PM_{10} Maintenance Plan
For the Denver Metropolitan Area

Approved by:
Colorado Air Quality Control Commission
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INTRODUCTION AND BACKGROUND

Chapter 1, *Introduction*, is provided as background information only and is not to be construed to be part of the federally-enforceable State Implementation Plan.

Chapter 2, *Overview of Maintenance Plan Analysis*, describes various components of the technical analysis for the maintenance plan. This is also provided as background information only and is not to be construed to be part of the federally-enforceable State Implementation Plan.

REVISED MAINTENANCE PLAN

Chapter 3, *Attainment/Maintenance of the PM_{10} NAAQS,* describes the PM_{10} monitoring network and demonstrates with monitored data the continued maintenance of the PM_{10} NAAQS.

Chapter 4, *Maintenance Plan*, describes the replacement of mobile source tailpipe emissions calculated in the previous maintenance plan that used MOBILE5 and the Tier II adjustment factors with mobile source tailpipe emissions using MOBILE6. This revised maintenance plan, which is being submitted for inclusion in the federally-enforceable State Implementation Plan, includes control measures and other requirements to ensure maintenance of the PM-10 standard through the year 2022. This submittal demonstrates maintenance of the PM_{10} standard for the 2^{nd} ten-year period beyond 2002, the year EPA formally redesignated the Denver metro area to attainment.

INTRODUCTION AND BACKGROUND

CHAPTER 1: INTRODUCTION

The State of Colorado, in coordination with the Regional Air Quality Council (RAQC), is submitting to the U.S. Environmental Protection Agency (EPA), in accordance with CAAA Section 176A(b), a revised PM_{10} Maintenance Plan for the Denver metro area that demonstrates continued attainment/maintenance of the 24-hour PM_{10} National Ambient Air Quality Standard (NAAQS) through 2022. This maintenance plan also replaces current mobile source tailpipe emissions with mobile source tailpipe emissions using MOBILE6 to fulfill the commitment made in the previously approved maintenance plan.

The Denver metropolitan non-attainment area was redesignated to attainment status by the EPA (67 FR 58335) on September 16, 2002 (effective date, October 16, 2002), when the EPA formally approved the PM_{10} Redesignation Request and Maintenance Plan for the Denver Metro Area, which demonstrated attainment/maintenance of the PM_{10} NAAQS through 2015 in accordance with CAAA Section 176A(a).

This maintenance plan, which is being submitted for inclusion in the State's federally-enforceable State Implementation Plan (SIP), provides for maintenance of the national standard for PM_{10} in the Denver metropolitan area for the second ten-year period beyond the year of redesignation to attainment (2002). This Maintenance Plan has been approved by the Regional Air Quality Council (RAQC) and the Colorado Air Quality Control Commission (AQCC), and complies with all federal requirements.

- **Regional Air Quality Council**

The Regional Air Quality Council is designated by Governor Owens as the lead air quality planning agency for the Denver metropolitan area. In this capacity, the mission of the RAQC is to develop effective and cost-efficient air quality initiatives with input from state and local government, the private sector, stakeholder groups, and private citizens. The RAQC's primary task is to prepare state implementation plans (SIPs) for compliance with federal air quality standards. The RAQC consists of a nine-member board appointed by the Governor. The board is comprised of local government, state agency, and citizen representatives.

- **Colorado Air Quality Control Commission**

The Colorado Air Quality Control Commission (AQCC) is a regulatory body with responsibility for adopting air quality regulations consistent with State statute. This includes the responsibility and authority to adopt State Implementation Plans (SIPs) and their implementing regulations. The Commission takes action on SIPs and regulations through a public rule-making process. The Commission has nine members who are appointed by the Governor and confirmed by the State Senate.

A. National Ambient Air Quality Standards for PM_{10}

In 1971, the EPA set National Ambient Air Quality Standards (NAAQS) for several air pollutants, including total suspended particulates (TSP), defined as particles with an aerodynamic diameter of less than 40 microns. In 1987, the EPA changed the particulate matter standard to include only those particles with an aerodynamic diameter of less than or equal to 10 microns (commonly referred to as PM_{10}). The current PM_{10} NAAQS allow for a maximum annual average of 50 micrograms per cubic meter (ug/m^3) and a 24-hour average of 150 ug/m^3. Essentially, the 24-hour PM_{10} NAAQS may not be exceeded more than three times over any three-year period.

There are both primary and secondary air quality standards. The primary standards are set to protect human health, with a margin of safety to protect the more sensitive persons in the population, such as the very young, elderly and the ill. Secondary standards are set to protect property, materials, aesthetic values and general welfare. For PM_{10}, the national primary and secondary standards are the same. The numerical levels of the standards are subject to change, based on new scientific evidence summarized in air quality criteria documents.

