Chapter

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MTP2040

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Air Quality and the MTP

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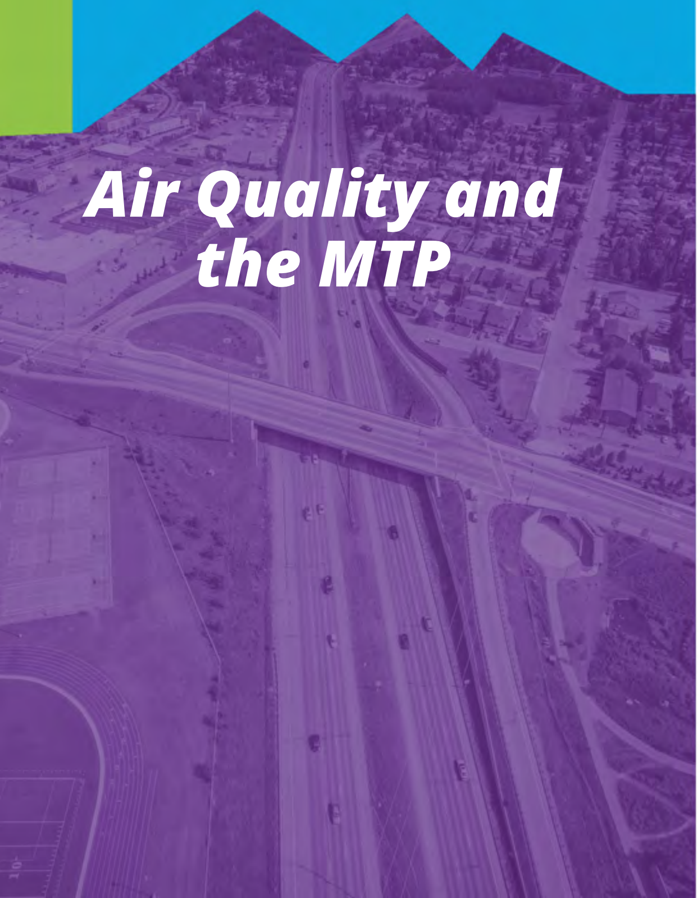


Introduction

In accordance with the 1970 Clean Air Act, the U.S. Environmental Protection Agency (EPA) established national ambient air quality standards (NAAQS) for six common air pollutants, including ground level ozone, sulfur dioxide (SO2), nitrogen dioxide (NO2), carbon monoxide (CO), airborne lead, and particulate matter. Particulate matter is regulated as particles less than 10 microns (PM_{10}) and as particles less than 2.5 microns ($PM_{2.5}$). The Municipality of Anchorage is compliant with the NAAQS for ground level ozone, sulfur dioxide, nitrogen dioxide, airborne lead and $PM_{2.5}$. Due to historical exceedances of the CO NAAQS in Anchorage and exceedances of the PM_{10} NAAQS in Eagle River, Anchorage and the State of Alaska are committed to CO and PM_{10} maintenance plans which have been incorporated into the Alaska State Implementation Plan (SIP). The plans utilize transportation system control measures to reduce CO and PM_{10} from automotive and roadway sources in the Anchorage and Eagle River maintenance areas. The Anchorage CO and Eagle River PM_{10} maintenance plans are effective for 10-years from their approval by EPA on May 2, 2014 and on March 3, 2013 respectively. The Alaska Department of Environmental Conservation is in the final review process of a second ten-year update of the Eagle River PM_{10} Limited Maintenance Plan for submission to EPA for approval. Anchorage and State of Alaska air quality planners expect the Municipality of Anchorage to remain compliant with national air quality standards through 2040 even with projected growth in travel on the transportation system.

Background

Anchorage enjoys low levels of most types of air pollution. Sulfur dioxide, nitrogen dioxide, lead and ozone have been monitored and are not a significant concern. Air pollutants of concern include carbon monoxide, particulate matter, including PM_{10} and $PM_{2.5}$, and air toxics. The American Lung Association issued Anchorage a grade of “B” in their 2019 State of the Air Report due to a few episodes per year of high 24-hour average concentrations of particle pollution. Although Anchorage presently maintains air quality standards for all criteria pollutants, it does incur elevated levels of PM_{10} during the early spring melt season (typically mid-March through April) and may also experience episodes of high daily concentrations of $PM_{2.5}$ during spring or summer whenever smoke from large-scale wildfires is present in southcentral Alaska.

