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

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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.

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III.C.2. Nonattainment Boundaries

The Fairbanks North Star Borough is located in the central portion of the state of Alaska. With a 2006 population of approximately 86,754 people, it is the second largest community in the state. Much of the Borough's population is concentrated in the urban area in and around the city of Fairbanks. A less densely urbanized area extends along the Richardson Highway corridor through the city of North Pole to the southeast. The Borough also contains other smaller outlying residential areas (i.e., Ester, Fox, etc.) as well as two military bases (Fort Wainwright and Eielson Air Force Base).

The extremely cold wintertime temperatures and thermal inversions common to the Fairbanks area result in the trapping of elevated levels of CO emissions from combustion sources in the urban area. In particular, emissions from motor vehicles have been shown to account for roughly 75% of current wintertime CO emissions,[2] due to high levels of motor vehicle travel in the community and the magnitude of CO emitted under "cold-start" conditions. These cold-start emissions have been discussed in detail in numerous technical reports, as well as in Fairbanks' prior SIP submittals. There is widespread agreement among the air quality technical community on the causes of these emissions and their impacts on CO levels in a majority of the nation's CO nonattainment areas. Given this perspective, no detailed information on this subject is presented in the current plan.

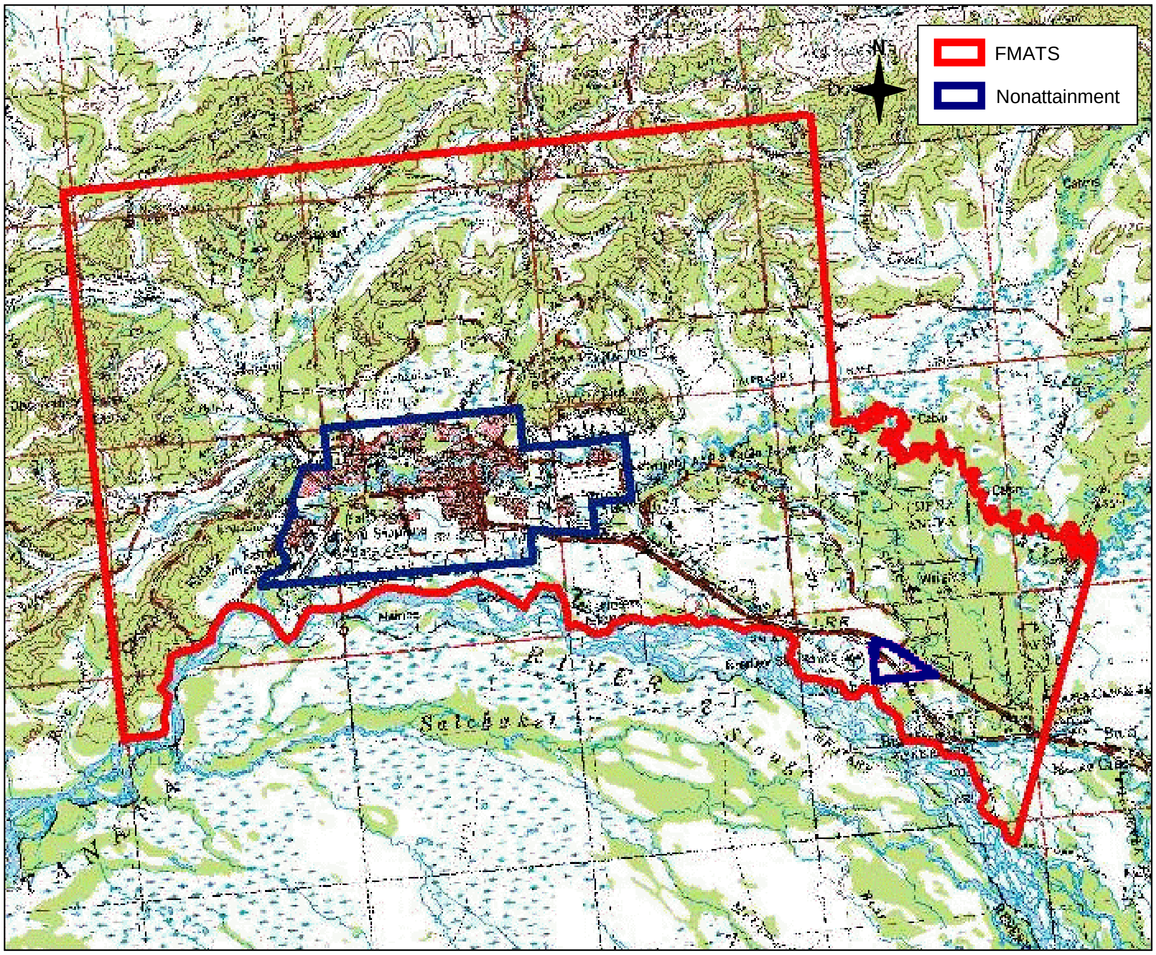
As previously indicated, ambient air quality monitoring conducted in Fairbanks since the early 1970s has resulted in a portion of the Borough being designated as nonattainment for CO. Figure III.C.2-1 shows the current boundaries of the Fairbanks nonattainment area as well as the FMATS planning area. This nonattainment area is primarily centered around the Fairbanks urban area. The city of North Pole is included in a smaller sub-area located on the lower right corner of the figure, based on CO violations of the NAAQS recorded in the area during the late 1970s. The formal boundaries of the Fairbanks nonattainment area are described as follows:

1. The Fairbanks/Fort Wainwright sub-area includes (a) Township 1 South, Range 1 West, Sections 2 through 23, the portion of Section 1 west of the Fort Wainwright military reservation boundary, and the portions of Section 24 north of the Old Richardson Highway and west of the military reservation boundary; (b) Township 1 South, Range 2 West, Sections 13 and 24, the portion of Section 12 southwest of Chena Pump Road, and the portions of Sections 14 and 23 southeast of the Chena River; and (c) Township 1 South, Range 1 East, Sections 7, 8, and 18, and the portions of Section 19 north of the Richardson Highway.

2. The North Pole sub-area includes Township 2 South, Range 2 East, and the portions of Section 9 and 10 southwest of the Richardson Highway.

The same boundaries define the maintenance area.

Figure III.C.2-1
FMATS & Nonattainment Area Boundaries



III.C.3. Air Quality Emission Data

Section 187 of the CAA requires three types of emission inventories for all moderate CO nonattainment areas. The three types of inventories are base year inventories, periodic inventories, and modeling inventories. In accordance with these requirements, previous plans included a series of nonattainment inventories for Fairbanks (1) 1990 base year inventory, (2) 1993 periodic inventory, (3) 1995 and 2000 projected year inventories, (4) 1996 periodic inventory, (5) 1995-2001 base year inventory and projections, and (6) 2002-2015 base year inventory and projections.[*]

Section 175A of the CAA defines the general required framework of a maintenance plan. Specifically, it requires that the plan provide for maintenance of the relevant NAAQS for at least 10 years after redesignation. These provisions have been further clarified through the release of subsequent EPA guidance.[3] This guidance includes a requirement that an attainment emissions inventory be included in the maintenance plan to identify the level of emissions in the area which is sufficient to attain the NAAQS. According to the guidance:

> *This inventory should be consistent with EPA's most recent guidance on emission inventories for nonattainment areas available at the time and include the emissions during the time period associated with the monitoring data showing attainment.*

The guidance goes on to indicate that for carbon monoxide (CO) nonattainment areas, the inventory should be based on actual "typical CO season day" emissions for the attainment year. Based on extensive consultation among the Borough, ADEC and EPA Region 10 staff, calendar year 2005 was selected as the most appropriate base year for the attainment inventory.[**] An emissions inventory was subsequently developed for this year and is included in Appendix III.C.3. Additional yearly modeling inventories up through 2015 were also developed to demonstrate continued maintenance of the NAAQS through the required 10-year timeframe after redesignation.

As discussed in Section III.C.2, the Fairbanks CO nonattainment area consists of the urban portion of the FNSB. Accordingly, the attainment and modeling inventories are all focused on this specific area. Unlike earlier Fairbanks CO nonattainment inventories, emissions originating in the remainder of FNSB are not included in the attainment or modeling inventories. The inventories were prepared based on EPA guidance. Detailed estimates of emissions were prepared for on-road mobile sources, non-road mobile sources, area sources, and point sources. The on-road mobile source portion of each inventory was prepared using the final version of EPA's mobile source emission model, MOBILE6 (version 6.2.03, dated September 24, 2003), which includes revisions to reflect the CO benefits of emission control technologies introduced to meet Tier II emission standards. MOBILE6 input parameters also reflect the current design elements of the Fairbanks I/M program.

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[*] A Sierra Research memorandum dated October 25, 2007 comparing the current 2005-2015 base year emission inventory to the 2002-2015 base year inventory is included in Appendix III.C.3

[**] The term "attainment inventory" is used to be consistent with that contained in the referenced EPA guidance memorandum. It refers to the emissions inventory that is to be included in the maintenance plan identifying the level of emissions in Fairbanks sufficient to attain the CO NAAQS.

2005 Base Year Inventory

The 2005 inventory prepared for the Fairbanks nonattainment area provides estimates of daily emissions calculated for a typical winter weekday during calendar year 2005. A copy of this emission inventory is included in Appendix III.C.3. Total CO emissions are estimated to be 34.31 tons per day (tpd) prior to the implementation of additional local control measures, which are addressed separately below. Roadway emissions produce the bulk (25.29 tpd or 74%) of the total CO emitted per day in the nonattainment area, based on a travel estimate of 816,616 vehicle miles traveled (VMT) per winter weekday provided by the ADOT&PF.[4] In addition, point sources (primarily power plants) account for about 9%, residential wood combustion for about 8%, aircraft operations for about 4%, airport ground support equipment for about 3%, and locomotives for about 1% of total daily CO emissions. Emissions from all other sources are under 1% for any single source type.

Base 2006-2015 Modeling Inventories

The base 2006-2015 modeling inventories account for the elimination of the inspection and maintenance (I/M) program after 2009. This results in a slight increase in on-road mobile emissions as the analysis assumes no residual benefits remain after the program is ended.

The base modeling inventories decline between 2005 and 2009, and increase slightly starting in 2010 due to the loss of the emission benefits from the I/M program. However, the inventories show a steady decline between 2010 and 2015.

Overall, base emissions (i.e., those that do not account for the implementation of additional local control measures) are projected to decline by 4.84 tpd (14%) between the 2005 attainment year and the 2015 horizon planning year. This is caused by a 24% reduction in on-road emissions (from 25.29 tpd to 19.18 tpd) during this timeframe. The substantial decrease in on-road emissions overwhelms the increase in emissions from other sources (19% for nonroad, 12% for area and 12% for point) estimated for the same period of time due to increases in activity among these latter categories. The primary driver in lower on-road emissions is a sustained reduction in average in-use emission rates, as newer, cleaner vehicles continue to replace older, higher emitting vehicles.

Table III.C.3-1 summarizes both the 2005 attainment inventory and the base 2006-2015 modeling inventories for the Fairbanks nonattainment area.

Additional 2005-2015 Reductions

Additional CO emissions reductions beyond those incorporated into the base 2005-2015 modeling inventories shown in Table III.C.3-1 are also projected to occur due to the implementation of additional local control measures. These measures, which are described in detail in Section III.C.5, include the following:

- Episodic woodstove burning ban;
- Oxygen sensor replacement program;
- OBD-I/M inspections of heavy-duty gas vehicles (HDGVs) until 2009; and
- Other measures (e.g., transit).

Table III.C.3-1
Base Fairbanks CO Emissions Inventory: Nonattainment Area Totals by Year

	CO (tpd)					
Nonroad Sources	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Agricultural Equipment	-	-	-	-	-	-
Aircraft Total	1.32	1.38	1.44	1.46	1.47	1.49
Airport Ground Support Equipment Total	1.05	1.10	1.13	1.15	1.18	1.20
Commercial Equipment Total	-	-	-	-	-	-
Construction and Mining Equipment Total	-	-	-	-	-	-
Industrial Equipment Total	-	-	-	-	-	-
Lawn and Garden Equipment Total	0.02	0.02	0.02	0.02	0.02	0.02
Logging Equipment Total	0.07	0.07	0.07	0.08	0.08	0.08
Pleasure Craft Total	-	-	-	-	-	-
Railroad Operations (Locomotives)	0.44	0.45	0.45	0.45	0.46	0.46
Railroad Equipment Total*	0.00	0.00	0.00	0.00	0.00	0.00
Recreational Equipment Total	0.14	0.14	0.14	0.14	0.14	0.15
Underground Mining Equipment Total	-	-	-	-	-	-
TOTAL Nonroad Sources	**3.04**	**3.16**	**3.26**	**3.30**	**3.35**	**3.40**
Area Sources						
Residential Wood Burning	2.57	2.65	2.67	2.69	2.72	2.74
Fuel Oil	0.15	0.15	0.16	0.16	0.16	0.16
Propane	0.002	0.002	0.002	0.002	0.002	0.002
Coal	0.003	0.003	0.003	0.003	0.003	0.003
Natural Gas	0.09	0.09	0.09	0.09	0.10	0.10
Structural Fires	0.08	0.08	0.08	0.08	0.08	0.09
TOTAL Area Sources	**2.89**	**2.98**	**3.01**	**3.03**	**3.06**	**3.09**
Point Sources						
MAPCO (Williams/Flint Hills)	0.08	0.08	0.08	0.08	0.08	0.08
Eielson	0.00	0.00	0.00	0.00	0.00	0.00
Fort Wainwright	1.45	1.50	1.51	1.52	1.54	1.55
GVEA/North Pole	0.03	0.03	0.03	0.03	0.03	0.03
Alaska RR Heating Plant	0.01	0.01	0.01	0.01	0.01	0.01
University of Alaska-Fairbanks	0.50	0.51	0.52	0.52	0.53	0.53
Petro - Star	0.003	0.003	0.003	0.003	0.003	0.003
Fairbanks MUS (Aurora)	1.02	1.05	1.06	1.07	1.08	1.09
Alyeska Pump Station #8	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL Point Sources	**3.08**	**3.18**	**3.21**	**3.23**	**3.26**	**3.29**
On-Road Mobile Sources						
Initial Idle Emissions	7.45	6.74	6.14	5.92	5.65	5.66
Traveling Emissions	17.83	16.39	15.12	14.36	13.60	15.65
Total On-Road Mobile Sources	**25.29**	**23.13**	**21.26**	**20.28**	**19.25**	**21.31**
GRAND TOTAL	**34.31**	**32.45**	**30.73**	**29.85**	**28.92**	**31.09**

* Does not include emissions from locomotive engines.

Table III.C.3-1 (cont.)

Base Fairbanks CO Emissions Inventory: Nonattainment Area Totals by Year

	CO (tpd)				
Nonroad Sources	**2011**	**2012**	**2013**	**2014**	**2015**
Agricultural Equipment	-	-	-	-	-
Aircraft Total	1.51	1.53	1.54	1.56	1.58
Airport Ground Support Equipment Total	1.22	1.24	1.26	1.28	1.30
Commercial Equipment Total	-	-	-	-	-
Construction and Mining Equipment Total	-	-	-	-	-
Industrial Equipment Total	-	-	-	-	-
Lawn and Garden Equipment Total	0.02	0.02	0.02	0.02	0.02
Logging Equipment Total	0.08	0.08	0.09	0.09	0.09
Pleasure Craft Total	-	-	-	-	-
Railroad Operations (Locomotives)	0.46	0.47	0.47	0.48	0.48
Railroad Equipment Total*	0.00	0.00	0.00	0.00	0.00
Recreational Equipment Total	0.15	0.15	0.15	0.15	0.15
Underground Mining Equipment Total	-	-	-	-	-
TOTAL Nonroad Sources	**3.44**	**3.49**	**3.53**	**3.58**	**3.62**
Area Sources					
Residential Wood Burning	2.76	2.79	2.81	2.84	2.86
Fuel Oil	0.16	0.16	0.16	0.17	0.17
Propane	0.002	0.002	0.002	0.002	0.002
Coal	0.003	0.003	0.003	0.003	0.003
Natural Gas	0.10	0.10	0.10	0.10	0.10
Structural Fires	0.09	0.09	0.09	0.09	0.09
TOTAL Area Sources	**3.11**	**3.14**	**3.17**	**3.20**	**3.23**
Point Sources					
MAPCO (Williams/Flint Hills)	0.08	0.08	0.08	0.08	0.08
Eielson	0.00	0.00	0.00	0.00	0.00
Fort Wainwright	1.56	1.58	1.59	1.61	1.62
GVEA/North Pole	0.03	0.03	0.03	0.03	0.03
Alaska RR Heating Plant	0.01	0.01	0.01	0.01	0.01
University of Alaska-Fairbanks	0.54	0.54	0.55	0.55	0.56
Petro – Star	0.003	0.003	0.003	0.003	0.003
Fairbanks MUS (Aurora)	1.10	1.11	1.12	1.13	1.14
Alyeska Pump Station #8	0.00	0.00	0.00	0.00	0.00
TOTAL Point Sources	**3.32**	**3.35**	**3.38**	**3.41**	**3.44**
On-Road Mobile Sources					
Initial Idle Emissions	5.40	5.28	5.20	5.15	5.07
Traveling Emissions	15.17	14.77	14.51	14.32	14.12
Total On-Road Mobile Sources	**20.56**	**20.05**	**19.71**	**19.47**	**19.18**
GRAND TOTAL	**30.44**	**30.03**	**29.79**	**29.65**	**29.47**
* Does not include emissions from locomotive engines.					

Table III.C.3-2 shows the additional emissions reductions projected for these measures, as well as the adjusted CO emissions totals estimated for each of the inventory years.

Table III.C.3-2
Adjusted Fairbanks CO Emissions Inventory:
Nonattainment Area Totals*

	CO (tpd)					
	2005	2006	2007	2008	2009	2010
Baseline Inventory	**34.31**	**32.45**	**30.73**	**29.85**	**28.92**	**31.09**
Wood Burning Ban	2.31	2.38	2.40	2.42	2.44	2.47
Oxygen Sensor Replacement	0.28	0.50	0.46	0.29	0.13	0.03
HDGV OBD-I/M	0.00	0.01	0.01	0.01	0.01	0.00
Other	0.03	0.03	0.03	0.03	0.03	0.03
Total Reduction	2.62	2.92	2.90	2.75	2.61	2.53
Adjusted Inventory	**31.69**	**29.53**	**27.83**	**27.10**	**26.31**	**28.56**

	CO (tpd)				
	2011	2012	2013	2014	2015
Baseline Inventory	**30.44**	**30.03**	**29.79**	**29.65**	**29.47**
Wood Burning Ban	2.49	2.51	2.53	2.55	2.58
Oxygen Sensor Replacement	0.00	0.00	0.00	0.00	0.00
HDGV OBD-I/M	0.00	0.00	0.00	0.00	0.00
Other	0.03	0.03	0.03	0.03	0.03
Total Reduction	2.52	2.54	2.56	2.58	2.61
Adjusted Inventory	**27.92**	**27.49**	**27.23**	**27.07**	**26.87**

*See the Sierra Research memorandum, "Fairbanks Carbon Monoxide Maintenance Plan Emission Inventory Control Measure Adjustments," dated October 25, 2007, in Appendix III.C.3-2 for emission calculations of control strategy benefits.