As stated in the Code of Federal Regulations (40 CFR Part 50.6),

> *The standards are attained when the expected number of days per calendar year with a 24-hour average concentration above 150 ug/m^3 is equal to or less than one (based on 3-year average), and the annual arithmetic mean concentration is less than or equal to 50 ug/m^3 (based on 3-year average) as determined by Appendix K.*

In general, demonstrating attainment requires collecting representative air monitoring data and using approved measuring instruments and procedures, with adequate quality assurance and quality control. The three most recent years are examined, during which the average annual number of exceedances must be less than or equal to one. The standard allows for a maximum annual average of 50 ug/m^3 and a 24-hour average of 150 ug/m^3. The 24-hour standard may not be exceeded more than three times over any three-year period. Air quality measurements in the Denver area satisfy this requirement, as shown in Section 2 “Attainment of the PM_{10} standard.”

B. Denver Metropolitan Nonattainment Area Classification History

Because of observed problems with air particles, monitoring of TSP began in the 1960's and continued through 1987. In 1987, based on relatively high TSP levels, the Denver area was designated as a “Group I” non-attainment area for PM_{10}. The Denver area was then designated a “moderate” non-attainment area in 1990 pursuant to section 107(d)(4)(B) of the CAA. This designation was for the 24-hour PM_{10} NAAQS; the area has never violated the annual PM_{10} NAAQS.

The Denver metro area was redesignated to attainment status on September 16, 2002, when the EPA approved the PM_{10} Redesignation Request and Maintenance Plan for the Denver Metro Area.

C. Denver Metropolitan PM_{10} Attainment/Maintenance Area

The Denver Metro area PM_{10} attainment/maintenance boundaries are defined by the Air Quality Control Commission as follows:

> *All of Denver, Jefferson, and Douglas Counties; Boulder County (excluding Rocky Mountain National Park) and the Automobile Inspection and Readjustment Program portions of Adams and Arapahoe Counties.*

A map describing the attainment/maintenance area boundaries is included in Chapter 3, Figure 3-1.

D. Continued Attainment of the PM_{10} Standard

The most recent five years (2000-04) of monitored data, which are presented in Chapter 3, shows that the Denver area has maintained attainment of the standard since the redesignation was approved.

E. Maintenance Plan

Finally, the following sections contain the core elements EPA has established as necessary for approval of maintenance plans:

1. Description of the control measures for the maintenance period
2. Emission inventories for current and future years
3. Maintenance demonstration
4. Mobile source emissions budget
5. Approved monitoring network
6. Verification of continued attainment
7. Contingency plan
8. Subsequent maintenance plan revisions

In developing this PM_{10} Maintenance Plan Revision to provide for maintenance of the PM_{10} NAAQS for an additional 10-year period, the RAQC and the State conducted a comprehensive reevaluation of mobile source control programs with MOBILE6.2 and the latest transportation data sets from Denver Regional Council of Governments' (DRCOG) 2030 Regional Transportation Plan. This revision removes the Air Quality Regulations No. 11 (Inspection Maintenance) from the Denver metro area PM_{10} State Implementation Plan (SIP). However, all other control strategies included in the previously approved maintenance plan remain unchanged in this revision.

Since this revision to the Denver area SIP includes the 2015 budget year contained in the previously approved maintenance plan, 2015 remains as an interim budget year in this plan. The maintenance year for this revision is 2022.

This maintenance plan revision follows the same format as the previously approved maintenance plan.

CHAPTER 2: OVERVIEW OF MAINTENANCE PLAN ANALYSIS

A. Air Quality Modeling Analysis

EPA guidance requires that the same level of modeling analysis be performed in maintenance plans that were used to demonstrate attainment in an attainment plan. Analysis of PM_{10} concentrations for the PM_{10} Attainment SIP (approved by EPA in 1997) was performed through several modeling approaches, including dispersion modeling. The modeling approach is documented in the original Technical Support Document (1993) that was developed to support the attainment SIP (Volume II, App. A; Volumes VI-XI).

This maintenance plan uses the same modeling protocols that were used in the attainment SIP and approved by EPA with the exception of the development of the 2001 base-attainment year secondary concentration value which was developed per discussion with the EPA in early 2005 as discussed in greater detail later in this chapter, and in the Technical Support Document. Base and future year emission inventories were updated for this modeling analysis.

1. Emission Inventories

Emission inventories are developed for categories of mobile, area, and point sources for 2001, 2009, 2010, 2015, 2020, and 2022. The mobile source inventory includes emissions from street sanding/sweeping and tailpipes as discussed in subsequent sections B and C. The area source inventory includes emissions in EPA's National Emissions Inventory (NEI). The point source inventory is based on the state's inventory system for actual emissions.

The emission inventory for the new base year, 2001, was developed based on actual activity data. Estimates of future emissions of PM_{10} and PM_{10} precursors (NO_X and SO_2) are derived using a variety of EPA-approved methods. Future year mobile and area emission inventories are calculated using projected regional and zonal activity levels such as population, employment, industrial activity, and vehicle miles traveled. Emissions from specific source categories are based not only on EPA emission factors but they are also supplemented by local studies that take into account local conditions and factors. Emission estimates also factor in current and future federal, state and local regulations that will reduce emissions from source categories.

