Alaska Department of Environmental Conservation

Amendments to:

State Air Quality Control Plan

Vol. II: Analysis of Problems, Control Actions

Section III.B: Anchorage Transportation Control Program

Adopted

August 20th, 2010

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

Introductory Note: In this document each reference to "CAAA" means the Clean Air Act Amendments of 1990, P.L. 101-549.

SECTION III.B ANCHORAGE CARBON MONOXIDE CONTROL PROGRAM

III.B.1. Planning Process

Background

Anchorage was first declared a nonattainment area for carbon monoxide (CO) on January 27, 1978. The Alaska Department of Environmental Conservation (ADEC) had recommended that the Environmental Protection Agency (EPA) designate a major portion of the Anchorage urban area as a nonattainment area for CO. The EPA accepted this recommendation, and in 1982 the Municipality of Anchorage (MOA) prepared a CO attainment plan which was incorporated as a revision to the State of Alaska Air Quality Control Plan. The State of Alaska Air Quality Control Plan serves as the State Implementation Plan (SIP) for air quality. A primary goal of the Anchorage CO plan was to attain the National Ambient Air Quality Standard (NAAQS) by December 31, 1987.

Anchorage, however, failed to achieve attainment by the December 31, 1987 deadline mandated in the 1977 Clean Air Act Amendments (CAAA). The Clean Air Act was amended again in November 1990. When these amendments were published, the EPA designated Anchorage as a "moderate" nonattainment area for CO and required the submission of a revised air quality plan to bring Anchorage into attainment with the NAAQS by December 31, 1995. The MOA prepared a revised air quality attainment plan that was approved by the Anchorage Metropolitan Area Transportation Solutions (AMATS) Policy Committee and Anchorage Assembly in December 1992. It was later approved by the EPA as a revision to the Alaska SIP in 1995. However, two violations* of the NAAQS were measured in 1996. As a consequence, on July 13, 1998, the EPA reclassified Anchorage from a "moderate" to a "serious" nonattainment area for CO.

Anchorage has not violated the NAAQS since 1996. Upon review of Anchorage CO monitoring data, EPA determined that Anchorage had attained the NAAQS. This finding was published in a July 12, 2001 Federal Register Notice (Federal Register Vol. 66, No.134, pages 36476-36477, effective August 13, 2001). However an "attainment finding" in and of itself is not sufficient to re-designate an area to attainment. The CAAA establishes additional planning requirements that must be satisfied before the EPA administrator can reclassify an area to attainment. An attainment plan and subsequently, a maintenance plan must be submitted to EPA for approval. The attainment plan, which shows that Anchorage achieved the emission reductions necessary to attain the CO NAAQS by the December 31, 2000 deadline stipulated in the CAAA for serious CO nonattainment areas, was completed and approved by the Anchorage Assembly on September 25, 2001. ADEC incorporated the plan as a revision to the Alaska SIP which was later approved by the EPA effective October 18, 2002.

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* Three exceedances of the NAAQS were measured at both the Seward Highway site and Benson site. Because the NAAQS allows one exceedance of the NAAQS per year at each site, three exceedances at a site constitutes two violations.

After the approval of the attainment plan, a maintenance plan was prepared. It showed that CO emissions in Anchorage would remain at a level that assures continued attainment of the NAAQS through calendar year 2023. The maintenance plan was approved by the Anchorage Assembly on October 7, 2003 and submitted to ADEC as a proposed revision to the Alaska SIP. ADEC obtained approval of this SIP revision by the EPA, effective July 23, 2004. With this approval, the EPA Regional Administrator reclassified Anchorage from serious CO nonattainment to an area that is in attainment with the NAAQS. The primary CO control measures committed for implementation in the 2004 maintenance plan were the Vehicle Inspection and Maintenance (I/M) Program, the Share-A-Ride / Vanpool Program, and the block heater promotion program.

On November 6, 2007 the Anchorage Assembly voted to discontinue the I/M Program by December 31, 2009 or earlier if EPA approval of the SIP revision necessary to delete this committed SIP measure could be obtained.* However, on July 15, 2008 they revoked this action and voted to continue I/M with some modifications. The most significant change to the I/M Program was extending the testing exemption for new cars from four to six years, beginning January 2010.†

The Assembly also directed the Municipal Department of Health and Human Services to work with the State of Alaska to remove the I/M Program as a primary control measure in the State Implementation Plan for air quality with a stipulation that it be retained as a local option and not be subject to a further SIP revision if further local action results in changes to or a discontinuation of the program.

The MOA and ADEC decided to implement the changes mandated by the Assembly in a two-phase SIP revision. The first phase of the revisions makes the relatively straight-forward changes necessary to extend the new car I/M test exemption from four to six years. The Assembly adopted these revisions on May 26, 2009 and a revised SIP was submitted to ADEC shortly thereafter. This SIP revision also included an updated CO emission inventory and motor vehicle emission budget, and changes to the contingency measure provisions in the Plan.

The second phase of these revisions, which are reflected in this document, address the more complicated issue of deleting the commitment to I/M in the SIP while preserving the right of the MOA to continue the program as a “local option.” Before these SIP revisions could proceed, however, it was necessary to determine whether Alaska statute or regulation prohibited the operation of a local I/M program not mandated in the SIP. MOA, ADEC and the Alaska Department of Administration’s Division of Motor Vehicles (DMV) have worked together to examine the regulatory and operational issues associated with implementing a local option I/M program in Anchorage. They have concluded that a local option program is viable pending revisions to the Alaska Administrative Code and the execution of a memorandum of understanding between MOA, ADEC and DMV that lays out the roles and responsibilities of each entity in the operation of a local option I/M program in Anchorage.

* Assembly Ordinance 2007-122(S)

† These actions were taken in Assembly Ordinance 2008-84(S). The ordinance also exempts vehicles with historical and classic license plates from testing.

The second phase of these SIP revisions, contained herein, deletes to the commitment to I/M as a primary CO control strategy. I/M is now included in the menu of contingency measures that could be implemented if Anchorage were to violate the NAAQS in the future. Because I/M provides reductions in CO emissions, the elimination of I/M was factored into new projections of future CO emissions and probability estimates for continued maintenance of the CO NAAQS. No other substantive changes have been made to the SIP.

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

Local Planning Process

The Anchorage air quality maintenance plan was prepared in accordance with the provisions of sections 110(a)(2)(M) and 174 of the CAAA (42 U.S.C. 7410(a)(2)(m) and 42 U.S.C. 7504), which require the consultation and participation of local political subdivisions and local elected officials. Under section 174 (42 U.S.C. 7504), 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." Such an organization is required to include local elected officials and representatives of the following organizations:

- the state air quality planning agency (i.e., ADEC);
- the state transportation planning agency (i.e., Alaska Department of Transportation & Public Facilities (ADOT/PF)); and
- the metropolitan planning organization (MPO) responsible for the Continuing, Cooperative, and Comprehensive (3C) transportation planning process for the affected area.

In 1976, the governor designated the MOA as the MPO for the Anchorage urbanized area. Consequently, the MOA conducts the 3C transportation planning process required under federal regulation, in cooperation with ADEC and ADOT/PF, through the AMATS planning group. In 1978, the governor designated MOA as the lead air quality planning agency in Anchorage. Based on this designation, MOA has continued its role as the lead air quality planning agency in the Anchorage area for the preparation of this plan. The air quality planning process is outlined in the AMATS Intergovernmental Operating Agreement for Transportation and Air Quality Planning. This agreement was last revised in August 2002 and became effective January 1, 2003. This operating agreement establishes the roles and relationships between governmental entities involved in the Anchorage air quality planning process.

Development of this plan required close coordination between air quality and transportation planning agencies in the community. This coordination was ensured through the oversight of the AMATS Policy Committee during plan development. AMATS is an on-going comprehensive transportation planning process for Anchorage. Cooperative efforts include 1) projecting future land use trends and transportation demands; 2) recommending long-range solutions for transportation needs; and 3) working together to implement the recommendations. The AMATS structure consists of a two-tiered committee system that reviews all transportation planning efforts within the area.

The *AMATS Policy Committee* provides guidance and control over studies and recommendations developed by support staff. Voting members of the Policy Committee are listed below.

- MOA Mayor;
- ADOT/PF Central Regional Director;
- MOA Assembly representative;
- MOA Assembly representative; and
- ADEC Commissioner or designee.

The *AMATS Technical Advisory Committee* (TAC) and member support staff analyze transportation and land use issues and develop draft recommendations for the Policy Committee. Voting members include the following:

- MOA Traffic Director;
- MOA Project Management and Engineering Director;
- MOA Planning Director;
- MOA Public Transportation Director;
- MOA Department of Health & Human Services representative;
- MOA Port of Anchorage Director;
- ADOT/PF Chief of Planning & Administration;
- ADOT/PF Regional Pre-Construction Engineer;
- ADEC representative;
- Alaska Railroad representative; and
- AMATS Air Quality Advisory Committee representative.

In addition, to help provide public input into the current air quality planning process by interested local groups and individual citizens, a third AMATS committee, the *Air Quality Advisory Committee* was appointed by the Policy Committee. The Air Quality Advisory Committee is comprised of nine members. Committee membership has generally included at least one physician or health professional, a representative of the I/M industry, a representative of the environmental community, and a representative from the Municipal Planning and Zoning Commission.

Air Quality Goals and Objectives

The goals and objectives of the Anchorage air quality maintenance plan provide the basis upon which the plan is developed and provide direction for future policy decisions that may affect air quality. The goals and objectives of the plan must reflect the intent of the CAAA as well the values, views, and desires of the citizens of Anchorage and their elected officials.

The goals and objectives need to integrate land use, air quality and transportation planning concerns. For this reason, the goals and objectives of this plan are designed to complement goals and objectives identified in the Anchorage Bowl Comprehensive Plan and Anchorage Long Range Transportation Plan.

Primary Goals and Objectives:

1. Continued maintenance of the NAAQS for CO throughout the Municipality of Anchorage through 2023 and beyond.†
2. Prevention of significant deterioration of air quality within the Municipality of Anchorage.
3. Development and implementation of control measures necessary to maintain compliance with the NAAQS through 2023.
4. Identification of contingency measures to be implemented if violations of the NAAQS occur.
5. Establishment of a mobile source emission budget to be used in future conformity determinations of transportation plans and programs.

In addition to the primary goals and objectives, there are community goals and objectives that must be considered and striven for during the development and implementation of the plan.

Community Goals and Objectives:

1. Clear healthful air that is free of noxious odors and pollutants.
2. Protection of the health of the citizens of the Municipality of Anchorage from the harmful effects of air pollution.
3. Establishment of an effective public information and participation program to ensure that the citizens of the Municipality of Anchorage have an active role in air quality planning.
4. Minimization of the negative regulatory and economic impact of air pollution control measures on Anchorage citizens and businesses.
5. Implementation and support of an efficient transportation system that offers affordable, viable choices among various modes of travel that serve all parts of the community and aids in the achievement of the goals and objectives of the State Implementation Plan for Air Quality.

Plan Development

This maintenance plan is a natural extension of a research planning effort begun in early 1997. The MOA collaborated with EPA Region 10, ADEC and the Fairbanks North Star Borough on a number of research projects aimed at quantifying the contribution of vehicle cold starts and warm up idling on ambient CO concentrations in Anchorage and Fairbanks. These studies provided insights that were important in developing this plan and in preparing the attainment and maintenance plans that preceded it.

The most significant revisions proposed in this maintenance plan are the deletion of I/M as a primary CO control measure and the inclusion of I/M in the contingency plan. The contingency plan outlines the actions that will be taken if Anchorage violates the CO NAAQS in the future. The revised contingency plan can be found in Section III.B.7.

† Section 175A of the Clean Air Act requires maintenance plans to provide for the maintenance of the national primary ambient air quality standard for at least ten years after redesignation. The Anchorage plan exceeds this minimum requirement and demonstrates maintenance for a 15-year period, 2009-2023. The original maintenance plan covered the 20-year period 2003-2023.

Public Participation Process

Section 110(a) of the CAAA (42 U.S.C. 7410(a)) 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 revisions to the Anchorage air quality attainment and maintenance plans, a multi-phase public involvement process, utilizing AMATS and the Anchorage Assembly was used.

***AMATS Air Quality Advisory Committee* –** The Air Quality Advisory Committee held a meeting to review the second phase of the revisions which delete I/M as a primary control measure in the SIP but retain it as a local option. A public review draft was released by the AMATS Technical Advisory Committee on March 18, 2010 for 45-day public comment. On May 6, 2010 the Air Quality Advisory Committee met to review the public review draft and to consider public comments received. During this meeting they recommended that the AMATS TAC and Policy Committees approve the public review draft of the Plan as drafted.

***AMATS Technical and Policy Committees* –**The AMATS Technical Advisory Committee recommended approval of the second phase of the revisions during their meeting on May 13, 2010. They forwarded their own recommendation for approval to Policy Committee. The AMATS Policy Committee met on May 27, 2010 and forwarded their recommendation for approval to the Anchorage Assembly.

***Anchorage Assembly* –** The Anchorage Assembly adopted the first phase of the SIP revisions during a public meeting held on May 26, 2009. They met again on June 8, 2010 to consider the second phase of the revisions which delete the commitment to I/M and make it a local option. The Assembly adopted the revised CO Maintenance Plan and directed that it be forwarded to ADEC for inclusion in the SIP. A copy of Anchorage Assembly Resolution (AR) 2010-174, adopting this CO Maintenace Plan, is included in the Volume III, Appendix to Section III.B.1.

***ADEC hearings* –** The final opportunity for public involvement occurs at the state administrative level. Prior to regulatory adoption of SIP revisions, ADEC holds public hearings on the revisions in the affected communities. ADEC held a public hearing on the Anchorage CO Maintenance Plan on August 2, 2010. This provided another forum for the public to comment on the air quality plan prior to state adoption and submission to EPA. No public comments were received.

III.B. 2. Maintenance Area Boundary

Portions of the MOA were first identified as experiencing high levels of ambient CO concentrations in the early 1970s. The nonattainment area within the MOA was first declared on January 27, 1978 after the completion of a monitoring study that measured CO concentrations at numerous locations. The results of that study were included in the *1979 State Air Quality Plan.* EPA reaffirmed the boundaries of the nonattainment area on November 6, 1991 (56 Fed.Reg. 56694, 56711)(40 C.F.R. 81.302). These same boundaries serve as the Anchorage CO Maintenance Area contained within the boundary described as follows:

Beginning at a point on the centerline of the New Seward Highway five hundred (500) feet south of the centerline of O'Malley Road; thence,

Westerly along a line five hundred (500) feet south of and parallel to the centerline of O'Malley Road and its westerly extension thereof to a point on the mean high tide line of the Turnagain Arm; thence,

Northwesterly along the mean high tide line to a point five hundred (500) feet west of the southerly extension of the centerline of Sand Lake Road; thence,

Northerly along a line five hundred (500) feet west of and parallel to the southerly extension of the centerline of Sand Lake Road to a point on the southerly boundary of the Ted Stevens Anchorage International Airport property; thence,

Westerly along said property line of the Ted Stevens Anchorage International Airport to an angle point in said property line; thence,

Northerly along said property of the Ted Stevens Anchorage International Airport to an angle point in said property line; thence,

Easterly, along said property line and its easterly extension thereof to a point five hundred (500) feet west of the southerly extension of the centerline of Wisconsin Street; thence,

Northerly along said line to a point on the mean high tide line of the Knik Arm; thence,

Northeasterly along the mean high tide line to a point on a line parallel and five hundred (500) feet north of the centerline of Thompson Street and the westerly extension thereof; thence,

Easterly along said line to a point five hundred (500) feet east of Boniface Parkway; thence,

Southerly along a line five hundred (500) feet east of and parallel to the centerline of Boniface Parkway to a point five hundred (500) feet north of the Glenn Highway; thence,

Easterly and northeasterly along a line five hundred (500) feet north of and parallel to the centerline of the Glenn Highway to a point five hundred (500) feet east of the northerly extension of the centerline of Muldoon Road; thence,

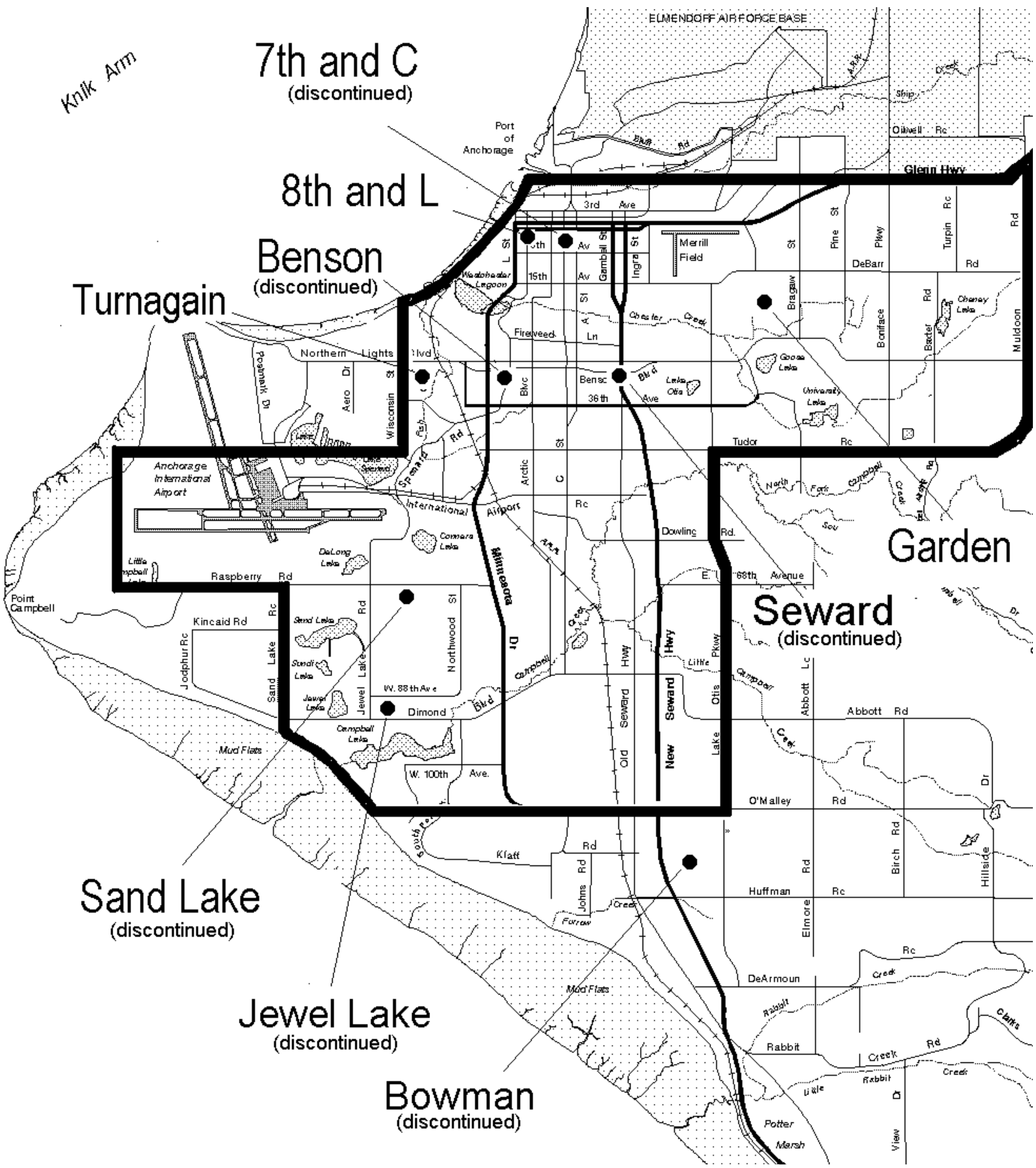
Southerly along a line five hundred (500) feet east of and parallel to the centerline of Muldoon Road and continuing southwesterly on a line of curvature five hundred (500) feet southeasterly of the centerline of curvature where Muldoon Road becomes Tudor Road to a point five hundred (500) feet south of the centerline of Tudor Road; thence,

Westerly along a line five hundred (500) feet south of the centerline of Tudor Road to a point five hundred (500) feet east of the centerline of Lake Otis Parkway; thence,

Southerly, southeasterly, then southerly along a line five hundred (500) feet parallel to the centerline of Lake Otis Parkway to a point five hundred (500) feet south of the centerline of O'Malley Road; thence, Westerly along a line five hundred (500) feet south of the centerline of O'Malley Road, ending at the centerline of the New Seward Highway, which is the point of the beginning.

The maintenance area boundary is shown in Figure III.B.2-1. This boundary is identical to the nonattainment boundary identified in previous attainment plans and it became the maintenance area boundary for the Municipality of Anchorage on July 23, 2004 when the the EPA approved the original Anchorage maintenance plan. Figure III.B.2-1 also shows the locations of CO monitoring stations in Anchorage. Monitoring at a number of these stations has been discontinued because measured values at these stations were low relative to other comparable sites in the network.

