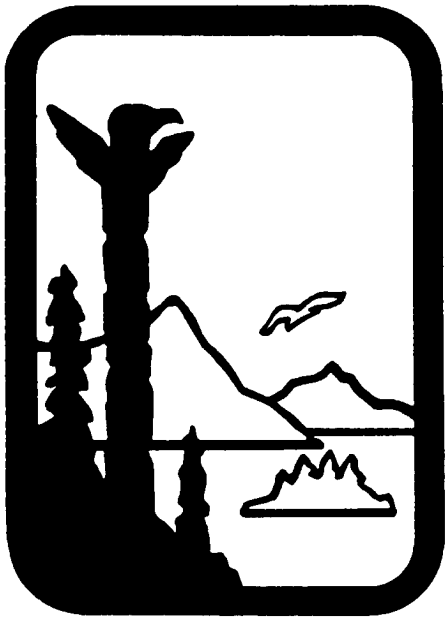
Alaska Department of Environmental Conservation



State Air Quality Control Plan

Vol. II: Analysis of Problems, Control Actions
Section III.C: Fairbanks Transportation Control Program

Adopted
April 4, 2008

(This page serves as a placeholder for two-sided copying)

Introductory Note: In this document each reference to "CAA" means the Clean Air Act as amended in 1990, P.L. 101-549.

SECTION III.C FAIRBANKS TRANSPORTATION CONTROL PROGRAM

III.C.1. Planning Process

The urban portion of the Fairbanks North Star Borough (FNSB) was designated in 1991 as a "moderate" nonattainment area for carbon monoxide (CO) under the CAA. On March 30, 1998, Fairbanks was reclassified as a "serious" nonattainment area for failing to attain the ambient eight-hour CO health standard by the December 31, 1995 deadline mandated for moderate CO nonattainment areas. As a serious nonattainment area, Fairbanks was required to prepare a state implementation plan (SIP) revision that demonstrated attainment by December 31, 2000. Since violations of the ambient CO standard were recorded in calendar year 1999 and 24 months of clean data are required to demonstrate attainment, it was not possible for Fairbanks to prepare a SIP revision that satisfied this requirement. Therefore in March 2001, Fairbanks and the Department of Environmental Conservation submitted a formal request to the Environmental Protection Agency (EPA) for an extension of the attainment date to December 31, 2001, as allowed under Section 186(a)(4) of the Clean Air Act, 42 U.S.C. 7512(a)(4). On July 5, 2002 EPA announced in a Federal Register Notice that the Fairbanks serious CO nonattainment area attained the National Ambient Air Quality Standard (NAAQS) for CO by its attainment date of December 31, 2001. On June 21, 2004, the State of Alaska submitted a CO maintenance plan for the Fairbanks nonattainment area to EPA for approval. On July 27, 2004, EPA announced in a Federal Register Notice that it was approving the maintenance plan and redesignating the Fairbanks CO nonattainment area to attainment with an effective date of September 27, 2004.

Subsequent to this approval, the Fairbanks Assembly determined that the Vehicle Inspection Maintenance (I/M) Program is no longer necessary for continued maintenance of the ambient CO standard and therefore plans to terminate the program after December 31, 2009. Recognizing the I/M Program is one of the primary control measures, this plan has been revised to include an updated emissions forecast, a demonstration of attainment without the I/M Program through 2015, a new conformity budget and a request for EPA approval to shift the I/M Program from an active measure to a contingency measure.

This control plan serves two purposes. First, it documents the process followed in developing the plan revision according to applicable Clean Air Act provisions and related EPA guidance documents. Second, the plan documents continued attainment of the CO standard in Fairbanks between 2005 and 2015. The key to the success of the plan is an on-going, integrated planning process that allows for adequate local participation and coordination among governmental agencies.

To ensure that there is adequate participation by local elected officials and citizens in the planning process, the CAA contain specific mandatory maintenance planning provisions. These requirements, and the FNSB's response to them, are discussed below.