The impact of these reductions on the continued proability of attainment in Fairbanks is discussed in Section III.C.8.

Carbon Monoxide Trends

Because vehicle travel is such a large source of CO emissions in the Fairbanks area, it is instructive to review past trends in both population and travel, as well as ambient CO concentrations. A review of historical population and traffic data is presented below.

Population Growth

Fairbanks was established in the early 1900s as a trading post serving gold prospectors in the area. During the first part of the century, the population peaked and waned according to the price and availability of gold. Completion of the Alaska Highway in the 1940s, plus increased military activity in the area due to World War II, combined to cause considerable growth. By 1950, the population of the Fairbanks Census District (an area somewhat larger than the current boundaries of the Fairbanks North Star Borough) had grown to 19,409.

Continued military spending and increased governmental growth resulted in renewed economic activity and growth in population during the 1950s. By 1960, the population of the Fairbanks Census District had risen to 43,412. In the 1960s, military influence in the area leveled off, while increased oil exploration on the North Slope accounted for a 15% increase in population during the decade. The Fairbanks North Star Borough was formed in the mid-1960s. The 1970 Census District population of 50,043 can be compared to a Borough population for the same year of 45,864.

Construction of the Trans-Alaska Oil Pipeline during the 1970s resulted in a large population influx into the area. FNSB population peaked at 72,037 in 1976. With completion of the pipeline, the population fell dramatically to 51,659 in 1981. However, increased state and local governmental spending due to state oil revenues led to a resurgence in local economic activity and another growth spurt in population, resulting in a 1985 FNSB population of 75,079.

Since 1985, population levels in the Fairbanks area have remained relatively unchanged. Increase in military activity due to the addition of a light infantry division to Fort Wainwright acted to offset a reduction in state and local governmental spending due to declining oil revenues. These factors resulted in a 1990 FNSB population of 77,720. According to the Census,[5] the Borough population experienced little change between 1990 and 2000, with an overall growth rate of 0.6% per year. During that same time period, the Census data indicate that the population in the nonattainment area actually declined from 39,858 to 39,231, a reduction of 0.16% per year. The decline in nonattainment area population during the 1990s is displayed in Figure III.C.3-2. It shows that while there was a net reduction in population, the year-to-year change was very modest.

Population forecasts for the 2005-2015 maintenance planning period show an increase of about 3% between 2005 and 2006 then a steady increase of about 1% each year to 2015. The nonattainment area population forecast as projected in the 2025 Fairbanks Metropolitan Area Transportation System (FMATS) Long Range Transportation Plan (LRTP)[6] is shown in Table III.C.3-3. The vehicle travel-specific forecasts for the period are described in more detail below.

Growth in Vehicle Travel

Despite the reduction in population recorded between 1990 and 2000, the nonattainment area still experienced a modest increase in travel during this decade. The increase is based on traffic counts recorded at Highway Performance Monitoring System (HPMS) and other sites located throughout the Borough.[7] Figure III.C.3-2 shows that travel activity, measured by average daily traffic counts, increased from 665,398 miles per day in 1990 to 752,992 miles per day in 2001, a growth rate of 1.1% per year.

Figure III.C.3-2

Trends in Population and Average Daily Traffic for Fairbanks, Alaska (1990-2001)

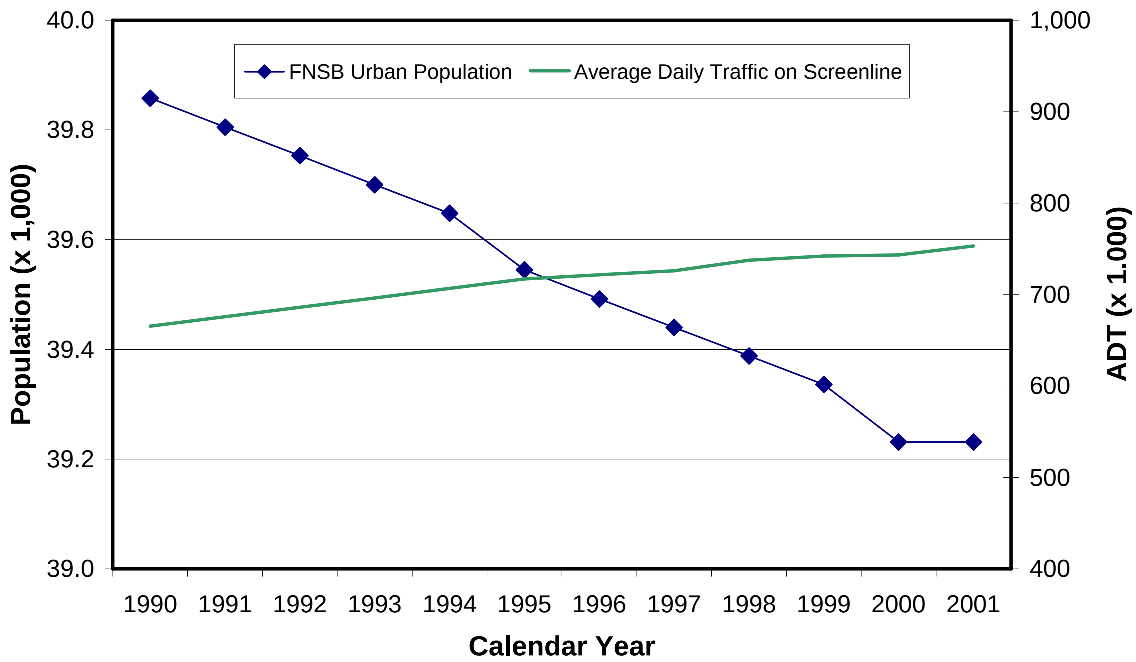


Table III.C.3-3
Projected Fairbanks Nonattainment Area Population

Calendar Year	LRTP Population Forecast
2005	41,183
2006	42,445
2007	42,809
2008	43,178
2009	43,553
2010	43,933
2011	44,320
2012	44,712
2013	45,111
2014	45,516
2015	45,926

From 2002 through 2004, ADOT&PF reported an annual nonattainment area VMT growth rate of 1.2%. Starting in 2005, the projected growth in vehicle travel reported in the previous Maintenance Plan was updated using the VMT projections reported in the FMATS LRTP. The resulting annual VMT projections for the area during the 2005-2015 maintenance planning period are shown in Table III.C.3-4.

Table III.C.3-4
Projected Vehicle Travel in the Fairbanks CO Nonattainment Area
(2005-2015)

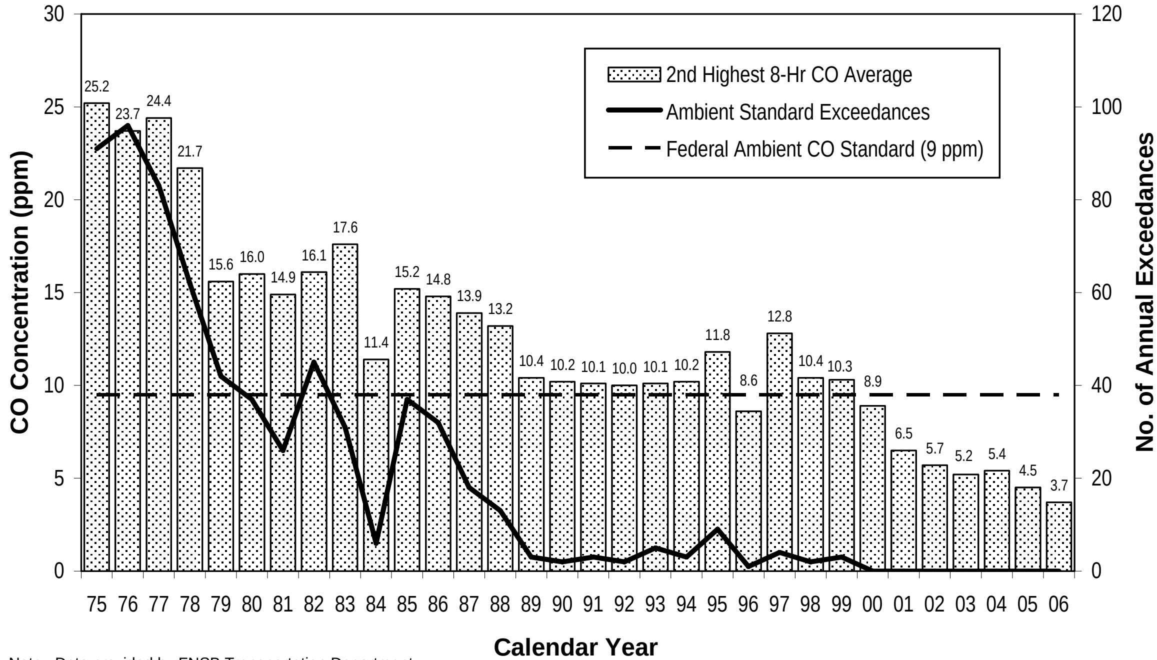
Year	Vehicle Miles Traveled (per winter day)
2005	816,616
2006	862,743
2007	876,029
2008	889,519
2009	903,217
2010	917,126
2011	931,249
2012	945,590
2013	960,151
2014	974,937
2015	989,950

Ambient CO Concentrations

The Fairbanks CO monitoring network is described in detail in Section III.C.4 of this plan. Analysis of ambient CO concentrations measured in Fairbanks during the last 32 years reveals a strong downward trend in both the number of days per year that have exceeded the federal CO standard of 9 parts per million (ppm) and the maximum levels recorded. Figure III.C.3-3 shows that CO exceedance days have dropped from over 140 per year in the early 1970s, to a total of nine in 1995, to zero in 2000. No exceedances have been recorded since 1999 at any of the monitoring sites.

Figure III.C.3-3 also shows the second highest annual eight-hour CO averages recorded during the same period. (The NAAQS for CO is based on the second highest eight-hour concentration for each year, with only one exceedance of the 9 ppm standard allowed annually.) The second-high concentrations, which determine whether a violation of standard occurs, also experienced a steady decline over the last 32 years. This decline has been even more pronounced in recent years. Following the figure, Table III.C.3-4 shows the second-high CO concentrations that have been recorded at each of the monitors since the last violation, which occurred in 1999. These monitoring results show that concentrations have steadily declined each year and no violations of the CO standard have been recorded, and that the area continues to attain the CO NAAQS.

Figure III.C.3-3
Trends in Ambient Carbon Monoxide Concentrations in Fairbanks, Alaska (1975-2006)



Note: Data provided by FNSB Transportation Department.

Table III.C.3-4
Second High-8-Hour CO Concentrations Recorded in Fairbanks (1999-2006)

Year	Post Office	Hunter	State Building	Armory
1999	10.3	9.9	8.9	*
2000	8.9	8.3	8.2	*
2001	6.5	6.0	6.2	*
2002	5.6	5.7	4.6	2.8
2003	5.0	5.2	*	3.5
2004	5.4	4.8	*	2.7
2005	4.5	4.3	*	2.4
2006	3.7	3.5	*	2.6

*The middle-scale CO monitoring site was relocated from the State Building to the National Guard Armory during 2002.

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III.C.4. Carbon Monoxide Network Monitoring Program

Although emission projections are used to track Reasonable Further Progress (RFP), it is actual ambient air quality monitoring data that determine whether an area attains the NAAQS by the required attainment date. The difficulty with using ambient monitoring data to assess progress toward attainment is the fluctuation in pollution concentrations caused by daily, weekly, and yearly variations in meteorological conditions, traffic levels, and other factors. However, it is important to monitor and compare ambient air quality concentrations to modeled emission projections to determine if the projections provide a reasonable surrogate for tracking progress toward attainment. Section 110(a)(2)(B) of the CAA requires that each implementation plan submitted to EPA provide for the establishment and operation of "appropriate devices, methods, systems, and procedures to monitor, compile, and analyze data on ambient air quality."

The Arctic Health Research Center began ambient air quality sampling in Fairbanks in 1969. The results of the preliminary monitoring program indicated that high CO levels were occurring during the winter months. The Fairbanks area experiences severe wintertime temperature inversions, resulting in the trapping of pollutants near ground level, with little vertical dispersion. Low winds and the presence of hills around most of the urban area combine to limit horizontal dispersion as well.

In fulfillment of the ambient monitoring requirement, and to better understand Fairbanks' air quality problems, the FNSB has operated a CO sampling network since the early 1970s. In 1972, the FNSB began continuous ambient CO monitoring in the downtown area. In addition, a grab sampling program to determine CO levels outside the downtown core area was conducted during the period 1976-1977, followed by mobile laboratory sampling during the winters of 1982-1985.

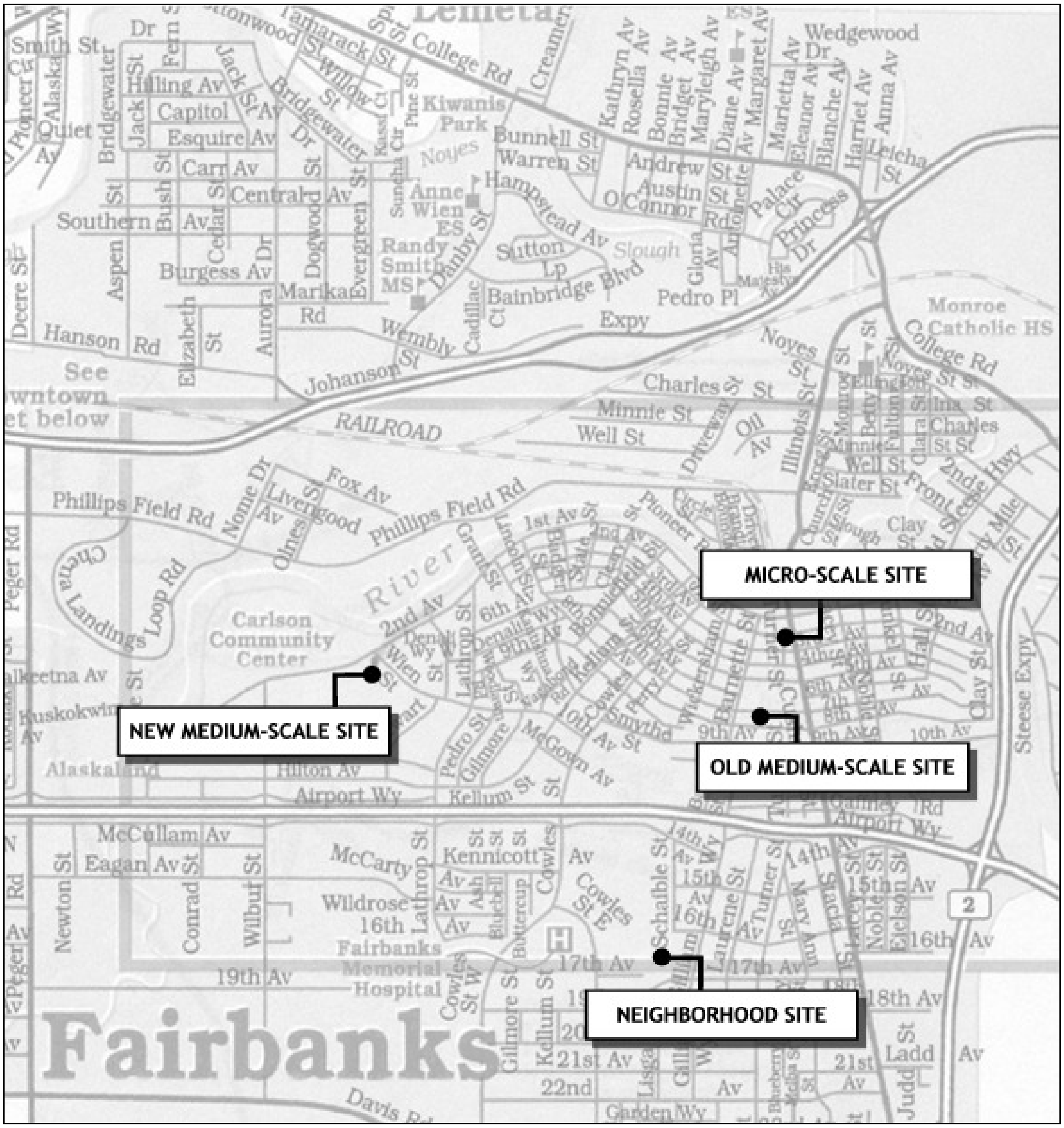
The monitoring network consists of three permanent sites (including one microscale, one middle-scale, and one neighborhood monitoring site) operated October 1 through March 31 each year, with up to 30 days of additional operation at the beginning and end of the season for quality assurance calibration and audits. The microscale and neighborhood sites have been operated in their present configuration since 1985. In April 2002, the middle-scale monitoring site was moved from the State Office Building (where it had been since 1985) to the National Guard Armory, at the corner of Wien Street and 2nd Avenue (approximately 2.5km to the west and 0.5km north of the old site) in order to provide an "off-axis" site relative to the other two monitoring sites. All three sites are equipped with data loggers and modems enabling daily data retrieval and dial-up access to current readings. All data are collected using ambient monitoring equipment and procedures, and quality control and assurance procedures approved by EPA. Table III.C.4-1 contains a detailed description of each site; the old middle-scale site is also described for completeness. Figure III.C.4-1 provides a map that shows each of the CO monitoring site locations (both the old and new middle-scale sites are shown).