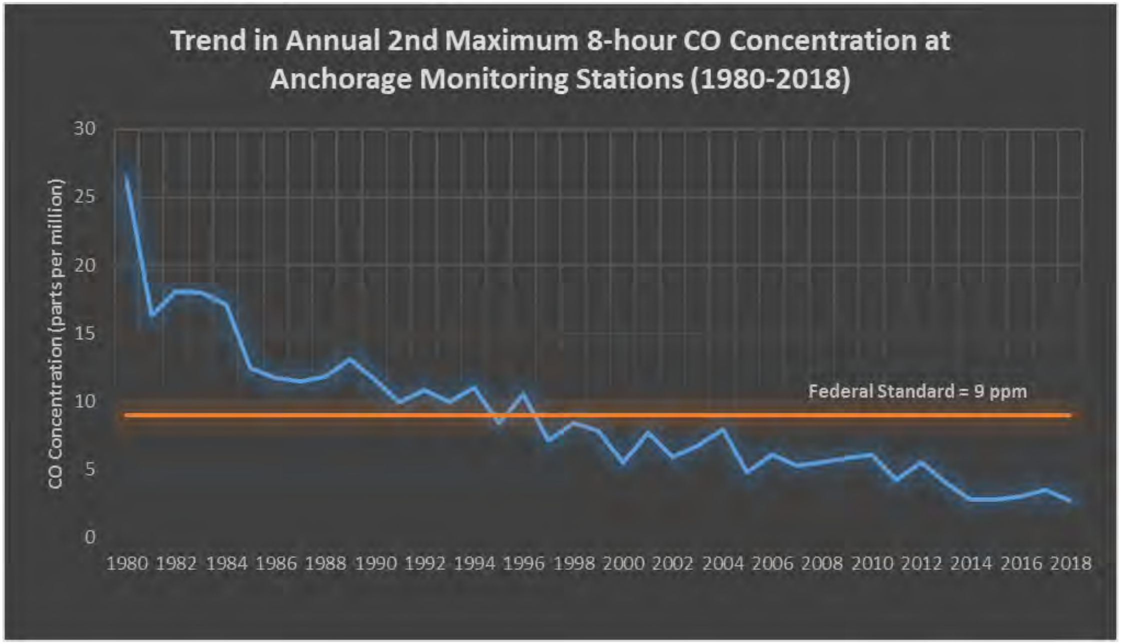
Figure 9-1 Use of Non-Motorized and Public Transportation Helps Decrease Emissions

Carbon Monoxide

During the past two decades, Anchorage has experienced dramatic reductions in ambient concentrations of CO. In the early 1980s, Anchorage violated the 8-hour CO standard as many as 50 times per year. Since then, concentrations have dropped more than 70 percent. Anchorage has had no violations of the CO NAAQS since 1996. Motor vehicles are the main source of CO pollution in Anchorage. Cars and trucks account for almost 80 percent of the CO emitted in the Anchorage Bowl. Continual advancements in technology to control air pollution on newer vehicles are largely responsible for this improvement. In January 2012, the EPA approved a revised CO control plan for Anchorage that showed the vehicle inspection and maintenance program was no longer necessary to meet the federal CO standard. Effective on May 2, 2014, Anchorage was reclassified as a Limited Maintenance Plan (LMP) area for CO. Anchorage continues to implement CO reduction measures such as continued investment in and optimization of transit bus and vanpool programs.

to decrease the use of single occupancy vehicles and reduce motor vehicle emissions. The trend in CO concentrations is shown in Figure 9-2. The highest CO concentrations in Anchorage occur in mid to late winter when strong temperature inversions trap air pollutants in a stagnant layer of cold dense air close to ground level. Vehicle CO emissions are greatest shortly after a cold start when catalytic control systems operate inefficiently. Peak CO concentrations in Anchorage occur in

Figure 9-2 Trend in 2nd Maximum CO Concentrations at Anchorage Monitoring Stations (1980-2016)



residential areas where vehicles are commonly parked outside, started cold and allowed to warm up by idling before the morning commute.

The MOA promotes the use of engine block heaters when temperatures fall below 20°F to reduce cold-start emissions. Congestion Mitigation Air Quality (CMAQ) Public Awareness programs include the Plug@20 Advertising Campaign, promoting the use of engine block heaters to reduce cold-start vehicle emissions, and the annual spring Bike to Work Campaign to promote bicycle commuting (see Fig. 9-3).