Local Planning Process

Under Section 174 of the CAA, the revised plan submitted to EPA as a formal SIP amendment must be prepared by "an organization certified by the State, in consultation with elected officials of local governments." In response to similar requirements in the 1977 Clean Air Act Amendments, the Fairbanks North Star Borough was previously designated in 1978 by the state as the lead Metropolitan Planning Organization (MPO) in the Fairbanks area for air quality purposes. This designation was affirmed by formal action of the city councils of the City of Fairbanks and the City of North Pole, and the Borough formally agreed to this designation by passage of Assembly Resolution No. 78-22 in April 1978 (See Appendix III.C.1).

Based on this designation, the Borough has continued its role as the lead air quality planning agency in the Fairbanks area for the preparation of this plan. Development of the plan required close coordination between air quality and transportation planning agencies in the local community. To accomplish this, the Borough involved the Fairbanks Metropolitan Area Transportation System (FMATS) planning group in reviewing the plan. Section 174 of the CAA also states that the preparation of the plan revisions must be coordinated with the continuing, cooperative, and comprehensive transportation planning process (known as the "3-C process") required under federal regulation. Because of its relatively small population, state and local transportation planning agencies have not been required in the past to follow the 3-C process in the Fairbanks area. However, the FMATS process and organizational structure were set up in 1969 to function in the same manner as a 3-C process. Additionally, on May 1, 2002, the Department of Commerce announced in a Federal Register Notice that Fairbanks, with a population of 51,926, qualifed as an urbanized area, and urbanized areas are required to establish a Metropolitan Planning Organization (MPO) within 12 months of being designated. As a result FMATS was constituted as an MPO through an agreement between the Borough Assembly, the mayor, City of Fairbanks, City of North Pole, and the State on March 27, 2003.

FMATS is an on-going comprehensive transportation and land use planning process for the Fairbanks area. Participants in this interagency effort include the Alaska Department of Transportation & Public Facilities (ADOT&PF), the FNSB (also referred to in this plan as the Borough), the City of Fairbanks, and the City of North Pole. Cooperative efforts include (1) projecting future land use trends and transportation demands; (2) recommending long-range solutions to meet transportation needs; and (3) working together to implement the recommendations. The FMATS structure consists of a two-tiered committee system that reviews all transportation planning efforts within the area. The *FMATS Policy Committee* provides guidance and control over studies and recommendations developed by support staff. Voting members of the Policy Committee include the following:

- Regional Director, Northern Region Alaska Department of Transportation and Public Facilities

- Mayor, Fairbanks North Star Borough
- Mayor, City of Fairbanks
- Mayor, City of North Pole
- Presiding Officer, Fairbanks North Star Borough Assembly
- Councilman, Fairbanks City Council
- Director, Air & Water Quality, Alaska Department of Environmental Conservation

The *FMATS Technical Committee* and member support staff analyze transportation and land use issues, and develop draft recommendations for the Policy Committee. Voting members currently authorized include:

- Planning Manager, Northern Region Alaska Department of Transportation and Public Facilities
- Director of Planning, Fairbanks North Star Borough
- City Engineer, City of Fairbanks
- City Engineer, City of North Pole
- Borough Transportation Director, Fairbanks North Star Borough
- Environmental Specialist, Alaska Department of Environmental Conservation
- Representative, Fairbanks International Airport
- Representative, Alaska Railroad
- Representative, Fort Wainwright
- Representative, University of Alaska Fairbanks
- Representative, Tanana Chiefs Conference
- Representative, Freight Carriers

Voting rights are restricted to members as indicated above, or their representatives.

Air Quality Goals and Objectives

Critical elements of Fairbanks' air quality plan are the goals and objectives. The goals and objectives provide not only the basis on which the plan is developed, but also direction for future policy decisions that may affect local air quality. The development of the goals and objectives must reflect the intent of the CAA. They also need to reflect the values, views, and desires of Fairbanks' citizens and elected officials.

The goals and objectives need to integrate land use, air quality, and transportation planning concerns to provide meaningful future air quality benefits for Fairbanks' citizens. For this reason, the goals and objectives contained in this plan are also designed to complement the goals and objectives of the three-year spending plan incorporated into the 2004-2006 Statewide Transportation Improvement Program (STIP).[1]

The following goals and objectives are included in the plan.