Figure III.B.2-1
MOA CO Monitoring Network and Maintenance Area Boundary



III.B.3. Nature of the CO Problem – Causes and Trends

Sources of CO – 2007 Area-wide Base Year Emission Inventory

Section 187 of the CAAA (42 U.S.C. 7512a) requires serious CO nonattainment areas to submit an inventory of actual emissions from all sources in accordance with guidance developed by EPA. This emission inventory, *Anchorage Carbon Monoxide Emission Inventory and Projections 2007 – 2023*, is contained in the Appendix to Section III.B.3.

The area inventoried includes the entire Anchorage maintenance area including areas to the west and east of the inventory boundary. These areas are included because of the growth and development that have occurred there over the past three decades. Elmendorf Air Force Base and Fort Richardson are not included in the inventory area.

According to the latest inventory compiled for the Anchorage area for base year 2007, 67% of winter season CO emissions in the maintenance area were from motor vehicles.[1] Because a large portion of these motor vehicle emissions are produced from cold engines and warm-up idling, a significant amount of resources and effort were devoted to accurately quantifying these impacts. The EPA MOBILE model is poorly suited for estimating this component of motor vehicle emissions. The MOA collaborated with the Fairbanks North Star Borough and ADEC on a local research effort aimed at quantifying the contribution of cold weather warm-up idling on the emission inventory. This research suggests that cold starts and warm-up idling are a very important component of vehicle emissions. In the winter, many Anchorage drivers engage in extended warm-ups, particularly prior to their morning commute. A study conducted in Anchorage during the winter of 1998-99 indicated that the average warm-up period for morning commuters was 12 minutes.[2]

Over the course of a 24-hour winter day, warm-up idling is estimated to account for nearly a quarter of all vehicle emissions generated in the Anchorage bowl. In some residential areas, idling accounts for almost half of all the CO emissions generated. Cold winter temperatures increase "cold start" emissions. When the EPA MOBILE6 model is run with Anchorage fleet characteristics, CO emissions at start up are almost three times greater at 20 °F than at 65 °F.

Other significant sources of CO in Anchorage include aircraft and residential wood burning. Estimated 2007 CO emissions sources in Anchorage are summarized in Table III.B.3-1. In addition to the base year 2007 inventory, emission forecasts were prepared for 2009, 2011, 2013, 2015, 2017, 2019, 2021 and 2023. These forecasts were used to develop the long term maintenance projections presented later in Section III.B.5.

Grid-based inventories were developed for each year. These grid-based inventories provide separate estimates of emissions for the 200 one square kilometer grid cells that make up the Anchorage inventory area. These grid-based estimates of emissions were further resolved by time-of-day. An estimate of the quantity of CO emitted during the AM peak traffic period (7 AM – 9 AM), the PM peak (3 PM - 6 PM) and off peak periods (6 PM- 7 AM and 9 AM – 3 PM) was provided for each grid cell. The results and methodology used to prepare these inventories is discussed in detail in the Appendix to Section III.B.3.

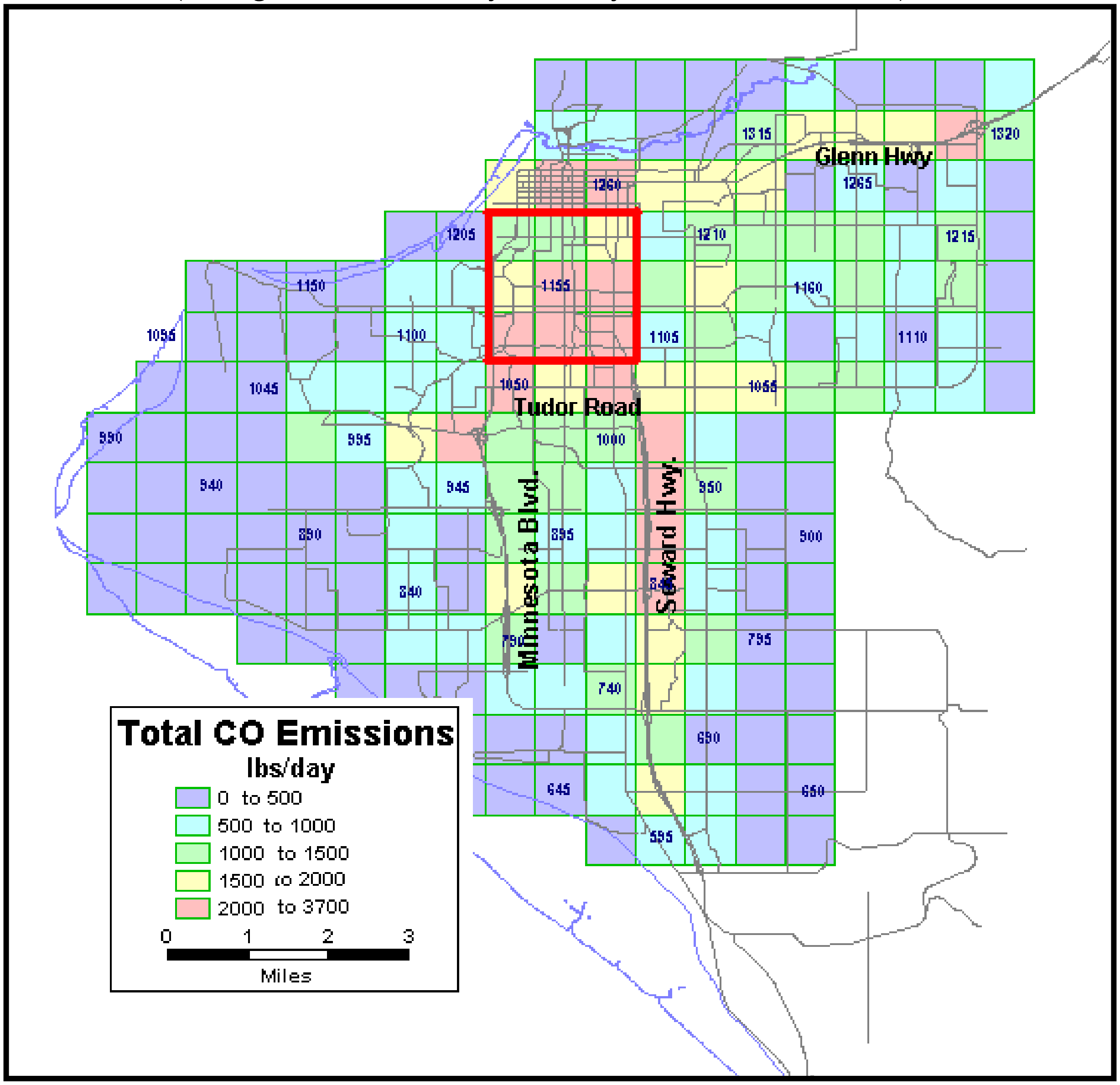
Table III.B.3-1
Sources of Anchorage CO Emissions in 2007 Base Year (Area-wide)

Source Category	**CO Emitted (tons per day)**	**% of total**
Motor vehicle – on-road travel	51.0	50.5%
Motor vehicle – warm-up idle	16.3	16.2%
Ted Stevens Anchorage International Airport Operations	12.4	12.2%
Merrill Field Airport Operations	0.7	0.7%
Wood burning – fireplaces and wood stoves	6.2	6.2%
Space heating – natural gas	3.8	3.7%
Miscellaneous (railroad, marine, snowmobiles, snow removal, portable electrical generators, welding, etc.)	9.3	9.2%
Point sources (power generation, sewage sludge incineration)	1.3	1.3%
TOTAL	**101.0**	**100%**

Analysis of CO Emissions Sources in Turnagain Area

In addition to the area-wide inventory discussed above, a micro-inventory was also prepared for the nine square kilometer area surrounding the Turnagain monitoring station in west Anchorage. The Turnagain station exhibits the highest CO concentrations of the current monitoring network; it has been shown to be approximately 20% higher than the next highest site. Analysis of historical CO data from over twenty monitoring locations in Anchorage suggests that the CO concentrations measured at this site are representative of the highest concentrations in Anchorage.[3] This micro-inventory provides added insight into the sources of CO in this particular area and is useful in developing appropriate localized control strategies. The boundaries of this nine square kilometer micro-inventory area are shown in Figure III.B.3-1 (a). This is one of the most densely populated and heavily trafficked areas of Anchorage. It also includes residential neighborhoods where vehicles are parked outside at night resulting in a prevalence of cold starts and warm-up idling. As can be seen in the figure, gridded inventory results suggest that CO emissions in this area are among the highest in the Anchorage bowl.

Figure III.B.3-1 (a)
CO Emissions Distribution in Anchorage
(Turnagain Micro-inventory Boundary noted with Red Border)



A breakdown of CO emissions in the Turnagain area is shown in Figure III.B.3-1 (b). Total estimated CO emissions during a 24-hour winter weekday were estimated to be 5.99 tons per day in 2007. These emissions can also be broken down by time-of-day to gain further insight into the nature of the CO sources in the Turnagain area. Figure IIII.B.3-1(c) shows CO emission rates (in lbs/hour) by source during the AM peak, PM peak and off-peak periods. Note that warm-up idle emissions are particularly significant during the AM peak. Not surprisingly, the Turnagain station typically exhibits its highest hourly CO concentrations shortly after this AM peak.

Figure III.B.3-1 (b)
24–Hour CO Emissions in the 9 km^2 Area Surrounding the Turnagain Station
Base Year 2007 Inventory

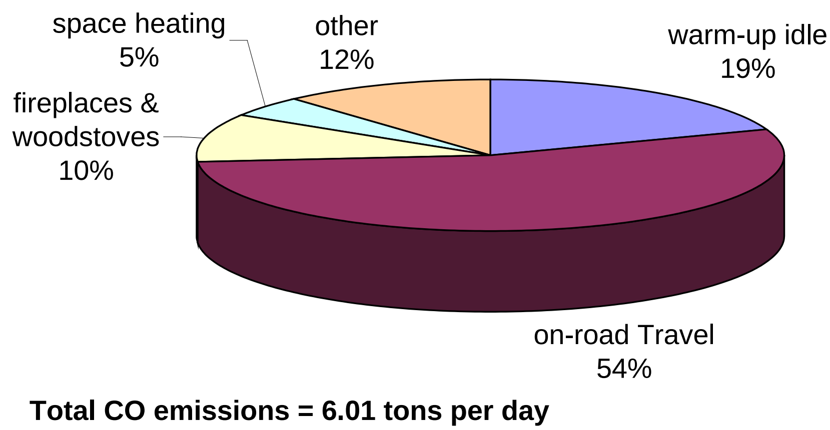
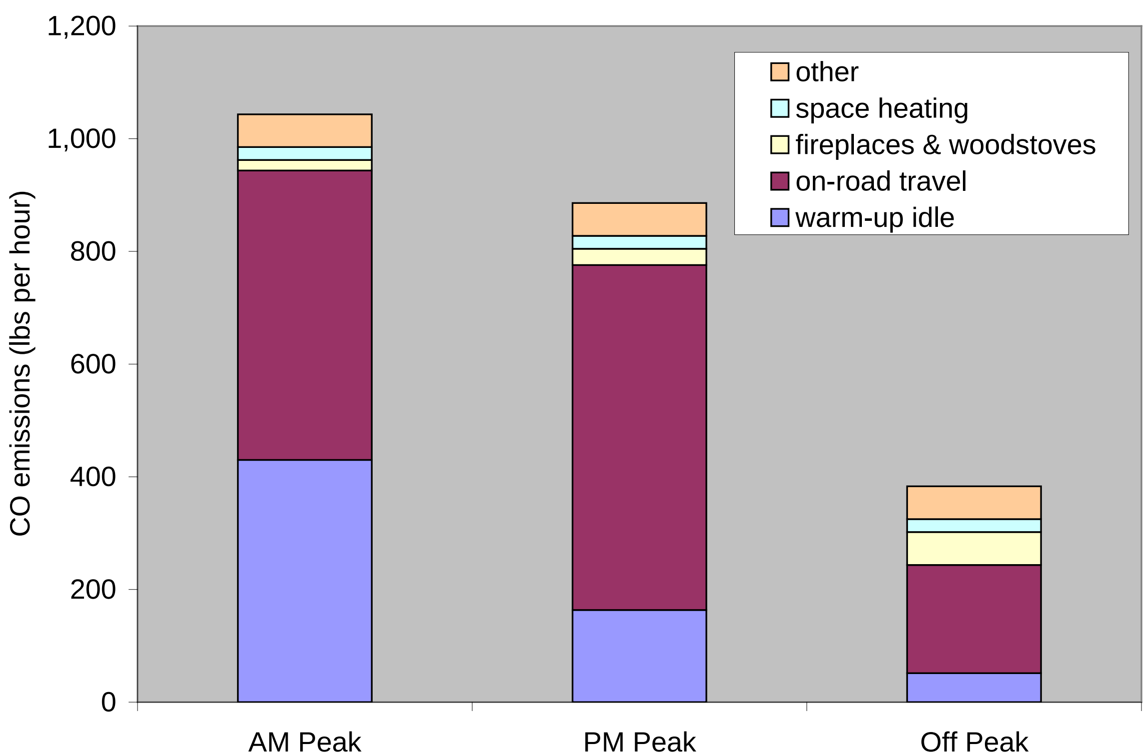


Figure III.B.3-1(c)
CO Emission Rate by Time-of-Day in Area Surrounding the Turnagain Station
Base Year 2007 Inventory



Evidence suggests that CO emissions from the Ted Stevens Anchorage International Airport, located approximately two kilometers west of the Turnagain monitoring site, have little effect on ambient CO concentrations in the Turnagain area. CO monitoring at the airport itself suggests that concentrations there are relatively low. The Winter 1997-98 CO Saturation Monitoring Study showed that maximum 8-hour CO concentrations measured at the airport (near the Fed Ex facility on Postmark Drive) were less than half those measured at the Turnagain station (see Figure III.B.3-2). CO sampling conducted in conjunction with the Ted Stevens Anchorage International Airport Air Toxics Study in January and February 2002 showed that sites along the airport perimeter had mean and maximum concentrations about four times lower than the Turnagain station.‡ Although total CO emissions from the airport are significant (12.4 tons per day in 2007), they are spread out over a large area so that the CO emissions density (in pounds emitted per square kilometer/day) is relatively low. The emission density in some one-kilometer grids immediately surrounding the Turnagain monitor is four or five times greater than the airport (see Figure III.B.3-1 (a).

Future Periodic Inventories

Periodic inventories are not required for maintenance areas. CAAA Section 175A(b) requires the submission of a SIP revision eight years after redesignation as a maintenance area. An emission inventory will be prepared to support this SIP revision. The MOA and/or ADEC may choose to prepare an additional inventory(s) in the interim.

Summary of Local Research

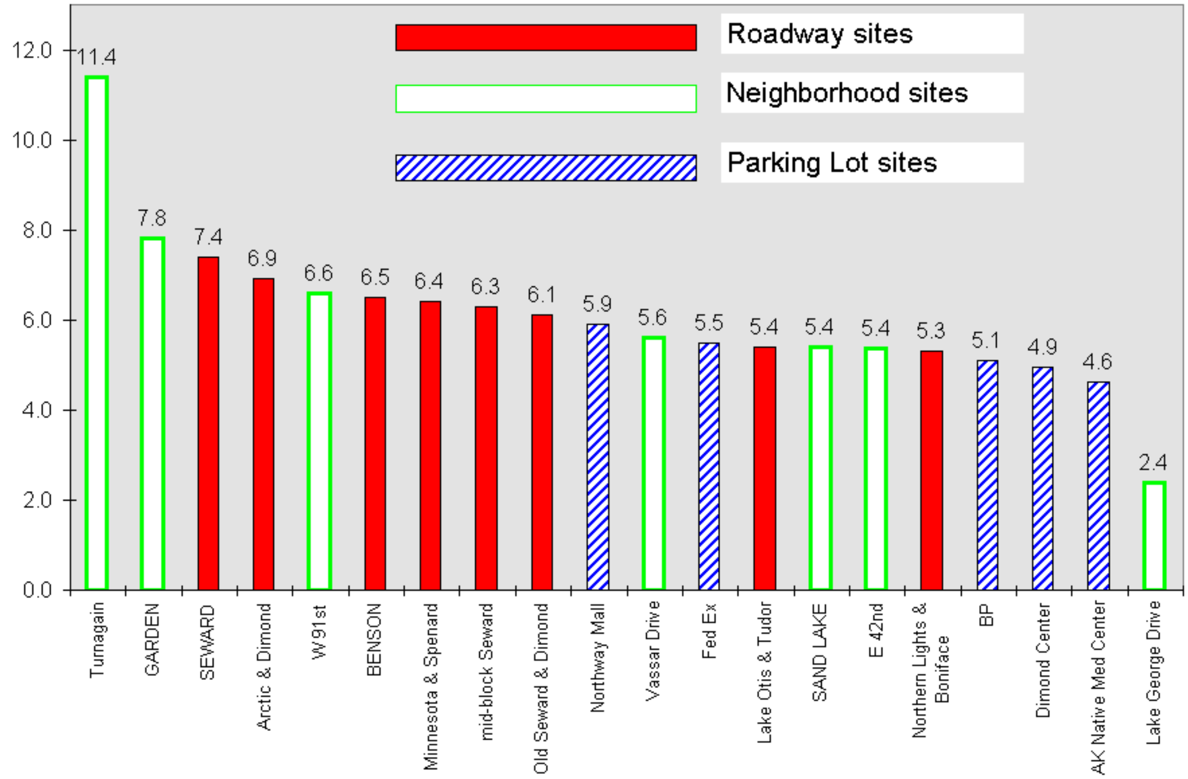
Beginning in 1997, the MOA, in cooperation with the EPA, ADEC, and the Fairbanks North Star Borough, conducted a number of studies to advance the understanding of the causes of the winter season CO problem in Anchorage and Fairbanks. In particular, these studies focused on quantifying the contribution of cold-starts and warm-up idling on the problem. These studies are summarized below.

CO Saturation Monitoring Study (1997-98)

The MOA performed additional CO monitoring during the period December 4, 1997 - February 4, 1998. Sixteen temporary monitoring sites were established to assess how well the four station permanent network was characterizing the air quality near congested roadway intersections, in neighborhoods, and in parking lots. Monitoring was conducted at a total of 20 locations during the study period. Six sites were located near major roadway intersections, five in neighborhoods, and five in large retail or employee parking lots. The maximum 8-hour concentrations measured at each of the 20 sites in the study are compared in Figure III.B.3-2.

‡ These perimeter sites included locations in Kincaid Park and Little Campbell Lake just south of the airport and near the end of North Runway north of the airport. The Concourse B site was not included in the comparison because it was heavily influenced by automobile CO emissions. It was located close to the passenger pick-up and drop-off area at the concourse. Mean and maximum 8-hour CO concentrations there were about 20% below the Turnagain station.

Figure III.B.3-2
Maximum 8-hour CO Concentrations Measured During CO Saturation Monitoring Study (1997-98)



The highest 8-hour CO concentrations were found at neighborhood locations with relatively low traffic volumes. The Turnagain neighborhood site (at Turnagain Street and 31st Avenue) recorded the highest and second highest 8-hour concentrations in the study. The next highest site was the Garden permanent station, also located in a neighborhood. Vehicle cold starts and warm-up idling by morning commuters were implicated as the cause of the elevated CO observed in these neighborhoods.

The permanent station at Seward Highway recorded the highest concentration of any of the six roadway intersection sites. The study concluded that the permanent station at Seward Highway adequately characterizes the upper range of CO concentrations experienced near Anchorage's major roadways. Lower than expected concentrations were found near a number of congested intersections. For example, the highest concentration measured near the busy intersection of Lake Otis Boulevard and Tudor Road was about 50% lower than the Turnagain neighborhood site.

CO concentrations at the five parking lot sites were generally lower than those found in neighborhoods or near the major roadway intersections monitored during the study. This was somewhat surprising given the number of vehicle start ups that originated in these parking lots. Many of these start ups, especially in retail shopping parking lots, were likely to be "hot starts," however, meaning that engines were still warm from an earlier trip. Warmer engines emit considerably lower amounts of CO and this may account for the relatively low ambient concentrations observed.

Anchorage Winter Season Driver Idling Behavior Study (1997-98)

The MOA conducted a study between November 28, 1997 and January 31, 1998 aimed at quantifying the amount of warm-up idling performed by Anchorage drivers. Field staff observed 1,321 vehicle starts at diverse locations in Anchorage. Warm-up idling duration was documented for trips that began at homes, work places, and other locations including shopping centers, restaurants, and schools.