Once emission inventories for all sources are developed, they serve as inputs into dispersion or other modeling techniques that estimate ambient concentrations and contributions from various source categories. The "modeled design value" (sum of impacts determined from the dispersion models, the secondary concentration, and the background concentration) is compared to the 24-hr PM_{10} standard.

2. Dispersion Models

The time averaging outputs from the two models discussed below are combined both in time and space to assess the primary PM_{10} concentrations.

a. Regional Air Model (RAM)

Primary PM_{10} emissions from area sources, mobile sources and minor stationary sources are modeled with RAM, a computer-based model formulated around the assumptions of steady-state Gaussian dispersion. RAM was run with five years of meteorological data (1985-89) using seasonally and hourly adjusted source data.

b. Industrial Source Complex (ISC) Model

Primary PM_{10} emissions from major stationary sources are modeled using the short-term version of the ISC model, which is also a steady-state Gaussian plume model. ISC is used to assess concentration gradients from elevated emission sources. ISC impacts include effects from building downwash and plume rise. Major sources are modeled at maximum hourly emission rates allowed under their permits for future year projections. ISC was run with the same five years of meteorological data used in RAM.

3. Secondary Particulate Roll-Forward Model

Since there are no EPA-approved dispersion models that can estimate the formation and concentration of secondary particles during the development of the attainment SIP, a surrogate approach was developed to estimate future changes in secondary particulate concentrations based on changes in precursor pollutants. The PM_{10} Attainment SIP used Chemical Mass Balance receptor modeling to establish the total secondary contribution for 1989, which was then apportioned among the source categories by a proportion consistent with the (NO_X and SO_2) precursor inventory emissions. Predicted levels of secondary particulate in future years are calculated using a simple linear "roll-forward" model based on changes in the emissions inventory of both pollutants from all sources.

Documentation of this approach is contained in Calculation of Secondary PM_{10} Concentrations in the Denver PM_{10} SIP Attainment Demonstration, EPA April 1994, and in Volume XIV, App. B (Revised 1994) in the original Technical Support Document.

This maintenance plan uses a similar, though modified approach for estimating secondary PM_{10} concentrations. The total secondary concentration for 2001 was established by using the highest winter secondary concentration from the ambient $PM_{2.5}$ database gathered between March 2001 and March 2005. The ammonium nitrate and ammonium sulfate fractions applied to the baseline secondary concentration value are based on the average of the fractions of the top five secondary values from the above database.

Rather than estimating the future total secondary concentration based on the change in NO_X plus SO_2 emissions, as done in the previous SIP, this maintenance plan analysis adjusts the nitrate fraction by the ratio of the change in total NO_X emissions and adjusts the sulfate fraction by the ratio of the change in total SO_2 emissions. The total of the adjusted nitrate and sulfate fractions provides the secondary concentration value for future years.

4. Background Concentration

The modeling analysis includes a background concentration, which was developed for the PM_{10} Attainment SIP, to account for the impact of emissions not considered in the modeling discussed above. Five years of particulate data from monitors in Estes Park and Limon and five

years of meteorological data from Stapleton International Airport were used to establish background concentrations.

B. Street Sanding/Sweeping

1. Background

The PM_{10} Attainment SIP addressed material specifications for street sanding material, street sanding guidelines and the development of local management plans in cooperation with state and local street maintenance officials and street sand suppliers. Local studies established the uncontrolled PM_{10} emissions rate from the wintertime sanding of streets in the Denver metro area for the 1989 time frame. Combined with DRCOG VMT estimates uncontrolled PM_{10} emissions were then calculated. Local studies and EPA protocols were used to estimate control strategy effectiveness. The Air Quality Control Commission Regulation 16 was included as a SIP strategy and established specific requirements for materials, sanding reductions, sweeping and reporting.

All sanding emissions reductions are calculated based on the established 1989 emissions rate and the difference between a sanding agency's baseline sand application rate (lbs/ lane mile) and the current sand application rate. Sweeping emissions reductions are based on control rate and percent of reported network swept within four days of a sanding event.

In the interim years since the attainment SIP was developed, state and local street maintenance officials and street sand suppliers continued to work with the RAQC to improve estimating techniques. Uncontrolled emissions are still based on the original 1989 emissions rates times the VMT from DRCOG estimates. However, the CDOT report Street Sanding & Sweeping (Cowherd, 1998) indicates that the sand fraction of the Paved Road Dust in the Denver area is 60% in wintertime, a change from the previously used 33.8%. Also, the RAQC's Emission Benefit Analysis (September 1999) and Emission Benefit Study (Alpha Trac, Inc. August 1999) established improved emission reduction credits for various sweeping equipment applied to the sand and dust fractions, when roadways are swept within four days of a sanding event. These improved estimating techniques are used in the calculations contained in the previously approved maintenance plan and in this revision to the maintenance plan.