Primary Goals and Objectives

Primary goals and objectives are defined as those related to the attainment and maintenance of NAAQS throughout the Borough. Primary goals include the following:

1. Continued maintenance of attainment within the entire Fairbanks North Star Borough after September 27, 2004.

2. Prevention of any significant deterioration of air quality within the portions of the Fairbanks North Star Borough that are designated as attainment.

Primary objectives are as follows:

1. Development and implementation of long-term control measures that will lead to continued attainment of the NAAQS for CO in Fairbanks beyond September 27, 2004.

Community Goals and Objectives

In addition to the primary goals, there are community goals that must be considered and striven for during development and implementation of the air quality plan. These goals include the following:

1. Protecting the health of all FNSB citizens from the harmful effects of elevated ambient concentrations of CO.

2. Establishing an effective public information and comment program to ensure that FNSB citizens have the opportunity to take an active role in the development of the plan.

3. Minimizing the negative regulatory and economic impact of air pollution control measures on FNSB citizens and businesses.

4. Supporting the maintenance of an efficient local transportation system that accommodates public needs, has a variety of transportation modes, and aids in the achievement of the goals and objectives of the air quality plan.

In order to address the community goals listed above, the following efforts were undertaken to support the development of the air quality plan.

1. A qualitative assessment of additional community benefits that would result from each control measure.

2. A qualitative assessment of how each control measure would integrate with other potential control measures, and with local transportation plans and comprehensive development plans.

3. An active outreach program to ensure that local citizens are provided with information on how the plan was developed, what control measures are contained in the plan, and how the measures will affect them. The outreach program also ensured that citizens had the opportunity to provide comments on the plan prior to its submittal to the Borough Assembly for approval.

Plan Development

A serious reexamination of the benefits of the I/M Program started in 2003 when a local ballot was introduced to repeal the program. While the ballot failed by a vote of 3,423 to 7,774 in 2004, it stimulated the Assembly to investigate options to reduce the I/M Program burden on the community. A committee was formed and among its recommendations were:

- Exclude new cars from the program for the first four years;
- Eliminate under-hood visual inspections for 1996+ vehicles;
- Eliminate functional inspections for 1996+ vehicles; and
- Prepare End of Program annual reports for the Assembly.

The first three recommendations were the subject of a previous Maintenance Plan revision and were implemented in 2006. Work on evaluating the feasibility of ending the I/M Program also began in earnest in 2006. That effort involved extensive discussions among the State, the Borough and EPA Region 10 staff on:

- Modeling requirements needed to demonstrate CO attainment without the I/M Program;
- The need to address Section 110(l) requirements governing a demonstration that loss of the I/M Program would not interefere with either the attainment or reasonable further progress towards attainment of any of the ambient air quality standards;
- The need to ensure loss of I/M revenues will not adversely affect CO monitoring requirements; and
- Requirements governing the transition of the I/M Program from an active control measure to a contingency control measure.

As a result of these consultations, Alaska Department of Environmental Conservation (ADEC) and FNSB staff began briefing FMATS, the Assembly, and the Borough Mayor on air quality issues and the need for plan revisions. These briefings included an explanation of the above requirements and the effort that would be required to prepare the maintenance plan needed to approve the termination of the I/M Program.

Borough staff then worked with ADEC and EPA Region 10 staff to update the statistical methodology used to determine whether the I/M Program was needed to demonstrate long-term maintenance with the ambient CO standard. While the results of that effort convinced Borough staff that it would be feasible to drop the I/M Program, it also convinced them it would be necessary to continue to implement other previously commited measures, including:

- A program to replace oxygen sensors in older vehicles;
- An ordinance that bans non-essential wood burning on days when air quality alerts are called;
- An ordinance requiring businesses to supply power to electrical outlets to facilitate the use of block heaters during the winter;
- The continuation of programs to encourage expansion of employee parking spaces equipped with electrical outlets to facilitate the use of block heaters;
- Coordination with ADEC to expand public awareness campaigns to encourage the use of plug-ins and incentives to boost transit ridership.

Several presentations on the results of the analysis and Maintenance Plan revisions were provided to FMATS, the Borough Assembly, and the Borough Mayor.