Transportation planning models typically categorize trips into three categories as follows:

- Home-based work (HBW) trips – Commute trips that involve travel directly from home to work or from work to home.
- Home-based other (HBO) trips – Trips that originate from home to some location other than work (e.g., shopping center, school, health club, doctor office, etc.) or the return trip from the "other" location if it returns directly home.
- Non home-based (NHB) trips – Trips that originate from some location other than home (e.g., work, shopping, etc.) and are not a HBW or HBO trip.

Field observations were used to estimate idle duration for each of the trip purpose categories described above. The longest warm-up idle times were associated with morning HBW trips. The average idle duration for these trips was over 7 minutes. About 35% of morning HBW trips involved vehicles parked overnight in heated garages. Idle duration for these vehicles averaged less than one minute. The average idle duration for vehicles parked outside was over 12 minutes. The average idle duration for evening HBW trips beginning at the workplace was 3.4 minutes. The shortest idle durations were associated with morning and midday NHB trips that began at sites other than work or home. Median idle time for these trips was less than one minute.

Engine soak times, the length of time that an engine sits in the cold between trips, were also estimated as part of the driver idling behavior study. Longer soak times result in colder engines and increased CO emissions. Data from a travel survey conducted by Hellenthal and Associates for the MOA in 1992 were used to estimate soak times by trip purpose and time of day. Results of the driver idling behavior study are shown in Table III.B.3-2.

TABLE III.B.3-2
Anchorage Winter Season Driver Behavior Study
Soak Time and Idle Duration by Time of Day and Trip Purpose

		Soak Time (hours)		Idle Duration (minutes)	
Time of Day	Trip Purpose	Average	Median	Average	Median
Morning 6:00 a.m. – 9:00 a.m.	HBW	11.9	12.8	7.3	5.7
	HBO	10.7	12.0	5.9	4.8
	NHB	1.1	0.1	0.8	0.6
Midday 9:00 a.m. – 3:00 p.m.	HBW	6.3	3.7	3.5	2.0
	HBO	6.6	1.7	2.0	1.2
	NHB	1.6	0.6	1.6	0.6
Evening 3:00 p.m. – 6:00 p.m.	HBW	6.8	8.2	3.4	1.2
	HBO	2.6	0.8	2.1	0.9
	NHB	3.0	0.8	3.1	0.8
Night 6:00 p.m. – 6:00 a.m.	HBW	5.8	4.5	3.0	1.2
	HBO	2.0	1.2	2.6	2.7
	NHB	2.0	1.0	1.5	1.3

Table III.B.3-2 shows that the longest soak times and idle durations are associated with morning HBW trips and HBO trips. Because most of these trips begin with a cold engine and involve long idles, it suggests that start up and idle CO emissions are likely to be greater than other trip types. Conversely, NHB trips, because they typically involve short soak times and idle durations, likely have relatively low start-up and idle CO emissions.

Alaska Drive Cycle Study (2000)

In 1996, EPA issued a final rule that revised the certification test procedure to account for the effects of aggressive driving conditions, high acceleration rates and air conditioning on motor vehicle emissions. The rule required manufacturers to control excess emissions produced under these previously unrepresented driving conditions and was phased-in between 2000 and 2002 model year vehicles. The rulemaking significantly impacted emission inventory estimates for all pollutants by increasing estimates for pre-2000 model year vehicles and dramatically reducing emissions from post 2000 model year vehicles. A review of the high-speed, high acceleration rates represented in the new driving cycles led to concern about how well they represented winter time driving conditions when snow, ice and darkness are the prevalent conditions in Anchorage and Fairbanks.

Under contract with ADEC, Sierra Research worked with transportation agencies in Anchorage and Fairbanks to select representative routes in those communities. Data were collected using a “chase car” equipped with a GPS system to collect second-by-second position measurements over each of the routes driven. The “chase car” followed and mimicked the behavior of randomly selected vehicles while driving over the route so that the collected data represented the operation of in-use vehicles. A total of 80 separate routes were driven in Anchorage and 79 routes in Fairbanks.

The position measurements in the collected data set were differentiated to produce speed estimates. Summary statistics were computed for each community and blended in proportion to each community’s share of their combined travel to produce an overall estimate of activity. The results showed that winter driving in Alaska had almost none of the high speed, high acceleration rate driving represented in EPA’s revised certification test procedure. As a result, a decision was made to not include the effects of these driving conditions on the emission inventories developed for both Anchorage and Fairbanks.

The collected driving data was used to develop a driving cycle representative of Alaska driving conditions. The approach used to develop the Alaska Driving Cycle was to select a mixture of driving patterns that best represented the overall speed acceleration frequency distribution of the collected dataset. Over 5,000 candidate cycles were created. Adjustments were made to minimize brake wear during decelerations and improve representation of constant speed activity. The resulting cycle was designed to mimic the federal test procedure (FTP) by establishing a cold start, hot start and stabilized mode of operation. Bag 1, the cold start, includes 2 minutes of idle activity and is 500 seconds long. Bag 3 is a repeat of Bag 1 with a hot start instead of a cold start. Bag 2 is 316 seconds long and represents operation between seconds 501 and 816.

Alaska Cold Temperature Vehicle Emission Studies (1998 – 2001)

In the time since the attainment and maintenance planning process began in 1997, two significant studies have been undertaken to better understand the nature of vehicle emissions in Alaska's cold winter climate. The MOA collaborated with ADEC and the Fairbanks North Star Borough on the design of these studies, both of which were conducted by Sierra Research working under contract with ADEC.

During the winter of 1998-99, Sierra Research conducted a study to quantify emissions from Alaskan vehicles during cold start and idling. They equipped a large van with a modified Horiba IMVETS emissions test system that provided measurements of CO and hydrocarbon (HC) mass emissions on a second-by-second basis. The van could be driven from location to location to test a variety of vehicles representative of the fleet mix in both Anchorage and Fairbanks.

After an initial cold soak of four hours or more at ambient temperature, test vehicles were cold-started and mass emissions were measured for a period of twenty minutes subsequent to start-up. Testing was conducted at ambient temperatures that ranged from -6 °F to +23 °F in Anchorage and -36 °F to +14 °F in Fairbanks.

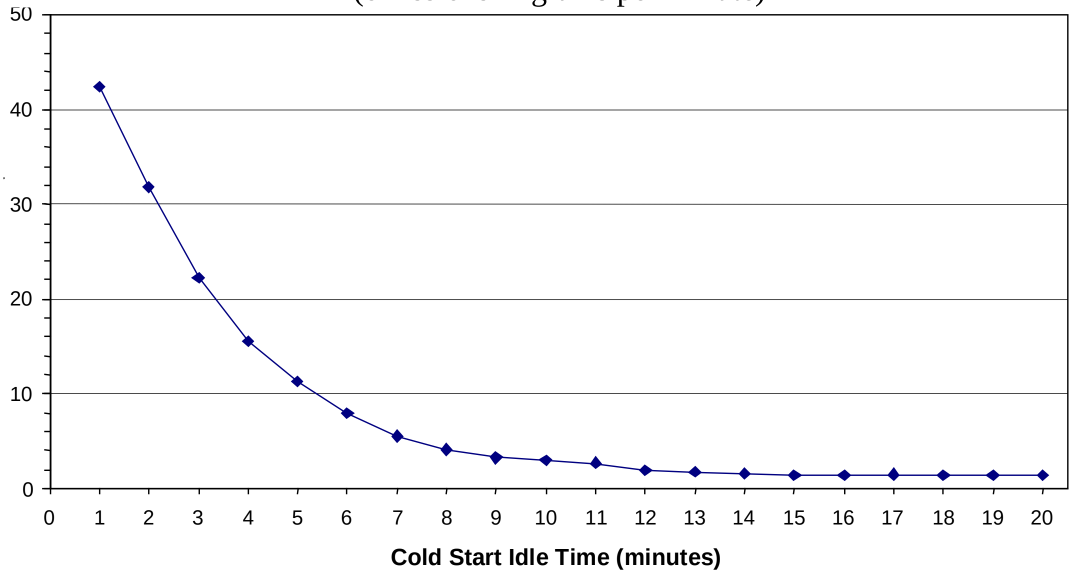
A second, follow-up vehicle emission study was conducted in Fairbanks during the winter of 2000-2001. For this study, Sierra Research procured a vehicle dynamometer that allowed vehicle emissions to be measured in simulated transient or travel mode. Sierra Research performed a gamut of tests on a sample of 35 vehicles selected to represent the Anchorage and Fairbanks fleet mix. These tests included a variety of soak and warm-up times designed to examine the influence of soak and idle times on CO emissions generated during the course of a vehicle trip. Transient mode emissions were evaluated with the dynamometer using the Alaska Drive Cycle to best reflect actual winter-season driving behavior in Anchorage. The emission reduction benefits of engine block heater use were also evaluated.

Key findings from these two studies are summarized below:

- *A large portion of CO emissions occur during warm-up idle.*
  In order to simulate a typical morning commute in Anchorage, CO emissions from cold-started vehicles were measured during the course of a 10-minute warm-up and a subsequent 7.3 mile drive. The warm-up idle accounted for 68% of the total CO emitted.

- *Emissions decrease dramatically during the course of a warm-up idle.*
  Testing showed that idle emissions drop significantly during the first five minutes, especially for newer model vehicles. Figure III.B.3-3 shows the decrease in emissions over time.

Figure III.B.3-3
Cold Start Idle Emission Rate vs. Time
(emissions in grams per minute)



- *Engine block heaters provide very significant reductions in cold start and warm-up idle emissions.*
  Test data showed that, during the first ten minutes of a warm-up idle, the use of an engine block heater reduced CO emissions by an average of 57%. Fuel consumption was reduced by 22% during this same ten-minute period.

- *Anti-idling programs appear to offer little promise of significant CO emission reductions.*
  Test data showed that on an overall trip basis, CO emissions actually increase when warm-up idle times are cut shorter than 10 minutes. When the idle time is cut to 5 minutes, Sierra Research found that overall trip emissions increased by an average of 8%, and by about 20% when the warm-up time was cut to 2 minutes. They also found that there was little or no air quality benefit from turning off a warmed-up vehicle if it was going to be started soon thereafter. For example, they found that turning-off a warmed vehicle during a short (60 minute or less) shopping errand provides no CO air quality benefit. The emissions from a vehicle left running were roughly comparable to a vehicle that was turned off and re-started at the end of the errand.

Anchorage I/M Evaluation Study (2006)

During the winter of 2005-2006, under contract with the MOA, Sierra Research conducted dynamometer emissions testing on over 200 vehicles in order to quantify the CO emission reductions provided by I/M under “real world” conditions in Anchorage.[4] This testing simulated the driving behaviors and temperatures experienced in the winter when CO concentrations are the highest. Vehicles were recruited from owners whose vehicles had recently failed an I/M test in one of Anchorage’s 80 privately-operated I/M testing facilities. Vehicles were tested both before and after repair to determine the CO reduction provided by the repair.

Some key findings:

- *The I/M Program is projected to reduce CO emissions from the Anchorage vehicle fleet by approximately 12% in 2010.§*
  This reduction is reasonably consistent with emissions reductions predicted by the EPA model MOBILE6.
- *The I/M Program is less effective in reducing cold start / warm-up idle emissions than reducing emissions from warm vehicles.*
  CO reductions resulting from I/M repairs were more than three times greater during the warm or "running" phase of the Alaska Drive Cycle (ADC) than during the 10 minute idle period following a cold start.
- *The I/M Program is less effective at reducing emissions from newer vehicles.*
  Because newer vehicles emit less CO, I/M repairs on these vehicles yield less benefit. On average, repairing a model year 1996 or newer vehicle that has failed I/M reduces CO by about 5 grams per mile. The repair of model year vehicles between 1990 and 1995 produces an average emission reduction nearly five times greater, about 24 grams per mile.

§ This is the estimated aggregate benefit of I/M. Based on emission testing of over 200 vehicles, Sierra Research estimated that I/M reduction from a *single* cycle of I/M testing and repair to be 5.1% among the fleet subject to I/M. When the effects of multiple I/M testing and repair cycles, seasonal waivers, and pre-inspection repairs were considered, the overall CO reduction benefit for the Anchorage fleet as a whole was estimated to be 12.1%.

Influence of Meteorology on Ambient CO Concentrations

In Anchorage, CO concentrations are highest during the months of November through February. As a high-latitude community, with long winter nights and weak daytime solar insolation, Anchorage frequently experiences strong and persistent temperature inversions that trap CO close to the ground. In mid-winter, due to the short daytime period available for warming and the low sun angle, inversions often persist throughout the day. Inversion strengths as high as +5°F per 100 foot rise in elevation have been measured. When winds are light, there is little vertical or horizontal dispersion of pollutants. Poor dispersion conditions, combined with high emission rates from motor vehicles started in cold temperatures create an environment particularly conducive to developing elevated CO concentrations.

The highest CO concentrations tend to occur on days with low wind speeds, clear or partly cloudy skies, and cold temperatures. Weather conditions during periods when the 8-hour average CO concentrations at the Turnagain site were at or above the 98th percentile are summarized in Table III.B.3-3.** .The average temperature during these periods was 4°F, with a range from -16°F to +18°F. The average wind speed was 2 miles per hour.

It should be noted that Local Climatological Data from the National Weather Service observatory at Point Campbell on the Ted Stevens Anchorage International Airport were used to prepare Table III.B.3-3. Point Campbell is in the extreme western part of Anchorage, adjacent to Cook Inlet. Temperatures there are often moderated by the surrounding water body. Temperatures in east Anchorage, away from the inlet, can sometimes be 10 to 20°F lower than temperatures in west Anchorage. Wind speeds at Point Campbell can also be higher than areas to the east, particularly under a northerly wind regime. Thus, the wind speed and temperatures recorded at Point Campbell may not always accurately reflect conditions elsewhere in Anchorage.

** CO data from Turnagain for the period October 1998 – December 2008 were analyzed to determine the 98th percentile 8-hour average concentration. This was computed to be 5.8 ppm. Table III.B.3-3 provides a summary of weather conditions during 8-hour periods when CO concentrations were equal to or higher than 5.8 ppm.

Table III.B.3-3
Meteorological Conditions during Periods of High CO Concentrations at Turnagain Monitoring Station (8-hour Average >= 98th Percentile)
October 1998 – December 2008

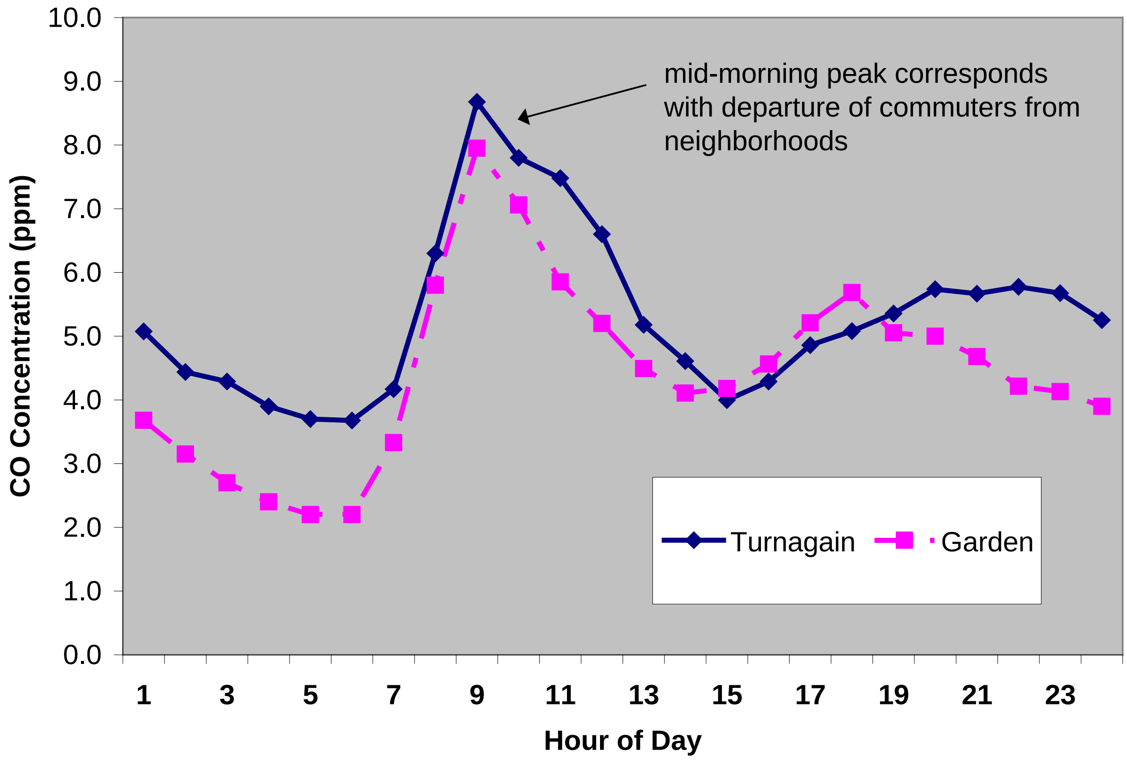
Date	**8-hour Average (ppm)**	**Day of Week**	**Time of Day**	**Temp** (°F)	**Wind Speed (mph)**	**Sky Cover***
12/16/1998	7.69	Wed	4 PM - 12 AM	2	2	CLR
12/24/1998	8.06	Thu	4 PM - 12 AM	6	0	FEW
1/4/1999	5.90	Mon	4 PM - 12 AM	-1	4	CLR
1/6/1999	10.14	Wed	11 AM - 7 PM	2	2	FEW
2/7/1999	5.80	Sun	10 PM - 6 AM	-9	2	FEW
2/8/1999	7.31	Mon	3 AM - 11 AM	-9	7	SCT
2/11/1999	6.09	Thu	1 AM -9 AM	-16	4	CLR
2/22/1999	6.50	Mon	7 PM - 3 AM	9	3	BKN
2/23/1999	7.61	Tues	4 AM - 12 PM	11	0	OVC
11/10/1999	5.93	Wed	4 AM - 12 PM	10	4	CLR
11/27/1999	7.16	Sat	5 PM - 1 AM	10	1	CLR
12/6/1999	7.24	Mon	6 AM - 2 PM	9	5	CLR
1/15/2000	7.21	Sat	7 PM - 3 AM	2	3	CLR
2/17/2001	6.13	Sat	10 PM - 6 AM	15	2	CLR
11/13/2001	6.13	Tues	7 PM - 3 AM	14	0	SCT
11/14/2001	7.74	Wed	4 AM - 12 PM	12	0	SCT
11/30/2001	5.90	Fri	9 PM - 5 AM	1	2	FEW
12/3/2001	6.30	Mon	8 AM - 4 PM	-3	1	CLR
12/4/2001	5.95	Tues	8 AM - 4 PM	2	3	FEW
12/5/2001	7.23	Wed	7 AM - 3 PM	3	3	BKN
12/7/2001	6.28	Fri	5 PM - 1 AM	-7	3	BKN
12/16/2001	9.78	Sun	12 PM -8 PM	-8	5	SCT
12/18/2001	7.40	Tues	9 AM - 5 PM	-6	3	SCT
1/25/2002	5.86	Fri	4 AM - 12 PM	2	5	CLR
2/6/2002	6.49	Wed	4 AM - 12 PM	18	0	SCT
12/5/2003	8.27	Fri	5 PM - 1 AM	8	2	CLR
1/1/2004	7.48	Thu	2 PM - 10 PM	4	0	SCT
1/3/2004	7.61	Sat	1 PM - 9 PM	11	2	CLR
1/4/2004	7.88	Sun	12 PM -8 PM	6	3	BKN
1/5/2004	8.11	Mon	10 AM - 6 PM	5	0	FOG
1/12/2004	5.87	Mon	5 PM - 1 AM	6	1	FEW
1/17/2006	6.09	Tues	6 AM - 2 PM	8	2	BKN
1/24/2006	6.11	Tues	4 AM - 12 PM	-5	1	SCT
11/29/2006	6.53	Wed	8 AM - 4 PM	14	0	SCT
12/29/08	6.35	Mon	7 AM – 3 PM	-2	0	FEW

* Sky Cover is the fraction amount of sky obscured. CLR = 0, FEW = 1/8 - 2/8, SCT = 3/8 – 4/8, BKN = 5/8 – 7/8, OVC = 8/8

Diurnal Pattern in CO Concentrations

There is a distinct diurnal pattern in ambient CO concentration that corresponds to driving patterns in the vicinity of a monitoring site. Residential neighborhood sites like Turnagain and Garden typically experience their highest concentrations in the mid-morning following the morning commute and accompanying vehicle warm-up idle. Figure III.B.3-4(a) shows the 99th percentile hourly concentration measured at the Turnagain and Garden sites during the winter CO seasons (October-March) in the period 2000-2008. The diurnal patterns observed at these two sites are very similar and implicate cold start and warm-up idling as a significant source of emissions at both sites. CO concentrations rise quickly in the early morning hours as commuters start their cars and leave for work from these two residential neighborhoods. They peak between 9 and 10 a.m. and drop off substantially during the late morning and early afternoon. Concentrations build again somewhat in the evening hours but the evening peak is substantially lower than the morning peak.

