/anpms/communities/pm2-5-matsu-butte>
- ¹⁷Personal communication with Denise Koch, DEC Division of Air Quality Director on February 5, 2018
- ¹⁸Mat-Su Borough and Alaska Department of Environmental Conservation Memorandum of Understanding for Air Monitoring in the Mat-Su Valley, 2006
- ¹⁹Information accessed on March 15, 2018 at <http://www.lung.org/our-initiatives/healthy-air/outdoor/air-pollution/particulate-pollution.html%20-%20cando>
- ²⁰American Lung Association State of the Air Mat-Su Borough, 2017: <http://www.lung.org/our-initiatives/healthy-air/sota/city-rankings/states/alaska/matanuska-susitna-borough.html>
- ²¹American Lung Association in Alaska Asthma and COPD Needs Assessment, 2016

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- ²⁴ An Association between Air Pollution and Mortality in Six U.S. Cities." *N Engl J Med* 1993; 329:1753-1759. <http://www.nejm.org/doi/full/10.1056/NEJM199312093292401>
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<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2662950/>
- ²⁶ U.S. Code: [§7506\(a\)](#)
- ²⁷ [McDowell Group and ALA analysis on MSRMC ED usage by patients with asthma and copd](#)
- ²⁸ [Personal communication with Nick Czarnecki, Fairbanks North Star Borough Air Quality Manager on March 8, 2018](#)
- ²⁹ U.S. Code: [§7413](#)
- ³⁰ U.S. Code: [§7604](#)
- ³¹ Information accessed on March 15, 2018 at <https://www.deq.idaho.gov/air-quality/monitoring/attainment-versus-nonattainment.aspx>

Appendices

Air Quality FAQ

1. **What is PM_{2.5}?**
 2. **What is PM₁₀?**
 3. **What air quality issues do we have in the Borough?**
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 6. **Why do we have or need air quality monitors in the Borough?**
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 8. **Why do we need air quality monitors?**
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 10. **Why are there only two monitoring stations when violations could affect the whole Borough?**
 11. **Isn't it scientifically questionable to implement regulations based on just two monitors, one of which is in the worst possible place?**
 12. **Why do we need an MOU with DEC?**
 13. **What does the current (2006) MOU between Borough and DEC say?**
 14. **Did the updated MOU proposed in January 2018 allow the borough to restrict the use of woodstoves?**
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1. **What is PM_{2.5}?**

Fine particulate matter, or PM_{2.5} is less than 2.5 micrometers in diameter and is a product of combustion, primarily caused by burning fuels.

2. **What is PM₁₀?**

Coarse particulate matter, or PM₁₀, is less than 10 micrometers in diameter and it primarily comes from road dust, agriculture dust, river beds, construction sites, mining operations and similar activities. The Borough primarily experiences PM₁₀ as blowing dust.

3. **What air quality issues do we have in the Borough?**

Borough primarily has documented 2 different particulate matter (PM) air quality issues. Areas in the Borough experience blowing dust particles, typically in the fall and spring, primarily from natural sources (glacial silt) and is therefore not required to control sources of dust pollution. The Butte area has documented elevated PM_{2.5} levels which can be exacerbated by inversions in the winter months that trap smoke from wood stoves, burn barrels, and slash burning close to the ground.

4. **Does dust from glaciers cause air pollution?**

Dust is a form of particle pollution (see "what is PM₁₀") and the Borough does experience elevated levels of PM₁₀. When we experience high wind events, conditions are dry and low river levels expose large gravel bars and tidal flats (typical in fall and spring), large amounts of glacial silt can be stirred up and carried down the valleys. The Borough issues several air quality alerts per year because of these wind-blown dust events, but because these elevated PM₁₀ levels are from a natural source, and often not reasonably controllable, rather than being

we are not required to control the sources of dust pollution, we are required to mitigate the impacts through air quality advisories and public education.

5. Why should we be concerned about PM_{2.5} pollution?

PM_{2.5} is associated with more severe health consequences: the smaller the particle, the greater the potential to impact health because they are small enough to slip through our natural defenses in the oral and nasal passages and penetrate farther into the respiratory tract and even enter the bloodstream. PM_{2.5} particles can lodge in the very small air sacs of the lungs which can slow the transfer of oxygen and carbon dioxide and cause the heart to work harder to achieve the same rate of transfer. These are similar to the health effects caused by the particles in cigarette smoke. This effect is most noticeable in children and the elderly as well as people with respiratory diseases like bronchitis, asthma, emphysema, or heart problems. However, particulate inhalation can affect all people and adverse effects may only appear after repeated low concentration exposures or exposure to extremely high concentrations.

6. Why do we have or need air quality monitors in the Borough?

DEC began monitoring ambient air quality in Palmer/Butte area in summer 1985 in response to smoke generated by fires used to clear land in Point Mackenzie. As a result of this sampling, heavy dust loads were detected, and, by the 1990's Borough complaints about dust in Butte/Palmer had increased.