Public Participation Process

Section 110(a) of the CAA requires that a state provide reasonable notice and public hearings of SIP revisions prior to their adoption and submission to EPA. To ensure that the public had adequate opportunity to comment on the revisions to the Fairbanks air quality attainment plan, a three-phase process for ensuring public involvement was used. First, briefings were held with FMATS members during the Policy and Technical Committees' regularly scheduled meetings, and input was solicited regarding the suggested content of the plan. All FMATS meetings are public meetings and advertised in the local daily newspaper. Local citizens are invited to attend and participate in discussions during the meetings. Staff thus attempted to involve local residents well in advance of actual plan development, to ensure that public input was incorporated into the air quality planning process in a timely manner.

The second opportunity for public participation in the air quality planning process occurs at the FNSB Assembly level, during public testimony on air quality regulatory changes (i.e., revisions to the I/M program). By allowing public testimony prior to Assembly debate, this process ensures that citizens have a chance to comment directly to locally elected officials prior to their consideration of regulatory changes. A similar process was available to the public to comment on changes incorporated into this plan.

The final opportunity for public involvement occurs at the state administrative level. Prior to regulatory adoption of these SIP revisions, ADEC held a public comment period on the revisions from November 21, 2007 through January 7, 2008 including a public hearing in Fairbanks on January 3, 2008. This provided another forum for the public to comment on the air quality plan prior to its adoption at the state level and submission to EPA.

Fairbanks North Star Borough Organization and Authority

The Borough has operated a local air pollution control program since 1972, first through its Environmental Services Division/Department and now through the Department of Transportation. Much of the FNSB's early efforts were concerned with establishing an ambient air monitoring network and enforcing its regulations concerning open burning, visible emissions, and dust control. FNSB air quality efforts have become increasingly centered on air quality planning and finding ways to reduce ambient carbon monoxide (CO) concentrations. The Borough has relied on ADEC to control large stationary emission sources within the FNSB.

The legal authority for establishing local air pollution control programs is found in Alaska Statutes 46.14.400, Local Air Pollution Control Programs (see Appendix to Section II) The FNSB air pollution control regulations, Code of Ordinances Chapter 8.04, cover open burning, visible emissions from stationary sources, and alert procedures. A copy of these regulations may be found in Appendix III.C.9. These regulations have not undergone any major revisions in the past several years, with the exception of an update to the alert program which is discussed in section III.C.8.

In 1984, the FNSB Assembly adopted Ordinance No. 84-24, implementing a motor vehicle emissions inspection and maintenance (I/M) program, beginning July 1, 1985. A copy of the ordinance is included in Appendix III.C.1. Currently, both the I/M and air pollution control programs are administered by the FNSB Department of Transportation.

the ambient standard). Implementation of these measures is expected to provide additional benefits not included in the above attainment projections.

Collectively, these considerations, combined with the confidence levels displayed in Figure III.C.6-3, demonstrate short-term maintenance and a high probability of continued long-term maintenance of the CO NAAQS.

Impact of Removing I/M Program on Other Criteria Pollutants

Section 110(l) of the Clean Air Act states:

> *Each revision to an implementation plan submitted by a State under this Act shall be adopted by such State after reasonable notice and public hearing. The Administrator shall not approve a revision to a plan if the revision would interfere with any applicable requirement concerning attainment and reasonable further progress (as defined in section 171), or any other applicable requirement of this Act.*

Since the body of the Plan includes a demonstration of the effect of dropping the I/M Program on projected carbon monoxide (CO) emissions and the probability of attaining the ambient CO standard through 2015, the focus of this section is on other criteria pollutants. A review of EPA's Green Book* shows that, with the exception of CO, Fairbanks has not been classified as nonattainment for any of the criteria pollutants, including:

- 1-hour ozone;
- 8-hour ozone;
- $PM_{2.5}$;
- PM_{10};
- Sulfur Dioxide;
- Nitrogen Dioxide; and
- Lead.