2. Maintenance Plan Analysis

Current Air Quality Regulation No. 16 requirements are contained in the maintenance plan analysis as follows:

a) 30% emissions reduction region-wide (20% in the foothills)
b) 50% emissions reduction required in the central Denver area (bounded by 38th, Downing, Louisiana, and Federal), effective beginning the 2001/02 winter season
c) 54% emissions reduction on I-25 from 6th Avenue to University
d) 72% emission reduction in the central business district (bounded by Colfax Avenue, Broadway, 20th Street, Wynkoop and Speer Boulevard), effective beginning the 2001/02 winter season

C. Mobile Source Strategies

1. Emission Modeling

Estimates of future mobile source emissions are based on the following:

a) Transportation data sets provided by DRCOG, which are the same as those contained in the recent conformity determination for the fiscally-constrained 2030 Regional Transportation Plan (January 2005);
b) MOBILE6.2 mobile sources emissions model estimates for PM_{10}, NO_X and $SO_{2;}$ and
c) Denver metro area road dust emissions factors for PM_{10} as discussed above.

2. Tier II/Gasoline Sulfur Standards

The mobile source emission inventories in the maintenance plan take credit for the Tier II/ gasoline sulfur standards promulgated by EPA in February 2000. These standards will begin in 2004 through a 4-year phase in period. These standards are expected to reduce tailpipe SO_2 emissions by more than 90%.

The modeling in this maintenance plan also takes credit for diesel emission and fuel standards promulgated by EPA in December 2000. These new standards will significantly reduce emissions of fine particulates and NO_X from diesel vehicles.

3. Diesel Inspection/Maintenance/Oxygenated Gasoline

The previously approved maintenance plan (September 16, 2002) removed Regulation No. 12, the region's diesel inspection/maintenance program, and Regulation No. 13, the oxygenated gasoline program, from the PM_{10} SIP. As a result, no emissions reduction credit is taken for these strategies.

4. Vehicle Inspection/Maintenance

This maintenance plan removes Air Quality Regulation No. 11 -- covering the Automobile Inspection and Readjustment (A.I.R.) Program from the Denver metro area PM_{10} SIP effective December 31, 2007.

5. Transportation System Improvements

The mobile source modeling is based upon the transportation network contained in DRCOG's updated fiscally-constrained 2030 Regional Transportation Plan (January 2005). The network contains transit and highway system improvements. However, none of these system improvements should be construed to be specific transportation control measures in the maintenance plan.

6. Non-Road Engines

The EPA Non-Road Emission Model was used to calculate base and future year emissions from this category. The Non-Road Model includes both the expected growth and federally required emission controls.

D. Stationary Sources

1. Modeling and Emissions Calculation Criteria

This maintenance plan employs the same modeling approach and rationale for stationary sources approved by EPA for use in the PM_{10} attainment SIP and the previously approved maintenance plan (September 16, 2002). The analysis distinguishes between major and minor stationary sources of PM_{10}, NO_X and SO_2 for purposes of inventory development and air quality modeling.

Major and minor stationary sources were modeled at 2001 actual emissions for the base year analysis.

Consistent with EPA regulations and guidance, major stationary sources generally are modeled in future year analyses at their maximum allowable emissions, which is the emission rate of a stationary source calculated taking into account its maximum rated capacity, its physical and operational design, continuous operation, and any federally-enforceable limitations on emissions. Some NO_X and SO_2 major sources, which are discussed later in this section are modeled in future years at anticipated actual emissions using 2001 actual emissions which are grown into the future using the EPA EGAS economic model. For information purposes only, the allowable annual emission rates for specific major stationary sources that have been modeled at their maximum short term allowable emissions are set out in this Chapter 2. This Chapter 2 is not included in the SIP, which means that the allowable emission rates set out in this chapter shall not be construed to be part of the SIP. For most major stationary sources, the maximum allowable emissions can also be found in the applicable Title V permits.

Allowable emission estimates for major stationary sources were updated using Title V permit applications, and latest emission factors.

Minor stationary sources of PM_{10} were modeled in RAM using projected actual emissions. To account for future growth in minor sources, 2001 actual emissions were grown into the future using the EPA EGAS economic model.

2. Major Sources of PM_{10}

Major sources of PM_{10} for purposes of future (2009+) modeling are defined as any stationary source that emits, or has the potential to emit, 100 tons per year (TPY) or more of PM_{10} facility-wide. The large point emission units at these sources are modeled at their maximum allowable short-term PM_{10} emissions using the ISC model described in section A.2.b. above. These sources and the annual maximum allowable emissions from the large point emission units at these sources are summarized below. Condensable PM_{10} emissions, if available, were included in the modeling emission rates and the annual rates in the table below.

Table 2.1: Major PM_{10} Sources within PM_{10} Modeling Domain

Source	Maximum Annual PM_{10} Emissions *(tons per year)*
Cherokee Electric Generating Station	4013
Arapahoe Station /Black Hills Colorado	1224
Trigen Colorado Energy	972
Zuni Electric Generating Station	631
Plains End Generating Station I and II	249
Suncor (USA) Inc. - Denver Refinery	225
Robinson Brick	187
Colorado Refining Company	185

Enforceable short-term emission limitations for all of these sources are based on Regulation No. 1 with the exception of the refineries which are based on maximum potential to emit calculated with AP-42 emission factors. A PM_{10} emission rate is determined from a PM limitation by applying the fraction of PM_{10} to PM listed for an emission unit type in AP-42. The specific short-term emission limitations or emission rates are converted into grams/second and modeled using actual facility stack parameters. Further detail is provided in the Technical Support Document.