Figure 9-3 Plug@20 Campaign and 2017 Bike to Work Poster

Particulate Matter (PM_{10})

The federal air quality standard for PM_{10} is set at 150 micrograms per cubic meter (μg/m3) averaged over a 24-hour period, not to be exceeded more than three times in any three-year period. Although PM_{10} levels in Anchorage and Eagle River sometimes exceed 150 μg/m3, no more than three exceedances have occurred in a three-year period and the MOA is compliant with the standard.

High PM_{10} concentrations typically occur during spring break-up when melting snow and ice expose a winter's worth of accumulated traction material on roadways. This sediment is stirred up by traffic, especially on high-speed, high-volume streets, potentially creating extremely dusty conditions. To control road dust emissions, the Anchorage Air Quality Program (AAQP) continually monitors dust levels. If air quality deteriorates, AAQP communicates with municipal and state street maintenance crews, and recommends applications of magnesium chloride brine to stabilize road sediment until it can be effectively removed by road sweepers followed by a post-sweep flush to remove residual silt. The magnesium chloride brine keeps sediments in place until daily low temperatures are safely above freezing to allow application of water to road surfaces.

In the late 1980's, dust from unpaved roads in the Eagle River area led to frequent violations of the standard. By 1991, most of these roads had been paved or surfaced with recycled asphalt and violations ceased. In March 2013, Eagle River's PM_{10} Limited Maintenance Plan (LMP) was officially approved by the EPA. Eagle River is now considered a maintenance area for PM_{10}.

Figure 9-4 Percent of Good AQI PM_{10} Values 2000-2018

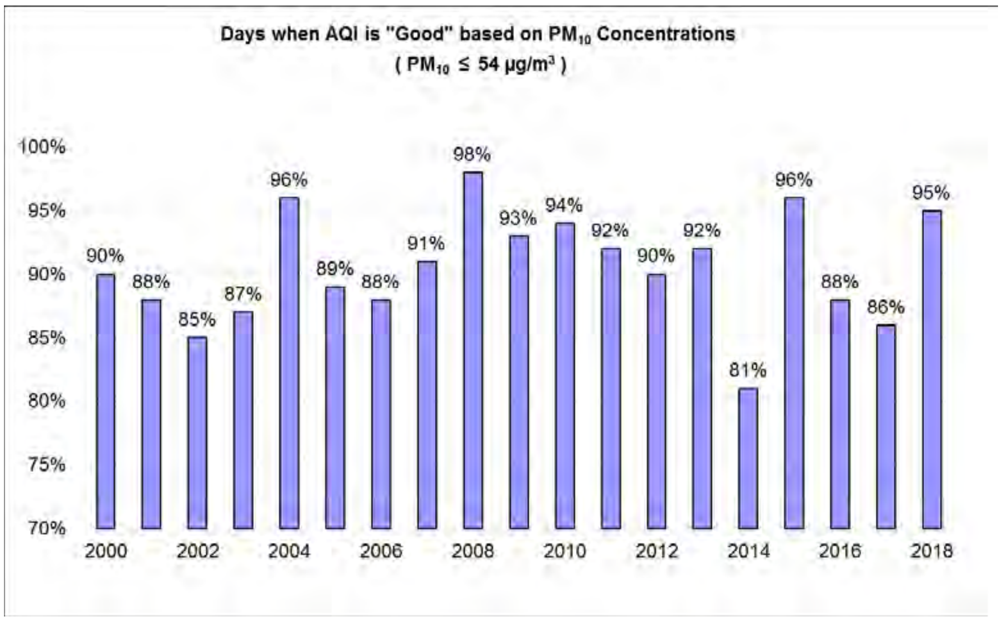


Figure 9-5 Street Sweeping Operations on "I" Street, April 2015

Natural events like volcanic eruptions and windstorms can have a significant impact on PM_{10} concentrations. Anchorage is surrounded by volcanoes to the south and west. The eruptions of Mt. Redoubt in 1990 and Mt. Spurr in 1992 were responsible for numerous exceedances of the PM_{10} standard both during the initial ash fall and in the months following when lingering ash was stirred up by wind and traffic.

Wind-blown glacial dust from the Matanuska-Susitna Valley can periodically impact Anchorage PM_{10} levels. Under specific meteorological conditions, large amounts of dust from the Matanuska, Knik, and Susitna River valleys north of the MOA can be transported to Anchorage and Eagle River by wind. This phenomenon has been responsible for many of the PM_{10} exceedances that have occurred in Anchorage over the years. The EPA excludes violations resulting from volcanic eruptions or transport of glacial river dust if the exceedances can be classified as an Exceptional Event (not caused by human actions).