A meteorological tower, located centrally between the micro-scale and previous middle-scale sites, was added to the network in 1988 and has been operated since that time. The tower is equipped with three levels of temperature measurement and two levels of wind

Table III.C.4-1
Description of Fairbanks CO Monitoring Sites

Location	Site Description
2nd Avenue and Cushman Street	This microscale monitoring site is in the downtown core area near the intersection of 2nd Avenue and Cushman Street. It is located in the old Federal Building and Post Office, currently known as Courthouse Square. The probe is located on the east side of the building in a two-story "street canyon." The installation is somewhat limited by the National Historic Register listing of the building. However, as a result of site modifications that were completed in the summer of 2000, the site meets all EPA siting criteria. This was the first monitoring site in Fairbanks, operated from 1972 through 1978, and then re-established in January 1985. Due to its long operating history, it provides the best picture of long-term trends in Fairbanks' CO levels. It records the highest concentrations of any monitor in the three-site network.
7th Avenue (State Office Building)	This middle-scale site was located at the State Office Building at 735 Seventh Avenue until April 2002. This site meets all siting criteria and was in continuous operation since the building opened in 1976. The probe was located on the north side of the building.
Wien Street and 2nd Avenue (National Guard Armory)	This middle-scale site is located at the National Guard Amory Building at the corner of Wien Street and 2nd Avenue. This site meets all siting criteria and has been in continuous operation since August 2003. The probe is located on the east side of the building approximately 120m from 2nd Avenue and 70m from Wien Street.
Hunter School	This neighborhood site is located at Hunter School at 15th Avenue and Gillam Way. The site was established in 1981. This site meets all siting criteria. The probe is on the west side of the building and more than 100 meters from the nearest roadway or parking lot.

Figure III.C.4-1
Fairbanks CO Monitoring Network



measurements. This allows early detection of temperature inversions for use in air quality forecasts.

The Clean Air Act Section 110(a)(2)(B) (42 U.S.C. 7410(a)(2)(B)) requires implementation plans to provide for the "establishment and operation of appropriate devices, methods, systems, and procedures necessary to monitor, compile, and analyze data on ambient air quality…." The FNSB is committed to the continued operation of this monitoring network. Any changes to the monitoring network are discussed in advance with the ADEC and EPA Region 10. The EPA Administrator has final authority on the placement of monitoring sites.

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III.C.5 Transportation Control Strategies

Vehicle Emissions Inspection and Maintenance Program

The vehicle emissions inspection and maintenance (I/M) program, which was initially implemented in in Fairbanks in 1985, will continue to operate through December 2009. This “basic” I/M program has been substantially enhanced over the last 18 years and currently includes the following key design elements:

- Decentralized (test-and-repair) network;
- Vehicle coverage of 1975 and newer gasoline-powered (1) light-duty vehicles (LDGVs), (2) light-duty trucks (LDGT1-4s), (3) heavy-duty vehicles (HDGVs) up to 12,000 lbs unladen weight,* and (4) buses (GAS BUS);
- Pass/fail test on second-generation on-board diagnostic (OBDII) systems on all 1996 and newer LDGVs and LDGT1-4s;
- Two-speed idle (TSI) tailpipe test on all HDGVs and buses, and 1975-1995 LDGVs and LDGT1-4s;
- Comprehensive underhood inspection**;
- Biennial inspection frequency;
- Newest four model years exempted from program**;
- Vehicle registration <u>and</u> sticker-based enforcement; and
- Geographic coverage that includes the entire Fairbanks North Star Borough.

Because of the CO-only nature of local air pollution problems, the program includes relatively loose hydrocarbon (HC) emissions standards on the TSI test. TSI CO standards are generally more stringent than the federal warranty limit of 1.2%, including the following standards categories:

Vehicle Type	Model Years	CO Standard
LDGV	1981-1993	1.0%
LDGV	1994 and newer	0.5%
LDGT	1984-1993	1.0%
LDGT	1994 and newer	0.5%
HDGV	1994 and newer	1.0%

* For the purpose of modeling I/M program benefits, the upper HDGV limit of 12,000 lbs unladen vehicle weight is assumed to be equivalent to the 14,000-lb gross vehicle weight rating (GVWR) limit incorporated into the HDGV3 MOBILE6 category. While no easy translation is possible between unladen weight and GVWR, the 14,000-lb GVWR limit was selected as a reasonable conservative value to use in the MOBILE6 modeling.

** Effective in 2006, the Fairbanks I/M program was amended to exempt the newest four model years of vehicles from testing (starting with model year 2004) and the underhood inspection was modified for OBD-equipped vehicles. Analysis of the impacts of these changes are discussed in *Analysis of Emissions and Air Quality Impacts of Increasing the Grace Period for New Vehicles in the Fairbanks I/M Program From 2 to 4 Years*, which is included in Volume III, Appendix III.C.5.

A copy of the statewide I/M Program Manual for the current "Alaska2000" program (which refers to the I/M program as currently implemented in Fairbanks and Anchorage) is included in Appendix III.A. Volume II, Section III.A.2 of the Air Quality Control Plan contains a detailed description of the Alaska2000 I/M program design and operating procedures. FNSB resolutions and ordinances continuing and enhancing the local I/M program (#92-090, 93-036, 99-087, 2004-62, 2006-06), as well as the FNSB Alaska 2000 Motor Vehicle Inspection and Maintenance Program Handbook, are included in Appendix III.C.5.

The Fairbanks I/M program is administered by the Borough, with technical assistance and oversight provided by the Alaska Department of Environmental Conservation (ADEC). Statutory and legal authority for the program resides at both the local and state level.[8] Since the program was implemented in 1985, the Borough and ADEC have worked together in an effort to continually improve the effectiveness of the program. The Fairbanks program is rated in the top tier of all basic decentralized programs in the country.[9]

Current Program Elements

In addition to the basic design elements listed above, the I/M program incorporates the following other important elements:

BAR97-Grade Hardware[10] – The current Alaska2000 emission inspection systems (EIS) meet the California Bureau of Automotive Repair's (BAR's) BAR97 equipment specifications, except that the Alaska2000 EIS are not required to perform functional gas cap or loaded mode testing (i.e., they have no dynamometer or NOx measurement capability). The Alaska2000 EIS do incorporate full OBDII test capability.

On-Line Data Communications and Vehicle Information Database (VID) – All I/M tests are conducted on-line unless the VID is not available. Each EIS connects to the VID via a Virtual Private Network (VPN) that incorporates Internet-based data transfer using standard Transmission Control Protocol/Internet Protocol (TCP/IP) communications protocols. The EIS makes one call to the VID at the beginning of a test to obtain information regarding the test vehicle. A second call is then made to transmit inspection results to the VID following the completion of testing.

The on-line, VID-based system provides improved testing accuracy (e.g., due to fewer errors in identifying test vehicles) as well as additional quality assurance and quality control (QA/QC) benefits. Due to the on-line nature of the tests, I/M mechanics know they are under closer scrutiny than was possible with the previous system.

Repair Technician Training and Certification (TTC) – Mechanic training and certification has been an element of the FNSB I/M program since its initial implementation in 1985. All mechanics who perform I/M testing are required to complete both classroom and hands-on training, and are then certified to perform official I/M tests. All I/M mechanics must also obtain recertification every two years, a process involving an updated training/testing component.

Because of the decentralized nature of the I/M program, almost all repair mechanics in the area also perform I/M tests. This means that the I/M training and certification requirements apply to almost all mechanics performing I/M-related repairs. While repairs by vehicle owners and non-certified mechanics are allowed, only those performed by certified I/M mechanics count toward the repair cost minimums incorporated into the program. (Vehicle owners must expend at least $450 on vehicle repairs by a certified mechanic and make one repair regardless of cost for all non-tampered vehicles, in order to qualify for a repair cost waiver. Waivers are not allowed for tampered vehicles. The stringency of these requirements has resulted in the FNSB I/M program office issuing fewer than 10 repair cost waivers per year.[11]) Electronic and computer controls on current technology vehicles have also largely eliminated the incidence of repairs by vehicle owners. As a result, almost all I/M-related repairs are now being performed by mechanics that have fulfilled the required training and certification requirements.

I/M mechanics are provided with many training opportunities. These include a series of FNSB- and ADEC-sponsored advanced vehicle diagnostic and repair training sessions held in 2003, which focused primarily on electronic vehicle controls. Mandatory OBDII-related diagnostic and repair training sessions have also been held for I/M mechanics. Other available training includes dealer-provided training (for mechanics working at vehicle dealerships) and Automotive Service Excellence (ASE) certifications. Based on I/M mechanic-related records maintained by the Borough and ADEC, a number of local mechanics have obtained such training in addition to participating in the agency-sponsored training classes. This includes the following ASE certification categories that are relevant to I/M emissions testing and repair: A1 - Engine Repair; A6 - Electrical/Electronics; A8 - Engine Performance; and L1 - Advanced Engine Performance Specialist.

Triggers System – The VID was modified to include a QA/QC element (i.e., triggers system) in late 2003. Triggers employ algorithms that automatically scan incoming test data to the VID. They are used to identify potential under-performing stations and inspectors. This system has the potential to further improve I/M program benefits.

2002 I/M Audit Results

In June 2002, ADEC funded Sierra Research to perform an independent audit of the entire Alaska I/M program. The audit found that the Fairbanks I/M program is complying with both the intent and letter of most federal and state requirements. Borough staff were found to be very knowledgeable about pertinent program issues and, in particular, very attuned to customer service issues. Overall, the staff exhibited an impressive degree of dedication and capabilities.

With one exception, all deficiencies identified in the audit are insignificant or of a minor nature. According to the Sierra audit report, almost all deficiencies that were identified, and the resulting recommendations for addressing them, could be thought of as fine-tuning the program to maximize its benefits to the greatest extent possible. The one exception to this was related to the then-current lack of a dedicated source of future funding for the support that ADEC provides on a statewide basis to both the Fairbanks and Anchorage I/M programs (e.g., VID operations). Since the audit, the Borough, MOA and ADEC have identified funding to operate the program through the end of 2009.

CMAQ-Funded Improvement Projects

In addition to recommendations aimed specifically at the agencies (i.e., ADEC, FNSB and MOA), the audit report recommended that several Congestion Mitigation and Air Quality (CMAQ) funded projects be pursued to further improve I/M effectiveness in both Fairbanks and Anchorage. As a follow-up to the audit, the Borough and ADEC worked together to secure funding for the following four CMAQ projects:

- Advanced Repair Mechanic Training
- Repair Effectiveness Improvement
- OBD-I/M Performance Tracking
- I/M Sticker Application

A fifth I/M related CMAQ project, Enhanced Motorist I/M Compliance, was also funded and is described below. All five projects have been implemented. While no additional CO reductions have been attributed to the projects in the current attainment inventory projections, they are expected to provide additional, currently unquantified air quality benefits.

Advanced Repair Mechanic Training – Under this project, certified I/M mechanics received advanced vehicle diagnostic and repair training. Specifically, the mechanics were trained in how to operate an automotive digital storage oscilloscope (DSO) and when to most effectively use the DSO for emissions-related diagnosis. The objective of this project was to improve emissions-related diagnosis and repair skills among certified I/M mechanics, thereby increasing the cost-effectiveness of the I/M program.

Repair Effectiveness Improvement Project – The objective of this project was to improve repair effectiveness, and thus overall program benefits, in the Fairbanks I/M program. It included the following elements:

- Design and implementation of advanced OBDII diagnostic and repair training classes for repair mechanics.

- Design and initial presentation of advertising of repair shops that employ mechanics that have successfully completed the advanced training.

- Providing repair mechanics with access to online training and repair assistance (e.g., iATN), and possibly providing personal computers to repair shops to facilitate such access.

- Providing advanced OBDII-related technical hotline assistance to repair mechanics.

A primary factor in maintaining or improving I/M program benefits is ensuring that failing vehicles are repaired effectively. No matter how good an I/M test is in identifying high emitting vehicles, the program will be effective only if those vehicles are properly repaired. OBD-I/M checks clearly provide an improvement in testing relative to the previous two-speed idle tailpipe test. However, it is also important that improvements in repair performance keep pace with advancements in the I/M test procedures. This project was designed to address this critical need.

OBD-I/M Performance Tracking Project – 1996 and newer LDGVs and LDGTs equipped with OBDII systems are not receiving tailpipe emission tests because their computer determines the pass/fail status of the vehicle. To provide oversight of OBD system performance, the Alaska2000 I/M software was modified to provide ADEC with the ability to periodically prompt for tailpipe tests on failing OBD vehicles. The VID system then tracks these vehicles and requires another tailpipe test for the after-repair OBD test. By comparing failing initial tests with after-repair tests, both ADEC and Fairbanks are monitoring the performance of the OBD-I/M Program. The results to date indicate that OBD repairs are targeting the most relevant control systems and producing real emission reductions. The information produced by this software also provides the basis to make modifications needed to enhance OBD-I/M Program performance if they are needed.

I/M Sticker Application Project – The 2002 I/M audit report noted that a large number of in-use vehicles had not yet been "stickered" in Fairbanks and Anchorage.[**] This included several categories of vehicles that are exempt from I/M requirements: (1) new vehicles that are less than two years old, (2) older Diesel vehicles previously inspected by the I/M offices and issued I/M exemptions, (3) pre-1975 model year vehicles, and (4) vehicles above 12,000 lbs unladen weight (except for school buses). This project is focused on getting the first two groups, which make up most of the exempt vehicles, stickered. This was accomplished through the design and implementation of a new vehicle sticker application and tracking system, as well as backlog stickering of the older Diesel vehicles.

By stickering most of the exempt vehicles, this project made it easier for enforcement officials to identify and pursue action against program evaders operating in the I/M area. The overall result was an improvement in I/M compliance among in-use vehicles.

Enhanced Motorist I/M Compliance Project – A CMAQ-funded I/M evasion enforcement project was conducted by ADEC in Fairbanks during the period of January 2000-September 2003. This project is projected to have resulted in cost-effective reductions in wintertime CO emissions.[12] Parking lot compliance survey results[13] collected during the project also supported its effectiveness, by showing that the compliance rate increased from 93% in 2000 to 94% in 2002.[††]

[**] As noted above, the I/M program includes both vehicle registration and sticker-based enforcement. The sticker requirements were added relatively recently to aid in enforcing program compliance among commuter vehicles and identifying vehicles improperly registered outside of the I/M area.

[††] Compliance rates reflect the results collected for all in-area and out-of-area (i.e., those registered outside of FNSB) vehicles observed during the survey that were within the model year range (i.e., all 1975 and newer models except for the two most recent model years) subject to I/M testing in the Fairbanks area. Out-of-area vehicles that seldom operate in the Fairbanks area are exempt from I/M requirements; however, it is impossible

An enhanced motorist I/M compliance project was implemented starting in 2004. Its efforts were focused on I/M windshield sticker enforcement actions. Additional compliance enforcement activities were also aimed at I/M mechanics and I/M stations. This is a statewide project whose objective is to identify and eliminate I/M program evaders in both the Fairbanks area and the Matanuska-Susitna (Mat-Su) Valley commuter fleet that travels into the Municipality of Anchorage. A parking lot compliance survey conducted in 2005 showed that the compliance rate in Fairbanks had increased to 95%.

Heavy-Duty OBD-I/M Inspections – Starting in 2006, the Borough and ADEC began to require all heavy-duty gasoline vehicles subject to I/M testing in the Fairbanks program to undergo OBD-I/M inspections. This enhancement to the program was structured similarly to the way the State of Oregon conducts heavy-duty OBD-I/M inspections. Inspectors initially attempt to perform an OBDII test on all HDGVs. If the inspector finds that the connector is missing, damaged, tampered or inaccessible, or the vehicle does not respond to the standard OBDII communications request programmed into the test software, the rest of the OBDII test procedure is bypassed and an alternate tailpipe emissions test is performed. If the mechanic can connect to the OBDII connector and a response is received to the standard communications request, the standard OBDII test is performed with no tailpipe test. This approach gives the benefit of the doubt to HDV owners; e.g., an HDGV is not failed for a damaged connector since the vehicle might not have a functional OBDII system.

Fairbanks has successfully tested over 55% of all 1996+ HDVs in the 8,500-14,000 lb GVWR range (these are often referred to as medium-duty vehicles, or MDVs, based on the convention used in the California certification process). While federal MDVs are not required to have working OBDII systems until MY2007,[‡‡] California-certified MDVs are required to be fully compliant, and most vehicle manufacturers are building 50-state MDVs in response to the CA requirements.

Modeled Benefits

Under current Clean Air Act provisions, the Fairbanks I/M program is required to meet the federal basic I/M performance standard. Table III.C.5-1 compares current program elements to those included in the basic performance standard.

As with other emissions modeling performed in support of this SIP revision, the comparison of modeled benefits shown in the last row of the table was performed using the final version of the MOBILE6 model (version 6.2). These results demonstrate that the Fairbanks program easily complies with the federal basic I/M performance standard. As noted, the modeling comparison was based on an evaluation date of January 1, 2006, and used inputs and assumptions consistent with those incorporated into the Fairbanks CO emissions inventory.

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to easily differentiate between these and other out-of-area vehicles that are subject to I/M (i.e., those principally operated in the area or used by students attending the University of Alaska Fairbanks). All out-of-area vehicles were therefore included in the survey results, based on the reasonable assumption that a de minimis number of these vehicles are exempt from the I/M program.

[‡‡] Federal regulations specify a percentage phase-in schedule of 60/80/100 for the 2005/06/07 model years, respectively, with full compliance required for all model year 2007 and later MDVs

This included assuming 100% of the model's test-only credit for the decentralized I/M program. This latter issue is addressed in more detail below.

Table III.C.5-1
Comparison of the Current FNSB I/M Program to the Federal Basic I/M Performance Standard

Program Element	Current FNSB Program	Basic Performance Standard
Network type	Decentralized	Centralized
Start date	July 1, 1985	January 1, 1983
Inspection frequency	Biennial	Annual
Model year coverage	MY1975 and newer	MY1968 and newer
Vehicle type coverage	LDGV, LDGT1-4, HDGV2B, HDGV3, GAS BUS	LDGV
OBDII checks	1996 and newer LDGVs and LDGTs	1996 and newer LDGVs
Tailpipe test type	Two-speed idle for pre-1996 vehicles	Idle only
Emissions standards	More stringent than federal limits	40 C.F.R. Part 85, Subpart W
Underhood inspection	Comprehensive visual/functional checks	None
Pre-1981 stringency	23%	20%
Waiver rate	0%	0%
Compliance rate	96% (projected from 2002 survey results)	100%
2005 Modeled Benefits[a]	9.7 % reduction in fleet-average CO emissions	3.2 % reduction in fleet-average CO emissions

[a] Benefits obtained using the final version of MOBILE6 (version 6.2) and an evaluation date of January 1, 2006. Model inputs and assumptions are consistent with those used in the Fairbanks CO emissions inventory.