With regard to regional transport, Section 110(a)(2)(D)(i) requires Alaska to demonstrate in its State Implementation Plan (SIP) that it has adequate provisions prohibiting

> *…any source or other type of emissions activity within the State from emitting any air pollutant in amounts which will -*
>
> 1. *contribute significantly to nonattainment in, or interfere with maintenance by, any other State with respect to any such national primary or secondary ambient air quality standard, or*
>
> 2. *interfere with measures required to be included in the applicable implementation plan for any other State… to prevent deterioration of air quality or visibility…*

* *http://www.epa.gov/oar/oaqps/greenbk/index.html*

Alaska meets these requirements for the following reasons:

1. It does not contribute to other states' NAAQS pollutants (its southern border is 500 miles north of lower 48-states and it is not subject to the "Rule to Reduce Interstate Transport of Fine Particulate Matter and Ozone").

2. It has a fully approved PSD/NSR program and is working to incorporate Phase II ozone requirements for PSD/NSR into the SIP.

3. It is working with the Western Regional Air Partnership to prepare a SIP addressing EPA's Regional Haze regulation and those submittals are due no later than December 17, 2007.

Despite these findings, a review of EPA's Air Quality System (AQS) database* shows that the particulate matter < 2.5 microns in diameter ($PM_{2.5}$) is an emerging concern to Fairbanks.

In a recent rulemaking† with an effective date of December 18, 2006, EPA revised the level of the 24-hour $PM_{2.5}$ standard from 65 to 35 $\mu g/m^3$. A review of monitoring data collected in Fairbanks in recent years shows summer values are generally low, approximately 7 $\mu g/m^3$ (24-hour average), except when smoke from wildfires is transported into the downtown area (i.e., the location of the Borough's $PM_{2.5}$ monitor). When this occurs, concentrations can become quite high (many multiples of the recently adopted 35 $\mu g/m^3$ standard). Concentrations resulting from these conditions, however, can qualify as exceptional events. Winter values average approximately 23 $\mu g/m^3$ (24-hour average), but episodically can exceed 50–60 $\mu g/m^3$.

The entire state of Alaska is currently classified as in attainment of the $PM_{2.5}$ standard; however, barring a substantial change in wintertime concentrations, it is likely the State will recommend to EPA that Fairbanks be designated nonattainment of the revised 24-hour $PM_{2.5}$ standard in 2008/2009. In light of this situation and the Borough's objective of eliminating the I/M Program, it is important to examine the contribution of motor vehicles to directly emitted $PM_{2.5}$ and precursor emissions under current and future conditions.

Analysis

The most current estimate of source contributions to particulate emissions in Fairbanks is in an emission inventory of criteria and visibility related pollutants prepared for regional haze planning. Seasonal estimates were prepared for the summer (April to September) and winter (October to March) for Anchorage, Fairbanks, and Juneau for the years 2002, 2005, and 2018.‡ Those estimates addressed on-road, nonroad, and area source emissions. A separate

* *http://epa.gov/air/data/monvals.html?st~AK~Alaska*

† Federal Register / Vol. 71, No. 200 / Tuesday, October 17, 2006, National Ambient Air Quality Standards for Particulate Matter, Final Rule.

‡ Criteria Pollutant Inventory for Anchorage, Fairbanks, and Juneau in 2002, 2005, and 2018, Draft Report,

estimate of point source emissions was provided by ADEC for calendar year 2002.* These estimates are based on quarterly or monthly production and process information provided in required facility operating reports to ADEC. A forecast of point source emissions in 2005 was developed by adjusting the 2002 estimates for population growth experienced between 2002 and 2005 (i.e., 3.4% according to the Alaska Department of Labor). Table III.C.6-5 summarizes each source's contribution to the 2005 winter inventory for nitrogen oxide (NOx), sulfur oxide (SOx), ammonia (NH_3), and PM emissions.

Table III.C.6-5
Fairbanks North Star Borough Emissions by Source Category
Winter - 2005
(tons per day)

Source Category	NOx	SOx	NH_3	PM_{10}	$PM_{2.5}$
On-Road	5.66	0.29	0.15	0.17	0.13
Nonroad	0.52	0.06	0.00	0.15	0.14
Area	1.07	2.51	0.00	0.88	0.88
Point	21.20	14.75	0.06	8.10	0.20
Total	28.45	17.61	0.21	9.30	1.35

The values presented in Table III.C.6-5 cover the entire Borough, which is substantially larger than the CO nonattainment area. To provide a perspective on how the CO nonattainment area compares with the overall Borough, Table III.C.6-6 compares square miles and population and travel values for calendar year 2000 for areas located within the Borough. It shows the urban area, which represents the CO nonattainment area, has the largest share of population and travel, and the smallest area in the Borough (i.e., the highest population density). In contrast, the FMATS outlying area has the smallest share of population and travel, the largest area and the lowest population density. What is not currently clear is whether the area within which elevated $PM_{2.5}$ concentrations occur is located entirely within the urban area or includes portions of the FMATS areas.