3. Major Sources of NO_X and SO_2

a. Modeling Protocol

In the modeling protocol approved for the Denver PM_{10} attainment SIP, EPA determined that modeling guidance for secondary particulate precursors can be viewed in a similar fashion to modeling for ozone precursors. Like ozone, secondary particulates are not emitted directly but are formed in the atmosphere through complex chemical reactions and conditions. They behave like ozone in that secondary particulate concentrations exhibit a pattern with relatively flat localized gradients.

EPA's ozone modeling guidance generally treats stationary sources as background sources where such sources do not need to be modeled with their maximum allowable emissions. Instead, emission estimates for stationary sources for modeling purposes are derived from allowable emission limits and actual (not design) operating levels.

Based on this similarity, EPA concluded that flexibility afforded by the modeling guidance should be exercised when modeling emissions of NO_X and SO_2 from stationary sources. EPA determined that any major stationary source emitting NO_X and SO_2 could be modeled at its anticipated actual emissions in the attainment demonstration if two criteria were met:

1) *the difference between modeling at actual versus allowable emission rates for any excluded source must be less than a de minimus level of 1 ug/m^3 secondary PM_{10} (using the secondary particulate roll-forward model described in A.2 above), and*

2) *the cumulative difference for all excluded sources must be no more than 2 ug/m^3.*

Major stationary sources that do not meet these criteria must be analyzed using their maximum allowable emissions for NO_X and SO_2. EPA concluded that these sources may operate at levels approaching their maximum allowable emissions for short periods of time and may have greater impact on secondary particulate levels.

Using these criteria, the stationary sources listed in Table 2.2 were modeled at their maximum allowable NO_X and SO_2 emission rates for future (2009+) year analyses. Several sources, including the two refineries, were modeled at maximum allowable emissions for PM_{10} but are instead modeled at their anticipated actual emissions for NO_X and SO_2 since they meet the exclusion criteria noted above.

Table 2.2: Major NO_X and SO_2 Sources

Source	**Maximum Annual Emissions** *(tons per year)*	
	NO_X	**SO_2**
Cherokee Electric Generating Station	18,485	36,416
Arapahoe Station /Black Hills Colorado	7,716	11,874
Valmont Electric Generating Station	5,009	10,233
Trigen-Colorado Energy Corp.	3,757	9,202
Rocky Mountain Bottle	424	369
Buckley AFB	250	250

To estimate their potential contribution to secondary particulate concentrations in the roll-forward modeling, the maximum allowable daily emissions, from short-term limits or maximum potential to emit based on emission factor and the rated design capacity of the emission unit, were used. Further detail is provided in the Technical Support Document.

b. Emission Limitations

The electric generating stations are subject to federally-enforceable limitations contained in state and federal regulations. Table 2.3 summarizes these limitations.

1. Public Service Company Power Plants

Regulation No. 1 contains existing SO_2 emission limitations for all metro area power plants and NO_X limits for Cherokee Units 3 and 4, Arapahoe Unit 4, and Valmont Unit 5.

Revisions to Regulation No. 1 that were adopted as part of the previous maintenance plan and may be found in Title V permits include the following limitations for metro area power plants:

a) 0.88 lb/mmbtu SO_2 limit for Cherokee Units 1 and 4 and Arapahoe Unit 4, based on a 30-day rolling average from November 1 to March 1. This limitation became effective October 16, 2002.

b) Arapahoe Units 1 and 2 were retired as a federally-enforceable control measure, effective January 1, 2003 and upon approval of the redesignation request and maintenance plan (December 16, 2002). Since these units were permanently retired, after January 1, 2003, they are not included in any future year emission inventory calculations.

   This limitation does not prevent the construction or operation of a new source on the site of such units, provided any such new source complies with all laws and regulations applicable to the new sources.

c) 0.60 lb/mmbtu NO_X limit for Cherokee Unit 1, based on a 30-day rolling average. This limit is effective January 1, 2005. This unit is well within this limitation with the application of overfire air and low- NO_X burners.

Also as part a state-enforceable emission reduction agreement with the State of Colorado, Public Service Company has gone significantly beyond current regulatory requirements by reducing its overall SO_2 emissions by at least 50% at its metro area power plants. However, this SO_2 emission reduction program is not included as a federally-enforceable measure in the SIP or permits and no credit is taken for the emission reductions that have been achieved.

2. Trigen-Colorado Energy

Regulation No. 1 contains existing SO_2 emission limitations for Trigen's boilers. Boilers 4 and 5 are subject to NO_X limits established by 40 CFR Part 60 (New Source Performance Standards). Boilers 1, 2, and 3 do not have regulatory NO_X limits and therefore are modeled at their maximum potential to emit using AP-42 emission factors.

3. Rocky Mountain Bottle Company

Rocky Mountain Bottle Company is subject to hourly permit limitations for NO_X and SO_2. Since the limits are based on the facility's maximum potential to emit, the permit does not need to be included in the SIP.