7. Where are air quality monitors in the Borough?

Currently, there are two PM_{2.5} (fine particulate matter) monitoring sites in the Borough Valley: one in Palmer, at S. Gulkana St. and one in the Butte, at Harrison Ct. In addition to the current monitors, previous sampling locations within the Borough include:

- Palmer Parks and Maintenance Building (1973-78)
- South Big Lake Road (1985- 2003, with PM_{2.5} monitoring from 3/4/2000 to 12/31/2002)
- Kirsten Square - 1451 E Parks Highway (1/1/1986- 7/31/1986)
- Colony School Drive (4/11/1998-12/31/1998)
- Trapper Creek (Established in 2001, still ongoing monitoring for the NPS IMPROVE site, transport site for Denali National Park)
- 100 W Swanson Ave, Wasilla (1/1/2008-9/30/2012)- closed due to budget cuts and low measurement levels

8. Why do we need air quality monitors?

Federal requirements mandate at least one PM_{2.5} State and Local Air Monitoring Station (SLAM) for areas with populations between 50,000 and 500,000:

- At least one site must be placed in a location that is expected to have the maximum concentration. (Butte meets this requirement)
- At least one PM_{2.5} monitoring location in an area with a most recent three-year design value that is ≥85% of any PM_{2.5} National Ambient Air Quality Standard (NAAQS). (Butte exceeds 85%)

- At least one PM_{2.5} site to monitor regional background and regional transport. (Palmer site meets this requirement)

9. Can the monitor in the Butte be moved to a better location?

This site is considered a regulatory State and Local Air Monitoring Station (SLAMS) site. It is very difficult to get permission to remove a monitoring site. Federal rules require the following for removal of a PM_{2.5} SLAMS site:

- The monitor has shown attainment and has a probability of less than 10% of exceeding 80% of the NAAQS during the next 3 years. (Butte cannot show this probability)
- A monitor that has not measured violations of the NAAQS in the previous five years (Butte has measured violations in the past 5 years)
- A PM_{2.5} monitor which EPA has determined cannot be compared to the NAAQS because of its siting. (Butte does not have a siting issue)
- A SLAMS Monitor not eligible for removal under the above may be moved to a nearby location with the same scale of representation if logistical reasons beyond the state's control make it impossible to continue operation at its current site. (The Butte site is in a public right of way. This option section typically refers to sites on private property where the land owner wants to have the site removed.)

10. Why are there only two monitoring stations when violations could affect the whole Borough?

Ambient air quality monitoring is expensive. Monitoring stations have to be set up for at least 3 years to produce sufficient data to compare to the national standards. This requires a lot of money for equipment and staff. In recent years, due to the State budget situation, the State has reduced the number of monitoring stations. DEC currently does not have the staff or funding to expand the monitoring network. DEC relies on public complaints to identify other areas of concern.

11. Isn't it scientifically questionable to implement regulations based on just two monitors, one of which is in the worst possible place?

When setting up air monitoring to represent an area, at least one of the sites is required to be in an area with the highest air pollution. When funding is limited, and resources exist only for one site, it should be located in the area of highest impact. In this way, a limited monitoring network is still protective of the public and when that monitor shows good air quality, one can assume that the other areas are clean as well.

12. Why do we need an MOU with DEC?

Simply put, the Borough does not have the authority to manage local air quality programs without an MOU with the State. The Alaska State Legislature has mandated that the Alaska DEC assess, evaluate, and mediate environmental issues that may affect the health and welfare of residents within the state (Title 46 of the Alaska Statutes). Authority for managing air quality can be delegated to a second class borough (AS 29.35.210) through AS 46.14.400 which requires DEC approval of any local program through a cooperative agreement or MOU. Without an MOU, the Borough does not have broad powers to create or manage local air quality programs which include actions like updating outdated Air Quality Code ([Matanuska-Susitna Borough](#)

[Code 8.30](#)), implementing a voluntary cost-share program for homeowners looking to improve the efficiency of their home heating devices, or providing a seasoned-wood swap out program.

13. What does the current (2006) MOU between Borough and DEC say?

The current MOU has been in effect since 2006 and it focuses primarily on DEC and the Borough working together to ensure that air monitoring results and health effects are communicated to the public. In this MOU, DEC supplies and operates the monitors and assists the Mat-Su Borough in communicating advisories and alerts. It is important to note that these advisories and alerts relate not only to PM_{2.5} issues, but also to PM₁₀ and is a critical notification for people that can have major health impacts when air quality is compromised.

14. Did the updated MOU proposed in January 2018 allow the borough to restrict the use of woodstoves?

No. The MOU in and of itself does not allow the Borough to restrict citizen use of wood stoves. Such restriction would require a code change and assembly action including public hearing and assembly vote. Wood stoves are an important heating source for many residents especially in areas where other heating sources such as natural gas are not available. Residents are encouraged to purchase wood stoves that meet efficiency standards and operate and maintain them properly.

Historical Timeline

- 1985: Monitoring in Palmer/Butte in response to smoke generated by fires to clear land at Point Mackenzie
- 1990's: study to understand complaints about dust in Palmer/Butte
- 1997: EPA adds PM_{2.5} NAAQS (65 µg/m³)
- 1999: DEC adds PM_{2.5} monitoring capabilities at Butte
- 2006: EPA tightened PM_{2.5} NAAQS to 35 µg/m³
- 2006: MOU between DEC and the Matanuska-Susitna Borough for air monitoring
- 2011: Targeted outreach/website developed for Borough in response to Butte data being close to NAAQS
- 2015: DEC briefing to Borough Assembly to emphasize concern for unhealthy levels of PM_{2.5} and potential consequences of non-attainment
- 2016: DEC update to Borough Assembly
- 2016: DEC & Borough increased public outreach with message of "Keep Mat-Su Air Clean" (*ongoing*)
- 2016: Fairbanks North Star Borough Mayor Karl Kassel presented to Borough Assembly on consequences of becoming a non-attainment area
- 2017: DEC update to Borough Assembly
- 2017: Proposed update to MOU with DEC (removed from consideration May 2017)
- 2018: Proposed update to MOU with DEC (defeated at Assembly Jan 2018)