Fraction of Test-Only Benefits

Previous versions of EPA's mobile source emissions model MOBILE limited the benefits of decentralized I/M programs to no more than 50% of the benefits of centralized programs. This limitation irritated many states looking for emission reductions and did not reward states with well run programs. In response to growing frustration over this limitation, the 1995 National Highway System Designation Act (NHSDA) provided states with procedures to claim higher benefits for their decentralized I/M programs. Under the provisions of NHSDA, Alaska claimed 85% of the MOBILE5a modeling credit allowed for a test-only centralized I/M program in a 1996 SIP submittal to EPA.[14] This was followed by the submittal of a qualitative assessment of the 85% test-only credit to EPA in late-1998. The qualitiative assessment was based on an approved approach developed by several states (including Alaska) and EPA under the auspices of the Environmental Council of the States (ECOS) and the State and Territorial Air Pollution Program Administrators (STAPPA).[15]

The so-called ECOS/STAPPA evaluation submitted by Alaska to EPA compared various I/M test data and statistical metrics across two basic types of decentralized I/M stations—surrogate for test-only (STO) stations, and test and repair (T&R) stations. Two I/M stations in Fairbanks were classified into the former and the remaining 42 stations were classified into the latter of these categories. For selected statistical metrics, the FNSB test data were also compared to a one-month sample of centralized I/M data obtained from the state of Oregon. Overall, the above results indicated the Fairbanks I/M program was achieving an excellent level of performance and providing CO emission reduction benefits considered equivalent to the Oregon test-only program.

In 2001, a revised SIP was submitted to EPA that assumed the Fairbanks I/M program was achieving 100% of test-only credits, based on the following elements:

1. The ECOS/STAPPA analysis results, which indicated that the program was achieving similar effectiveness to that of Oregon's centralized program.

2. Alaska2000 and other related enhancements that were incorporated into the Fairbanks program, including improvements in the following areas:

    - More accurate test equipment;
    - Improved quality control and quality assurance of test equipment and inspection procedures;
    - Increased motorist compliance enforcement and oversight;
    - Increased enforcement against I/M stations and inspectors, including better prevention of erroneous or fraudulent inspections through implementation of VID-based online testing; and
    - Advanced technician training in diagnosing and repairing current technology vehicles.

Full OBDII inspections have also been implemented for all gasoline-powered passenger cars and light-duty trucks. Given these factors, the 100% test-only credit claim for the Fairbanks program is considered reasonable.

Expanded Availability of Plug-Ins

Engine preheaters are used extensively throughout Fairbanks when ambient temperatures drop below 0° F to ensure that vehicles exposed to these temperatures can be easily started. Local testing programs have confirmed that preheating vehicles, a practice commonly referred to as "plugging-in," provides a substantial reduction in motor vehicle cold start emissions. Recognizing the many benefits of plugging-in (e.g., reduced emissions, lower need for maintenance, fuel economy, startability, etc.), the Borough has had a long-standing practice of expanding the number of parking spaces equipped with electrical outlets. This has been achieved by securing funds for retrofitting existing facilities (e.g., school renovations) and including outlets in new public facilities (e.g., new schools). It has also been achieved by encouraging the private sector to retrofit existing facilities (e.g., hospital expansions) and including outlets in new private facilities (e.g., Home Depot). This strategy was made more viable with Congress' passage of the Transportation Equity Act for the 21st Century that removed the restriction on the use of CMAQ funds for the Section 108(f) transportation control measure (xii) that reduces motor vehicle emissions under extreme cold start conditions.

In support of an earlier plan, the Borough conducted a survey of employee parking lots,[16] public and private, located within the nonattainment area that were thought to have more than 100 parking spaces. The results of that survey are presented in Table III.C.5-2. It shows that slightly more than 90% of employee parking lot spaces were equipped with electrical outlets in 2001.

Table III.C.5-2
Summary of Employee Parking Spaces Equipped with Plug-Ins
in the Fairbanks Nonattainment Area

	Spaces	Plug-Ins	% Equipped
Government Summary			
FNSB	2,345[a]	2,170	93
Federal	1,948	1,928	99
State	971	937	96
City	485[b]	446	92[b]
Subtotal	5,749	5,481	95
Schools Not in Nonattainment Area			
Badger Road Elementary	63	63	100
Pearl Creek Elementary	62	42	68
Ticasuk Brow Elementary	48	48	100
Weller Elementary	40	40	100
Subtotal	213	193	91
Nonattainment Area Government Total	5,536	5,288	96
Private Summary			
Lots with >250 plug-ins	2,438	2,318	95
Lots with <250 plug-ins	1,753	1,427	81
Subtotal	4,191	3,745	89
Nonattainment Area Government and Private Total	9,727	9,033	93

[a] Includes initial retrofit of employer parking at Lathrop High School.
[b] The City Manager could not provide an estimate of the total spaces. Therefore, an estimate was prepared by assuming that the City fraction equipped was the same as the Borough employee fraction (i.e., 92%).

A more recent survey of new construction prepared by the Northern Regional Office of the Alaska Department of Transportation and Public Facilities determined that over 1,500 parking spaces were equipped with electical outlets between 2001 and 2004. A summary of the locations with the new electrical outlets is presented in Table III.C.5-3. These locations

Table III.C.5-3
Parking Lots in the Fairbanks Nonattainment Area
Equipped with New Plug-Ins Since 2001

Facility	New Plug-Ins	Comments
Lathrop High School	240	Student parking completed in 2001
Hutchinson Career Center	135	Completed in 2004
University of Alaska, Fairbanks	200	New student parking
McKinley Bldg. (new DOT bldg.)	140	New construction
Former U of AK Parking Structure	300	Retrofited in 2004
New State Courthouse	90	Employee parking
New State Courthouse	72	Juror parking
Downtown Parking Structure	380	Completed 2002
Total	1,557	

represent an increase of roughly 17 percent in the supply of electrical outlets. In contrast, data from the ADOT&PF indicate that travel in the nonattainment area will increase only by 3% between 2001 and 2004. Clearly, the increase in spaces equipped with electrical outlets has outpaced the growth in travel and contributed meaningful reductions in the level of CO emitted in the nonattainment area. This trend continued as the Borough secured CMAQ funds from the Federal Highway Administration (FHWA) to carry on the program of retrofitting public parking lots located in the nonattainment area with electrical outlets. As shown in Table III.C.5-3, several projects were completed in 2004.

More recently, several large retailers that have expanded their operations in Fairbanks (e.g.WalMart, Home Depot, etc) have included electrical outlets for plug-ins in their parking lots. Fairbanks International Airport (FIA) is also in the process of reconstructing portions of the airport. One of the deficiencies noted in the Airport Master Plan is an “inadequate supply of headbolt heaters (HBOs)” in the parking lot. Discussions with FAI staff confirmed the number of parking spaces equipped with plug-ins is being expanded. The preconstruction parking lot had 1,128 spaces and 60% were equipped with plug-ins. Current plans call for the fraction of spaces equipped with plug-ins to be increased to 98%.[17]

In addition to the Borough’s emphasis on the installation of electrical infrastructure in parking lots, the Assembly passed an ordinance[18] on April 12, 2001, that requires employers or businesses that have 275 or more parking spaces to provide power to electrical outlets at temperatures of 20 degrees F or lower. This ordinance is included in Appendix III.C.5. Key provisions addressed in the ordinance include:

- Parking lot owners are required to supply electricity to outlets between November 1 of each year and March 31 of the subsequent year.
- Power to parking lots may be cycled on and off every other hour during days when temperatures fall below 21º F.
- Employers or businesses subject to the ordinance are required to keep a logbook that documents the days on which power is supplied to electrical outlets. The logbooks are required to note special circumstances that prevented the supply of electricity to outlets. The logbooks need to be maintained and available for inspection for a five-year period.
- Employers and businesses subject to the ordinance must provide outlets for any new parking spaces intended for use by motorists for longer than two hours.
- Employers or businesses subject to the ordinance must maintain electrical outlets in operable condition and they cannot decrease the number of parking spaces with outlets without prior approval of the Borough.
- The Borough can institute a civil action and obtain penalties not to exceed one thousand dollars for each violation.

To ensure the effectiveness of the ordinance, the Borough developed policies and procedures to govern its implementation, key elements include:

- Maintaining a list of parking lots with plug-ins that are subject to the program.
- Conducting surveys at least twice each winter on days when temperatures are below 20º F to determine whether outlets have power.
- Conducting surveys at least twice each winter to determine the number of vehicles that are plugged in at each of the parking lots subject to the ordinance.
- Maintaining records of the surveys and making that information along with data on the number of parking spaces equipped with plug-ins available to the public.
- Using the results of the surveys to determine the level of plug-in usage and related emissions benefits on an annual basis and making that information available to the public.

Violations of the health standard typically occur during a temperature range of -20º F to +20º F. Since plug-ins are already used extensively in the Borough when temperatures fall below 0º F, the principal benefit of the ordinance is to ensure that power is available at temperatures betweeen 0 and +20º F. The Borough has conducted surveys to determine if outlets have power each winter since the ordinance was implemented. The results, which are available at the Borough Air Quality Management Program Offices, show that employers have a high level of compliance with the ordinance.

The effects of the ordinance and available supply of plug-ins was last formally quantified using the 2001 survey results and the baseline 2005-2015 modeling inventories reflect those benefits. The benefits of additional plug-in units made available since 2001 have not been included in the emission calculations, for this reason the inventory is considered to be conservative.

Consumer-Based Oxygen Sensor Replacement Project

The oxygen sensor is one of the most important emission control components on today's cars and light-duty trucks because it makes it possible to control the air/fuel ratio of an engine within the tolerances required to achieve the simultaneous removal of hydrocarbons (HC), CO, and oxides of nitrogen (NOx) emissions with a three-way catalyst.

Previous Sierra Research analyses[19,20,21] of component failures in other I/M programs and special studies found that oxygen sensor repairs have the potential to provide substantial CO reductions. The latter of the referenced analyses found that in test programs conducted by EPA and by the California Air Resources Board (CARB), oxygen sensor replacement was required on 42% to 58% of the vehicles with high emissions of HC or CO. These evaluations indicated that a comprehensive check of the oxygen sensor and closed-loop control system is the single most effective diagnostic procedure for vehicles that fail the HC or CO emissions test in an I/M program. This procedure alone showed the potential to identify repairs that could reduce HC emissions from the light-duty, fuel-injected fleet by 23% and CO emissions by 33%. In addition, proper identification and repair of oxygen sensor defects was found to be extremely cost-effective.

The Fairbanks I/M program does not currently include a specific check of oxygen sensor performance in pre-1996 model year vehicles. (The OBD-I/M inspections performed on 1996 and later model year vehicles specifically target the performance of oxygen sensors.) In light of the Sierra findings, however, it appeared beneficial to investigate the benefits of an oxygen sensor replacement program for pre-1996 model year vehicles. To help evaluate this potential strategy, a pilot study of oxygen sensor replacement in model year 1985–92 cars and trucks was conducted in Fairbanks during the winter of 2002–03. Forty-nine in-use vehicles were procured and driven on a chassis dynamometer and exhaust mass emissions of CO were measured before and after oxygen sensor replacement. In order to best represent vehicle operation in Fairbanks, the test schedule used typical Alaska driving and vehicles were plugged in when the overnight temperature was below 10ºF.

Pilot study results showed that there was considerable variation from vehicle to vehicle as a result of oxygen sensor change. However, for model year 1985–92 vehicles having initial tailpipe CO concentrations greater than 0.40% and less than or equal to 1.0%, a category which is estimated to include about half of the population of vehicles in this model-year range, median CO emissions were significantly reduced as a result of sensor change. Other study findings included the following:

1. For model year 1985–92 vehicles having initial tailpipe concentrations in the range of 0.40-1.0%, sensor replacement yielded an average CO emission reduction of about 21% for typical winter day driving in Fairbanks.

2. Although model year 1983-84 and 1993 vehicles were not tested, most of these vehicles have the same CO cutpoint of 1% as model year 1985–92 vehicles and generally similar emission control technology. For maximum emission reduction benefits, an oxygen sensor replacement program should include model year 1983–93 vehicles.

3. A consumer-based oxygen sensor replacement program in Fairbanks that achieved participation of 60% of the eligible vehicles[*] Borough-wide would affect about 6,700 vehicles, reduce wintertime CO emissions by about 1.77 tons per day (on a 2004 year basis), and have a cost-effectiveness of about $1,350 per ton of CO reduced (for the entire FNSB). The total cost for a consumer-based oxygen sensor replacement program in Fairbanks, including both sensor replacement costs and administrative costs, was estimated at about $1.3 million.

Based on the results of the pilot study, a combination of CMAQ funding and Section 103 EPA grant funds[§§] was secured for implementation of a consumer-based oxygen sensor replacement program beginning in calendar year 2004. Under the program, owners of model year 1983–93 vehicles having initial tailpipe CO concentrations in the range of 0.40-1.0% on their normal biennial I/M test were given an offer to have the oxygen sensors on their vehicles replaced free of charge. The full benefits of the program accrued over a two-year period as the 1983–93 model year fleet completed its biennial inspection cycle. As part of the program, sensors from 2,643 vehicles were replaced between July 2004 and June 2007. Estimates of CO benefits were developed by weighting the 1.77 tons/day CO reductions seen from replacing sensors in about 6,700 vehicles in Fairbanks' pilot study. The table below shows the vehicles with sensors replaced during each winter year of the program, along with the estimated CO benefits. The sensors were assumed to have a useful life of 3 years, which results in a 25% deterioration in effectiveness each year.

Recently, the Borough received funding to continue the program through the end of 2008. The Borough currently estimates that between 800 and 1,000 additional vehicles, beyond those listed in Table III.C.5-4, will have sensors replaced in the second half of 2007 and 2008. Given the uncertainty in how many vehicle owners will choose to participate in the program, no credit is being taken for the CO reductions attributable to these vehicles.

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[*] The costs and benefits of a community-based measure that would target all vehicles in the same model year range were also considered in the pilot study. However, the Borough decided to focus on the consumer-based approach due to its less burdensome effect on Fairbanks residents, and since it was projected to be less costly to administer and produce cost-effective emissions reductions.

[§§] The Borough recently received a Section 103 grant from EPA for $1.7 million to study and implement additional approaches to reducing CO emissions in Fairbanks. A final decision on the exact approaches that will be evaluated using the grant funds has not yet been made; however, some of this funding will be used to supplement available CMAQ funds to fully fund the oxygen sensor replacement program.

Table III.C.5-4
Oxygen Sensor Replacement Program Achievements

Winter Year	Vehicles with Sensors Replaced	Vehicle Totals Adjusted for Sensor Deterioration[a]	CO Reduction (tpd)
2004	234	234	0.06
2005	902	1078	0.28
2006	1088	1881	0.50
2007	420	1745	0.46
2008	0	1084	0.29
2009	0	482	0.13
2010	0	105	0.03
2011	0	0	0.00

[a] Assumes a sensor effective lifespan of three years with a linear deterioration rate.

Episodic Woodstove Burning Ban

In October 2003, the FNSB Assembly adopted an ordinance that implemented an episodic woodstove burning ban as an additional CO control measure. A copy of the ordinance, 2003-71, is included in Appendix III.C.5. This episodic measure applies to the designated nonattainment area, but not the remainder of the Fairbanks North Star Borough. It is a targeted measure that is designed to decrease CO emissions when and where the reductions are needed in a highly cost-effective manner, while also minimizing the regulatory impact on the public in general.

Under this measure, a woodstove burning ban will be implemented whenever the Borough declares an air quality alert. (As described in more detail in Section III.C.10, an alert is to be declared whenever the Borough determines that the 9-ppm 8-hour CO standard is likely to be exceeded and CO concentrations are expected to remain at that level for 12 hours.) During the ban, no person may operate a woodstove unless it is the sole source of available heat in the residence. Loss of electrical power also qualifies a woodstove as being the only source of heat for the duration of the power outage. The alert and accompanying woodstove burning ban will continue for the duration of the air quality episode until cancelled by the Borough.

In evaluating the feasibility of this measure, it was found that a *de minimis* number of residences located within the nonattainment area rely on a woodstove for their only source of heat. It is therefore projected that the episodic woodstove burning ban will result in a significant reduction in woodstove use in this area for the duration of the ban. The ban will be enforced through a combination of normal Borough patrol activities throughout the nonattainment area and public reporting of suspected offenders. For example, Borough animal patrol officers routinely patrol this area and can look for evidence of woodstove use (i.e., chimney smoke) during any bans. Residents can also call the Borough air quality office to report suspected offenders.

Funding for this measure has been incorporated into the Borough's overall air quality budget. No air quality alerts have been called for winter CO season since 2003, so a relatively minimal amount of funding will be needed to implement and support his measure. This also means the regulatory impact on local residents will be fairly small.

Voluntary Programs

During the period 1995-2001, Fairbanks implemented additional programs to encourage changes in behavior that produce emission reductions. The Borough continues to operate these programs and plans to do so in the future. Since these programs are voluntary and it is difficult to quantify their impact on behavior, no formal credit for emissions reductions has been claimed for them in this plan.

Public Awareness on Actions to Reduce CO Emissions

Public outreach is an important component of the Fairbanks air quality program. Initial public outreach efforts in 1995 focused on informing the public of air quality alerts, explaining why they were called, and giving residents options in the case of an alert. Alerts are called during winter months when CO forecasts issued by the Borough indicate that the 9 ppm eight-hour average standard is likely to be exceeded. During an alert, the Borough will notify local media that conditions exist that can cause a violation of the ambient CO standard. As part of the alert, the public is encouraged to minimize driving in the downtown area, plug in their vehicles, and use transit when possible. To further encourage the use of transit, the public was informed that bus fares would be waived. Efforts in 1995 included paid radio and TV advertisements.

The following year, it was decided to encourage residents to plug in their vehicles at temperatures up to 20º above zero. Engine block heaters are considered an essential component of winter driving in Fairbanks. It is estimated that a significant number of vehicles will not start at temperatures of 20º below zero. Since –20º or colder temperatures are a frequent occurrence in winter, it was assumed that by encouraging motor vehicle operators to plug in at warmer temperatures, CO emissions would be reduced without creating an onerous burden on residents, as they already have engine block heaters. Subsequent test programs conducted by ADEC and the Borough confirmed the emission benefits of plugging-in at warmer temperatures. Television spots were produced to inform the public of the multiple benefits of plugging in at warmer temperatures. Although not scientific in nature, the messages were that plugging in:

1. Reduces engine wear, thus reducing vehicle maintenance costs;
2. Keeps the air pure and improves air quality;
3. Improves chances of complying with the federal Clean Air Act; and
4. Improves vehicle starting and reduces the idling time needed before driving.