Table III.C.6-6
Distribution of Population, Travel, and Land Area Within
Fairbanks North Star Borough
(Calendar Year 2000)

Area	Population	Travel (vehicle miles traveled)	Land Area (square miles)
Urban Area	39,231	743,083	45
FMATS Area	36,256	556,609	135
FMATS Outlying Area	7,353	265,073	7,270
Total	82,840	1,563,634	7,450

Prepared for Alaska Department of Environmental Conservation by Sierra Research, February 2, 2007.

* Those values were computed using current AP-42 emission factors and quarterly or monthly production and process information provided to ADEC in facility operating reports.

Since the spatial extent of the area being impacted by elevated $PM_{2.5}$ concentrations is currently unknown, insight into the source category contributions to directly emitted $PM_{2.5}$ and related precursor emissions can be gained through a review of the Borough-wide inventory. Outlined below are several points that should be considered when reviewing the contents of Table III.C.6-5.

- On-road motor vehicle estimates reflect the benefits of the I/M Program, which will not be eliminated before 2010.

- Both on-road and nonroad estimates are not temperature corrected. Neither MOBILE6 nor the NONROAD model includes a temperature correction factor for $PM_{2.5}$ or PM_{10} emissions. Data collected in Fairbanks* and by EPA in Kansas City and in RTP testing† indicate PM emissions increase as temperature decreases.

- The area source PM_{10} and $PM_{2.5}$ emission estimates include fugitive dust emissions. Fugitive dust is substantially diminished when roads are covered with snow and ice.

In light of the above comments, motor vehicles' share of the PM emissions will be larger than the values displayed in Table III.C.6-5. Those estimates, however, suggest that motor vehicles are a relatively minor source of directly emitted $PM_{2.5}$ and a relatively minor source of secondary sulfate $PM_{2.5}$.

Insight into how motor vehicles' precursor and directly emitted $PM_{2.5}$ emissions change over time with and without the I/M Program is needed to determine if eliminating the I/M Program will adversely affect reasonable further progress or attainment of the ambient $PM_{2.5}$ standard. To provide this insight, estimates of motor vehicle emissions within the CO nonattainment area (which is a subset of the Borough-wide estimates presented in Table III.C.6-5) were prepared. They were computed using emission estimates produced by the MOBILE6.2 settings and activity data used to prepare the CO inventory estimates presented in the Plan update. Estimates were prepared for directly emitted $PM_{2.5}$, hydrocarbon (HC), NOx, SOx, and NH_3 emissions, and are presented in Table III.C.6-7.

With the exception of ammonia, emissions of all pollutants are projected to decline substantially between 2005 and 2015. Directly emitted $PM_{2.5}$ levels are projected to decline by 66% and are shown by MOBILE6.2 to be unaffected by I/M. Hydrocarbon levels are projected to decline by 51% with I/M and by 39% without I/M. NOx levels are projected to decline by 63% with I/M and by 59% without I/M. SOx levels are projected to almost disappear after 2005 because of the recent compliance with low sulfur gasoline and Diesel fuel standards in urban Alaska. Ammonia is the only pollutant that is projected to increase,

* Effect of Ambient Temperature and E-10 Fuel on Particulate Matter Emissions from Light-Duty Vehicles, Mulawa, Cadle, et al.

† Particulate Matter Exhaust Emissions from Light-Duty Gasoline Vehicles in Kansas City, Ed Nam, et al., U.S. EPA, Office of Transportation and Air Quality, 17th CRC On-Road Vehicle Emissions Workshop, March 2007.

albeit at a very low level. This is because emission rates for ammonia predicted by MOBILE6.2 are relatively stable over time and therefore increase in proportion to VMT growth in the community, which is low. Both SOx and NH_3 emissions are shown by MOBILE6.2 to be unaffected by I/M.