Figure III.B.3-4(a)
Diurnal Variation in 99th Percentile Hourly CO Concentrations at
Turnagain and Garden Monitoring Stations (2000-2008)

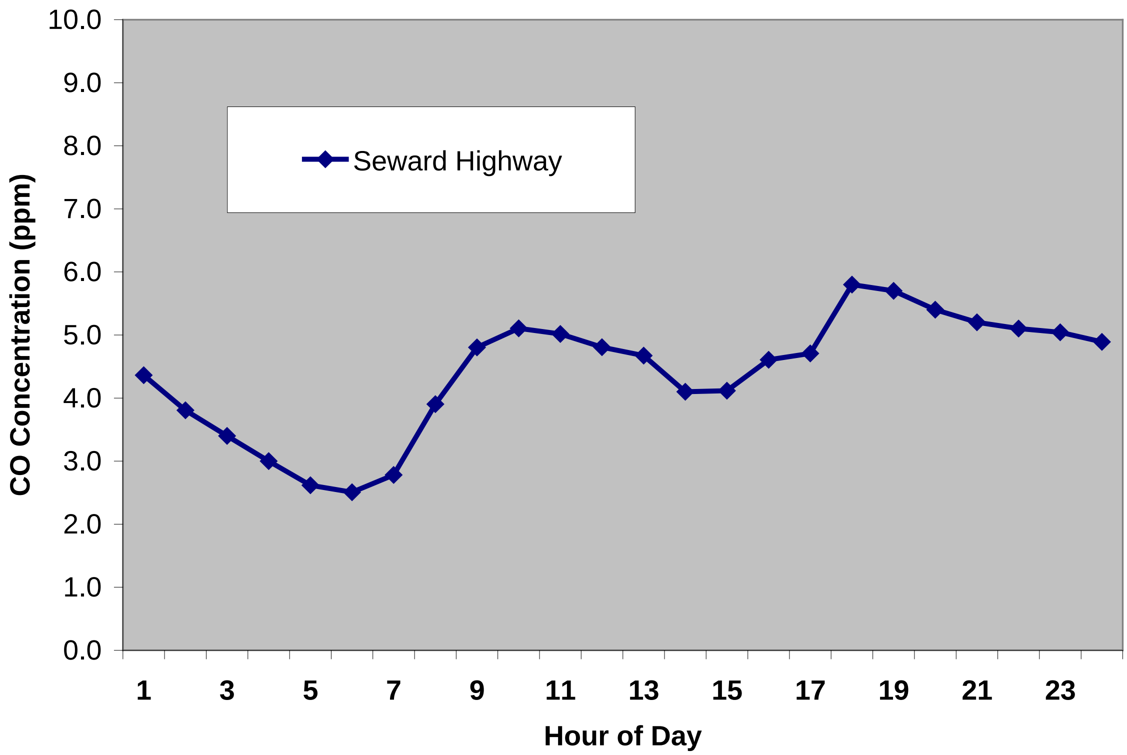


The diurnal pattern in CO concentrations near major traffic arterials is different than residential areas. Figure III.B.3-4(b) shows the diurnal pattern at the Seward Highway station, located at the busy intersection of the Seward Highway and Benson Boulevard†† Although a morning peak is present, the highest concentrations in the day correspond with the evening commute. Concentrations peak between 5 and 6 p.m. and decline slowly

†† The Seward Highway Station was decommissioned on December 30, 2004. This discussion and Figure III.B.3-4(b) therefore are limited to data collected from 2000-2004.

thereafter. Cold start emissions from evening commuters leaving from downtown and mid-town employment centers likely contribute to this evening peak.

Figure III.B.3-4(b)
Diurnal Variation in 99th Percentile Hourly CO Concentrations at
Seward Highway Monitoring Stations (2000-2004)



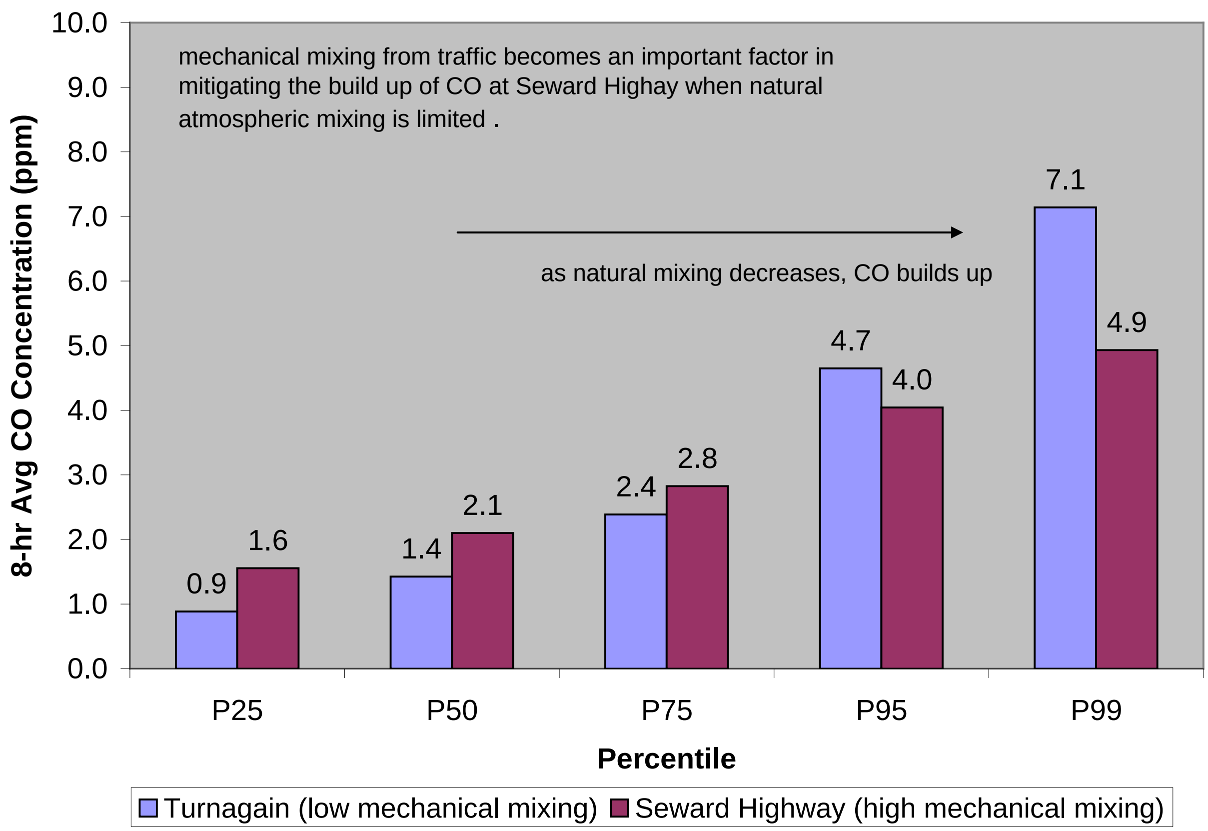
Role of Mechanical Turbulence from Vehicle Traffic in Reducing Ambient CO Concentrations during Stagnation Conditions

As noted to earlier, the highest CO concentrations in Anchorage tend to occur in residential neighborhoods rather than near major roadways where vehicle traffic volumes may be an order of magnitude greater. Although vehicle cold starts result in higher *per vehicle* emission rates in residential areas, total CO emissions in commercial areas in midtown Anchorage are greater due to the shear volume of vehicles traveling along its major roadways. If the ambient CO concentration in a particular area were solely a function of the quantity of emission produced there, CO concentrations near major roadways in midtown Anchorage should be higher than residential areas. Ambient monitoring data indicate that this is not the case.

In testimony given before a National Research Council committee assembled in 2001 to review the CO problem in Fairbanks, Anchorage and other cold climate areas, the MOA posed the hypothesis that mechanical mixing from high-speed vehicle traffic may reduce ambient CO concentrations near major traffic thoroughfares on severe stagnation days.[5] Monitoring data support this hypothesis.

Figure III.B.3-5 compares CO concentrations by percentile at the Seward Highway and Turnagain stations. Traffic volumes are an order of magnitude greater near the Seward Highway station than the Turnagain station. On days when natural atmospheric mixing from wind and thermal convection is good, the additional mixing provided by mechanical turbulence of vehicle traffic at Seward Highway is relatively unimportant. Under these conditions one would expect CO concentrations at Seward Highway to be higher than those at Turnagain because traffic and CO emissions are so much greater. Indeed, the lower quartile (P25) and median (P50) concentration are considerably higher at Seward than Turnagain. However, when a strong ground-based temperature inversion and lack of wind create very poor natural atmospheric mixing, mechanical mixing from vehicle traffic appears to be a very important factor in mitigating the build up of high CO concentrations. Under these extreme meteorological conditions concentrations at Turnagain are much higher than those at Seward Highway. The 99th percentile (P99) CO concentration at the Turnagain station is more than 40% higher than the Seward Highway station.

Figure III.B.3-5
Effect of Mechanical Mixing on CO Concentrations at
Seward Highway and Turnagain Stations



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Carbon Monoxide Trends

In 1983, CO levels in Anchorage exceeded the NAAQS at one or more monitoring sites on 53 days. During midwinter months in the early 1980's, a violation of the NAAQS was measured roughly one-in-four days. However CO concentrations have fallen dramatically over the past twenty years. No violations have been measured since 1996. Single exceedances of the NAAQS were measured in 1998, 1999 and 2001 but these are not considered violations because the NAAQS allows up to one exceedance per calendar year. No exceedances were measured in 1995, 1997, 2000, or between 2002 and 2008.

The highest and second highest 8-hour averages for five Anchorage monitoring stations are tabulated by year, 1980 – 2008, in Table III.B.3-5. The number of days exceeding the NAAQS at each station is also tabulated. Dramatic declines in CO have occurred in Anchorage over the past three decades.

Data from the 7th & C Street, Jewel Lake and Bowman, and 8th and L stations are not tabulated. Monitoring at 7th & C was discontinued in 1995 because concentrations there were the lowest in the network. The Jewel Lake station went into operation in October 2002 and was discontinued in March 2004 because concentrations measured there were lower than the other monitors operating in the network. The Bowman station in South Anchorage was operated from January 2006 through March 2007. It was discontinued because it too had low CO concentrations. The 8th and L station has only been in operations since October 2007.

The trend in the second highest 8-hour average concentration or second maximum measured in each calendar year is often used to measure improvements in CO air quality and progress toward attainment of the NAAQS. The second maximum is statistically more robust (i.e., less prone to year-to-year fluctuation) than the first maximum, making it easier to discern long-term air quality trends. The second maximum is also a direct measure of compliance with the NAAQS. A community is considered to be in compliance if the second maximum at all monitoring stations is below 9.5 ppm.

Table III.B.3-5

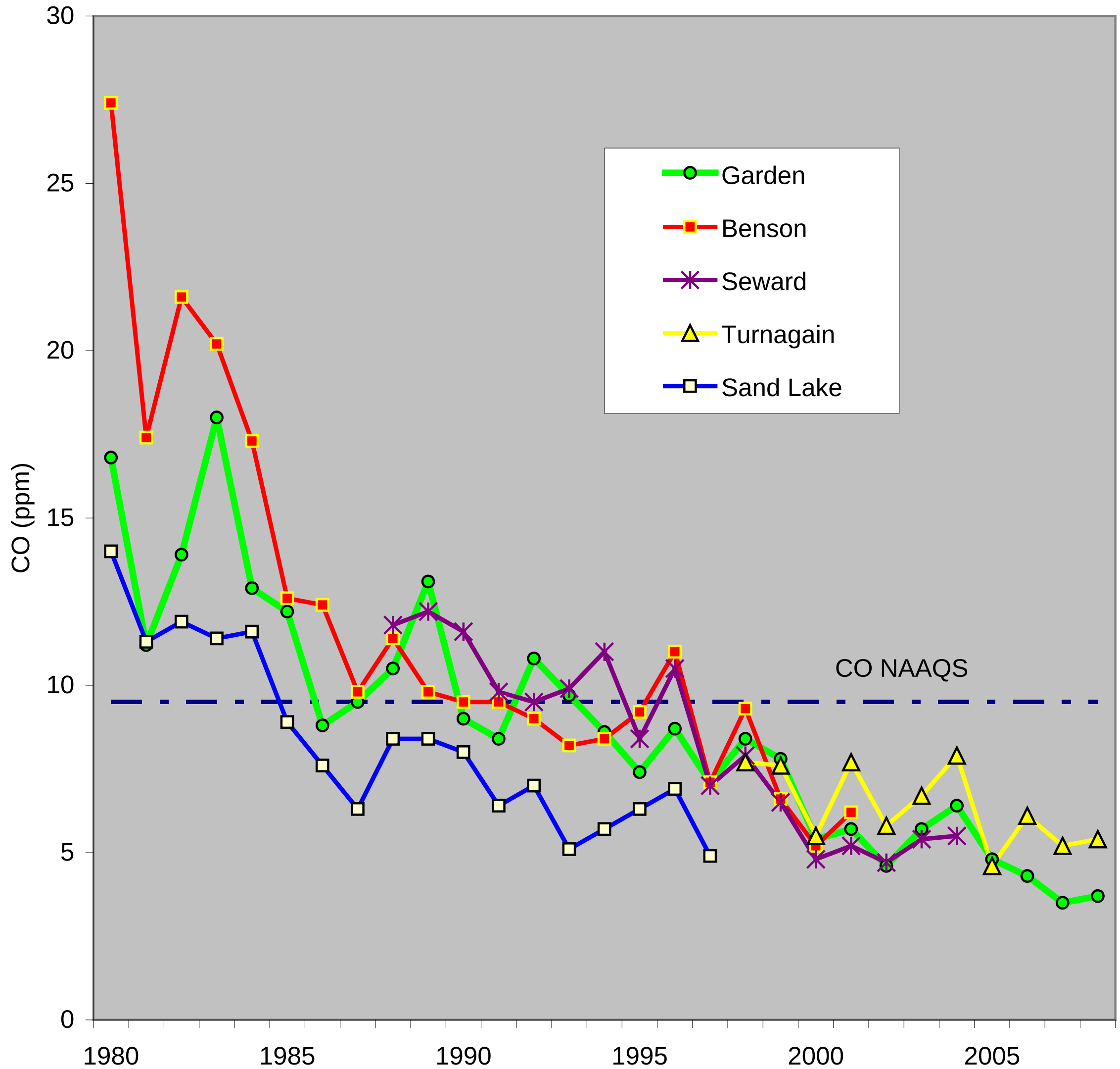
Summary of CO Data from Anchorage Monitoring Stations (1980 –2008)

	Benson (microscale) 2902 Spenard Road			Garden (neighborhood) 3000 E 16th Street			Sand Lake (neighborhood) 3426 Raspberry Road			Seward (microscale) 3002 New Seward Highway			Turnagain (neighborhood) 3201 Turnagain Street		
Year	**max**	**2nd max**	**# days ≥9.5**	**max**	**2nd max**	**# days ≥9.5**	**max**	**2nd max**	**# days ≥9.5**	**Max**	**2nd max**	**# days ≥9.5**	**max**	**2nd max**	**# days ≥9.5**
1980	27.4	26.3	39	17.1	16.8	21	14.0	14.0	6	--	--	--	--	--	--
1981	17.4	16.2	33	12.6	11.2	7	12.6	11.3	5	--	--	--	--	--	--
1982	21.6	18.1	30	15.6	13.9	14	16.6	11.9	3	--	--	--	--	--	--
1983	20.2	16.0	48	19.6	18.0	24	11.5	11.4	7	--	--	--	--	--	--
1984	17.3	17.1	27	13.0	12.9	6	12.6	11.6	5	--	--	--	--	--	--
1985	12.6	12.4	9	12.7	12.2	4	9.2	8.9	0	--	--	--	--	--	--
1986	12.4	11.7	5	10.5	8.8	1	8.1	7.6	0	--	--	--	--	--	--
1987	9.8	8.6	1	10.7	9.5	1	8.1	6.3	0	--	--	--	--	--	--
1988	11.4	10.4	3	11.8	10.5	2	8.5	8.4	0	12.3	11.8	9	--	--	--
1989	9.8	9.6	2	14.0	13.1	2	10.0	8.4	1	14.0	12.2	5	--	--	--
1990	9.5	9.4	1	9.8	9.0	1	8.8	8.0	0	13.0	11.6	11	--	--	--
1991	9.5	8.1	0	8.9	8.4	0	6.7	6.4	0	11.5	9.8	3	--	--	--
1992	9.0	8.8	0	10.9	10.8	2	7.1	7.0	0	10.4	9.5	2	--	--	--
1993	8.2	7.6	0	10.0	9.7	2	8.8	5.1	0	10.4	9.9	2	--	--	--
1994	8.4	8.3	0	9.4	8.6	0	5.8	5.7	0	11.3	11.0	2	--	--	--
1995	9.2	7.6	0	8.4	7.4	0	6.7	6.3	0	9.0	8.4	0	--	--	--
1996	11.0	9.6	3	8.9	8.7	0	7.7	6.9	0	10.8	10.5	3	--	--	--
1997	7.1	6.8	0	7.3	7.1	0	5.9	4.9	0	7.3	7.0	0	--	--	--
1998	9.3	8.2	0	9.5	8.4	1	--	--	--	9.4	7.9	0	8.1*	7.7*	0*
1999	6.6	5.9	0	8.2	7.8	0	--	--	--	7.5	6.5	0	10.1	7.6	1
2000	5.2	4.7	0	5.8	5.4	0	--	--	--	5.2	4.8	0	7.2	5.5	0
2001	6.2	5.7		6.1	5.7	0	--	--	--	5.4	5.2	0	9.8	7.7	1
2002	--	--	--	4.7	4.6	0	--	--	--	5.4	4.7	0	6.4	5.8	0
2003	--	--	--	6.1	5.7	0	--	--	--	6.2	5.4	0	8.3	6.7	0
2004	--	--	--	6.8	6.4	0	--	--	--	5.8	5.5	0	8.1	7.9	0
2005	--	--	--	4.8	4.8	0	--	--	--	--	--	--	5.7	4.6	0
2006	--	--	--	5.1	4.3	0	--	--	--	--	--	--	6.5	6.1	0
2007	--	--	--	4.0	3.5	0	--	--	--	--	--	--	5.5	5.3	0
2008	--	--	--	4.0	3.7	0	--	--	--	--	--	--	6.3	5.4	0

* Incomplete year of data. In 1998 Turnagain station began operations in mid-October.

Annual second maximum concentrations recorded from these five sites are plotted in Figures III.B.3-6. Available data from 1980-2008 are plotted. The Garden station, located in an east Anchorage residential area provides the longest data record in the network. CO concentrations at Garden declined by 76% during this 29 year period. Benson, Sand Lake and Seward Highway experienced similar declines.