4. Buckley AFB

Regulation No. 6 contains SO_2 limitations for Buckley AFB's coal-fired equipment. Other maximum potential to emit emissions are based on published emissions factors, which may also be found in the facility's Title V permit.

Table 2.3: Summary of Current Emission Limitations and/or Modeling Parameters at Metro Area Electric Generating Stations

Unit	PM_{10} limit[6] *(lb/mmbtu)*	Basis	NOx limit *(lb/mmbtu)*	Basis	SO_2 limit *(lb/mmbtu)*	Basis
Cherokee Electric Generating Station						
1	0.1	Reg. No. 1	0.6 [1]	Reg. No. 1	0.88[2]	Reg. No. 1
2	0.1	Reg. No. 1	0.8 [3] (0.98)	40 CFR Part 76 (AP-42 maximum potential to emit)	1.1[4]	Reg. No. 1
3	0.1	Reg. No. 1	0.6 [1]	Reg. No. 1	1.1[4]	Reg. No. 1
4	0.1	Reg. No. 1	0.45 [1]	Reg. No. 1	0.88[2]	Reg. No. 1
Arapahoe Station /Black Hills Colorado						
3	0.1	Reg. No. 1	0.8 [3] (0.99)	40 CFR Part 76 (AP-42 maximum potential to emit)	1.1[4]	Reg. No. 1
4	0.1	Reg. No. 1	0.6 [1]	Reg. No. 1	0.88[2]	Reg. No. 1
2 gas turbines	3 lb/hr ea[7].	maximum potential to emit	573 lb/hr ea.	maximum potential to emit	0.27 lb/hr	AP-42 maximum potential to emit
Valmont Electric Generating Station						
5	0.1[5]	Reg. No. 1	0.45 [1]	Reg. No. 1	1.1[4]	Reg. No. 1
6	0.1[5]	Reg. No. 1	0.32	AP-42 maximum potential to emit	0.0034	AP-42 maximum potential to emit
2 gas turbines	3 lb/hr ea.[5, 7]	maximum potential to emit	162.5 lb/hr ea.	maximum potential to emit	0.2 lb/hr	AP-42 maximum potential to emit
Trigen-Colorado Energy Corp.						
1 & 2 (gas)	0.115	Reg. No. 1	0.27 lb/hr ea.	AP-42 maximum potential to emit	0.0006	AP-42 maximum potential to emit
3	0.122	Reg. No. 1	0.27 lb/hr ea.	AP-42 maximum potential to emit	1.8[4]	Reg. No. 1
4	0.1	Reg. No. 1	0.7 [4]	40 CFR Part 60	1.2[4]	Reg. No. 1
5	0.1	Reg. No. 1	0.7 [4]	40 CFR Part 60	1.2[4]	Reg. No. 1

(1) 30-day rolling average; (2) 30-day rolling average Nov. 1 to March 1; (3) annual average, averaged over entire facility; however, these units are modeled at their maximum daily potential to emit; (4) 3-hour average, (5) Valmont is not located in the primary PM_{10} modeling domain; (6) Filterable PM only unless otherwise indicated; (7) Filterable and condensable PM_{10}.

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CHAPTER 3: CONTINUED MAINTENANCE OF PM_{10} NAAQS

Attainment of the 24-hour PM_{10} NAAQS, which is 150 micrograms per cubic meter (ug/m^3) of PM_{10} in ambient air (based on a 24-hour averaging time for the measurement) is demonstrated when the average annual number of expected exceedances is less than or equal to one. The following information demonstrates, as required by Section 107(d)(3)(E) of the Clean Air Act, that the Denver metropolitan area continues to attain the national 24-hour standard for PM_{10}. This demonstration is based on quality assured monitoring data collected throughout the Denver area, with focus on the monitors located in the central portion of the metro area.

A. Denver Area Historical Perspective

Historically, the PM_{10} particulate matter standard was frequently violated in the 1970's, 1980's, and early 1990's throughout the Denver metropolitan area. There was only one exceedance of the 24-hour standard during the 1994 through 1999 period. Since 1999, no exceedances of the PM_{10} NAAQS have been monitored. With the implementation of emission control programs aimed at reducing re-entrained fugitive dust, automobile and industrial emissions, PM_{10} concentrations have stabilized at levels well below the NAAQS.

B. PM_{10} Monitoring Network

The current PM_{10} ambient air monitoring network in the Denver area consists of nine stations operated by the Colorado Air Pollution Control Division. There have been other stations that have operated in the past as special purpose monitoring efforts, such as the Rocky Flats facility and National Jewish Hospital. The geographical distribution of the current monitors is presented in Figure 3-1.

This section shall not be construed to establish a monitoring network in the federally-enforceable SIP. EPA has already approved a monitoring SIP for the State of Colorado and this description of the PM_{10} monitoring network shall not be construed to amend such monitoring SIP.