Two additional messages were developed and advertised extensively. One was related to increased I/M program enforcement activities. The ads were designed to inform the conforming public of increased enforcement efforts and to give notice to those evading the I/M program that their efforts would soon be thwarted. The enforcement campaign was dealt with on a humorous level with TV advertisements and on a more factual basis with full-page newspaper ads describing the enforcement efforts as a "piece of the puzzle" for reaching attainment. Concerns that residents did not understand the reason for the government's push to change behavior led to the development of yet another TV spot. This advertisement featured a well-respected member of the community talking to residents about the Clean Air Act, the possible impacts of not reaching attainment, and explaining again the efforts residents could undertake to achieve that goal.

In 2000, the Borough received CMAQ funding that allowed the Borough to offer free bus rides during the CO season. In TV and radio spots, the governor, the mayor, the chancellor of the university, and others told residents about the free bus rides and their benefits. Although bus ridership was initially thought to be an inelastic market, ridership increased 72%. Since community response to the initial TV ad was overwhelmingly positive, the audio of the spot was used in radio spots that alternated with the television spots.

With the assistance of ADEC, a professional research firm was hired to conduct a public opinion survey in November 2000. It was designed to determine residents' driving, idling, and plug-in behavior and also what motivated them to plug in their vehicles. The results indicated that 90.1% of Borough residents plug in during the course of the winter. When asked if there are electric receptacles and power to allow block heater use where they work or attend school, 76.7% responded affirmatively. Based in part on the results of this survey, the Borough implemented an ordinance that requires owners of parking lots to provide power to electrical outlets for plug-ins at temperatures below 20ºF. Advertising programs were designed to encourage residents to use them and plug in at warmer temperatures.

Over the period of March 31, 2001 – December 31, 2002, the Congestion Mitigation & Air Quality (CMAQ) Improvement Program provided funds in the amount of $76,800 to support a project that focused on educating the public about personal choices they can make to improve air quality. The project has been a cooperative effort between ADEC and the Borough. It was designed to build on the results of the previous Public Information Campaign Pilot Project.

The goal of the project was to continue the previously developed ad campaign and to develop new ads that focused public attention on the I/M program and encouraged the use of proven control measures to reduce vehicle emissions. Over the course of the project a total of $40,000 was spent continuing a mixture of television, radio and newspaper advertising during the CO season. Television and radio stations offer the Borough a "non-profit" rate that provided maximum reach at an advantageous price. The television ads were targeted for high frequency without overkill and consumed the bulk of the funds expended. They were designed to mirror past "buys" and averaged 4.8 spots per day over a 15-day period. The ads were run every day of the week, throughout the day, of the selected buy period. During that time it was estimated that 26,810 households were reached and they would see the message approximately 6.4 times.

In recent years, the Borough has continued to fund public awareness ads highlighting the choices that can reduce winter CO levels and the benefits of participating in the oxygen sensor replacement program. Those ads were funded with an EPA Assistance Grant that runs through 2008, so additional ads will be shown in the coming winter. ADEC has also provided assistance to the Borough by funding ads that have highlighted the benefits of plug-ins and wood stove maintenance. ADEC plans to continue providing public awareness support to the Borough.

Transit System Improvements

Ridership on the Metropolitan Area Commuter System (MACS) increased steadily between 1999 and 2005 at annualized rate of by 10.2%. This is well above the 1.9% annualized growth in Borough travel that ADOT&PF estimates to have occurred over the same time period. A key contributor to the growth in ridership was a continuation of the free winter service that began in 2000/2001. Funding for that program, however, ran out this past winter. Recognizing the success of the program, the Borough agreed to partially fund the program out of the general fund. The result was that while the cost of a trip was significantly reduced, ridership is estimated to have diminished. The outlook for this program is unclear since no dedicated funding has been identified to subsisdize a continuation of either free or reduced fare winter service.

The Borough also operates a para-transit service that has experienced proportionate increases in ridership. The American Disabilities Act of 1990 (ADA) requires all public transit systems that provide fixed route bus and rail service to also provide an alternative transportation service (usually vans and small buses) for people with disabilities who cannot use fixed route bus and train service. This service is usually called “para-transit.” Those ridership levels, however, are relatively low and are not reflected in the MACS values presented in Table III.C.5-5.

Table III.C.5-5
Annual MACS Transit Ridership
2001 – 2003

Year	Number of Riders
1999/2000	246,064
2000/2001	335,341
2001/2002	370,689
2002/2003	375,201
2003/2004	382,000
2004/2005	399,215
2005/2006	392,024
2006/2007	280,000[a]

[a] estimated

Freeway/Arterial/Intersection Improvements

Since 2000, a total of 10 separate highway improvement projects were completed or have been initiated in the nonattainment area.[22] A summary of these projects and their impacts on local congestion levels is presented in Table III.C.5-6. Some of these projects focused on intersection and signalization improvements; others were focused on roadway upgrades and

Table III.C.5-6
Highway Construction Projects: 2004-Present
Fairbanks CO Maintenance Area

Contract Award Date	Project	Contract Amount (thousand $)	Completion Date (Final Acceptance)	Significance to Vehicle Speeds/CO Emissions		
				Significant	Minor	No Benefit
9/28/04	Northern Region ADA Improvements – Airport Way (Great Northwest, Inc.)	$1,650.0	Summer 2005		X	
9/22/04	Chena River Path – Centennial to Steese (Great Northwest, Inc.)	$1,900.0	Summer 2005		X	
12/16/04	Tanana Valley Trainhouse Museum (Ghemm Co.)	$1,630.0	Fall 2005			X
6/28/05	Old Richardson Highway Improvements North Pole (Great Northwest, Inc.)	$4,233.0	4/3/07			X
5/5/05	Fairbanks Electrical Plug-ins – State Parking Garage (Sampson Electric, Inc.)	$207.0	2/3/06	X		
9/13/05	Eielson Access Ramps (HC Contractors, Inc.)	$5,100.0	Summer 2006		X	
9/13/05	Davis Road/Wilbur Intersection (B&B Contractors)	$143.0	Fall 2005		X	
12/14/05	Fairbanks Pedestrian Facilities Enhancements (Exclusive Paving)	$200.0			X	
2/24/06	South Fairbanks Streets Drainage Improvements (Exclusive Landscaping, Inc.)	$1,600.0				X
7/11/06	Northern Region Bike Path Rehabilitation (HC Contractors, Inc.)	$460.0	Fall 2006		X	
7/12/06	Chena Pump/Chena Ridge Surface Treatment (Great Northwest, Inc.)	$530.0	Summer 2006			X
7/25/06	North Pole Roads Lighting (Grasle & Associates)	$758.0	Summer 2007			X
8/6/06	Richardson Highway Northbound Chena Overflow Bypass/Bridge (HC Contractors, Inc.)	$608.0	Fall 2007			
10/25/06	Richardson Highway MP 348-357 Bypass Lane (HC Contractors, Inc.)	$4,800.0	Summer 2007		X	

Table III.C.5-6
Highway Construction Projects: 2004-Present
Fairbanks CO Maintenance Area

Contract Award Date	Project	Contract Amount (thousand $)	Completion Date (Final Acceptance)	Significance to Vehicle Speeds/CO Emissions		
				Significant	Minor	No Benefit
12/15/06	Richardson Highway 3-Mile RR Crossing Bypass Lane, Peridot RR Crossing Bypass Lane, and Richardson Highway MP 348-357 Repave (HC Contractors, Inc.)	$6,440.0	Summer 2007			X
1/30/07	Richardson Hwy MP 350 Badger Interchange Ramp/Intersection Improvements (roundabouts) HSIP Project	$3,100.0	Summer 2007	X		
4/10/07	Fairbanks North Pole Pedestrian Signal Upgrade (B &B Electric, Inc.)	$91.0	Fall 2007		X	
7/31/07	Richardson Highway North Pole Interchange (GARVEE) (HC Contractors, Inc.)	$21,800.0	Fall 2008	X		
6/5/07	Steese Hwy 2-5 Repaving (HC Contractors)	$6,000.0	Summer 2008			X
7/02/07	2nd & Wilbur Widening (Great Northwest, Inc.)	$3,900.0	Fall 2007	X		
7/12/07	Steese Hwy 0-2 Repaving (Exclusive Landscaping)	$3,700.0	Fall 2007			X

reconstruction. The ADOT&PF, the source of this information, estimates that the combined effect of these improvements will be a small increase in average vehicle speeds in the nonattainment area. This in turn will reduce vehicle CO emissions slightly based on the speed correction curves incorporated into MOBILE6.

State Programs

ADEC has accepted responsibility for enforcing the I/M program since it was first implemented in 1986. In recent years, ADEC has expanded its I/M enforcement efforts in Fairbanks by adding staff and pursuing action against an increased number of program evaders. ADEC also has sole responsibility for the operation of the stationary source permit program. In addition, ADEC would be responsible for administering the Fairbanks I/M program if the Borough were to decide to not administer the program.

I/M Program Enforcement

A key state-level CO control measure involves enforcement efforts aimed at assuring motorist compliance with local I/M program requirements. The main enforcement mechanism for the I/M program is through the motor vehicle registration process administered by the Alaska Division of Motor Vehicles (DMV). All FNSB residents are required to show proof of I/M compliance in order to register their vehicles. Concern has been expressed in the past, however, that a significant number of motorists may be evading the program. Examples of this behavior include the following:

- Claiming residency status outside FNSB to avoid having their vehicles inspected;
- Obtaining I/M Certificates of Inspection through fraudulent means for vehicles not in compliance with the I/M regulations;
- Operating seasonally waived vehicles during the CO nonattainment period (November 1 through March 31), in violation of state and FNSB regulations;
- Failing to renew registrations in a timely manner to avoid I/M test expenses/repairs; and
- Misuse of temporary plates and other means by used car dealers to avoid I/M program requirements.

Under a Memorandum of Understanding (MOU) signed by ADEC and FNSB,[23] ADEC is responsible for providing improved enforcement aimed at reducing I/M program evasion levels. This has included recent allocation of additional resources directed at identifying and addressing instances of non-compliance with I/M program requirements by local motorists. As described previously, a CMAQ-funded I/M evasion enforcement project was conducted by ADEC in Fairbanks during the period of January 2000-September 2003; additional CMAQ funds were then secured to continue the program through 2006. Using available CMAQ funding, ADEC hired investigative and administrative staff to provide improved enforcement of I/M program requirements in FNSB. The added staff were dedicated to I/M enforcement issues, thus allowing ADEC to identify and pursue an increased number of enforcement actions against evaders. These staff investigated potential evaders identified by the FNSB I/M program office, other ADEC staff, and the public. They collected evidence and built the cases needed to pursue legal action against motorists found to be violating program requirements.

These efforts led to a significant increase in enforcement efforts aimed at non-complying vehicles. Table III.C.5-7 summarizes enforcement cases undertaken between 2000 – 2006 period under these CMAQ projects. The increased motorist compliance rate resulting from this project was presented previously.

Table III.C.5-7
January 2000 – December 2006
Vehicle Emissions Enforcement Actions

Type	Expired Plates	False Registration	Seasonal Violators	No Emissions Inspection	Total Actions
New cases	**618**	**1,262**	**309**	**706**	**2,895**
I/M obtained	251	184	52	258	745
Seasonal obtained	24	65	0	13	102
Surrendered plates	5	12	5	1	23

Table III.C.5-7
January 2000 – December 2006
Vehicle Emissions Enforcement Actions

Type	Expired Plates	False Registration	Seasonal Violators	No Emissions Inspection	Total Actions
Vehicle sold	55	75	9	15	154
Pending further sightings	146	335	11	138	630
NOV* issued	26	161	157	46	390
Unfounded	47	403	60	81	591
Pending further investigation	4	17	0	5	26
Closed other	10	5	0	2	17
Total closed	568	1,257	294	559	2,678

*NOV stands for Notice of Violation.

Vehicle Stickers

As described previously, a CMAQ project was implemented in 2004 that specifically aimed at stickering most of the currently non-stickered vehicles in the Fairbanks area. By stickering most of the exempt vehicles, this project made it easier for enforcement officials to identify and pursue action against program evaders operating in the I/M area. All vehicles operated within the FNSB must now show proof of compliance with I/M program requirements by display of a valid windshield sticker. This additional enforcement tool will further improve compliance with I/M requirements.

Stationary Source Program

The CAA Section 172 (c) requirements for nonattainment areas do not apply to maintenance areas. The requirements for reasonable further progress, identification of certain emissions increases and other measures needed for attainment do not apply, because these measures have meaning only for areas not attaining the standard. Under this maintenance plan, the requirements of CAA Part D, New Source Review (NSR) no longer apply as they did under nonattainment. Upon redesignation to maintenance, the prevention of significant deterioration (PSD) program replaces the NSR program requirements for major stationary sources. Section 302 of the CAA (42 U.S. C. 7602) defines a major stationary source as any stationary facility or source of air pollutants that directly emits, or has the potential to emit, 100 tons per year of any pollutant.

Given the long timeframe evaluated in this maintenance plan, a growth allowance has been applied to stationary source emissions (see *Fairbanks 2005-2018 Carbon Monoxide Emission Inventory* included in Appendix III.C.3). Stationary source emissions increase in proportion to projected population growth. This is a conservative assumption; no future improvements in CO emission control technology for these sources have been assumed.

Permits for construction and operation of new or modified major stationary sources within the maintenance area must be approved through the PSD program. Within the FNSB, ADEC is responsible for issuing construction and Title V operating permits. ADEC has incorporated the requirements for PSD in 18 AAC 50, Article 3.

Federal Motor Vehicle Control Program

The large decline in ambient CO levels in Fairbanks over the last 20 years is due, in large measure, to the success of the Federal Motor Vehicle Control Program (FMVCP). The FMVCP is the federal certification program that requires all new cars sold in 49 states to meet certain emission standards. (California is excluded because it has its own state-mandated certification program.) These standards vary according to vehicle age, with the newer vehicles required to be considerably cleaner than older models. The result of this decline over time in allowable emissions from newly manufactured vehicles has been a drop in overall emissions from the vehicle fleet in Fairbanks, as older, dirtier vehicles are replaced with newer, cleaner vehicles.

As part of the FMVCP, all new cars must meet their applicable emission standards on a standard test cycle called the Federal Test Procedure (FTP). The 3.4 g/mi CO standard results from a CAA-mandated 90 percent reduction from the CO levels of light-duty vehicles manufactured in model year 1970. This standard, enforced by EPA under the FMVCP, represents the primary CO control strategy available to CO nonattainment communities.

Although the CAA states that vehicles must meet a 90% emission reduction criteria "when in actual use throughout their useful life," EPA had not formally interpreted this to mean that this reduction must be met at all temperatures at which vehicles operate. Thus, while vehicles achieve the current 3.4 grams per mile (g/mi) CO standard under the 68º-86ºF temperature range allowed under the standardized test conditions of the FTP, they emit substantially higher levels of CO at lower ambient temperatures. Stated another way, less progress was achieved in the control of emissions during cold weather than under temperatures similar to those used during EPA's certification testing. Thus, the benefit of the FMVCP was less in those areas, such as Fairbanks, that exceed the NAAQS for CO during cold wintertime air stagnation episodes.

The Borough, with the assistance of ADEC, devoted significant resources to focus EPA's and Congress' attention on the issue of non-FTP emissions. These efforts succeeded in getting non-FTP CO emissions addressed in the CAA. As a result, section 202(j) of the CAA required EPA to promulgate regulations regarding CO emissions certification at 20ºF as well as under FTP conditions. EPA issued a final rulemaking[24] establishing such a program. Under this program, emissions from light-duty vehicles may not exceed 10.0 g/mi CO at 20ºF, and 3.4 g/mi under FTP conditions. (The relative difference in standards reflects the greater difficulty in controlling CO emissions under cold-temperature conditions due to cold start enrichment events.) Light-duty trucks must meet a standard comparable in stringency to the light-duty vehicle cold CO standard.

The Phase I standards took effect beginning with the model year 1994 and were phased in over a three-year period. The benefits of vehicles certified to these cold temperature controls are reflected in the substantial motor vehicle fleet emission reductions forecast to occur between 2001 and future years. The CO benefits of emission control technologies introduced to meet Tier 2 emission standards also contribute to those reductions.

Section 202(j) of the CAA also includes a provision for more stringent Phase II cold temperature CO standards to be implemented if there are six or more CO nonattainment areas remaining as of June 1, 1997. These standards require light-duty vehicles to meet a CO standard of 3.4 g/mi and light-duty trucks to meet a CO standard of 4.4 g/mi beginning with model year 2002 vehicles. (Steubenville, Ohio, and Oshkosh, Wisconsin are excluded from this count of CO nonattainment areas due to the non-vehicular nature of each area's pollution problems.) To date, EPA has not made a formal determination of the number of CO nonattainment areas that existed at the June 1, 1997 deadline and has not made a decision about the need to implement the more stringent Phase II cold CO standards.

Another element of the FMVCP is the recently introduced Tier 2 emission standards for passenger cars, light trucks and larger passenger vehicles. While these standards are focused on reducing emissions most responsible for ozone and particulate matter (i.e., nitrogen oxide or NOx and hydrocarbon or HC emissions), the control equipment introduced to meet these standards will also provide significant reductions in CO. Mandated reductions in the sulfur content of gasoline will further enhance the performance of this equipment. It will also reduce emissions from the existing fleet of gasoline-powered vehicles by reducing the deterioration of catalytic converters. Discussions with EPA caused the agency to incorporate a revision in the final version of MOBILE6 (version 6.2) to capture the CO benefits of the Tier 2 emission standards.

Future Re-Evaluation of Control Strategies

The FNSB and ADEC recognize that in the long term the mix of CO control strategies implemented in Fairbanks could warrant revision. This would be accomplished through a future maintenance plan revision and subject to approval by EPA. This evaluation could result in measures being removed or added to the plan depending on the outcome of the analyses prepared at that time. All changes to the maintenance plan must be approved by EPA.