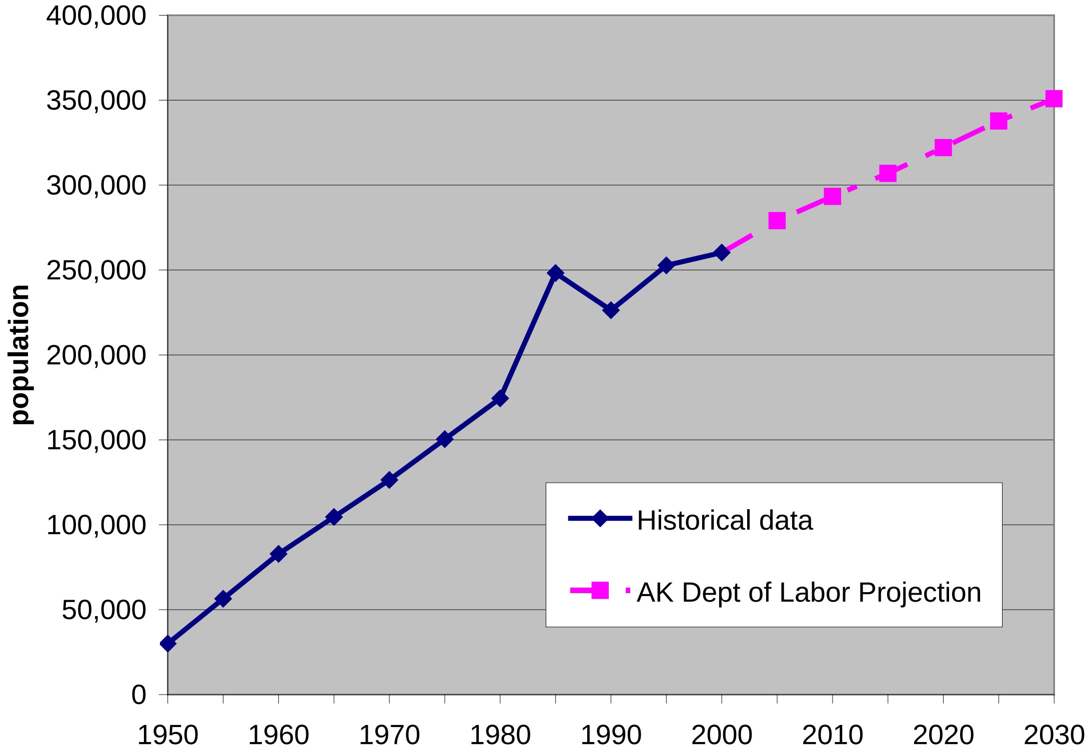
Figure III.B.3-6
Trend in 2nd Maximum 8-hour CO Concentration at Anchorage CO Monitoring Stations 1980 - 2008



Population Growth

Located in a state that has been historically subject to short-term cycles of economic booms and recessions, the Anchorage area has experienced a slowing, but stable pattern of long-term population growth in recent years. Between 1950 and 1990 the average rate of growth was nearly 5,000 persons per year. Growth between 1990 and 2008 slowed to about 3,500 per year. Growth over the next twenty years is expected to further slow to about 2,900 per year, slightly under 1% per annum. Figure III.B.3-7 depicts historic and projected population growth in the Municipality of Anchorage.‡‡

Figure III.B.3-7
Population Growth and Projected Growth and in Anchorage, Alaska



Sources: U.S. Census (1950 -2000), Alaska Department of Labor (projections 2010 – 2030)

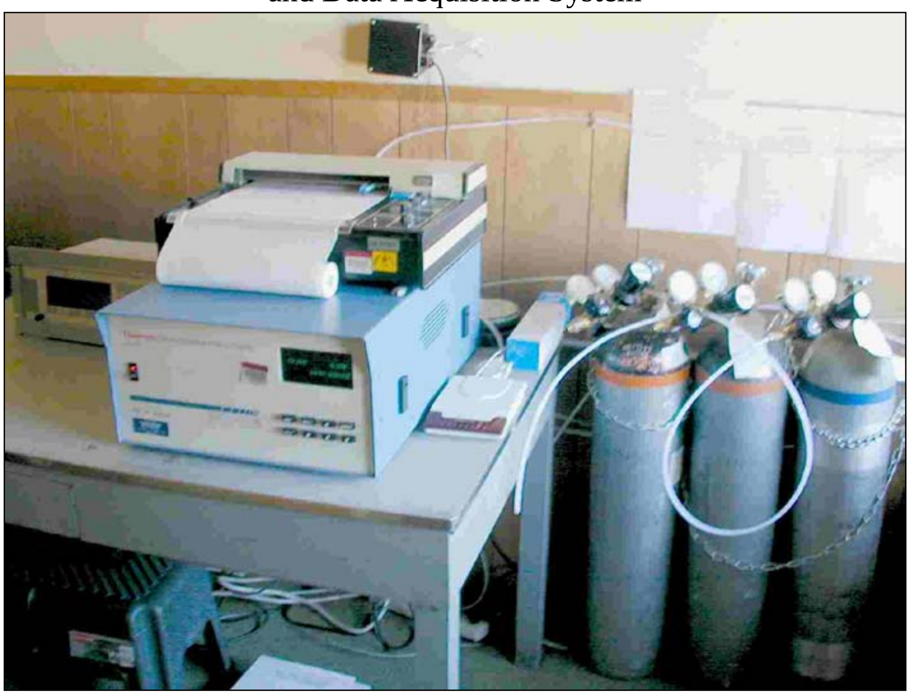
‡‡ Figure III.B.3-7 includes population outside the Anchorage bowl but within the Municipality of Anchorage. Thus, the Eagle River-Chugiak and Girdwood areas are included.

III.B.4. Carbon Monoxide Monitoring Program

Although emission projections are used to track reasonable further progress (RFP), it is actual ambient air quality monitoring data that determine whether or not an area meets the NAAQS. The difficulty with using ambient monitoring data to assess trends 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 are reasonable and credible. Section 110(a)(2)(B)of the CAAA (42 U.S.C. 7410(a) (2) (b)) requires that each implementation plan submitted to EPA 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 Anchorage CO monitoring network is currently comprised of four sampling stations. The MOA uses TECO48 CO analyzers at each station (Figure III.B.4-1). These instruments meet all specifications required by the EPA for ambient CO monitoring and are designated by the EPA as a "reference method" for CO.

Figure III.B.4-1
TECO 48 CO Analyzer with Strip Chart Recorder
and Data Acquisition System



The monitoring network is operated 24 hours a day from October 1 through March 31. Hourly averages of CO levels are provided from each station in the network. These data are uploaded to a central computer every weekday. Data are submitted to EPA on a quarterly basis for inclusion in the nationwide air quality database known as AQS. CO monitoring is conducted in conformance with guidelines established in federal regulations, EPA guidance and instrument manufacturer recommendations. Third party instrument performance audits are conducted by EPA and/or ADEC quarterly.

The locations of the stations in the CO monitoring network are described in Table III.B.4-1. The purpose of this network is to characterize the range of CO exposures experienced by Anchorage residents. By analyzing pollution concentration trends over time, CO monitoring stations can also serve to assess the effectiveness of strategies designed to reduce air pollution emissions and improve air quality. Each monitoring station was selected in accordance with guidelines established by the EPA. As more has been learned about the nature of the CO problem in Anchorage, more emphasis has been placed on monitoring CO levels in neighborhoods.

Table III.B.4-1

Description of Anchorage CO Monitoring Sites

Location	Site Description
Turnagain (active)	Monitoring began at this neighborhood-scale site in October 1998 CO concentrations measured here were the highest of the twenty sites monitored during a saturation monitoring study conducted in the winter of 1997-98. It now exhibits the highest concentrations of the current network. It exceeded the NAAQS once in 1999 and 2001.
Garden (active)	Monitoring began at this residential neighborhood location at 16th and Garden Street in 1979. In the early 2000's, Garden typically recorded higher peak concentrations than the micro-scale sites at Seward Highway and at Benson.
Parkgate (active)	Monitoring began at this middle-scale site in Eagle River (approx 10 miles north of Anchorage) in December 2005. Thus far, concentrations appear to be low relative to other active sites (i.e., Turnagain, Garden) in the network.
8th and L Street (active)	Monitoring began at this middle-scale site in downtown Anchorage in October 2007. Thus far, concentrations appear to be low relative to other active sites in the network.
7th & C Street (discontinued)	This station was located mid-block between 6th and 7th Avenue on C Street. Monitoring began here in 1973 and was discontinued in 1995. The last exceedance at this site was recorded in 1990.
Benson (discontinued)	Monitoring began at this micro-scale site on the southwest corner of Spenard Road and Benson Blvd in 1978. This site frequently recorded exceedances of the NAAQS in the late 1970's, 1980's and early 1990's. The last exceedance was measured here in 1996. Benson was decommissioned in December 2001 when it became evident that the Seward Highway site exhibited higher concentrations.
Sand Lake (discontinued)	Monitoring began at this neighborhood-scale site in 1980 and was discontinued in March 1998. This station was located on Raspberry Road approximately 0.3 miles east of Jewel Lake Road in west Anchorage. The last exceedance was recorded here in 1989.
Seward Highway (discontinued)	Monitoring began at this micro-scale site, located on the southwest corner of the intersection of Benson Blvd. and Seward Highway, in October of 1987. In the late 80's and early 90's this site frequently measured exceedances of the NAAQS. However, no exceedances were measured after calendar year 1996. This station was decommissioned in December 2004 when it became clear that future exceedances at this site were unlikely and the highest CO concentrations were occurring in residential areas.
Jewel Lake (discontinued)	Monitoring began here at this neighborhood-scale site in west Anchorage in October 2002 and was discontinued in March 2004 because CO concentrations were lower than the other three sites in the network.
Bowman (discontinued)	Monitoring at this neighborhood-scale site in south Anchorage was conducted between January 2006 and March 2007. Monitoring was terminated when it became apparent that CO concentrations were very low at this site.

The locations of the monitoring sites are shown on the maintenance area boundary map (Figure III.B.2-1) in Section III.B.2.

Continued Monitoring

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 MOA is committed to the continued operation of this network. Three saturation monitoring studies have been conducted by the MOA to assess the adequacy of the monitoring network. The 1997-98 saturation study resulted in the establishment of the Turnagain Station in west Anchorage. 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.B.5 Transportation Control Strategies

Control Measures Implemented as a Consequence of the 2004 Maintenance Plan

This section discusses the control measures implemented in fulfillment of commitments of the maintenance plan approved by the EPA in 2004 and previous attainment and maintenance plans. The Anchorage 2004 maintenance plan included I/M, the Share-A-Ride and Vanpool programs, and public awareness and incentive programs that encourage the use of engine block heaters to reduce cold start CO emissions.

The current status of these programs is described in the sections below. Note that this section includes a description of the I/M Program as it existed in 2007 when "new" vehicles were exempted for the first four years after initial purchase. In January 2010 this exemption was extended to six years. MOA's commitment to continued operation of I/M will cease upon approval of this document as a revision to the SIP.

The CO reductions from all the programs listed below were estimated for calendar year 2007 using a MOBILE6-based modeling approach.

Vehicle Emissions I/M Program

Program Description - The MOA I/M program was implemented in July 1985 as a primary control measure in the 1982 air quality attainment plan. It has been included in all subsequent attainment and maintenance plans approved by the EPA including the maintenance plan approved in 2004. The MOA administers the program in cooperation with the ADEC. The basic design includes a decentralized test and repair program with both idle and 2500 rpm tests for model year vehicles 1968-1995 and OBDII§§ testing for 1996 and newer vehicles. The current program requires biennial testing but exempts new vehicles for the first four years after purchase.*** According to an independent evaluation by Sierra Research in 2001, the Anchorage I/M program was rated among the best decentralized programs in the country.[6]

Cut points - CO emission cut points, the maximum tailpipe CO emission concentration allowed in a passing I/M test in Anchorage, are generally more stringent than the federal warranty limit of 1.2%. Cut points by vehicle category, as defined in Table 1 of AAC52.037(b),are:

Light Duty Gasoline Vehicles (LDGV)

	Idle	2500 RPM
1968-1971	5.0%	4.0%
1972-1974	4.0%	3.0%
1975-1980	2.0%	2.0%
1981-1993	1.0%	1.0%
1994 and newer	0.5%	0.5%

§§ OBDII refers to the second generation of On-board Diagnostic Systems on vehicles. OBDII was required on all MY 1996 and newer vehicles and allows I/M technicians to determine whether a vehicle's emission testing system is working properly by interrogating the OBDII computer on the vehicle.

*** The I/M Program was modified slightly in January 2006 to expand the new car I/M testing exemption from two years to four years. The Municipality and the State submitted SIP revisions supporting the four-year test exemption to the EPA in 2006.

Light Duty Gasoline Trucks (LDGT1 and LDGT2)

	Idle	2500 RPM
1968-1972	5.0%	4.0%
1973-1978	4.0%	3.0%
1979-1983	2.0%	2.0%
1984-1993	1.0%	1.0%
1994 and newer	0.5%	0.5%

Anchorage has also implemented a hydrocarbon cut point of 220 ppm for 1994 and newer vehicles.

Test Equipment and Procedures - Beginning in January 2000, BAR90 test analyzer systems in the MOA were replaced with emission inspection systems with BAR97-grade hardware. Although these systems do not perform functional gas cap or loaded mode testing, the BAR97 upgrade provides significant improvements in measurement accuracy particularly at lower concentrations of CO. The new systems include dilution correction capability that reduces the possibility of a vehicle being falsely passed due to accidental or intentional dilution of the exhaust gas being analyzed. The new emission inspection system also includes an enhanced Internet-based communications system and Vehicle Information Database (VID) that facilitates the proper identification of the vehicle being tested. This system also provides for on-line oversight and scrutiny of the mechanics conducting emission tests. Presumably, these upgrades have resulted in an overall improvement in the identification of vehicles requiring repair, improved the quality of the emission tests, and consequently reduced CO emissions. In addition, mandatory OBDII testing was implemented on July 1, 2001, ahead of the EPA mandated implementation date.

Enforcement - Working with ADEC, the MOA has implemented a number of changes to improve the effectiveness of enforcement against program evaders. ADEC has conducted parking lot surveys in Anchorage[7] that suggest that up to 10% of the vehicles operating in Anchorage could be evading I/M requirements. In January 2000, in cooperation with ADEC, the MOA implemented a windshield sticker program that allows for easier and more obvious identification of vehicles that may be evading I/M requirements. The windshield sticker program supplements the registration denial program already in place. The windshield sticker program is discussed in 18 AAC 52.020 and 18 AAC 52.025.

Enhancements in Mechanic Training and Certification - Mechanic training and certification has been a part of the MOA I/M program since its inception. I/M mechanics are required to complete classroom and hands-on training and pass a test prior to being certified to perform tests in the MOA program. More recently, the MOA worked in consultation with ADEC to implement an additional technician training and certification program (TTC). TTC was included as a contingency measure in the MOA element of the SIP. Violations in 1996 triggered this measure. The MOA worked with ADEC to develop a comprehensive 40-hour training course.

Estimated CO Reduction – A MOBILE6-based method was used to model the estimated CO reductions from I/M in 2007. Modeled benefits of the MOA program exceed the basic I/M performance standard stipulated in the CAAA. In 2007, the I/M program reduced area-wide CO emissions in Anchorage by an estimated 11.6 tons per day, about 15% of total vehicle emissions. Attributes of the MOA program are summarized in Table III.B.5-1.

Table III.B.5-1

Attributes of Anchorage I/M Program in 2007

Program Element	**Year 2007 Anchorage Program**
Network type	Decentralized
Start date	July 1, 1985
Inspection frequency	Biennial, exemption for newest 4 model years
Model year coverage	1968 and newer
Vehicle type coverage*	LDGV, LDGT1, LDGT2, HDGV
Test type	Two-speed idle (1995 and older) OBDII (1996 and newer)
Emission cut points	More stringent than federal limits
Under hood inspection**	Comprehensive visual and functional checks
Pre-1981 stringency	23%
Waiver rate	0%
Compliance rate	90%
Assumed program effectiveness (relative to centralized)	85%
% Reduction in vehicle emissions (2007)	14.8%
Estimated CO Reduction in Year 2007	11.6 tons per day

* LDGV = light-duty gasoline vehicles, LDGT = light-duty gasoline trucks, HDGV = heavy-duty gasoline trucks.

** Visual and functional tests are not required for 1968-74 model year vehicles. For 1996 and newer vehicles, visual and functional tests are limited to catalyst and oxygen sensor inspection. 1975-1995 vehicles receive a comprehensive visual and functional test.

Share-A-Ride Program

Program Description – The Anchorage Share-A-Ride Program provides carpool and vanpool services to individuals travelling within or commuting to Anchorage. Carpooling was first identified as a CO control strategy in the 1982 MOA air quality plan. The vanpool program began in 1995. The Share-A-Ride Program was included in the 2004 CO Maintenance Plan as primary control measure. Carpooling and vanpooling programs are supported with Congestion Mitigation / Air Quality funding from the Federal Highway Administration.

In 2007, there were 365 individuals and 181 carpools actively participating in the program. The vanpool program has experienced substantial growth since its inception and there is an on-going demand for more vanpools especially among long distance commuters living outside of Anchorage in the Matanuska Susitna Valley, Eagle River-Chugiak and Girdwood. Table III.B.5-2 shows the growth that has occurred in the vanpool program over the last decade. In 2007 there were 42 vanpools and 589 vanpool riders; by 2008 this number had increased by another 20%.[8]

Table III.B.5-2 Vanpool Program Participation (1996-2008)		
Year	Number of Vanpools	Number of Vanpoolers
1996	9	126
1997	10	137
1998	11	151
1999	14	184
2000	18	231
2001	18	260
2002	21	270
2003	23	323
2004	24	363
2005	24	375
2006	41	569
2007	42	589
2008	52	810

Estimated CO Reduction – In 2007, based on program statistics, the carpooling and vanpooling components of the Share-A-Ride program eliminated approximately 800 cold starts and 10,000 miles of travel per day from the Anchorage roadway network. This resulted in an estimated CO reduction in the Anchorage maintenance area of approximately 0.25tons per day or about 0.3% of motor vehicle emissions.

Promotion of Engine Block Heater Use Prior to Vehicle Cold Starts

Program Description - Testing performed as part of the Alaska Cold Start and Idle Emission Study during the winters of 1998-99 and 2000-2001 showed that the use of an engine block heater reduced CO emissions by an average of 57% over the course of a 10-minute cold start and idle.[9] Survey data show that over three-quarters of the vehicles in the MOA are equipped with block heaters.[10] Because cold starts and warm-up idling make up such a large portion of Anchorage's CO emissions, particularly in residential neighborhoods, significant reductions could be realized if motorists were convinced to use their engine block heaters prior to their morning commute.

Beginning with the winter of 1999-2000, television commercials, radio advertising, and newspaper inserts have been used to promote the advantages of using a block heater. In addition to reducing air pollution, using a block heater results in easier start-ups, reduced engine wear-and-tear, and a shorter time for the heater and defroster to work. All of these advantages have been emphasized in campaigns over the past several winters. Beginning in the winter of 2004, the MOA initiated the Plug@20 public awareness campaign, encouraging vehicle owners to plug-in their block heaters whenever temperatures drop below 20 ºF. Television, radio, and print media along with targeted advertising have been employed. Plug@20 is now highly recognizable among Anchorage residents.

In addition, the MOA and ADEC have provided additional incentives to encourage residents to plug-in. Since the winter of 1999-2000, nearly 10,000 programmable electrical timers, designed to turn block heaters on two-to-three hours prior to the morning commute, have been distributed free-of-charge to Anchorage residents. In addition, beginning in the winter of 2002-2003, and continuing on for the four following winters, residents who owned vehicles without block heaters could have them installed for a nominal charge of $25. By the time this program ended in December 2006, over 8,000 block heaters had been installed in Anchorage vehicles.

Annual telephone surveys have been conducted at the conclusion of each winter since 2000 to assess the effectiveness of the block heater promotion and incentive programs. These surveys suggest that the public awareness and incentive programs have had a positive effect on block heater usage. Residents who have taken advantage of the programmable timers and/or block heater installations have a greater inclination to plug-in. Survey data suggest that, even for those who have not received incentives, plug-in rates have increased as a result of TV, radio and print media advertising.

Estimated CO Reduction – Annual telephone survey data indicate that over 70% of respondents saw or heard the television or radio ads. Survey results suggest that plug-in rates have doubled from about 10% from October 1999 to about 20% in 2007. Survey data indicate that plug-in rates among those who have received either a free timer or subsidized block heater installations approach 50% when temperatures fall to 10ºF or colder.

In 2007, on an area-wide basis, the increase in plug-in rates resulting from incentives and promotions provided an estimated CO reduction of about 0.5 tons per day. This amounts to a 0.6% reduction in area-wide vehicle emissions. The impact of block heater promotion and incentives in residential areas is likely greater because cold start emissions are a more significant part of total emissions. In neighborhoods with large numbers of vehicles parked outside, increases in block heater plug-in rates may play a significant role in reducing CO emissions from the morning commute. Some of the highest CO concentrations in Anchorage are experienced in these neighborhoods on cold winter mornings.

Combined Impact of Control Programs on Base Year 2007 CO Emissions

In the year 2007, the combined reduction of the three CO control programs described above was 12.3 tons per day. These programs reduced daily motor vehicle CO emissions from an estimated 79.4 tons per day to 67.1 tons per day. Reductions are summarized in Table III.B.5-3.

Table III.B.5-3
Combined Reduction from Locally Implemented CO Control Programs in Anchorage (2007)

Control Program	**Estimated CO Reduction (tons per day)**
I/M Program	11.61
Share-A-Ride Program (carpool and vanpool)	0.25
Engine Block Heater Promotion	0.49*
Cumulative Benefit of Control Measures	**12.3**
% Reduction in Motor Vehicle Emissions	**15.5%**

* This is the estimated *incremental* benefit of an increased plug-in rate resulting from block heater promotion campaign and incentives. The total benefit of all block heater use is estimated to be about one ton per day.

Stationary Source Program

The CAAA 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 only have meaning for areas not attaining the standard. Under this maintenance plan, the requirements of CAAA 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 CAAA (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 fifteen year timeframe evaluated in this maintenance plan, a growth allowance has been applied to stationary source emissions. 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 MOA, ADEC is responsible for issuing construction and Title V operating permits. ADEC has incorporated the requirements for PSD in 18 AAC 50, Article 3.