Table III.C.6-7
Forecast of Fairbanks CO Nonattainment Area
Winter Motor Vehicle Emissions With and Without the I/M Program
(tons/day)

Pollutant	Scenario	2005	2010	2015
$PM_{2.5}$	I/M	0.06	0.03	0.02
	No I/M in 2010	0.06	0.03	0.02
	Difference	-	-	-
HC	I/M	1.44	0.99	0.71
	No I/M in 2010	1.44	1.16	0.88
	Difference	-	17.2%	23.9%
NOx	I/M	2.57	1.69	0.94
	No I/M in 2010	2.57	1.79	1.06
	Difference	-	5.9%	12.8%
Sox	I/M	0.13	0.01	0.01
	No I/M in 2010	0.13	0.01	0.01
	Difference	-	-	-
NH_3	I/M	0.08	0.09	0.09
	No I/M in 2010	0.08	0.09	0.09
	Difference	-	-	-

It is important to note that just because MOBILE shows that I/M has no effect on certain pollutants does not mean those pollutants are unaffected by I/M. Instead it means that MOBILE does not account for the effect of I/M on these pollutants. Given this perspective, it is useful to review potential I/M impacts on each of the pollutants modeled to have no effect.

With regard to directly emitted $PM_{2.5}$ emissions, several points need to be considered:

1. As previously noted, the levels computed by MOBILE are not corrected for temperature. Therefore, the values produced are for federal test procedure conditions (i.e., 68º–86º F) and will increase as temperature decreases.

2. Particulate emissions from gasoline-powered vehicles are correlated with HC emissions. This is because many of the same factors that contribute to increased HC emissions (e.g., over-fueling, component wear, fuel properties, lubricating oil, etc.) also contribute to increased PM emissions.*

* Particulate Matter Exhaust Emissions from Light-Duty Gasoline Vehicles in Kansas City, Ed Nam, et al.,

3. The recent mobile source air toxics (MSAT) rule* concluded that controls on cold temperature hydrocarbon emissions would also reduce PM emissions. Data analysis presented in the rule showed there is a "clear, linear association" between bag 1 (the cold start portion of federal test procedure) PM and non-methane hydrocarbon (NMHC) emissions as temperature decreases. As a result, the rule concluded that PM reductions would be directly proportional to the estimated reductions in NMHC emissions. For Alaska, the rulemaking estimated that at 20º F, NMHC emissions from light-duty vehicles and trucks would be reduced by 46% in 2030. Since the benefits of this rule are not incorporated into MOBILE, it will produce reductions in cold temperature HC and $PM_{2.5}$ emissions that will offset increases due to the elimination of the I/M program. The phase-in schedule for the program shows that, on a nationwide basis, the program will produce a 5.1% reduction in 20º F, NMHC emissions from light-duty vehicles and trucks in 2010; a 12.9% reduction in 2015; a 20.9% reduction in 2020; and a 30.1% reduction in 2030. Assuming a proportional relationship between the Alaska and nationwide values in 2030 (46%/30.1%), this means that NMHC and PM emissions in Alaska will be reduced by 7.8% in 2010, 19.7% in 2015, and 31.9% in 2020. While these estimates are not specific to Fairbanks, they will help offset any loss in $PM_{2.5}$ control that results from elimination of the I/M Program.

SOx emissions are directly proportional to the sulfur content of the fuel. While MOBILE6 does not have a temperature adjustment for SOx, it is reasonable to assume that SOx emissions would increase in proportion to fuel consumption, which does increase as temperature declines. However, since Alaska urban areas now use low sulfur gasoline and Diesel fuels, the issue is moot since there is very little sulfur left in the fuel to produce sulfate emissions. There are no data to suggest that I/M has a significant impact on the level of sulfate being emitted from gasoline-powered vehicles.