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III.C.6 Modeling and Projections

Model Selection

In previous air quality plans, Fairbanks acknowledged the limitations of using rollback modeling to determine the emission reductions needed to demonstrate attainment of the ambient CO standard. The rollback modeling approach conflicted with EPA guidance that requires the use of dispersion modeling to demonstrate attainment of the NAAQS. However, concerns about Fairbanks' ability to supply the data needed to accurately characterize emissions and meteorology within the modeling domain and the ability of dispersion models to adequately characterize low-level arctic inversions led EPA to accept the use of rollback modeling. Nevertheless, concerns about the limitations of rollback persisted and the history of attainment demonstrations that underestimated the emission reductions needed to ensure long-term attainment of the CO standard caused the Borough to agree to work with both EPA and a National Research Council (NRC) committee investigating CO to assess the feasibility of using dispersion models to accurately represent conditions leading to CO violations in Fairbanks. The Borough followed through on both of these commitments. This resulted in the development of a probabalistic rollback methodology that was used to demonstrate long-term attainment in the previous maintenance plan. Presented below is a review of the methodology. For further details on the methodology please consult the January 27, 2004 Sierra Research memorandum titled, *Selection of CO Design Values for Fairbanks Maintenance Plan*, included in Appendix III.C.6.

Probabilistic Rollback Modeling

Rollback modeling is a simple calculation that assumes that the percent reduction needed to reduce design values (maximum regulatory values recorded during the period of interest) to the level of the ambient standard dictates the percent reduction in emissions needed to demonstrate attainment of that standard. The only nuance of the calculation is an adjustment to account for the effect of the background concentrations (i.e., emissions not produced or controlled within the area of interest) on the percent reduction needed for attainment. The calculation implicitly assumes that all emissions produced within the modeling domain have an equal impact on attainment. It also assumes that the meteorology producing the specified design value is the worst meteorology that the modeling domain will encounter in future years.

The weakness in the first assumption is that all pollutant sources do not have an equal impact on concentrations recorded at monitors or encountered within the nonattainment area. For example, power plants with high stacks in Fairbanks are very likely emitting pollutants above the low-level inversions that trap emissions from even lower level sources (e.g., cars and trucks, etc.). The effect of terrain (e.g., river valleys) and topography (the hills surrounding the community) on airflow is poorly understood, but has an effect on the relative contributions of upwind sources on concentrations recorded in the urban core. Unfortunately, the best method available to eliminate this assumption is to employ dispersion models that use gridded emission inventories and meteorological data to account for the effect of where and when CO is emitted on concentrations recorded at monitoring sites and throughout the modeling domain. And, as discussed above, too much effort and time would be required to use these models to evaluate attainment prospects in this plan.

The weakness of the second assumption is that the weather is constantly changing and it is not only possible but likely that conditions seen in past years leading to high concentrations will show up again in the future. Thus, unless the weather leading to the specified design value represents the worst historical condition that produced a violation of the standard, use of that design value will underestimate the emission reductions needed to assure long-term attainment of the standard.

Past efforts to address this weakness have used methods that provide an extra level of protection against the recurrence of historically severe meteorology. One example is the use of a safety margin to decrease the level of the ambient standard and increase the percentage reduction in emissions required to demonstrate attainment. Another is to expand the implementation of existing control measures (e.g., parking spaces equipped with electrical outlets for operating plug-ins, expanded road construction, etc.). The problem with these methods is that it is unknown if the additional protection they afford is sufficient to offset the effects of historically severe meteorology. Even less is known about what levels have occurred in the past, how severe they were, and how likely they are to occur again. What is needed is a design framework akin to that used in flood protection planning (i.e., designing for a 100-year flood, a 200-year flood, etc.). For air quality maintenance planning, a statistical measure of the probability of continuing to attain the standard in the face of encountering recorded meteorological events is needed (e.g., a 90% inversion, a 95% inversion, etc.).

Puget Sound developed a methodology to address the weakness in the design value (and implicit meteorology) assumption by evaluating attainment under three separate types of modeling: (1) rollforward emissions modeling to demonstrate continuing attainment throughout the maintenance period, (2) multi-year rollback analysis to determine the probability of continued attainment at existing CO monitoring sites, and (3) air quality dispersion modeling to predict the probability of attainment at non-monitored sites.

One of the reasons these methods provided improved insight is that Puget Sound has seven separate monitoring sites that are widely dispersed. As a result, the evaluation of the emissions produced within the $1/8^{th}$ mile study domain surrounding each of those sites and their effect on attainment prospects via a CAL3QHC modeling approach provided representative geographic coverage of the nonattainment area. This approach, however, would not provide representative geographical coverage of the Fairbanks nonattainment area because until recently all but one of the monitors were located within blocks of each other in the downtown core.

Given the importance of the issue, the previous Maintenance Plan prepared by Fairbanks included a statistical analysis of ambient CO concentrations and related meteorological data recorded between 1990 and 2002. The goal of the analysis was to define a curve of design values representing different probabilities of occurrence. These values were then used with rollback modeling to evaluate the probability of continuing to attain the ambient CO standard in future years. A similar probabilistic methodology has been used to update the CO design values for this plan.

In the prior plan, two different statistical methods were used to examine calendar year trends in design values under alternate confidence intervals. The first was a simple linear regression of 2nd high 8-hour CO concentrations recorded at the individual monitors located in Fairbanks. The analysis used upper bound (i.e., 1-sided) confidence intervals, since lower bound values are not relevant to the selection of design values,* to define potential design values for each monitor. All of the design values at the 90 and 95% levels were found to be above the 8-hour standard of 9 ppm. The problem with this approach was that simple linear regressions poorly represented trends in the data (the R^2 values range between 0.2 and 0.4). The weather-induced annual variation in 2nd high CO values, combined with the steep drop in monitor values in the later years, provided a noisy nonlinear trend that was beyond the scope of simple linear regression to model. There was also concern that this type of analysis offered no insight into the causal factors underlying ambient CO concentrations and little assurance that the factors affecting concentrations recorded in recent years had been adequately accounted for in establishing a design value.

To fill this void, an alternative statistical analysis was conducted. It used data on 8-hour average CO concentrations and corresponding meteorological conditions compiled over the 1990 – 2002 period to develop a physical model of ambient wintertime CO concentrations in Fairbanks. The results of that analysis indicated that CO concentrations were directly proportional to the CO inventory estimated for an average winter day (for each of the years addressed) and were also related to the following meteorological conditions represented in the database:

- A rapid decline as temperatures fall below a reference temperature that indicates onset of ice fog;
- A similar, but less significant decline as temperatures rise above the reference temperature, indicating a reduction in source-specific emission rates;
- Increased trapping and higher concentrations as a result of stronger inversions; and
- Decreased concentrations as a result of higher wind speeds.

Collectively, the analysis indicated that CO peaks are the result of a stochastic (probabilistic) process in which meteorological conditions that support trapping of CO are combined with increased activity levels to produce elevated CO readings at one or more of the monitors. Any given level of CO may occur because meteorological conditions that cause partial trapping coincide with unusually high rates of CO generation, or because stronger trapping conditions coincide with lower CO generation rates. The overall

* For example, a 2-sided 95% confidence interval would establish both an upper and lower bound CO value. The upper bound value would be exceeded only 2.5% of the time (i.e., equivalent to a 97.5% upper bound confidence interval).

probability that a given level of CO will occur is the joint probability of occurrence for all of the above-described causal factors.

Using this approach, the prior air quality plan estimated a design value probability curve based on a Monte Carlo simulation in which:

- Randomly selected weather conditions from the years represented to simulate a hypothetical winter period (i.e., November – February);

- Evaluated expected CO concentrations for each 8-hour period using the physical model and the 2002 emission inventory, so that the resulting values pertained to calendar year 2002 (the base year for the previous maintenance plan);

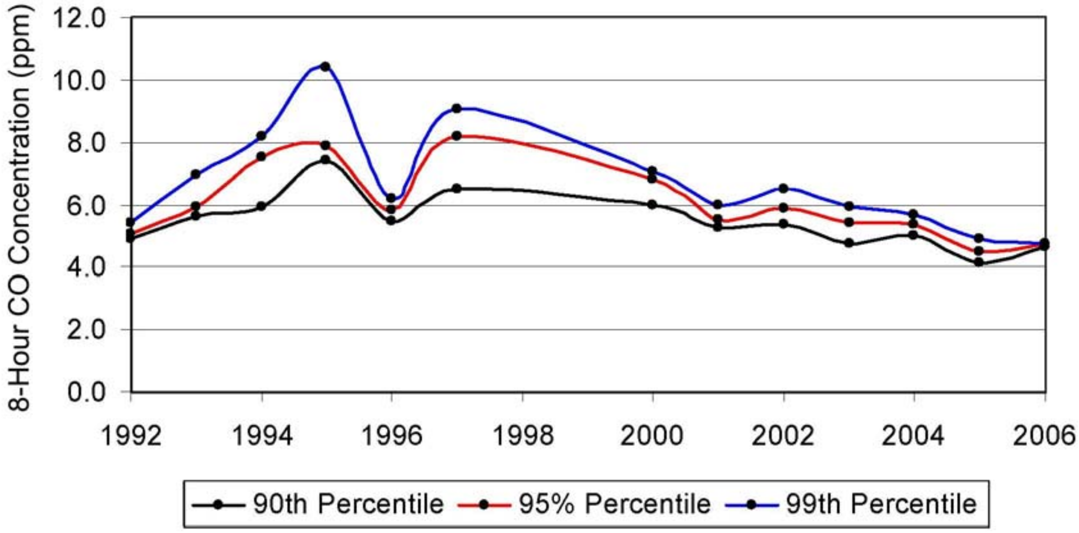
- Used EPA criteria to select 2nd high non-overlapping peak CO values; and

- Stored the resulting 2nd high CO value for each period and repeated the simulation.

A total of 1,000 complete 4-month winter periods, each consisting of 120 days (November-February), were simulated in the analysis to produce 2nd high CO concentrations. For the present air quality plan, the physical model underlying the Monte Carlo simulation has been re-estimated to include more recent CO and meteorology data, and the Monte Carlo simulation has been rerun to estimate a new probablistic curve for CO design values. It should be noted that natural decadal climate variability is an important uncertainty not fully addressed by this modeling. Although Fairbanks experiences higher natural climate variability than most locations in the United States, decadal climate variability has not traditionally been addressed by State Implementation Plans.

Fairbanks has not recorded a CO exceedance since 2000 nor a violation since 1999, and its experience since has been one of declining CO levels, fewer hours each winter with high CO levels, and a trend toward more-moderate meteorological conditions on average. As shown in Figure III.C.6-1, the result is that the highest CO levels observed in winter months (ie. November – February) have declined steadily and the very highest levels (95th and 99th percentiles) have been compressed (down) against the lower percentile levels, even after adjustment for declining CO inventories over time. The extreme CO levels encountered during the 1990s have not recurred. Because the data shown in the figure are inventory-adjusted, the declining inventories over time do not contribute to the observed downward trend in CO levels.

Figure III.C.6-1
Trends in Percentile Levels for High Winter CO Values
(After Inventory Adjustment)



For this plan, the probabilistic analysis was updated to incorporate the more recent experience along with new CO inventory estimates for the average winter day to give the latest information on trends in CO generation activity. By including CO and meteorological data representing the more recent years in the analysis, a lower CO design value curve can be expected compared to the prior plan, as the more-adverse conditions of the 1990s are increasingly counterbalanced by the less-adverse conditions that have occurred since 2000.

Originally, the analysis was to be updated to include new data through the winter of 2005/2006, but it was discovered that crucial meteorological data on temperature lapse rates for the years 2004 – 2006 had been incorrectly recorded or had become corrupted and were not usable. As a result, only one additional year's CO and meteorological data (for 2003) could be included. Fairbanks is in the process of investigating the cause of the problem.

The updated analysis was conducted in three steps to understand the effects of the inclusion of new data and CO inventory estimates and of updates to the methodology. These steps generate the three cases (A, B, and C) shown in Table III.C.6-1, in comparison to the result of the analysis conducted for the prior plan. The prior analysis would imply a CO design value (95% confidence) of 10.5 ppm for the winter of 2005/2006, when adjusted to the new base year using the updated inventories. The updated analyses would imply CO design values ranging from 8.7 to 9.9 ppm. These design values are at a one-sided 95% confidence level, meaning that a higher value would be expected with only 1 chance in 20 (5%) of occurring.

Table III.C.6-1
Summary of Updated Analysis Cases Conducted for Current Air Quality Plan
(Winter 2005/2006 Base Year for an Average Winter Day)

Analysis Components	Prior Maintenance Plan	Current Maintenance Plan		
		Case A	Case B	Case C
Time Period of Data	1990-2002	1990-2002	1990-2002	1990-2003
Base Year for CO Inventory	Adjusted to 2005/06	2005/06	2005/06	2005/06
CO Inventory Source	Updated	Updated	Updated	Updated
Threshold CO Value in ppm (defines high CO days used in the analysis)[a]	5.5	5.5	3.5	3.5
Peak CO Levels Used in Calibrating the Physical Model	Through 2002	Through 2002	Through 2002	Through 2003
Design Value Results (ppm)[b]				
80% confidence level	9.2	7.8	8.2	7.7
90% confidence level	9.9	8.4	9.1	8.5
95% confidence level	10.5	8.7	9.9	9.2

[a] At Winter 2002/03 CO inventory level
[b] As a function of confidence level (1-sided)

The new cases conducted for this air quality plan are:

1. **Case A** re-estimates the physical model developed for the prior air quality plan using an equivalent methodology and data for the period 1990 – 2002, but with the adoption of updated CO inventory values and a correction to the interpretation of temperature lapse rate data. This case estimates the lowest CO design values of all of the cases, 8.7 ppm at 95% probability (one-sided) for the winter of 2005/2006.

2. **Case B** is a transitional case that measures the effect of reducing the CO threshold value to 3.5 ppm while retaining other assumptions from Case A. Winter 8-hour periods in which the CO value exceeds this threshold (as adjusted for inventory changes) are used in the analysis. Because recent years have shown many fewer days with high CO levels, new data for 2003 and later years would make little contribution to the analysis if the CO threshold were retained at its previous 5.5 ppm value. This case estimates the highest CO design values of all of the cases, 9.9 ppm at 95% probability (one-sided) for the winter of 2005/2006.

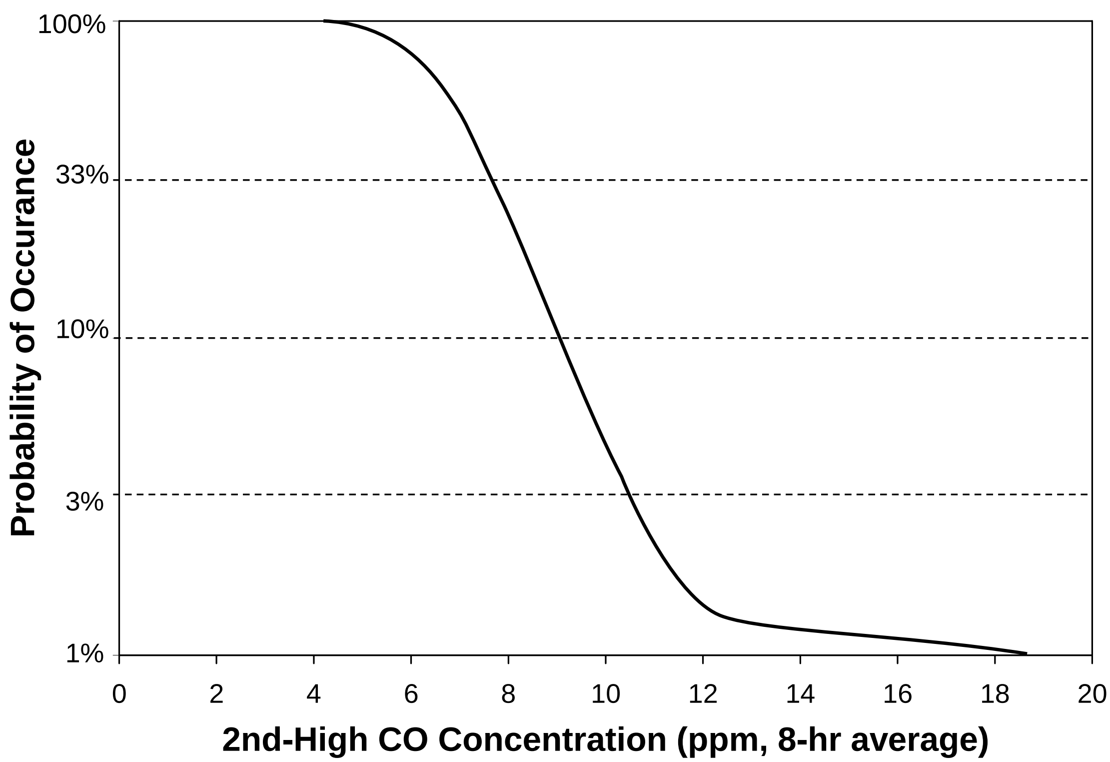
3. **Case C** is the final case in which new CO and meteorological data for 2003 are introduced in the analysis, with the reduction in the CO threshold to 3.5 ppm and use of updated CO inventory values. This case estimates an intermediate CO design value of 9.2 ppm at 95% probability (one-sided) for the winter of 2005/2006.

Cases A and B continue to show that peak CO concentrations are directly proportional to the CO inventory for the average winter day in the form of inventory exponents that are not statistically different from 1.00. Case C shows a more-than-direct proportionality to the CO inventory with an inventory exponent of 1.09 that is statistically different from 1.00. The larger exponent implies that CO levels are falling faster than the CO inventory over time, given constant meteorological conditions as measured by temperature, lapse rate, and wind speed. This may indicate that components of the inventory that are most closely related to surface CO concentrations are falling more rapidly than the overall inventory. It could also indicate the presence of meteorological or other factors, not explicitly accounted for in the physical model, that are contributing to the observed lower CO levels over time and being attributed to a parallel decline in CO inventories over time.

The range of estimated design values from 8.7 ppm to 9.9 ppm at 95% probability reflects the uncertainties present in the analysis given alternatives for the key assumptions, including: the time period of the CO and meteorological data, the threshold CO value, and the use of updated CO inventories. Until these uncertainties can be resolved with additional years of data and an increased understanding of meteorological and other effects on ambient CO levels in Fairbanks, the most conservative (highest) design value estimates have been adopted (from Case B) for use in this air quality plan.

Figure III.C.6-2 presents these results. The horizontal axis is the CO concentration (in ppm) expected for the 2nd high peak and the vertical axis is the probability of occurrence stated as

Figure III.C.6-2
Probability Distribution of 2nd High CO Concentrations for 2005



a percent. It shows that the probability of occurrence declines as CO values increase. A value of 4 ppm is shown to be virtual certainty (i.e., 100% probability of occurrence) and a value of 19 ppm is shown to be very unlikely with a probability of 1%.