Primary Control Measure Commitments for the 2008 – 2023 Maintenance Plan Period

Section III B.6 contains an analysis of Anchorage maintenance prospects during the 2008-2023 maintenance plan period. The most significant revision in this plan from previous maintenance plans submitted to EPA is the deletion of the commitment to I/M as a primary CO control measure. Even if I/M continues to operate as a "local option," because the commitment to IM in the SIP has been removed, the CO reduction provided by I/M is assumed to be zero after 2010. The impact of eliminating the I/M Program on overall CO emissions in Anchorage and on the probability of continued maintenance of the CO NAAQS will be discussed in Section III.B.6.

Under this Maintenance Plan, the probability of complying with the NAAQS is estimated to be 99% or higher each year during the period 2008-2023. In other words, even with deletion of I/M as a primary control measure., there is less than a 1-in-100 chance of violating the standard in any year.

Primary CO Control Measures

Three primary control measures will be implemented during the 2008-2023 maintenance plan period. These include air quality public awareness, transit marketing, and the ridesharing and vanpooling program. Because all of these programs rely on voluntary participation by the public in order to realize emission reductions, the CO reduction benefits of these programs were ignored in the analysis of maintenance prospects discussed later in Section III.B.6.†††

The status of these four programs in the 2008-2023 maintenance planning period is discussed in more detail below.

Air Quality Public Awareness

Air quality public awareness was a key air quality improvement strategy and primary measure of the 2004 maintenance plan and this effort will continue. Survey data suggest that public awareness campaign efforts over the past eight years have resulted in measureable changes in engine block heater plug-in rates among Anchorage motorists. Air quality public awareness is supported by congestion mitigation / air quality funds from the Federal Highway Administration. Future funding is programmed in the 2010-2013 Anchorage Transportation Improvement Program (TIP). The public awareness effort is expected to broaden into other areas where changes in public behavior can result in improvements in CO air quality. Some of these areas include:

- Promotion of alternatives to the single occupancy vehicle such as bicycling, walking, public transit, car and vanpooling, telecommuting, and electronic meetings and conferencing.‡‡‡

††† Generally speaking, the benefits of voluntary strategies are less certain. EPA guidance recommends excluding anticipated pollutant reductions from voluntary measures when analyzing prospects for compliance with the NAAQS. The EPA guidance regarding voluntary measures can be found in *Incorporating Emerging and Voluntary Measures in a SIP*, U.S. EPA, September 2004.

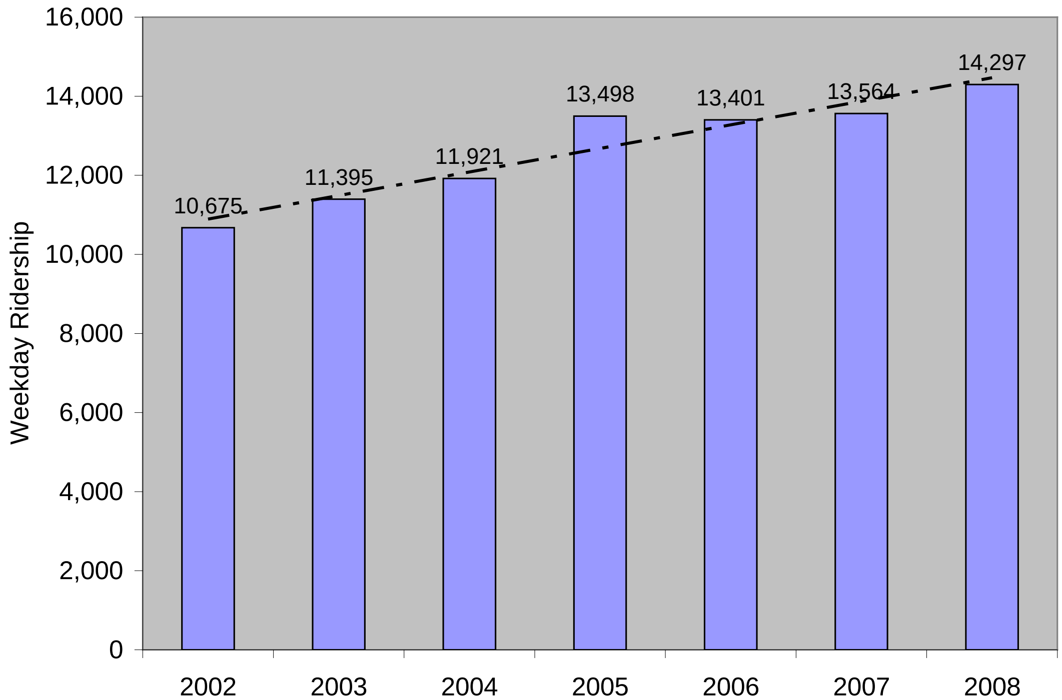
‡‡‡ One important factor in the successful promotion of bicycling, walking and transit is providing safe and accessible routes for pedestrians and cyclists. This means making routes available that minimize conflicts with motor vehicle traffic and clearing snow promptly in the winter. Safe routes to school are particularly important

- Encouraging motorists to combine trips to reduce travel and the number of cold starts (i.e., promote trip chaining).
- Increasing public awareness with regard to the importance of regular vehicle maintenance in reducing air pollution and improving fuel economy. Simple maintenance checks such as air filter replacement, oil changes, and proper tire inflation can make a big difference.

Transit Marketing

Anchorage's public transit system, People Mover, receives congestion mitigation / air quality (CMAQ) funding from the Federal Highway Administration to advertise and promote its service in Anchorage. The Anchorage TIP includes funding through 2013 for transit promotion. Figure III.B.5-2 shows transit ridership has increased significantly over the past several years. [11] Although many factors have probably contributed to increased ridership, on-going marketing is an essential part of the continued growth of People Mover ridership. A transit marketing effort will continue, now as a committed primary measure in this Maintenance Plan.

Figure III.B.5-2
Weekday People Mover Bus Ridership



In 1998, as a direct result of its transit promotion efforts, People Mover reached an agreement with the University of Alaska that provides free bus service (called U-Pass) for their students and staff. Since that time Alaska Pacific University, Charter College have joined in with a faculty and staff pass program and most recently Conoco Phillips has joined the U-Pass program for all their Anchorage-based employees. Efforts to reach similar agreements with other employers and institutions are on-going.[12]

for "school age" pedestrians and bicyclists. A significant number of vehicle trips could be eliminated if more students walked, biked or took the bus to school instead of being dropped off by parents.

Carpooling and Vanpooling

The 2004 maintenance plan committed to implementing a carpooling and vanpooling program in Anchorage. Support for Anchorage's Share-A-Ride Program will continue through the 2008-2023 maintenance plan period. As noted earlier in this section, the vanpooling program has experienced considerable growth in the past decade and demand for new service is on-going. CMAQ funds for support of the Share-A-Ride Program are programmed through 2013 in the Anchorage TIP.

Estimated CO Reduction Benefit from Implementation of Primary Measures 2008-2023

The I/M Program is projected to reduce motor vehicle CO emissions by roughly 15% during the 2008-2023. However, because the motor vehicle fleet is expected to grow progressively cleaner over time, the absolute magnitude of emission reduction provided by I/M drops from about 10.2 tons per day in 2011 to 8.8 tons per day in 2023.

As noted earlier, because of the voluntary nature of the air quality public awareness, transit marketing and the Share-A-Ride programs, the CO reductions anticipated from these three measures are ignored in the assessment of future probability of compliance with the NAAQS. Nevertheless, survey data suggest that these measures are currently providing tangible CO reductions in Anchorage and they have the potential to provide additional reductions in the future. The current overall combined benefit of these three measures is estimated to be in the range of one ton per day CO reduced.

Ancillary Benefits of Primary Measures

Although reducing CO emissions has been a prime focus in Anchorage for three decades, there is growing realization of the need to reduce other air pollutants. Monitoring data in Anchorage suggest that ambient concentrations of benzene, a known human carcinogen associated with leukemia, are among the highest in the U.S. Alaska gasoline contains more benzene than most of the U.S. and motor vehicles are a significant source of this toxic air pollutant in Anchorage. Studies conducted in Fairbanks by Sierra Research suggest that strategies aimed at reducing CO also reduce benzene. Like CO, emissions of hydrocarbons such as benzene tend to be highest during cold start and warm-up idle when engines are cold. Thus, using an engine block heater prior to a cold start not only reduces CO emissions but also benzene and other air toxics.[13]

Greenhouse gas emissions are of growing concern globally and locally. Besides being a source of CO, motor vehicles are a significant source of carbon dioxide (CO_2) and other greenhouse gas emissions. This plan supports the use of transit, carpooling and vanpooling, telecommuting, walking, bicycling and other alternatives to the single occupancy vehicle. Besides reducing CO emissions, these strategies provide CO_2 emission reduction benefits. As these strategies become more successful, CO_2 reductions increase.

This plan recognizes the importance of addressing other air pollutants even if they are unrelated to CO emissions. The Municipality of Anchorage is committed to examining new technlogies that lead to reduction of air pollutant emissions including CO_2 and diesel particulate. The Muncipality is examining the purchase of of high fuel economy vehicles, including hybrid electrics, for its own fleet.

Consistency with Other Municipal Plans and Programs

The air quality improvement strategies outlined in the CO Maintenance Plan rely in large part on reducing the dependence on the single occupancy vehicle by enhancing alternative transportation modes such as transit, carpooling, vanpooling, bicycling and walking. This strategy is consistent with many other plans and programs adopted by the Municipality.

One of the goals of the *Anchorage Long Range Transportation Plan* (LRTP) is to "provide a transportation system that provides viable transporation choices among various modes." Objectives include the "development of a safe network of trails and sidewalks that provide year-round, reasonable access to work, schools, parks, services, and the natural environment." Meeting these objectives will make walking, cycling and transit more attractive, reduce single occupancy vehicle use and help decrease air pollution, including CO. The LRTP also recognizes the need for transit service improvements and endorses recommendations included in *The People Mover Blueprint: A Plan to Restructure the Anchorage Transit System.* Additional buses and stable funding will be necessary to attain the goals and objectives identified in the route restructuring plan.

The Municipality is in the process of developing a plan that will address specific needs as related to pedestrian and bicycle travel. This Non-Motorized Plan was identified in the LRTP as a task to be completed. The first chapter of the Non-Motorized Plan, the Pedestrian Plan was adopted by the Municipality in October 2007. The Pedestrian Plan establishes a 20 year framework for improvements to enhance the pedestrian environment and increase opportunities to choose walking as a mode of transportation. The Pedestrian Plan features a list of over 300 capital projects in the Municipality that will create safer and more pleasant places to walk. The Municipality recently adopted the next chapter of the Non-Motorized Plan, the Bicycle Plan. This Bicycle Plan identifies a network of facilities to be used by commuter cyclists to navigate Anchorage more safely. Both of these plans identify ways for Anchorage to develop the infrastructure necessary to make walking and bicycling more attractive as a means to get to work, school and shopping.

III.B.6 Modeling and Projections

EPA, based on its regulatory guidance, prefers that dispersion modeling techniques be used to demonstrate attainment and maintenance of air quality standards in State Implementation Plans. In May of 2002, representatives from the MOA, FNSB and the ADEC met with EPA Region 10 staff to discuss the modeling techniques and approaches to be used in maintenance demonstrations in Anchorage and Fairbanks. Meeting participants reviewed the results of an area wide modeling feasibility analysis performed by a consultant on behalf of ADEC and MOA[14], and concluded that currently available area wide dispersion models lack the capability to adequately address the meteorological extremes encountered in Anchorage and Fairbanks. Also, the existing meteorological database in Anchorage and Fairbanks may not have the micro-scale meteorological parameters needed for adequate model performance for regulatory purposes. Therefore, after evaluating several options, the participants settled on the use of a probabilistic roll-forward approach in the maintenance demonstration.

As general guidance, EPA staff has stated that this maintenance demonstration should show a 90% or greater probability of complying with the NAAQS each year during the maintenance planning period. The modeling analysis discussed in this section assumes that the CO reductions provided by the I/M Program will be zero in 2011 and beyond.§§§

Probabilistic Roll-Forward Modeling / Maintenance Demonstration

Because the Turnagain site exhibits the highest CO concentrations in the monitoring network, a regression analysis of observed second 8-hour maximum CO concentrations at this site was performed.[§] Using commonly accepted statistical techniques, the CO regression line and upper-bound 90th percentile prediction interval were computed. In theory, 90% of observed second maximum concentrations should fall below this interval. The upper-bound 90th percentile prediction interval values for 2007 serves as the design value (DV).

A nine square kilometer area surrounding the Turnagain site was identified and the emissions within this area were inventoried for base year 2007 and projected through 2023. (See Figure III.B.3-1 (a)) Conventional statistical methods were used to estimate the probability of complying with the NAAQS in the year 2007, the base year for the analysis. The "roll forward" technique, used in the previous maintenance demonstration, was used to estimate probability of complying with the standard in future years. This technique relies on CO emissions projections for years 2008 through 2023 to help estimate the probability of complying with the NAAQS during this time period. A more detailed description of the methodology used in this analysis can be found in the Appendix to Section III.B.6.

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§§§ The actual termination date for I/M is unknown. The commitment to I/M will continue until EPA approves this SIP revision; this could take up to 18 months from submission. I/M could also continue well beyond 2011 as a local option. Thus, for the purpose of this maintenance demonstration, a 2011 termination date for the reductions provided by I/M is a conservative assumption.

§ Although not shown here, a similar analysis was also performed on data from the Garden station. Because Garden has lower CO concentrations than Turnagain, the computed probability of complying with the NAAQS is substantially higher at Garden than Turnagain. Thus, Turnagain provides a more rigorous analysis with regards to the likelihood of a future violation.

The probabilistic roll-forward procedure consists of 5 basic steps:

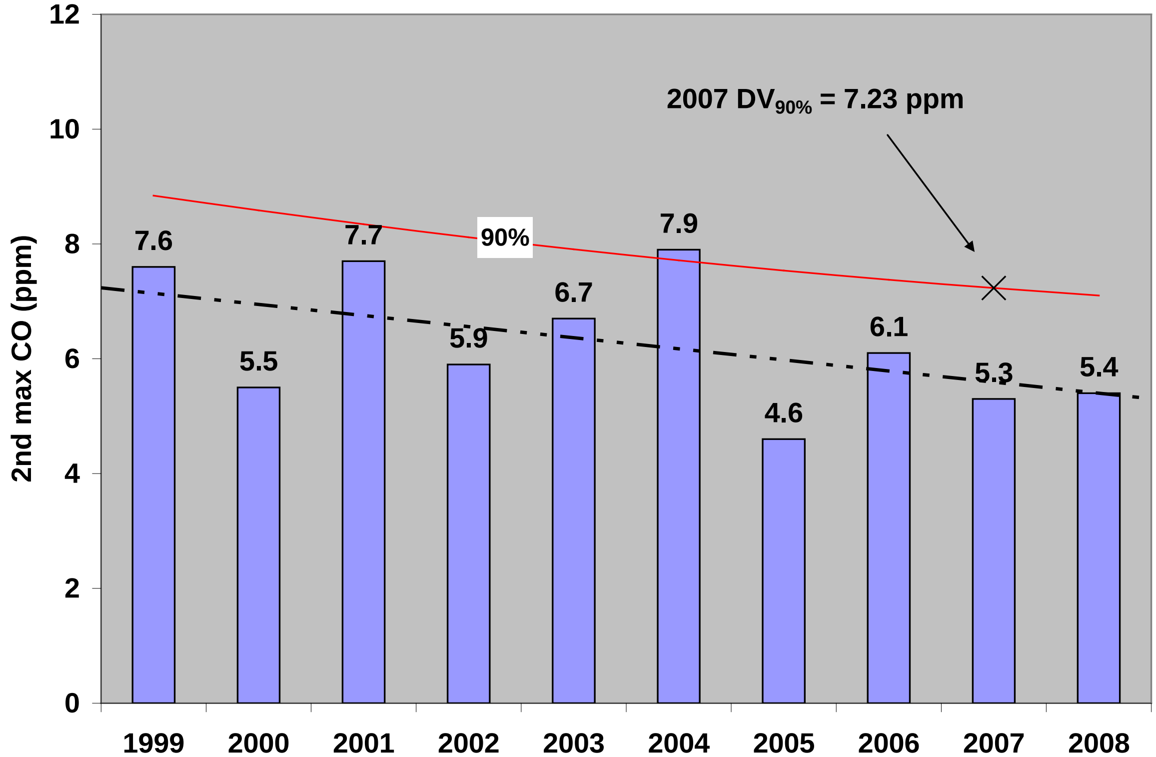
1. Compute the base year 2007 DV using the 90th percentile prediction interval from Turnagain station CO data.
2. Compile the 2007 base year CO inventory and determine the quantity of emissions generated in the nine square kilometer area surrounding the Turnagain monitoring station during a 24-hour "design day." A design day is defined as a winter weekday when a CO violation is most likely to occur. Emission modeling assumptions (i.e. ambient temperature, traffic activity, etc.) reflect conditions on the design day.
3. Using the roll-forward technique, the computed 2007 DV and assumed background CO concentration, determine the emission reduction required to achieve attainment or, conversely, the increase in emissions that can occur and still maintain attainment of the NAAQS at Turnagain.
4. Using the roll-forward equation, compute the quantity of emissions that can be generated within the Turnagain site area on a design day and still remain in compliance with the NAAQS.
5. Using the best available data and assumptions regarding growth in population, vehicle miles traveled and trip starts within the nine kilometer square area surrounding the Turnagain site, project the quantity of CO emissions generated on a design day in 2009, 2011, 2013, 2015, 2017, 2019, 2021, and 2023 to assess whether compliance of the NAAQS will be maintained throughout the 2008-2023 maintenance plan period with a 90% probability or greater.

A description of how this procedure was applied in the nine square kilometer area surrounding the Turnagain monitoring station follows.

Step 1: Computation of 2007 DV for Turnagain Monitoring Station

The probabilistic approach referred to above was used to compute the DV for the Turnagain Highway monitor. Results of the statistical procedure employed to compute the DV are illustrated in Figure III B.6-1. The computed 2007 DV is 7.23 ppm.

Figure III.B.6-1
Computation of Probabilistic DV for 2007 from
90th Percentile Prediction Interval at Turnagain Station



Step 2: Computation of Micro-area Emission Inventory for Turnagain Station

A gridded emission inventory comprised of the 200 one-kilometer square grids that make-up the Anchorage bowl was prepared for base year 2007. The mobile source portion of these inventories was based on transportation activity outputs (e.g., volumes, speeds, number of trip starts) from the Anchorage Transportation Model· These estimated transportation activity levels were used in conjunction with a "hybrid" MOBILE6 emission factor model to estimate mobile source CO emissions. MOBILE6 was used to estimate on-road travel emissions and locally-developed cold start emissions data from two studies conducted by Sierra Research were used to estimate warm-up idle emissions. MOBILE6 was run with supplemental FTP speed correction factors disabled to better simulate winter season driving behavior in Alaska. The Sierra Research studies used as the basis for mobile source modeling are discussed in more detail in Section III.B.3.

The Anchorage Transportation Model was also useful in providing key information for the area source inventory. The transportation model provided estimates of demographic parameters (population, employment, and housing stock) for each of the grids that were utilized to estimate area source activity (e.g. non-road sources, space heating, industrial activity, and electricity generation, fireplace and woodstove emissions). For example, the quantity of CO emitted from fireplace and woodstoves in a specific grid was proportional to the number of households in that grid. Other area source types, like commercial space heating emissions, were assumed to be a function of the amount of employment in each grid.

A micro-area inventory for the nine square kilometer area surrounding the Turnagain monitor was compiled by summing the CO emission estimates from each of the nine grid cells that comprise the area. CO emissions are summarized in Table III.B.6-2.

Table III.B.6-2

Estimated Year 2007 CO Emissions in Nine Square Kilometer Area Surrounding the Turnagain Monitoring Station (emissions in tons per day)

Motor Vehicles	Fireplace or Woodstove	Space Heating	Other	**TOTAL CO EMISSIONS**
4.42	0.62	0.28	0.70	**6.01**

Step 3: Use Roll-Forward Equation to Calculate Allowable Emission Increase at Turngain Station

The roll-forward equation can be used to compute the amount that CO emissions can be increased and still maintain compliance with the NAAQS. The equation is written as follows:****

$$\%\ allowable\ emission\ increase = \frac{NAAQS - DV}{DV - bkg} x100 = \frac{9.0 - DV}{DV - bkg} x100$$

In the equation above the DV was computed in Step 1 to be 7.23 ppm but the background concentration *(bkg)* has not yet been defined. Note, that the background value yielding the least allowable percentage increase in emissions is zero. Thus the most conservative assumption for computing allowable emissions is a background value of zero. This was utilized in this maintenance demonstration. The allowable increase in emission in the Turnagain area from base year 2007 is calculated as follows:

$$\%\ allowable\ emission\ increase = \frac{9.0 - 7.23}{7.23 - 0.0} x100 = 24.5\%$$

Thus, in the Turnagain area, emissions can increase from 2007 levels by 24.5% and still maintain a 90% probability of compliance with the NAAQS.