NH_3 is important because it can react in the atmosphere to form both ammonium sulfate and ammonium nitrate, which contribute to $PM_{2.5}$. A number of studies have shown that NH_3 is primarily formed due to reactions on the catalyst (i.e., after catalyst light-off has occurred).†,‡,§ This has led to speculation that improved catalyst performance might result in an increase in ammonia emissions from on-road vehicles.** Thus, to the extent that I/M programs improve catalyst performance, it is possible they could have a negative influence

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U.S. EPA, Office of Transportation and Air Quality, 17th CRC On-Road Vehicle Emissions Workshop, March 2007.

* Regulatory Impact Analysis, Control of Hazardous Air Pollutants from Mobile Sources, EPA420-R-07-002, U.S. EPA, February 2007.

† Investigation of the Formation of NH_3 Emissions as a Function of Vehicle Load and Operating Condition, Huai, et al., Bourns College of Engineering, Center for Environmental Research and Technology (CE-CERT).

‡ Fraser, M.P., and G.R. Cass, Detection of excess ammonia emissions from in-use vehicles and the implications for fine particle control, Environmental Science and Technology, 32, 1053-1057, 1998.

§ Kean, A.J., R.A. Harley, R.F. Sawyer, D. Littlejohn, D. Zucker, and G.R. Kendall, On-road measurement of ammonia and other motor vehicle exhaust emissions, presented at the 10th CRC On-Road Vehicle Emissions Workshop, San Diego, California, March 27-29, 2000.

** Atmospheric Ammonia: Sources and Fate, A Review of Ongoing Federal Research and Future Needs, NOAA Aeronomy Laboratory, June 2000.

on the level of NH_3 emitted. In light of this finding, the elimination of the I/M program is unlikely to lead to an increase in gaseous NH_3 emissions and subsequent $PM_{2.5}$ production in the atmosphere.

Conclusions

In summary, the preceding analysis has shown that the only criteria pollutant of concern with regard to a Section 110(l) demonstration is $PM_{2.5}$. A forecast of motor vehicle pollutant emissions over time shows that with the exception of ammonia, all pollutants will decline substantially between 2005 and 2015.

The elimination of the I/M program will, however, diminish the reduction in HC and NOx emissions forecast to occur between 2010 and 2015. Since both are precursors to $PM_{2.5}$, it is important to consider whether these increases will cause a delay in attainment. A review of the forecasts in Table III.C.6-7 shows that the increases are projected to be quite small and range between 0.10 and 0.17 tons/day for each pollutant and year (and represent less than 1% of the forecasted inventory for each pollutant). An analysis of speciated monitoring data collected in Fairbanks showed that nitrates have limited correlation with $PM_{2.5}$ and contribute little to the overall mass. The conversion of HC emissions to secondary particulate is complex and governed by many factors, including specie volatility, temperature, water content, sunlight, etc. Although most, if not all, of the gaseous HC emissions from motor vehicles will be converted to $PM_{2.5}$ during cold, wintertime inversions, current modeling and measurement techniques are unable to determine the proportion of $PM_{2.5}$ that results from motor vehicles. While it is not currently possible to accurately assess the impact of higher HC emissions on $PM_{2.5}$ attainment, the impact should be small.

Several weaknesses in current emission factor estimates were identified that suggest that directly emitted $PM_{2.5}$ emissions are under-represented at lower temperatures. Recent EPA analysis, however, documents that cold temperature controls implemented as part of the MSAT rule will produce substantial HC and $PM_{2.5}$ emission reductions at lower temperatures and will help offset increases associated with the elimination of the I/M Program. I/M is shown to have a negligible impact on SOx emissions, which are being emitted at trace levels due to recent compliance with low sulfur gasoline and Diesel fuel rules. NH_3 emissions are projected to increase slightly over time. Since I/M has the potential to increase NH_3 emissions, loss of the program is unlikely to increase the level emitted.

Overall, the analysis shows that the impact of I/M on directly emitted $PM_{2.5}$ emissions is poorly understood. The available data and analysis indicate that any increases due to the elimination of the I/M program may be offset by the MSAT rule, whose phase-in begins in 2010 (the year the I/M Program is terminated). The available data show that loss of the I/M program will not adversely impact precursor emissions. Therefore, elimination of the I/M Program will not interfere with either the attainment or reasonable further progress towards attainment of the ambient $PM_{2.5}$ standard in Fairbanks.