Table III.C.6-2 summarizes the CO design values estimates for Fairbanks (at the CO inventory for the winter of 2005/2006) as a function of the confidence interval. At probability levels of 90% or higher, the design values are above the 9 ppm standard, which means that rollback analysis using these values will indicate the need for further emission reductions beyond 2005/2006 to demonstrate continued attainment of the ambient CO standard.

Table III.C.6-2
CO Design Value Estimates for Fairbanks
(As of Winter 2005/2006)

Confidence Interval (1-sided)	CO (ppm)	Probability of Occurrence
80%	8.2	1 year in 5
90%	9.1	1 year in 10
93.3%	9.6	1 year in 15
95%	9.9	1 year in 20

Rollback Calculations – As previously discussed, rollback is used to determine the emission reductions needed to ensure long-term attainment (i.e., maintenance) of the ambient CO standard. It determines a percentage reduction target by taking the ratio of the difference between the design value computed for the base year and the ambient CO standard, and the design value adjusted for ambient background concentration. The rollback calculation is as follows:

$$\% \text{ reduction} = \frac{\text{ppm base - ppm std.}}{\text{ppm base - ppm bg.}} \times 100$$

where:
ppm base = design value
ppm std = NAAQS for CO
ppm bg = background value

Based on consultation with EPA, the base year used in this analysis is 2005. The design values used in the analysis come directly from the results of probabilistic analysis described earlier. Values addressed in this plan range between 80 and 99% confidence levels. The background level used in the calculation is 0.3 ppm. That estimate was recorded at a monitoring site at Chugach Electric Association's Beluga Power Station and approved by EPA for use in previous SIP revisions.[25] It is the only location within Alaska where non-urban ambient CO concentrations have been measured. This site is located on the west side of Cook Inlet in Southcentral Alaska.

The value used for the NAAQS is 9.0 ppm. This is consistent with the previously approved Maintenance Plan. It is considerably more conservative than 9.4 ppm, which is considered the proper monitored value to use as the attainment target. This position is based on a review of the Federal Code of Regulations, Part 50 - National Primary and Secondary Ambient Air Quality Standards, 40 C.F.R. Part 50, as revised on September 13, 1985. However, based on guidance from EPA,[26] the more conservative value of 9.0 ppm was used for the Fairbanks rollback calculation.

The combination of probabilistic design values and conservative assumptions regarding both the CO background level and the attainment target were run through the rollback model. All three current monitoring sites were modeled. A summary of the results for design values reflecting confidence intervals ranging from 80% – 99% is presented in Table III.C.6-3. It shows that if there is no change in emissions relative to 2005, the probability of attainment is 89% (i.e., the probability of attainment in 2005 is 89%). In light of the extremely low average concentrations recorded in Fairbanks in recent years, where the 2nd high concentration in 2005 was only 4.5 ppm, it is clear that this is a conservative methodology. The table also shows that if future inventories increase relative to 2005 baseline (i.e., the percent reduction becomes negative), the probability of attainment will decline below the base year value of 89%.

Table III.C.6-3
% Reductions Required to Demonstrate Maintenance of the Ambient CO Standard at Alternate Confidence Intervals

Confidence Interval	Design Value	%Reduction in 2005 CO Emissions
99.0%	17.8	50.3
98.0%	11.1	19.4
97.0%	10.5	14.7
96.0%	10.2	12.1
95.0%	9.9	9.4
94.0%	9.8	8.4
93.0%	9.6	6.5
92.0%	9.4	4.4
91.0%	9.2	2.2
90.0%	9.1	1.1
89.0%	9.0	0.0
88.0%	8.9	-1.2
87.0%	8.8	-2.4
86.0%	8.7	-3.6
85.0%	8.6	-4.8
84.0%	8.6	-4.8
83.0%	8.5	-6.1
82.0%	8.4	-7.4
81.0%	8.3	-8.7
80.0%	8.2	-10.1

CO Emissions Inventory and Projections

As discussed previously in Section III.C.3, an emissions inventory[27] has been prepared for the FNSB based on EPA guidance and extensive coordination with Region 10 staff. Two separate scenarios were addressed in that effort (one with I/M and one without I/M). The inventory evaluates the impact of dropping the I/M program in 2010 on emissions through 2015. Travel activity used to support the development of on-road mobile source emissions is based on forecasts included in the LRTP. A summary of the combined emissions from all sources is presented in Table III.C.6-4 below. It shows that emissions are forecast to decline steadily from 2005 through 2009 and then increase in 2010 due to the elimination of the I/M Program, and then decline steadily through 2015.

Table III.C.6-4
Forecast of Fairbanks CO Inventory With and Without the I/M Program
(tons/day)

Year	I/M Program Status	CO Inventory	Reduction Relative to 2005
2005	With I/M	31.69	-
2006	With I/M	29.53	2.16
2007	With I/M	27.83	3.86
2008	With I/M	27.10	4.59
2009	With I/M	26.31	5.38
2010	Without I/M	28.56	3.13
2011	Without I/M	27.92	3.77
2012	Without I/M	27.49	4.20
2013	Without I/M	27.23	4.46
2014	Without I/M	27.07	4.62
2015	Without I/M	26.87	4.82

CO Emissions Inventory and Projections

A summary of how the emission reductions projected through 2015 compare with the attainment probabilities presented earlier is presented in Figure III.C.6.3. It shows that the probability of attainment starts at 93% and climbs to 97% in 2008 – 2009. Starting in 2010, however, emissions start to climb because of the termination of the I/M Program. This causes the probability of attainment to decline to 95% in 2010 and 2011. Steady reductions in the overall emission inventory, however, overcome the loss of I/M benefits and the probability of attainment begins to increase in 2012 and reaches 97% by 2015.

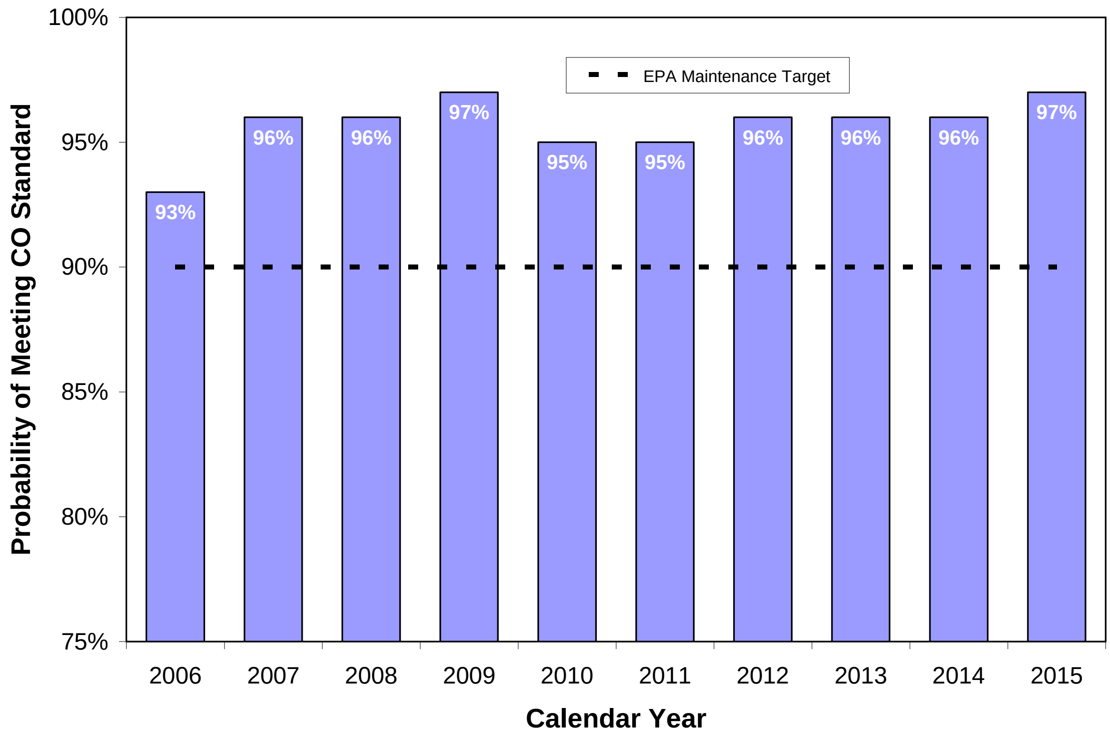
Discussions with EPA staff have indicated that a 90% confidence interval is desirable for a long-term demonstration of attainment for a maintenance plan. The values displayed in

Figure III.C.6.3 indicate that none of the years are projected to fall below this target during the forecast period. Additional considerations that support this finding include:

- Fairbanks has not violated the ambient CO standard since 1999.

- This plan employed a conservative probabilistic approach to selecting design values for determining attainment. The forecast of probability is based on Case B, which does not incorporate the addition of new CO and meteorological data for 2003. Because of data problems, Case B also does not incorporate new CO data for 2004 and 2005, which would extend the downward trend in CO concentrations observed in recent years. Case B therefore represents a conservative forecast of attainment probability.

Figure III.C.6-3
Probability of Continued Compliance



- The rollback methodology used an attainment target of 9 ppm and not a higher, but less stringent, value that takes advantage of rounding of fractional values for standards defined in terms of integers (i.e., a value of 9.4 instead of 9 ppm).

- The benefits of voluntary control measures, including roadway improvements and public education programs, have not been incorporated into the emission inventory forecasts.

- This plan includes numerous contingency measures that either have been and/or are scheduled for implementation (rather than the typical contingency approach in which the measures would be implemented in the event that CO concentrations approach 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 µg/m^3. A review of monitoring data collected in Fairbanks in recent years shows summer values are generally low, approximately 7 µg/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 µg/m^3 standard). Concentrations resulting from these conditions, however, can qualify as exceptional events. Winter values average approximately 23 µg/m^3 (24-hour average), but episodically can exceed 50–60 µg/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

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* *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

* 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.*

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* 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.

III.C.7 Contingency Plan

In the 1980s, nonattainment areas across the country submitted SIPs to EPA demonstrating reasonable further progress (RFP) toward attainment, and actual attainment by the required deadline of December 31, 1987. However, many of these areas failed to achieve both RFP and attainment. This failure resulted primarily from inaccuracies in existing computer models and difficulties in implementing plan provisions. To provide added assurance that current nonattainment areas would not experience similar problems, Congress included the concept of contingency control measures in the 1990 Clean Air Act Amendments (CAA).

Section 172(c)(9) of the CAA requires individual nonattainment plans to "provide for the implementation of specific measures to be undertaken if the area fails to make reasonable further progress, or to attain the national primary ambient air quality standard by the (applicable) attainment date . . . ." It further states that such contingency measures shall be structured to take effect, if triggered, without any further action by the State or EPA. Fairbanks has successfully implemented contingency measures in the past when it failed to demonstrate attainment of the ambient standard. The most recent example was the implementation of the repair technician training and certification (TTC) credits as an I/M program element in 1996 after failing to attain as a moderate CO nonattainment area by the end of 1995.

A number of contingency measures have been established to provide additional emission reductions for Fairbanks. A summary of these measures and their funding is presented in Table III.C.7-1. All but the last of the measures listed in the table are included in the Statewide Transportation Improvement Program (STIP)[28] and have funding commitments for the specified years.

Table III.C.7-1
Contingency Measures for Fairbanks, Alaska

Project #	Title	Funding						
		FFY '04	FFY '05	FFY '06	FFY '07	FFY '08	FFY '09	FFY '10
18022	Advanced OBDII Repair Training	X						
12424	Coordinated Transit Program	X						
9339	Electrical Plug-In and Operation Program	X						
17087	Bus Fleet Replacement		X	X				
18023	Sticker Application Project	X						
6401	Paratransit Vehicle Replacement				X			
18024	OBD I/M Performance Tracking Project	X						
18025	Repair Effectiveness Improvement Project	X						
18026	Enhanced Motorist Compliance Project	X	X	X				
3854	Bus Stop Shelters		X	X				
12519	New Busses/New Routes			X	X			

Table III.C.7-1
Contingency Measures for Fairbanks, Alaska

Project #	Title	Funding						
		FFY '04	FFY '05	FFY '06	FFY '07	FFY '08	FFY '09	FFY '10
19110	North Pole Park and Ride						X	
13201	Oxy-Sensor Program			X				
18790	Low Sulfur Fuels (LSF) Impact Study					X		
20878	PM 2.5 Reductions					X		
[a]	Road System Improvements	X	X	X	X			

[a] The STIP lists and has funding commitments for nearly 20 projects that will improve traffic flow within the nonattainment area (e.g., grade separation, intersection improvements, road widening, etc.).

The listed projects include a mix of I/M, transit, emission measurement, electrical plug-in and roadway improvement projects (many of these were previously described in Section III.C.5). Unlike the normal contingency approach in which these measures would be implemented only if Fairbanks exceeded the CO NAAQS, most of the measures have already been scheduled for implementation. CO reductions expected from all but the roadway improvement projects and oxygen sensor replacements in the latter half of 2007 and 2008 were not included in the maintenance projections presented in Section III.C.6, and the anticipated air quality benefits from these measures are not necessary to demonstrate maintenance. Therefore, the scheduled implementation of these contingency measures is expected to provide Fairbanks with an added measure of assurance of continued compliance with the CO NAAQS beyond that discussed in that section.

Section 175A(d) of the Clean Air Act requires maintenance plans to retain the ability to implement all control measures which were contained in the state implementation plan before redesignation to attainment. To satisfy this requirement, when the Fairbanks I/M Program is removed as an active control measure at the end of 2009 it will become a contingency measure and available for implementation if needed to ensure continued attainment of the ambient CO standard. As documented in Section III.C.9, Fairbanks will retain the local legal authority necessary to implement the I/M Program as a contingency measure. Similarly, the State will retain its authority to implement the I/M Program under state regulation, 18 AAC 52 (included in the appendix to section III.A.2), as specified in Alaska Statutes 46.14.400 (included in the appendix to Volume II of this plan). Since the program is financially self supporting, no funding will be needed to restart the program.

In the event monitoring data indicate that a violation of the ambient CO standard has occurred, the Borough would examine the data to assess the spatial extent (i.e., hot spot versus region) and severity of the episode as well as trends over time. Based on this information, Borough staff in consultation with ADEC would determine which of the following measures to implement:

- Increased public awareness;
- Enhanced public transit;
- Expansion of the supply of plug-ins;
- Altered signal timing;
- Roadway improvements; and
- Reintroduction of the I/M Program.

The schedule for completing the above process would allow one month for data analysis and control measure selection once the data are validated. The time required for control measure implementation would depend on the measure(s) selected, but in no case would extend beyond the beginning of the next winter season. If inventory revisions in future years indicate the probability of attainment will drop below a 90% confidence interval, the Borough would conduct a similar analysis and consultation process with ADEC to select and implement an appropriate mix of control measures. Once measures are implemented, the Borough will track monitoring data and determine in consultation with ADEC whether additional controls are needed.

On August 28, 2003, the FNSB Assembly adopted Resolution No. 2003-44, a resolution that urged the development of a hydrogen fuel infrastructure as a means to provide additional CO reductions in the Fairbanks area while also bringing jobs and economic development to the community. The resolution, a copy of which is included in Appendix III.C.7, referenced President Bush's FreedomCAR (Cooperative Automotive Research) and Fuel Initiative, and indicated that:

1. The FNSB Assembly supports the development of hydrogen fuel; and

2. Efforts being made to bring hydrogen fuel and hydrogen powered vehicles to the Fairbanks area in order to reduce CO emissions would be listed in this maintenance plan.

The resolution demonstrates the Borough's support of developing a hydrogen fuel infrastructure in Fairbanks as another means to reduce local CO emissions.

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III.C.8 Fairbanks Emergency Episode Plan

Section 127(a) of the CAA requires all SIPs to include measures providing public notification of instances or areas in which any NAAQS is exceeded, and of the health hazards associated with such pollution. EPA previously issued guidance on the adoption of emergency episode plans designed to keep air pollution concentrations below those levels considered to have adverse consequences on human health. In October 2003, the FNSB Assembly adopted revisions to the Borough's CO Emergency Episode Prevention Plan.[29] As noted previously, a copy of this ordinance, 2003-71, is included in Appendix III.C.5. The revised plan requires the Borough to issue daily weekday CO forecasts during the months of November through February (i.e., the period of potential CO episodes). The forecasts are based on CO data collected from the Borough's ambient CO monitoring and meteorological reporting network.

Under the plan, an air quality alert is to be declared whenever the Borough determines that a violation of the 9 ppm 8-hour CO standard is likely to occur and CO concentrations are expected to remain at that level for 12 hours. Declaration of an alert results in the implementation of a woodstove burning ban throughout the nonattainment area for the duration of the alert. This episodic measure was previously described in Section III.C.5, and its implementation is projected to provide the additional CO reductions estimated in that section during the period of the alert. The Borough will notify local news media to ensure that the declared alert is broadcast to the public. This notification will include the CO forecast and additional information on how the public can further reduce CO emissions (e.g., through use of public transporation and engine preheating, and eliminating unnecessary vehicle travel and trips). The alert and accompanying woodstove burning ban will continue until cancelled by the Borough.

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III.C.9 Assurance of Adequacy

Under section 110(a)(2)(E) of the CAA, each SIP must provide the necessary assurances that the State or the general-purpose local government designated by the State (e.g., the FNSB) for such purposes will have "adequate personnel, funding and authority" under State or (as appropriate) local law to carry out the SIP. The CAA also states that the SIP must provide necessary assurances that, where the State has relied on a local government for the implementation of any plan provision, the State has responsibility for ensuring adequate implementation of such plan provisions.

Local Legal Authority

As previously noted, the key local CO control measures contained in this air quality plan are (1) the continuation of and enhancement of the Borough's existing I/M program through 2009 (after which it would become a contingency measure), (2) the increased availability of plug-ins and the mandated supply of power to them at temperatures below 21º F, and (3) an episodic woodstove burning ban that will occur whenever an air quality alert is declared. The State of Alaska has delegated authority for air pollution control within the Borough to the FNSB under Alaska Statute, AS 46.14.400 (formerly AS46.03.210). AS 46.03.210 allowed local municipalities to establish air pollution control programs within their jurisdictions by August 5, 1974. The FNSB Assembly adopted such authority by ordinance. A copy of the FNSB air pollution control regulations, codified as Chapter 8.04 of FNSB Code of Ordinances, is included in Appendix III.C.9.