Step 4: Calculate Quantity of CO Emissions that can be Generated in the Nine Square Kilometer Area Surrounding the Turnagain Station and Still Attain the NAAQS

If the allowable emission increase at each monitoring station is known from Step 3, the quantity of CO that can be emitted in the nine square kilometer area surrounding the Turnagain station and still meet compliance with 90% probability can be determined from the 2007 micro-inventory. The result of this computation is shown in Table III.B.6-3.

**** Note that the value assumed for the NAAQS in this equation is 9.0 ppm when in fact 8-hour CO concentrations below 9.5 ppm meet the NAAQS. This lends an added margin of safety to the computation.

Table III.B.6-3 Allowable Emissions in the Nine Square Kilometer Area Surrounding the Turnagain Monitoring Station (Maintain >= 90% Probability of Compliance)		
2007 Emissions (tons per day)	**Allowable Emission Increase**	**Allowable Emissions in 9 km^2 Area surrounding Turnagain Monitoring Station (tons per day)**
6.01	24.5%	**7.48**

Step 5: Prepare CO Emission Projections for 2008-2023 and Assess Prospects for Continued Compliance with the NAAQS

Prospects for continued compliance with the NAAQS during the 2008-2023 maintenance plan period were assessed by preparing emission projections for a design day in 2009, 2011, 2013, 2015, 2017, 2019, 2021 and 2023. The Anchorage Transportation Model was run for analysis years 2007, 2017, and 2027. Although mobile and area source activity levels in intervening years were interpolated, mobile source emission factors were estimated by running MOBILE6 for each and all years evaluated. Depending on the type of source, area source activity levels were projected to grow in proportion with housing stock and/or employment.

As was the case with the 2007 base year runs, MOBILE6 was run with supplemental FTP speed correction factors disabled to better reflect winter driving behavior in Anchorage. MOBILE6 was run with the assumption that the I/M Program will change from a four year new car exemption to a six year exemption in January 2010.

Cold start / warm-up idle emissions were estimated using data collected by Sierra Research in testing programs conducted in 1998-1999 and 2000-2001. These data provide a "snapshot" of warm-up idle emission rates in the year 2000. The effect of new emission control technology and fleet turnover on future emissions was estimated by running MOBILE6 at 2.5 miles per hour and computing the emission rate in grams per hour.[‡‡] The relative change in this MOBILE6 idle emission rate relative to the year 2000 was applied to the Sierra Research data to project idle emission factors through 2023.

Data collected by Sierra Research indicate block heater usage reduced emissions by 86 grams per cold start in the year 2000. In order to estimate block heater benefits in the future, the benefit in the year 2000 was discounted in proportion with the overall decline in idle emissions predicted by MOBILE6 (i.e., as idle emissions decline, the absolute benefit of plugging-in a block heater also declines). For example, the plug-in benefit falls from 86 grams in 2000 to 52 grams per cold start in 2013.

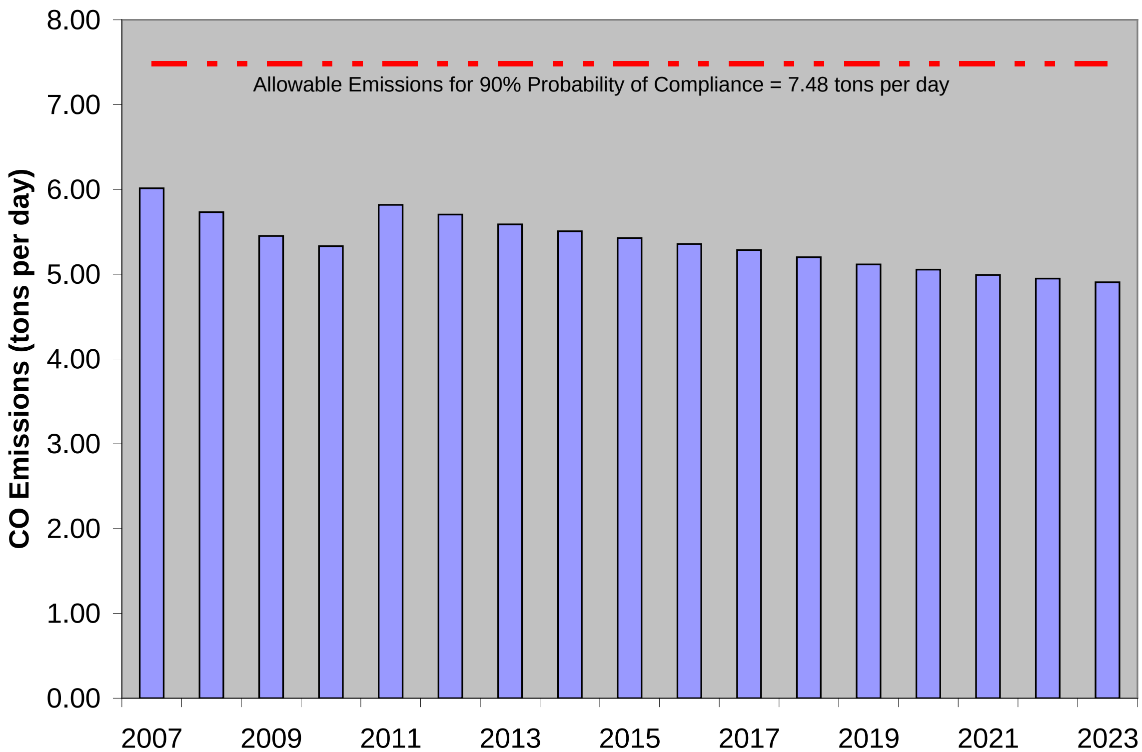
As noted earlier, CO reductions from the I/M program were assumed to be zero after 2010 and any CO reductions that might result from enhancements to the other primary control measures discussed in Section III.B-5 (i.e., air quality public awareness,

‡‡ This method of estimating idle emissions is recommended in the *Users Guide to MOBILE6*.

rideshare/vanpooling, transit marketing) have been ignored in these emission and compliance projections. Although the MOA and ADEC intend to continue and enhance current efforts to increase plug-in rates among motorists, plug-in rates were conservatively assumed to remain at year 2007 levels throughout the maintenance plan period. Anticipated growth in vanpooling and transit ridership has also been disregarded. This provides an added measure of conservatism to the computations.

Figure III.B.6-3 shows projected emissions and prospects for continued compliance with the NAAQS at the Turnagain station. (Projected CO emissions increase in 2011 because CO reductions provided by I/M are assumed to cease in that year.) In theory, the probability of maintaining compliance with the NAAQS in any given year is 90% or greater if emissions remain below the allowable emission levels identified in the figure.

Figure III.B.6-3 Compliance Prospects at the Turnagain Station through 2023



Conclusions Regarding Long-Term Prospects for Compliance with the CO NAAQS in Anchorage

The preceding analysis suggests there is a very high probability of continued compliance with the CO NAAQS. Anchorage has not violated the NAAQS since 1996 and no exceedances have been measured since 2001. During the period 2008-2023, the estimated probability of complying with the NAAQS is 99% or higher each year.

An additional analysis was performed (see Appendix to Section III.B.6) to see how sensitive the compliance projections were to assumptions about the growth in emissions over time and the effect of eliminating the I/M Program. This sensitivity analysis examined a “worst case” scenario in which:

(1) the growth in vehicle travel in the Turnagain area will be three times greater than projected (vehicle travel would increase by 12% between 2007 and 2023 instead of the 4% assumed);

(2) there will be a 2% per annum growth in wood heating among households in the Turnagain area resulting from high natural gas prices.

Using these substitute assumptions, CO emissions were re-estimated for the 2008-2023 period and the resultant probabilities of complying with the NAAQS were re-computed. *Even with the assumed higher rates of growth in vehicle travel and wood burning, the probability of compliance remains at 99% or greater each year through 2023.*

The sensitivity analysis provides additional confidence that there is a high likelihood that Anchorage will remain in compliance with the NAAQS even if future growth in vehicle travel and wood burning is more rapid than anticipated in the projections presented earlier.

Impact of Deleting I/M as a Primary Control Measure in the SIP 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.*

A review of EPA's Green Book†††† shows that, with the exception of CO, Anchorage has not been classified as nonattainment for any of the criteria pollutants, including: ozone, PM-2.5, PM-10, sulfur dioxide, nitrogen dioxide and lead. It should be noted, that unlike Fairbanks, PM-2.5 concentrations in Anchorage are well below the current 24-hour and annual NAAQS.

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

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III.B.7 Contingency Plan

Section 172(c)(9) of the CAAA 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.

Because I/M and the ethanol-blended gasoline program were control measures in the previous Anchorage attainment plan, they must be included as contingency measures to be implemented if needed to address future violations of the CO NAAQS.

In addition, a number of other control measures are included in the contingency plan for possible implementation. The menu of control measures available for implementation and the projected amount of time needed for implementation after being triggered by a violation of the NAAQS is listed in Table III.B.7-1.

In the event monitoring data indicate that a violation of the ambient CO standard has occurred, Anchorage would examine the data to assess the spatial extent (i.e., hot spot versus region), severity and time period of the episode as well as trends over time.‡‡‡‡ Based on this information, Anchorage, in consultation with ADEC, would determine which measure or measures in Table III.B.7-1 to implement.

Table III.B.7-1

Menu of Anchorage Contingency Measures

Contingency Measure	Projected Time Necessary for Implementation
Increase public awareness and education, transit, carpool and vanpool promotion efforts	6 to 12 months
Curtail or limit use of fireplaces, wood stoves and other wood burning appliances when high CO is predicted	6 to 12 months
Promote increase in transit ridership among commuters by offering reduced fares, or free transit fares for employees of companies that contribute to subsidy.	12 to 24 months
Reinstate block heater installation subsidy	12 to 24 months
Reinstate ethanol-blended gasoline	12 to 24 months
Reinstate I/M	12 to 24 months

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

‡‡‡‡ For example, if the CO violation(s) occurred in a residential area during evening hours and was associated with elevated PM-2.5, it might implicate residential wood heating as important factor in the violation. Thus, it might be appropriate to implement a curtailment or restriction of fireplace and wood stove use when high CO episodes are predicted.

beyond 24 months of the violation. If inventory revisions in future years indicate the probability of attainment will drop below a 90% confidence interval, Anchorage would conduct a similar analysis and consultation process with ADEC to select and implement the appropriate control measure or measures. Once implemented, Anchorage will track monitoring data and determine in consultation with ADEC whether additional controls are needed.

III.B.8 Anchorage Emergency Episode Plan

The CAAA section 127 (42 U.S.C. 7427) requires that all state implementation plans include measures to provide public notification when the NAAQS has been exceeded, advise the public of the health hazards associated with the pollution, and enhance public awareness of the measures that can be taken to reduce air pollution. The MOA air pollution episode plan is outlined in municipal code and meets the requirements of Section 127 (42 U.S.C. 7427). Local ordinance AMC 15.30.060 requires the director of the MOA Department of Health and Human Services to publish and distribute copies of an Air Pollution Episode Plan that prescribes the specific actions to be taken at each stage of notification. The plan was developed and published by the MOA in October 1993 and adopted by reference under AMC 15.30.06. Copies of the plan are available from the MOA, Department of Health and Human Services. A copy of AMC 15.30 is included in the Appendix to Section III.B.8.

Three levels of notification are outlined in AMC 15.30.060 related to the level of air pollution predicted or measured in the air. For CO these levels are as follows:

- *Level 1 – Alert* – Declared when the 8-hour average CO concentration has reached or is predicted to reach 9 ppm.
- *Level 2 – Warning* – Declared when the 8-hour average CO concentration has reached or is predicted to reach 15 ppm.
- *Level 3 – Emergency* – Declared when the 8-hour average CO concentration has reached or is predicted to reach 30 ppm.

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III.B.9 Assurance of Adequacy

Under the CAAA Section 110(a)(2)(E) (42 U.S.C. 7410(a)(2)(E)) each SIP must provide the necessary assurances that the State or the local government designated by the State for such purposes (e.g., MOA), will have "adequate personnel, funding, and authority" under State or (as appropriate) local law to carry out the SIP. The CAAA 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 retains responsibility for ensuring adequate implementation of such plan provisions.

Local Legal Authority

The State of Alaska has delegated authority for air pollution control within the Municipality to MOA under AS 46.14.400 (formerly AS 46.03.210). AS 46.03.210 allowed local municipalities to establish air pollution control programs within their jurisdictions by August 5, 1974. In the MOA, air pollution control powers are exercised under the South Central Clean Air Ordinance, codified in Anchorage Municipal Code (AMC), Chapters 15.30 and 15.35. A copy of AS 46.14.400 is included in Volume III, Appendix to Section II, and copies of AMC 15.30 and 15.35 are included in Volume III, Appendix to Section III.B.8.

AS 46.14.400, AS 28.10.041(a)(10), and AS 29.04 authorize the MOA to implement a motor vehicle emissions inspection program. The MOA Assembly initially enacted the authority for the MOA I/M program in March 1984 in local ordinance AMC 15.80. As noted in Section III.B.5, the commitment to continued operation of I/M will cease upon approval of this document as a revision to the SIP. However, if the Assembly so chooses, I/M may continue as a local option as stipulated in local ordinance. AMC 15.80 is included in the Appendix to Section III.B.9.

The State of Alaska retains the regulatory authority to reestablish the I/M and oxygenated fuels programs under 18 AAC 52.007, 18 AAC 52.005(i) and 18 AAC 52.030 in the event that the I/M area violates the NAAQS for carbon monoxide in the future.

Adequate Local Personnel and Funding

Air quality monitoring and planning in Anchorage is performed by the Municipal Department of Health and Human Services (DHHS). These functions are currently supported by revenues from I/M Program Certificate of Inspection fees and an annual Section 105 grant from EPA.[§§§§] The overall budget and staffing level of the air quality program is reviewed annually by the MOA Administration and by the Anchorage Assembly. This process provides a means to address needs on a timely basis, consistent with requirements outlined in the Municipal charter and ordinance.

§§§§ In 2007, air quality program activities in DHHS were supported with $323,000 in I/M Program revenues and with a $135,195 EPA Section 105 grant.

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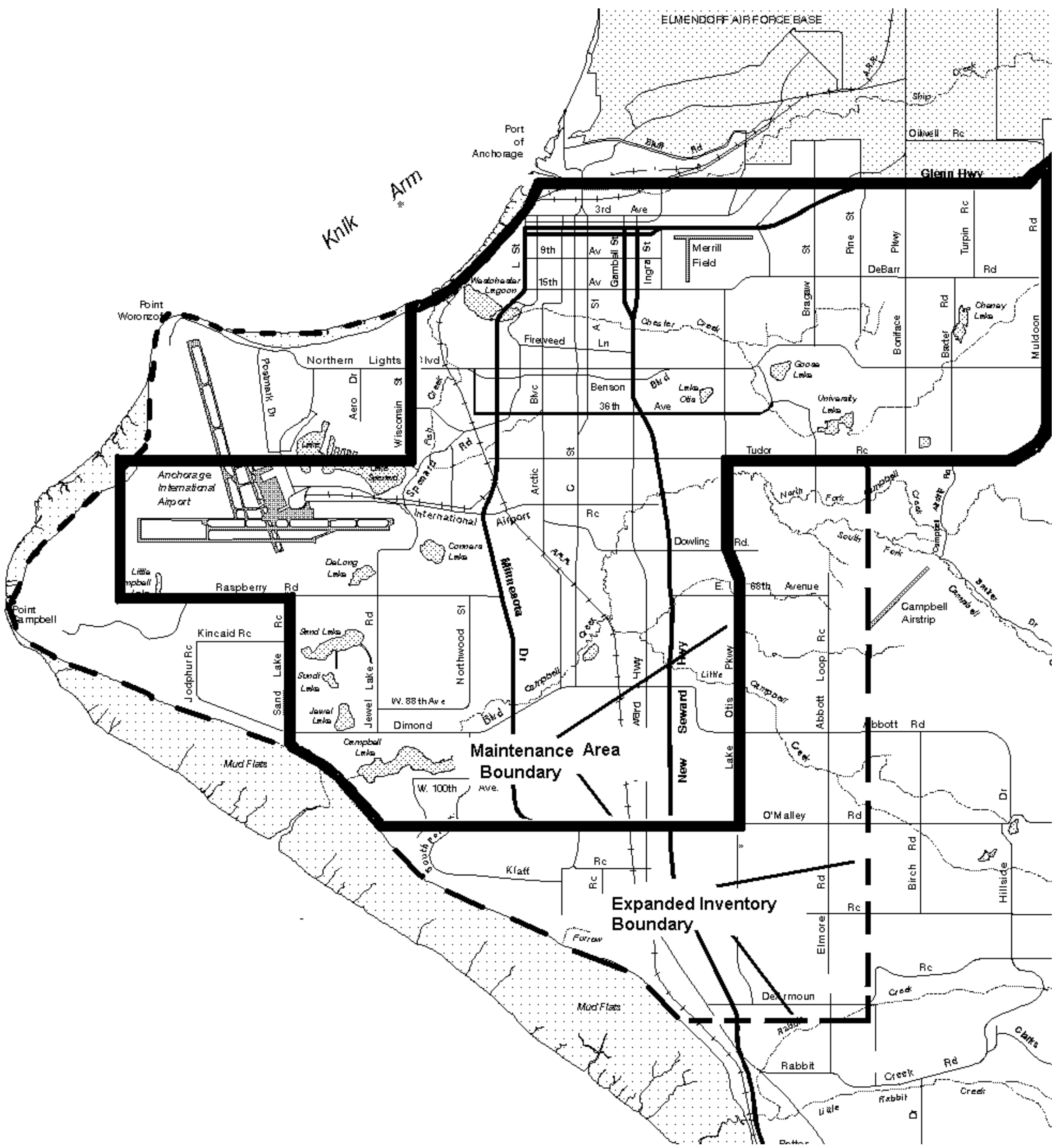
III.B.10 Motor Vehicle Emissions Budget

Before any regional transportation plan can be adopted or amended, the emissions from the transportation network proposed in the plan must be shown to be less than the motor vehicle emission budget established in the SIP. The motor vehicle emissions budget presented here applies during the period 2008 and beyond, unless changed in an EPA-approved SIP.

Motor Vehicle Emission Budget Inventory Area

The motor vehicle budget is compiled on an area-wide basis. The area encompassed by "expanded inventory boundary" noted in Figure III.B.10-1 will be used to establish the emission budget. Future conformity determinations will evaluate emissions in this same area.

Figure III.B.10-1 Expanded Emission Inventory Area Used to Compute Emission Budget



Methodology Used to Establish Motor Vehicle Emission Budget

In a manner similar to that used in the compliance demonstration discussed in III.B.6, the roll-forward approach was used to compute the regional motor vehicle emissions budget for the expanded emission inventory area described in Figure III.B.10-1. The emission budget is based on estimated emissions within the boundary of this area during the 2007 base year. As was the case in the maintenance demonstration presented in Section III.B.6, it can be shown that total emissions within the inventory area can increase from 2007 levels because there was a greater than 90% probability of meeting the NAAQS at 2007 levels. In other words, CO emissions can increase somewhat from 2007 levels and the probability of compliance would still be greater than 90%. The roll-forward computation is used to determine how much the CO emission sources can increase within the inventory area and still maintain compliance with the NAAQS. This amount is the “total CO emission budget.” Because some of these emission are from sources other than motor vehicles (aircraft, wood heating, etc.), the budget “available” for motor vehicle emissions will be less than the total budget.

The process for determining the motor vehicle emission budget for base year 2007 is described below.

1. Use roll-forward method to compute *total* CO emission budget from 2007 area-wide emission inventory and computed 2007 design value (DV).

   Area-wide CO emissions (2007) = 101.0 tons per day
   2007 DV = 7.23 ppm
   Allowable increase in area-wide emissions = $\frac{9.0-7.23}{7.23-0.0} x 100 = 24.5\%$

   Total CO emissions budget = (1+0.245) x 101.0 = 125.8 tons per day

2. Estimate 2007 motor vehicle budget by subtracting other “non-motor vehicle emissions” from total allowable area wide emissions.