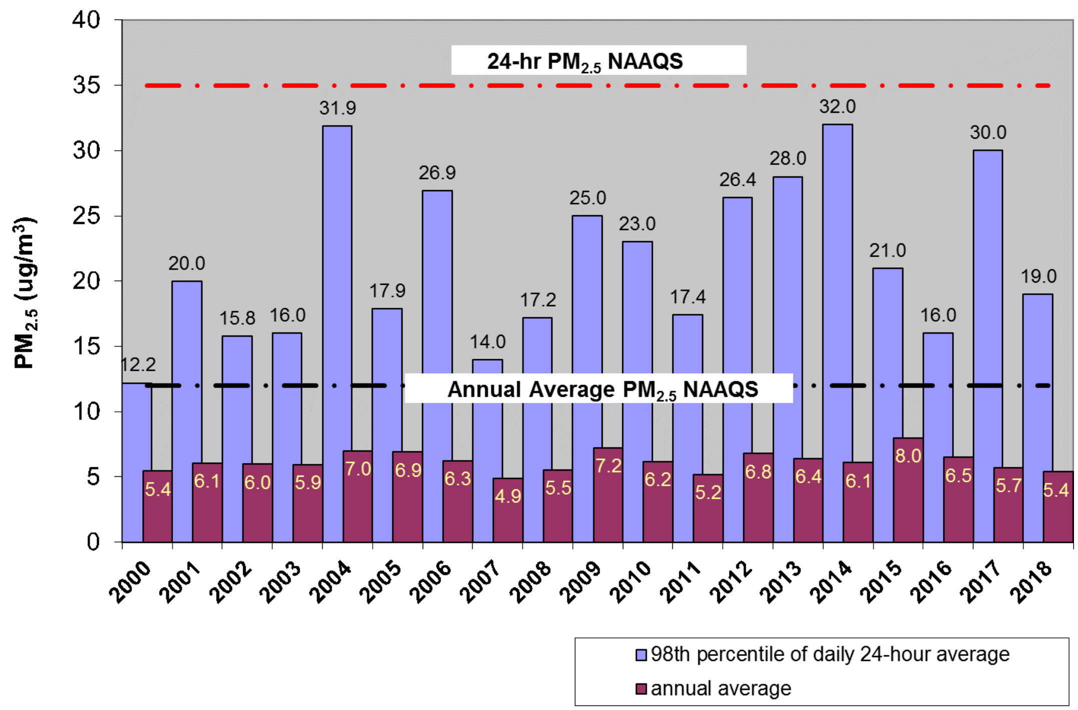
Figure 9-6 Glacial Dust Transported to Anchorage by High Winds, September 24, 2010

Particulate Matter ($PM_{2.5}$)

$PM_{2.5}$, also called fine particle pollution, has become a more prominent air quality issue for Alaska. Wood smoke from outdoor wood boilers, fireplaces and wood stoves can cause significant neighborhood impacts. Fine particle pollution has significant health ramifications, harming lungs, blood vessels and the heart. In 2006, the EPA instituted a more stringent 24-hour average $PM_{2.5}$ standard reducing the level from 60 to 35 μg/m3. Anchorage remains in compliance with the revised 24-hour $PM_{2.5}$ standard.

Figure 9-7 Wood Fired Boiler Smoking in Neighborhood

Figure 9-8 Variability of PM2.5, Annual Average and Yearly Maximum 24-Hr Average



Lead and Ozone

In 2008, EPA established a more stringent air quality standard for airborne lead based on current scientific evidence of health impacts. The new standard lowered airborne lead from 1.5 to 0.15 micrograms per cubic meter or one-tenth its former level. Merrill Field was selected by EPA as one of 15 airports nationwide for inclusion in a one year study to determine whether airports serving large numbers of piston powered aircraft are in compliance with the NAAQS for lead. Sampling completed by AAQP in October 2012 showed levels were 0.07 μg/m3 or less than half the new federal standard.

Ozone was monitored in Anchorage and in Eagle River in 2010-2012. During the April through October monitoring periods, the highest 8-hr maximums were 50 parts per billion (ppb) at the Parkgate site in Eagle River and 47 ppb at the Garden site in Anchorage. Both were well below the current NAAQS of 70 ppb.