Under AS 28.10.041 (10) and AS 29.04 (copies of both are provided in the Volume III Appendix to Section II), the Borough also has the authority to implement a motor vehicle emissions inspection program. Authority for the Fairbanks I/M program was enacted by the FNSB Assembly in March 1984.[30] A copy of the enabling ordinance, No. 84-24, is included in Appendix III.C.1, and copies of the resolutions continuing and enhancing that program as the local transportation control program are included in Appendix III.C.5. A copy of the FNSB vehicle inspection and maintenance program regulations, codified as Chapter 8.18 of FNSB Code of Ordinances, is included in Appendix III.C.9. The FNSB Assembly enacted authority for the plug-in power requirements (Ordinance No. 2001-17) and the episodic woodstove burning ban (Ordinance No. 2003-71) on April 12, 2001, and October 30, 2003, respectively. Copies of the enabling ordinances for each of these measures are included in Appendix III.C.5.

Adequate Local Personnel and Funding

The Fairbanks air quality program is designed to be financially self-supporting. The air quality program includes the implementation and operation of all local CO control measures described in Section III.C.5, including the I/M program. Borough administration of the entire air quality program is funded through (1) fees for Certificates of Inspection that are charged by the FNSB to certified I/M stations and (2) a small Section 105 grant that is received from EPA by the Borough. (A Certificate of Inspection is required by the state Division of Motor Vehicles [DMV] before a vehicle subject to the program can be registered.) The I/M stations in turn pass on these fees to the vehicle owners. The certificate fee charged by the FNSB is $20. Certificate revenues collected from the stations, combined with the Section 105 grant funds, are sufficient to maintain adequate funding of air quality program costs.

The overall budget and staffing level of the air quality program is reviewed annually by the Borough Administration and Assembly during the adoption of the Borough's annual operating budget. Upon justification by the program manager, the Assembly provides the Administration with authorization for adequate personnel to carry out the air quality program. This annual process ensures that program staffing levels can be upgraded on a timely basis if required, while also providing the fiscal control required by Borough ordinance. This process will be used to ensure that the funds available for operating the program in 2010 and later years match the air quality program operating requirements. As described in Section III.C.5, additional CMAQ funds are also obtained through the standard transportation planning process on a project-specific basis to fund special, short-term programs.

III.C.10 Motor Vehicle Emissions Budget

The requirements for transportation and general conformity are found in 18 AAC 50.700 through 50.735 of State regulation; and specifically for transportation conformity in Volume II - Section III.I, and for general conformity in Volume II - Section III.J in the State Air Quality Control Plan (SIP). Table III.C.10-1 shows the carbon monoxide motor vehicle emissions budget for the Fairbanks nonattainment area applicable to conformity determinations.

The budget is based on the emission inventories and attainment projections found in the Volume III Appendix to Section III.C.3. This motor vehicle emissions budget applies for each of the years listed in Table III.C.10-1. The values presented for 2006, 2010 and 2015 are based upon guidance from EPA that 90% is the confidence level target for maintenance plans. The 2006 value represents the mobile source component of an inventory meeting the 90% probability of attainment. Budgets for 2010 and 2015 are reduced relative to 2006 to offset the growth forecast for the non-mobile source categories (i.e., point, area and nonroad sources). This approach assures that when mobile source emissions meeting those budgets are combined with the forecasted values for the other source categories that a 90% confidence interval for the overall inventory will be maintained. Section III.C.6 provides a justification for accepting this confidence level.

Table III.C.10-1
FNSB Motor Vehicle Emissions Budget

Calendar Year	CO Emissions (tons/day)
2006	24.62
2010	24.01
2015	23.61

The motor vehicle emissions budget, when found adequate by EPA, establishes a ceiling for emissions from the on-road sources. The on-road source budget is based on emissions inventories and attainment thresholds calculated using a "hybrid" method that combined measured idle test data with MOBILE6 in AKMOBILE6. The on-road portion of the inventory is used for transportation conformity purposes.

For an emissions budget to be found adequate by EPA, the revisions to the air quality control plan that establishes the budget must:

- be endorsed by the Governor (or a designee);
    - Prior to submittal to EPA, this plan will be filed by the Lieutenant Governor as per state regulation.

- be subject to a public hearing;

  - Prior to submittal to EPA, these plan revisions were the subject of a public hearing held in Fairbanks on January 3, 2008. The affidavit of oral hearing is included in Appendix III.C.10.

- be developed through consultation among federal, State and local agencies;

  - Federal, state, and local agencies were consulted on the motor vehicle emissions budget. No comments were received.

- be supported by documentation that has been provided to EPA ;

  - This plan contains documentation supporting the motor vehicle emission budget. See Section III.C.3. The CO emission inventory is included in Appendix III.C.3.

- address any EPA concerns received during the comment period;

  - No comments were received from EPA during the formal comment period.

The methodology presented in this section is consistent with the methodology employed in the previous Maintenance Plan, which was designed to address guidance received from EPA Region 10 staff, including:

- clearly identify and precisely quantify the revised budget;

  - This section clearly identifies the motor vehicle emissions budget for Fairbanks.

- show that the motor vehicle emissions budget, when considered together with all other emissions sources, is consistent with the requirements for continued maintenance of the ambient CO standard;

  - The motor vehicle emissions budget is established based on the Fairbanks CO emission inventory. The budget when considered with all other emission sources is consistent with the requirements for continued maintenance of the CO standard. In particular, see Sections III.C.3, III.C.5, III.C.6, and III.C.7

- demonstrate that the budget is consistent with and clearly related to the emissions inventory and the control measures in the plan revision;

  - The motor vehicle emissions budget is established based on the Fairbanks CO emission inventory and control measures included in the plan. In particular, see Sections III.C.3, III.C.5, III.C.6, and III.C.7.

- explain and document revisions to the previous budget and control measures, and include any impacts on point or area sources; and

- The budget presented in this plan is an update of the 24.62-ton per day budget established in the previous version of this plan. A discussion of revisions to the control measures and impacts on point and area sources is included in section III.C.5

- address all public comment on the plan's revisions and include a compilation of these comments.

  - The response to comments received is included in Appendix III.C.10. In addition, the Fairbanks North Star Borough Assembly passed resolution #2007-46 approving the plan revisions on October 25, 2007. A copy of this resolution is also included in Appendix III.C.10.

Once a motor vehicle emissions budget is found to be adequate by EPA, the Fairbanks Transportation Plan and Transportation Improvement Program (TIP) must be less than or equal to the motor vehicle emissions budget. For projects not from a conforming TIP, the additional emissions from the project together with the TIP emission must be less than or equal to the budget.

As a result of the hybrid method used for calculation of Fairbanks mobile source emissions, it is necessary to clearly set out a means for agencies to compute emissions for use in TIP and project conformity determinations.

On-road mobile source emission inventories typically are computed using emission factors generated by EPA's latest vehicle factor model, MOBILE6 (version 6.2). Unfortunately, MOBILE6 is limited in its ability to represent wintertime CO emission factors in cold-weather communities. That model fails to adequately treat two very common wintertime practices in Fairbanks that significantly affect vehicle CO emissions:

1. Extended initial idling of vehicles to warm them up prior to travel; and

2. Use of "plug-in" heaters to keep the engine warm while parked for long periods to aid in cold start driveability.

To address these limitations, on-road mobile source emissions were computed using a hybrid methodology in a shell program, AKMOBILE6, that combines actual measurements of warm-up idling and plug-in benefits with emission factors from MOBILE6. See Appendix III.C.10 for instructions on operating AKMOBILE6 (User's Guide to AKMOBILE6, October 23, 2007).

To address the subsequent use of this hybrid approach within the conformity process, the following steps are being incorporated into the conformity procedures for Fairbanks plans and projects. The additional steps set out in this section are to be used in conjunction with the applicable requirements for conformity found in 18 AAC 50.700-18 AAC 50.735 and Volume II - Sections III.I and III.J of this SIP.

Regional Conformity − For regional emissions analyses (e.g., Plan/TIP updates and regionally significant projects), computation of mobile source emissions will use a method that follows the hybrid method used in developing the emission budget. AKMOBILE6 is the emissions model to be used in computing regional emissions estimates. Under a regional conformity determination, mobile source emissions of a regionally significant project or a transportation improvement program must be compared to the applicable emissions budget established in the SIP. Thus, the emission calculations of a project or plan must be consistent with the methodology used to establish the motor vehicle emissions budget.

Project-Level Conformity – Under project-level analysis, conformity determinations cannot be made by comparing localized project emissions to a regional emissions budget. Instead, project-level conformity analysis consists of performing hot-spot dispersion modeling to determine whether a project will cause or contribute to any new violations of ambient standards or increase the frequency or severity of existing violations. This hot-spot modeling requirement applies to nonattainment and maintenance areas for each pollutant. Thus in Fairbanks, hot-spot CO modeling must be performed in project-level conformity determinations. Inputs to the hot-spot modeling include link-specific vehicle emission factors for roadway segments in the project vicinity. For project-level analyses, these emission factors will be developed in one of two ways, depending on the type of project. Through the interagency consultation process, a project will be put into one of two tracks:

1. Those projects that are **not** significantly impacted by changes in off-road emissions (e.g., initial idling and engine block heater use) will follow a more routine approach to computing emission impacts using MOBILE6 and CAL3QHC. Off-road emissions will not be directly modeled in the analyses of these projects, as they do not change as a result of the project. For these types of projects, off-road emissions are accounted for in the background input to the hot-spot modeling. Examples of this type of project include street widening and signalization improvements.

2. Those projects that **are** significantly impacted by changes in off-road emissions (e.g., initial idling and engine block heater use) will follow a process that incorporates both the off-road emissions and the on-road "traveling" emissions. This will require a hybrid approach using AKMOBILE6 to represent roadway link-specific emissions in the local vicinity of the project. Examples of this type project include the construction or expansion of parking garages and inter-modal facilities.

The interagency consultation process will be the key means of ensuring that projects are placed in the correct track for calculation of emission impacts. The interagency consultation process will also be important in ensuring that appropriate analyses of project emission impacts are conducted under the two scenarios listed above. As always, conformity determinations will be subject to the applicable public review requirements required under regulation. This provides the public an opportunity to comment on the approach that is taken for the conformity determination for each plan, program and project.

The background values employed in hot spot CO modeling must be based on local measurements taken from monitors in the immediate vicinity of the project site. In the absence of such data, a background CO value of *5.7 parts per million (ppm)* for a one-hour averaging time should be used in conjunction with the directly modeled vehicle emissions for the roadway links to compute total ambient CO impacts. This value came from an ADEC CO Saturation Study conducted in 2001 and should be used in representing base-level one-hour background values for the entire nonattainment area. This value should be adjusted to account for projected changes in the regional CO inventory over time as shown in the Table III.C.10-2. Values for the years between 2010 and 2015 should be interpolated.

Table III.C.10-2
Hot Spot Background Values
(1-hr CO concentrations)

Calendar year	Adjustment Factor	Background Value
2001	1.00	5.7
2005	0.88	5.0
2006	0.79	4.5
2007	0.75	4.3
2008	0.73	4.1
2009	0.71	4.0
2010	0.70	4.0
2015	0.66	3.7

General Conformity – For projects requiring general conformity determinations, it is also important to consider the impacts of off-road motor vehicle emissions (e.g., idle emissions) in developing conformity determinations. Interagency consultation shall be used to determine whether off-network mobile source emissions are significant and what analysis of these emissions is appropriate for determining general conformity. An example of this type of project is an airport expansion.

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III.C.11 Redesignation Request

On June 21, 2004, the department and the Borough submitted to the EPA a Maintenance Plan and concurrently requested redesignation of the Fairbanks carbon monoxide serious nonattainment area to attainment of the CO NAAQS. Section 107(d)(3)(E) of the CAA requires the U.S. EPA administrator to make five findings prior to granting a request for redesignation:

1. The U.S. EPA has determined that the NAAQS has been attained;

2. The applicable implementation plan has been fully approved by U.S. EPA under section 110(K);

3. The U.S. EPA has determined that the improvement in air quality is due to permanent and enforceable reductions in emissions;

4. The state has met all applicable requirements for the area under Section 110 and Part D; and

5. The U.S. EPA has fully approved a maintenance plan, including a contingency plan, for the area under Section 175A, which includes as contingency measures all contingency measures that were contained in the most recently approved State Implementation Plan.

Information necessary for EPA to make these five findings follows.

Attainment of the Standard

According to EPA guidance, the demonstration of attainment with the CO standard must rely on 24 consecutive months of quality-assured air quality monitoring data collected in accordance with 40 CFR 58. The Fairbanks CO nonattainment area has not experienced any exceedances of the NAAQS since 1999. An expanded discussion of Fairbanks CO air quality data is included in Section III.C.3.

Approved Implementation Plan

As discussed in Section III.C.1, the department revised its State Implementation Plan in response to the moderate nonattainment designation in 1994. When Fairbanks was unable to achieve attainment by the 1995 deadline, the department submitted revisions to meet the requirements of its serious nonattainment redesignation. The attainment plan revisions were approved through the Fairbanks North Star Borough, incorporated into state regulations, and submitted to EPA for findings of adequacy and budget approvals. The attainment plan became effective on April 5, 2002. EPA approved the plan in July 2002.

Permanent and Enforceable Emission Reductions

CO reductions leading to attainment of the federal standards are the result of local control actions that were implemented beginning in 1978. Additionally, the FNSB adopted the I/M technician training and certification program contingency measure in the moderate plan as backup should violations occur. This measure was triggered in 1996. Section III.C.5 contains an expanded discussion of existing control action implementation. Section III.C.6 contains a discussion of long-term prospects for attainment aided by the reductions resulting from the continued implementation of the vehicle inspection and maintenance program, engine block heater program, vehicle oxygen sensor replacement program, episodic woodstove burning ban, and transit.

Section 110 and Part D Requirements

Section 110 and Part D of the CAA address implementation of SIPs and SIP requirements for nonattainment areas. EPA's finding of adequacy and budget approval of the FNSB Serious Area SIP on April 5, 2002, demonstrate compliance with the Section 110 and Part D requirements.

Approved Maintenance Plan

The department in conjunction with the Borough submitted the Maintenance Plan concurrently with the redesignation request. The department requested that EPA expeditiously review the Plan and, if determined to meet the provisions of the CAA, approve the Maintenance Plan as a part of the redesignation process.

On July 27, 2004, the EPA published a direct final rule approving the Maintenance Plan and redesignating the Fairbanks CO nonattainment area to attainment effective September 24, 2004.

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3. "Procedures for Processing Requests to Redesignate Areas to Attainment," memorandum for John Calcagni, Director, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Air Quality Management Division, to EPA Regional Office Air Directors, September 4, 1992.

4. Vehicle miles traveled data supplied by Paul Pruzak, Alaska Department of Transportation and Public Facilities, Northern Regional Office, November 2003.

5. Census data supplied by the Alaska Department of Transportation and Public Facilities (ADOT&PF).

6. LRTP report

7. "1997 – 1998 – 1999 Annual Traffic Volume Report," State of Alaska, Department of Transportation & Public Facilities.

8. Alaska Statutes 46.14.400, Local Air Pollution Control Programs; Fairbanks North Star Borough Assembly Ordinance No. 99-087, adopted December 9, 1999.

9. United States Motor Vehicle Inspection and Maintenance (I/M) Programs," prepared by Sierra Research, Inc., Report No. SR00-08-01.

10. "Alaska I/M Program Manual, Part I: Alaska2000 Emissions Inspection System (EIS) Specifications," Alaska Department of Environmental Conservation, November 29, 1999.

11. Private communication with Glenn Miller, FNSB I/M Program Office, November 2003.

12. "Final Report on the I/M Evasion Enforcement CMAQ Project in Fairbanks, Alaska," Draft Report, prepared for Alaska Department of Environmental Conservation, by Sierra Research, Inc., September 2003.

13. Fairbanks Wintertime Parking Lot Survey Results, performed by Alaska Department of Environmental Conservation, February 2000 and 2002.

14. Letter from Michele Brown, Commissioner, Alaska Department of Environmental Conservation, to Chuck Clark, Regional Administrator, U.S. Environmental Protection Agency, Region 10, March 26, 1996.

15. "Revised I/M Program Evaluation Criteria Paper," ECOS/STAPPA NHA I/M Workgroup, July 11, 1996.

16. Spreadsheet of Parking Spaces Equipped with Plug-ins, transmitted from Leah Bobick to Bob Dulla of Sierra Research, dated April 9, 2001.

17. Personal communication from Alan Braley, Fairbanks International Airport to Siona Delaney, Sierra Research, August 8, 2007

18. Ordinance No. 2001-17, "An Ordinance Mandating a Fairbanks North Star Borough Motor Vehicle Plug-in Program."

19. "Analysis of Causes of Failure in High Emitting Cars," American Petroleum Institute Publication No. 4637, February 1996.

20. "Causes of Failure in High Emitting Cars," SAE Paper No. 961280, Presented at the SAE Government/Industry Meeting, Washington, DC, April 1996.

21. "Benefits and Costs of Oxygen Sensor Repairs on High-Emitting Vehicles," Presented at the 12th Annual Mobile Sources/Clean Air Conference, September 17-19, 1996.

22. Spreadsheet of Highway Construction Projects Transmitted from Paul Pruzak, Alaska Department of Transportation, to Bob Dulla, Sierra Research, dated February 6, 2001.

23. Memorandum of Understanding between Fairbanks North Star Borough and the State of Alaska, January 23, 1997.

24. "Control of Air Pollution from New Motor Vehicles and New Motor Vehicle Engines; Interim Regulations for Cold Temperature Carbon Monoxide Emissions from Light-Duty Vehicles and Light-Duty Trucks; Proposed Rule," Federal Register, Volume 55, Number 180, September 17, 1990.

25. Personal communication from Michael Lidgard, Engineer, U.S. Environmental Protection Agency, Region X, to Ronald King, Project Manager, Alaska Department of Environmental Conservation, dated April 27, 1990.

26. Personal communication from David Kirchner, Chief of Air Programs Development Section, U.S. Environmental Agency, Region X, to Leonard Verrelli, Chief, Air Quality Management, Alaska Department of Environmental Conservation, dated November 19, 1991.

27. Robert G. Dulla, et. al., "Fairbanks 1995-2001 Carbon Monoxide Emission Inventory," Sierra Research Report, July 24, 2001, prepared for the Fairbanks North Star Borough.

28. "2004 – 2006 Statewide Transportation Improvement Program," Alaska Department of Transportation and Public Facilities, November 2003.

29. Fairbanks North Star Borough Assembly Ordinance No. 2003-71, October 2003.

30. Fairbanks North Star Borough Assembly Ordinance No. 84-24, March 22, 1984.