C. Monitoring Results and Attainment Demonstration

The monitoring data presented in Table 3-1 verify that the Denver area is attaining 24-hour PM_{10} NAAQS, in accordance with the federal requirements of 40 CFR Part 58. Since 1993, the three-year average of expected values greater than 150 ug/m^3 ppm is less than or equal to one. Summary data from 2000 through 2004 are also shown in the following tables.

D. Quality Assurance Program

PM_{10} monitoring data for the Denver area have been collected and quality-assured in accordance with 40 CFR, Part 58, Appendix A, EPA's "Quality Assurance Handbook for Air Pollution Measurement Systems, Vol. 11; Ambient Air Specific Methods", the APCD's Standard

Operating Procedures Manual, and Colorado's Monitoring SIP which EPA approved in 1993. The data are recorded in EPA's AIR QUALITY SYSTEM (AQS) and are available for public review at the APCD and through EPA's AQS database. Table 3-2 presents the data recovery rates for each monitoring site.

Figure 3-1: Map of the Denver Metropolitan PM_{10} Attainment/Maintenance Area and Monitoring Sites

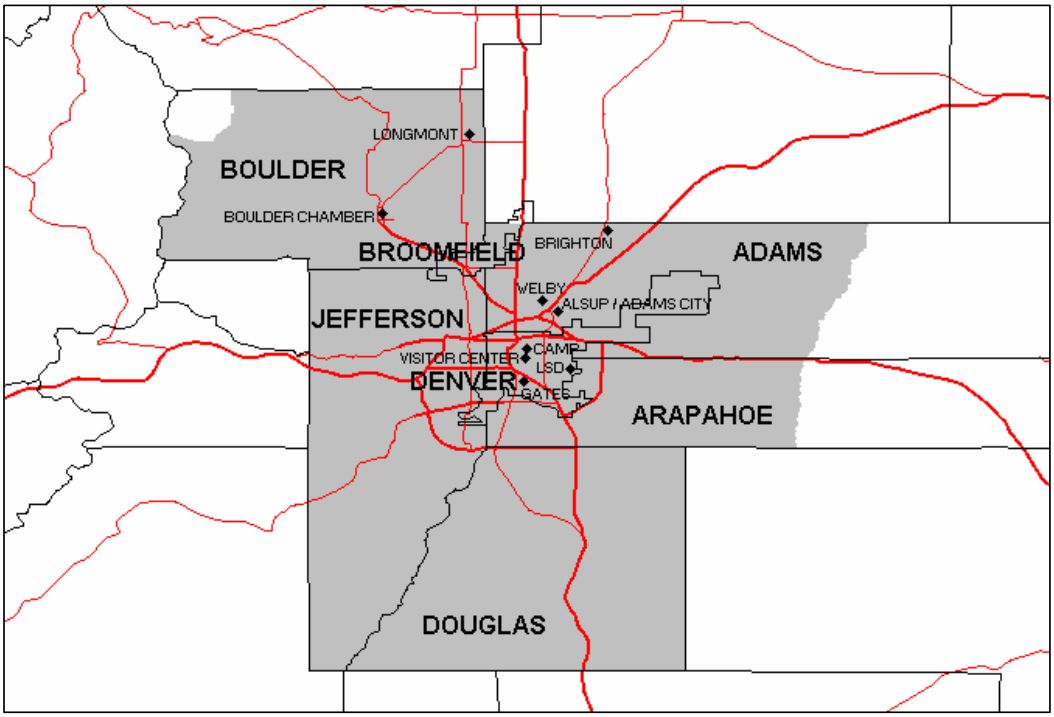

Table 3-1: Monitoring Data and Three-Year Average of Expected Exceedances of the PM_{10} NAAQS

PM_{10} Concentrations 2000 through 2004

Denver Metro Area

Adams City -- 4301 E. 72nd Ave.

Year	1st Max. (ug/m^3)	2nd Max. (ug/m^3)	Yearly Estim. Exceed.	3 yr. avg. Estim. Exceed.	Annual Avg. (ug/m^3)
2000	135	134	0.00	0.00	42.7
2001	134	112	0.00	0.00	34.4 *
2002	***sampling ended 4-13-2001***				
2003					
2004					

** Annual average was calculated with one or more quarters having less than 75% data recovery.*

Alsup Elementary -- 7101 Birch St.

Year	1st Max. (ug/m^3)	2nd Max. (ug/m^3)	Yearly Estim. Exceed.	3 yr. avg. Estim. Exceed.	Annual Avg. (ug/m^3)
	sampling began 1-9-2001				
2001	142	98	0.00	0.00	35.7
2002	118	115	0.00	0.00	37.6
2003	119	103	0.00	0.00	38.2
2004	102	98	0.00	0.00	34.6

Brighton -- 22 S. 4th Ave.

Year	1st Max. (ug/m^3)	2nd Max. (ug/m^3)	Yearly Estim. Exceed.	3 yr. avg. Estim. Exceed.	Annual Avg. (ug/m^3)
2000	69	46	0.00	0.00	20.3 *
2001	61	46	0.00	0.00	20.4 *
2002	58	46	0.00	0.00	24.1
2003	57	57	0.00	0.00	22.1
2004	102	87	0.00	0.00	27.6

** Annual average was calculated with one or more quarters having less than 75% data recovery.*

Welby -- 78th Ave. & Steele St.