Benzene and Other Toxic Air Pollutants

Motor vehicle emissions are the major source of benzene and other toxic air pollutants including Volatile Organic Compounds (VOCs) and Poly Aromatic Hydrocarbons (PAHs). Although EPA has not established an ambient air quality standard for pollutants like benzene (a known carcinogen), they are associated with increased cancer and other health risks. A 2008-09 municipal study indicated that ambient benzene concentrations in Anchorage were among the highest in the United States. The benzene content of Anchorage gasoline - nearly 4 percent by volume at that time - was 3 to 10 times higher than the benzene content of gasoline sold in most other U.S. cities.In 2012, EPA promulgated rules limiting refineries to maximum average benzene content and establishing cold temperature motor vehicle emissions standards for new vehicles. The AAQP conducted a follow-up study in 2013. Results indicated that gasoline sold locally was meeting the reduced benzene standard, and ambient benzene levels had declined substantially. Data showed that the amount of benzene in fuel was reduced by about 70 percent and that ambient benzene concentrations had dropped from an average of 5.05 to 1.53 ppb.

Air Quality Conformity for the 2040 MTP

An Air Quality Conformity analysis was performed by Anchorage Air Quality Program staff to assure that the 2040 MTP is consistent with the Alaska State Implementation Plan (SIP) for air quality and with federal rules governing regional air quality conformity. Analysis for consistency with the Alaska SIP included a review of Anchorage CO and Eagle River PM_{10} air monitor data through calendar-year 2018 (the most recent EPA-certified data) to assure that the Anchorage CO and the Eagle River PM_{10} maintenance areas continue to uphold the qualification criteria established by EPA for use of the limited maintenance plan (LMP) option employed for each area.

The EPA provides the limited maintenance plan (LMP) option for CO maintenance areas that have a design value not exceeding 7.65 ppm. Using data through December 31, 2018, the Anchorage CO maintenance area was found to have a CO design value of 3.5 ppm.

Table 9-1 Anchorage CO Annual Monitor Value Statistics

	2nd maximum, 8-hr CO Concentration		
	Garden Site	Turnagain Site	CO Design Value
2014	2.5	2.8	3.1
2015	2.8		2.8
2016	3		3
2017	3.5		3.5
2018	2.7		3.5

The primary CO control measures for Anchorage, as committed to in the Alaska SIP, include: (1) an air quality

public awareness program aimed at promoting use of engine block heaters to reduce CO cold start emissions, and the promotion of bicycling, walking, transit and other alternatives to use of a single occupancy vehicle; (2) a transit marketing program; and (3) promotion of carpooling and vanpooling.The Anchorage Transportation Planning program continues to apply these control measures and has funded them in the current Transportation Improvement Program (TIP).

The EPA allows use of the LMP option to prepare PM_{10} limited maintenance plans for areas that have a 5-year average PM_{10} design value not exceeding 98 ug/m3.By the empirical frequency distribution method as outlined in outlined in section 6.3.3 of PM_{10} SIP Development Guideline (EPA-450/2-86-001, June 1987) Eagle River PM10 monitor data collected through December 31, 2018 was found to have a 5-year average PM_{10} design value of 96 µg/m3.

Table 9-12 5-Year Average Eagle River PM_{10} Design Values

5-Year Period	Average DV (µg/m3)
2004-2008	85
2009-2013	**87**
2014-2018	**96**
LMP Qualification Criteria	≤ 98 µg/m3

The primary measures for control of PM_{10} in the Eagle River maintenance area are: (1) the upkeep of pavement chip-seal on previously unpaved residential and collector streets (2) and use of winter traction sand containing less than 2% of fines within the Eagle River PM_{10} maintenance area. These PM_{10} primary control measures are assured by MOA land use regulation and by a cooperative agreement between State of Alaska and Anchorage road maintenance programs respectively.The Anchorage CO and Eagle River PM_{10} LMP elements of the Alaska air quality control plan (SIP) remain compliant with EPA's LMP-option eligibility criteria for each pollutant. The Municipality of Anchorage continues to uphold its CO and PM_{10} maintenance plans consistent with the Alaska SIP. On August 14, 2019 Anchorage Air Quality Program staff presented these analyses to the Transportation Conformity Interagency Consultation Team in a draft conformity determination report, consistent with the transportation plan conformity rules mandated in 40 CFR § 93.112. Comments and recommendations receive from the consultation team have been incorporated into a public review draft titled Air Quality Conformity Determination for the Anchorage 2040 MTP, which will be provided by AMATS for 30-day public review in conjunction with the public review of the Anchorage 2040 MTP.