Ted Stevens Anchorage International Airport Operations	12.4
Merrill Field Airport Operations	0.7
Wood burning – fireplaces and wood stoves	6.2
Space heating – natural gas	3.8
Miscellaneous (railroad, marine, snowmobiles, snow removal, portable electrical generators, welding, etc.)	9.3
Point sources (power generation, sewage sludge incineration)	1.3
TOTAL NON MOTOR VEHICLE EMISSIONS	**33.7 tons per day**

2007 Motor Vehicle Emissions Budget = Total allowable emissions less non motor vehicle emissions = 125.8 **–** 33.7 = **92.1 tons per day**

The motor vehicle emission budget for the years covered by the maintenance plan, 2008-2023, will shrink over time because emissions from other non motor vehicle sources are expected to grow during this period. Because emissions from all sources in the inventory area cannot exceed the 125.8 ton per day limit, the amount of the budget available for motor vehicle emissions will decrease. This is shown in Table III.B.10.1.

Table III.B.10.1

Motor Vehicle Emission Budget

	Stevens Int'l Airport	Merrill Field	Wood Burning	Space Heating	Point Sources	Other	**Non Motor Vehicle Sources TOTAL**	TOTAL CO EMISSION BUDGET	**MOTOR VEHICLE EMISSION BUDGET**
2007	12.4	0.7	6.2	3.8	1.3	9.3	33.7	125.8	**92.1**
2008	12.7	0.7	6.3	3.8	1.3	9.3	34.1	125.8	**91.7**
2009	13.0	0.7	6.4	3.8	1.3	9.4	34.6	125.8	**91.2**
2010	13.3	0.7	6.4	3.8	1.3	9.5	35.0	125.8	**90.8**
2011	13.6	0.7	6.5	3.9	1.3	9.5	35.5	125.8	**90.3**
2012	13.8	0.7	6.5	3.9	1.3	9.6	35.9	125.8	**89.9**
2013	14.1	0.8	6.6	3.9	1.3	9.6	36.4	125.8	**89.4**
2014	14.4	0.8	6.7	3.9	1.3	9.7	36.8	125.8	**89.0**
2015	14.7	0.8	6.7	4.0	1.3	9.8	37.3	125.8	**88.5**
2016	15.0	0.8	6.8	4.0	1.3	9.8	37.7	125.8	**88.0**
2017	15.3	0.8	6.8	4.0	1.3	9.9	38.2	125.8	**87.6**
2018	15.8	0.8	6.9	4.0	1.3	10.0	38.8	125.8	**87.0**
2019	16.2	0.8	6.9	4.0	1.4	10.0	39.4	125.8	**86.4**
2020	16.7	0.8	6.9	4.1	1.4	10.1	40.0	125.8	**85.8**
2021	17.2	0.8	7.0	4.1	1.4	10.1	40.6	125.8	**85.2**
2022	17.6	0.9	7.0	4.1	1.4	10.2	41.2	125.8	**84.6**
2023	18.1	0.9	7.0	4.1	1.4	10.3	41.8	125.8	**84.0**

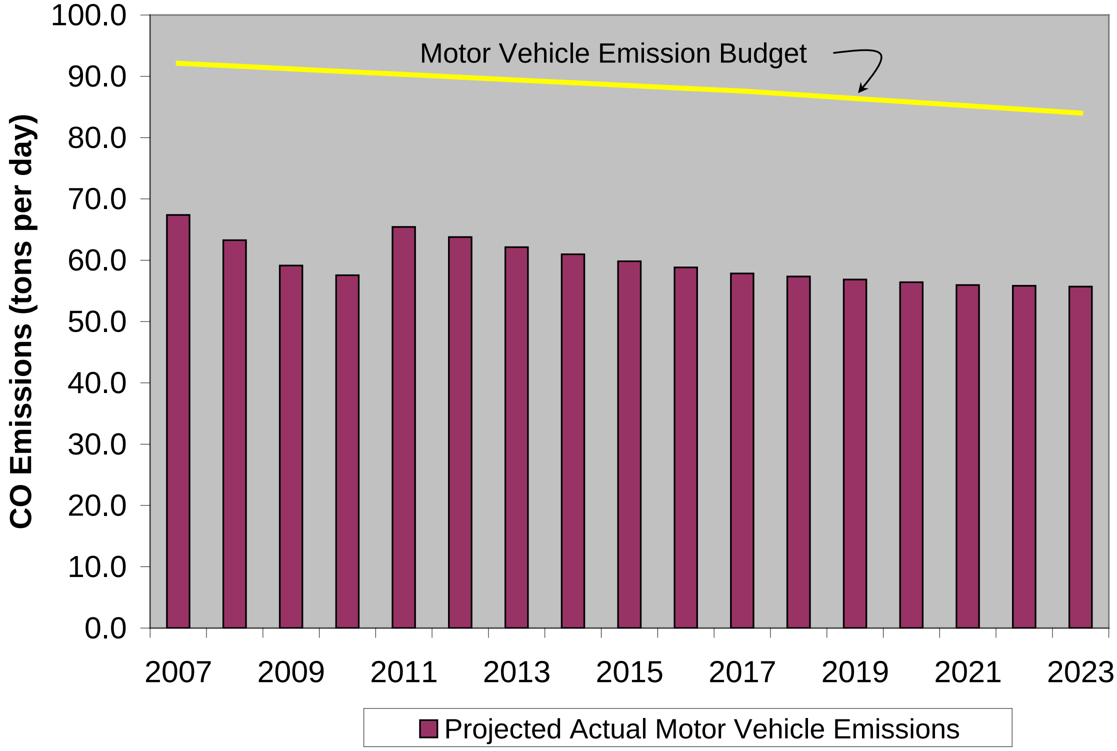
Note: Some rows may not total exactly because of rounding. Totals are rounded to one significant digit beyond the decimal.

Emission budgets for years beyond 2023, the end of the maintenance plan, shall be assumed to be 84.0 tons per day.

Long Term Prospects for Meeting Conformity Budget

A preliminary analysis of long term prospects for meeting the conformity budget were evaluated using the travel activity projections and transportation network assumptions contained in the current Long Range Transportation Plan. The analysis suggests that, barring unanticipated major changes in population or employment growth, motor vehicle emissions from Anchorage transportation network will remain below the motor vehicle emission budget during the period 2008–2023. Projected motor vehicle emissions are compared to the budget in Figure III.B.10.2.

Figure III.B.10-2. Projected Motor Vehicle Emissions vs. Budget 2007 - 2023



Finding of Adequacy of Mobile Source Emissions Budget

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 Anchorage on August 2, 2010. The affidavit of oral hearing is included in the Appendix to Section III.B.10.
- be developed through consultation among federal, State and local agencies;
  - Federal, state, and local agencies were consulted on the motor vehicle emissions budget. (Note ADEC will update based on comments received).
- be supported by documentation that has been provided to EPA ;

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

- address any EPA concerns received during the 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 Anchorage.

- 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 Anchorage CO emission inventory. The budget when considered with all other emission sources is consistent with the requirements for continued maintenance of the CO standard.

- 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 Anchorage CO emission inventory and control measures included in the plan.

- 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 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.B.5

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

  - The response to comments received will be included in the Appendix to Section III.B.10. In addition, the Anchorage Assembly passed a resolution ((2010-174) approving the plan revisions on June 8, 2010. A copy of this resolution is also included in the same appendix. (Note ADEC will update based on comments received)

Once a motor vehicle emissions budget is found to be adequate by EPA, emissions modeled from the transporation network reflected in the Anchorage Long Range Transportation Plan (LRTP) 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.

Use of the Hybrid Model in Conformity Analysis

Because a hybrid method, that relies on the use of MOBILE6 for modeling on road travel emissions and local emissions data to estimate idle 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 Anchorage that significantly affect vehicle CO emissions:

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

2. Use of block 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 that combines actual measurements of warm-up idling and plug-in benefits with emission factors from MOBILE6. This methodology is described in detail in Appendix to Section III.B.3.

To address the subsequent use of this hybrid approach within the conformity process, the following steps are being incorporated into the conformity procedures for Anchorage transportation 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 Determination Methodology

Analysis Years Required for Demonstration of Consistency with Emission Budget

Transportation plans and programs must be shown consistent with the motor vehicle emission budget shown above. Criteria and procedures for determining the consistency with the emissions budget are established in 40 CFR Part 93.118. These regulations state that consistency with the motor vehicle emission budget must be demonstrated for

- each year that the applicable emission plan specifically establishes a motor vehicle emission budget;
- for the last year of the transportation plan's forecast period; and
- for any intermediate years as necessary so that the years for which consistency is demonstrated are no more than ten years apart.

The conformity regulations state that "the regional emissions analysis may be performed for any years in the timeframe of the transportation plan provided they are not more than ten years apart and provided the analysis is performed for the attainment year (if it is in the timeframe of the transportation plan) and the last year of the plan's forecast period."[*****] The regulations also state that consistency with the motor vehicle budget for other years "may be determined by interpolating between the years for which the regional analysis is performed." Because Anchorage is a maintenance area that has already attained the CO standard, it will not be necessary to include the attainment year as an analysis year in future transportation plans. Thus, for future transportation plans and programs in Anchorage, explicit conformity analysis, involving a separate run of the transportation model and computation of the CO emissions for that particular year, must be performed for the last year of the transportation plan, and any additional years necessary to ensure that explicit conformity demonstrations are performed no more than ten years apart. Intervening years may be computed by interpolation to establish conformity with each year of the emission budget shown in Table III.B.10-2.

Assumptions used in modeling analysis for conformity determinations must be consistent with those in the CO Maintenance Plan. Because this SIP revision assumes that the CO reductions provided by the I/M program cease after 2010, any modeling performed for conformity analyses must also assume this, even if the I/M program is still in operation as a "local option." The other primary measures included in the Plan (air quality public awareness, transit marketing, and the ridesharing and vanpooling program) are voluntary programs; their CO reduction benefits were disregarded in the analysis of Anchorage's prospects for continued compliance with the NAAQS. Therefore the CO reductions from those programs must also be disregarded in regional conformity analyses.

Methodology Employed to Compute Emissions in Analysis Years

The motor vehicle emission budget shown in Table III.B.10-1 was prepared using a "hybrid" method that combined locally collected idle test data with the MOBILE6 model run with supplemental FTP speed correction factors disabled. This same hybrid approach was used to prepare the maintenance demonstration for the Turnagain area. It will also be employed in future regional conformity analyses.

This MOBILE6-based hybrid method provides a means to model the impact of extended initial idling of vehicles prior to travel and the use of "plug-in" heaters to keep the engine warm while parked for long periods to aid in cold start driveability. Because the hybrid method used to estimate motor vehicle emissions in the MOA is unique and somewhat unconventional, it is necessary to delineate a method to compute emissions for use in future TIP and project-level conformity determinations.

To address subsequent use of this hybrid approach within the conformity process, the following steps are being incorporated into the conformity procedures for the MOA transportation 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 Volume II, Sections III.I and III.J of this plan and 18 AAC 50.700 – 18 AAC 50.720.

The emission calculations of a project, program, or plan must be consistent with the methodology used to establish the motor vehicle emissions budget. For regional emissions analyses (e.g., the LRTP or TIP) computations of mobile source emissions will use the same hybrid method used in developing the emission budget. In a regional conformity determination, mobile source emissions resulting from the plan or program must be

***** See 40 CFR 93.118 d(2)

compared to the applicable emissions budget established in the SIP. All regionally significant projects must be specifically modeled in the conformity analysis.

The computation of motor vehicle emissions relies on VMT, speed, and operating mode outputs provided by the Anchorage Transportation Model and post processing software. Currently, these post-processor outputs are utilized in a separate Excel spreadsheet model that contains MOBILE6 emission factors used to estimate travel emissions and idle emission factors that are based on local test data. The user must provide estimates of average soak times, idle duration and plug-in rates by trip purpose. Base year 2007 assumptions are shown in Tables III.B.10-2 (a-c). These same assumptions should be used for other analysis years. Any deviation from these assumptions should be discussed and approved through the interagency consultation process outlined in 40 CFR 93.105.

Changes to the Anchorage Transportation Model may necessitate modifications in the manner in which regional mobile source emissions are calculated. Significant changes should be documented and then discussed and approved through the interagency consultation process.

Tables II.B. 10-2(a-c) Assumptions Regarding Soak Times, Idle Duration and Plug-In Rates for Modeling Regional Conformity

Table III.B.10.2(a)

Assumptions for AM Peak Period (7 AM – 9 AM)

Trip Type†††††	Trip Origin	Average Soak Time (hours)	Average Idle Duration (minutes)	% plugged in	Proportion of Trips originating from home vs. other‡‡‡‡‡
HB Work	Home	12	7	20%	0.955
	Other	5	3	0%	0.045
HB Shop	Home	12	7	10%	0.794
	Other	1	1	0%	0.206
HB School	Home	12	7	20%	0.972
	Other	0.5	1	0%	0.028
HB Other	Home	12	7	20%	0.798
	Other	1	1	0%	0.202
NHB Work	Home	NA	NA	0%	0.000
	Other	4	3	0%	1.000
NHB Non-work	Home	NA	NA	0%	0.000
	Other	1	1	0%	1.000
Truck	Home	NA	NA	0%	0.000
	Other	2	3	0%	1.000

††††† Trip types include: *HB Work* = trips between home and work or vice versa, *HB shop* = trips between home and a shopping destination or vice versa; *HB School* = trips between home and school or vice versa, *HB Other* = trips between home and some destination other than work, shopping or school or vice versa; *NHB Work* = trips between work and a destination other than home or vice versa; *NHB non-work* = trips between two locations that are neither work or home; and *Truck* = freight trips made by commercial trucking.

‡‡‡‡‡ The travel model provides information regarding the types a trip taken in a particular grid but does not specify whether they began and work, home, or other location. For example, the travel model might estimate that 1,000 HB work trips began in a particular grid between 7 AM and 9 AM. We do not know, however, whether these trips began at home or work. For modeling purposes, we assume that 95.5% of these trips began at home and would therefore have an average soak time of 12 hours, an idle duration of 7 minutes and 20% would be plugged in. The remaining 4.5% of these trips we assume began at work with shorter soak (5 hours) and idle times (3 minutes) than home. The plug-in rate at work is assumed to be zero. These assumptions are based on an analysis of Anchorage Home Interview Survey data.

Table III.B.10.2(b)

Assumptions for Off Peak Periods (9 AM – 3 PM, 6 PM – 7 AM)

Trip Type	Trip Origin	Average Soak Time (hours)	Average Idle Duration (minutes)	% plugged in	Proportion of Trips originating from home vs. other
HB Work	Home	3	3	10%	0.500
	Other	5	3	0%	0.500
HB Shop	Home	1	1	0%	0.500
	Other	0.5	1	0%	0.500
HB School	Home	2	2	0%	0.500
	Other	0.5	1	0%	0.500
HB Other	Home	2	2	5%	0.500
	Other	1	1	0%	0.500
NHB Work	Home	NA	NA	0%	0.000
	Other	3	2	0%	1.000
NHB Non-work	Home	NA	NA	0%	0.000
	Other	1	1	0%	1.000
Truck	Home	NA	NA	0%	0.000
	Other	2	1	0%	1.000

Table III.B.10.2(c)

Assumptions for PM Peak Periods (3 PM - 6 PM)

Trip Type	Trip Origin	Average Soak Time (hours)	Average Idle Duration (minutes)	% plugged in	Proportion of Trips originating from home vs. other
HB Work	Home	3	3	10%	0.500
	Other	5	3	0%	0.500
HB Shop	Home	1	1	0%	0.500
	Other	0.5	1	0%	0.500
HB School	Home	2	2	0%	0.500
	Other	0.5	1	0%	0.500
HB Other	Home	2	2	5%	0.500
	Other	1	1	0%	0.500
NHB Work	Home	NA	NA	0%	0.000
	Other	3	2	0%	1.000
NHB Non-work	Home	NA	NA	0%	0.000
	Other	1	1	0%	1.000
Truck	Home	NA	NA	0%	0.000
	Other	2	1	0%	1.000

Project-Level Conformity Methodology

In project-level analysis, conformity determinations cannot be made by comparing localized project emissions to a regional emissions budget. Instead, a 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 non-attainment and maintenance areas for each pollutant. Thus, in Anchorage, 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 as follows:

1. Projects that do **not** significantly impact off-network emissions (e.g., projects that are not likely to affect the amount of initial idling and/or engine block heater use in the project area) will follow a more routine approach to computing emission impacts using MOBILE6 with supplemental FTP speed correction factors disabled. Off-network 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-network emissions are accounted for in the background concentration input in CAL3QHC.

2. Those projects that do significantly impact off-network emissions (e.g., projects that are likely to affect the amount of initial idling and/or engine block heater use in the project area) will follow a process that incorporates both the off-network emissions and the on-road "traveling" emissions. This will require a hybrid approach similar to that used in developing the emission budget and adapted to represent roadway link-specific emission factors in the vicinity of the project.

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. Moreover, it is important that the interagency process be used to develop guidance so that consistent methodologies are utilized in project-level analyses. Hot spot modeling is often required in project-level conformity determinations. When possible, the interagency consultation process should be used to develop written guidance regarding modeling inputs and assumptions and these assumptions should be consistent with those employed in the maintenance demonstration in this Plan.§§§§§ As always, conformity determinations will be subject to the applicable public review requirements. This provides the public an opportunity to comment on the approach that is taken for the conformity determination for each plan, program, and project.

Unless otherwise approved through interagency consultation, the CO background value to be employed in hot spot modeling is 5.1 ppm for a one-hour average or 3.6 ppm for an 8-hour average. These values should be used to model CO emissions in 2008. Background concentrations are expected to decline over time in relation to anticipated future reductions in CO emissions. To estimate background concentrations for future years, the 2008 background concentration should be adjusted downward in accordance with CAL3QHC

§§§§§ As noted earlier, this means disregarding the CO reduction benefits of air quality public awareness, transit marketing, and the ridesharing and vanpooling programs..

modeling guidance. A detailed discussion on how the 2008 background concentration was derived can be found in the Appendix to Section III.B.10.

General Conformity

For projects requiring general conformity determinations, it is also important to consider the impacts of off-network motor vehicle emissions (e.g., idle emissions). 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 a project of this type is an airport expansion.

III.B.11 Redesignation Request

On February 18, 2004 the State of Alaska submitted a request to the EPA that Anchorage be redesignated from a serious nonattainment area to an attainment area. Section 107(d)(3)(E) of the CAAA 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 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;
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.

The information necessary for EPA to make these five findings was as follows:

Attainment of the Standard

According to EPA guidance, the demonstration of attainment with the CO standard must rely on three complete, consecutive years of quality-assured air quality monitoring data collected in accordance with 40 CFR 50, Appendix K. The Anchorage CO nonattainment area did not experience any violations of the NAAQS during the three-year period, 2000-2002, prior to submission of the redesignation request. (******)

Approved Implementation Plan

As discussed in Section III.B.1, the department revised its State Implementation Plan in response to the moderate nonattainment designation in 1994. When Anchorage 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 AMATS process, incorporated into state regulations and submitted to EPA for findings of adequacy and budget approvals. The attainment plan became effective on October 18, 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. Section III.B.5 contains an expanded discussion of existing control action implementation. Section III.B.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, the Rideshare and Vanpooling program, and engine block heater program.

****** The period without a violation now extends through 2008. An expanded discussion of Anchorage CO air quality data is included in Section III.B.3.

Section 110 and Part D Requirements

Section 110 and Part D of the CAAA address implementation of SIPs and SIP requirements for nonattainment areas. EPA's finding of adequacy and budget approval of the MOA Serious Area SIP on October 18, 2002, demonstrates compliance with the Section 110 and Part D requirements.

Approved Maintenance Plan

The department in conjunction with the MOA 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 CAAA, approve the Maintenance Plan as a part of the redesignation process. This request was approved by EPA effective July 23, 2004 (64FR 34935).

References

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[3] "Analysis of the Probability of Complying with the National Ambient Air Quality Standard for CO in Anchorage between 2007 and 2023," Anchorage Air Quality Program, April 2009.

[4] "Municipality of Anchorage I/M Program Evaluation Study," prepared for the Municipality of Anchorage by Sierra Research, Inc., Report No. SR2007-01-01, January 19, 2007.

[5] "The Ongoing Challenge of Managing Carbon Monoxide Pollution in Fairbanks, Alaska," National Research Council, May 2002.

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[7] "Anchorage I/M Compliance Rate Study," ADEC Air and Water Quality Program, March 1999.

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[13] "Fairbanks Cold Temperature Vehicle Testing: Warm-up Idle, Between Trip Idle, and Plug-in," Sierra Research, July 2001.

[14] "CO Dispersion Model Feasibility Study: Fairbanks and Anchorage, Alaska," prepared for the Alaska Department of Environmental Conservation by Systems Applications International, Inc. / ICF Consulting, June 14, 2002.

The End.