Year	1st Max. (ug/m^3)	2nd Max. (ug/m^3)	Yearly Estim. Exceed.	3 yr. avg. Estim. Exceed.	Annual Avg. (ug/m^3)
2000	45	43	0.00	0.00	24.0
2001	81	55	0.00	0.00	27.9
2002	48	45	0.00	0.00	24.6 *
2003	44	41	0.00	0.00	23.6
2004	104	95	0.00	0.00	29.5

** Annual average was calculated with one or more quarters having less than 75% data recovery.*

Welby Continuous PM_{10} -- 78th Ave. & Steele St.

Year	1st Max. (ug/m^3)	2nd Max. (ug/m^3)	Yearly Estim. Exceed.	3 yr. avg. Estim. Exceed.	Annual Avg. (ug/m^3)
2000	69	33	0.00	0.00	12.1 *
2001	97	96	0.00	0.00	30.7 *
2002	139	126	0.00	0.00	34.9
2003	117	98	0.00	0.00	32.0
2004	76	71	0.00	0.00	28.0

** Annual average was calculated with one or more quarters having less than 75% data recovery.*

Longmont -- 3rd Ave. & Kimbark St.

Year	1st Max. (ug/m^3)	2nd Max. (ug/m^3)	Yearly Estim. Exceed.	3 yr. avg. Estim. Exceed.	Annual Avg. (ug/m^3)
2000	91	68	0.00	0.00	22.5
2001	57	47	0.00	0.00	21.6
2002	60	41	0.00	0.00	19.4
2003	43	34	0.00	0.00	17.3
2004	75	68	0.00	0.00	21.6 *

** Annual average was calculated with one or more quarters having less than 75% data recovery.*

Boulder Chamber Bldg. -- 2440 Pearl St.

Year	1st Max. (ug/m^3)	2nd Max. (ug/m^3)	Yearly Estim. Exceed.	3 yr. avg. Estim. Exceed.	Annual Avg. (ug/m^3)
2000	41	39	0.00	0.00	22.4 *
2001	49	48	0.00	0.00	24.2
2002	62	50	0.00	0.00	23.4
2003	75	42	0.00	0.00	22.0 *
2004	51	33	0.00	0.00	19.1 *

** Annual average was calculated with one or more quarters having less than 75% data* recovery.

CAMP Primary hi-vol -- 2105 Broadway

Year	1st Max. (ug/m^3)	2nd Max. (ug/m^3)	Yearly Estim. Exceed.	3 yr. avg. Estim. Exceed.	Annual Avg. (ug/m^3)
2000	60	57	0.00	0.00	33.8 *
2001	78	75	0.00	0.00	38.4
2002	88	75	0.00	0.00	37.5
2003	103	61	0.00	0.00	33.7
2004	53	53	0.00	0.00	29.1

* *Annual average was calculated with one or more quarters* having less than 75% data recovery.

CAMP Continuous PM_{10} -- 2105 Broadway

Year	1st Max. (ug/m^3)	2nd Max. (ug/m^3)	Yearly Estim. Exceed.	3 yr. avg. Estim. Exceed.	Annual Avg. (ug/m^3)
2000	77	58	0.00	0.00	27.7 *
2001	93	81	0.00	0.00	31.0
2002	91	87	0.00	0.00	31.0
2003	97	93	0.00	0.00	27.9
2004	73	69	0.00	0.00	24.5

* *Annual average was calculated with one or more quarters* having less than 75% data recovery.

Gates Primary hi-vol -- 1050 S. Broadway

Year	1st Max. (ug/m^3)	2nd Max. (ug/m^3)	Yearly Estim. Exceed.	3 yr. avg. Estim. Exceed.	Annual Avg. (ug/m^3)
2000	58	54	0.00	0.00	28.2
2001	49	47	0.00	0.00	27.7 *
2002	78	62	0.00	0.00	28.9
2003	76	66	0.00	0.00	31.8
2004	84	76	0.00	0.00	28.1

* *Annual average was calculated with one or more quarters* having less than 75% data recovery.

Denver Visitor's Center -- 225 W. Colfax Ave.

Year	1st Max. (ug/m^3)	2nd Max. (ug/m^3)	Yearly Estim. Exceed.	3 yr. avg. Estim. Exceed.	Annual Avg. (ug/m^3)
2000	74	72	0.00	0.00	29.2
2001	119	102	0.00	0.00	37.4 *
2002	111	97	0.00	0.00	33.9
2003	100	79	0.00	0.00	30.6
2004	98	76	0.00	0.00	26.1

* *Annual average was calculated with one or more quarters* having less than 75% data recovery.

CDPHE Laboratory Services Division -- 8100 Lowry Blvd.

Year	1st Max. (ug/m^3)	2nd Max. (ug/m^3)	Yearly Estim. Exceed.	3 yr. avg. Estim. Exceed.	Annual Avg. (ug/m^3)
2000	37	32	0.00	0.00	18.9 *
2001	89	51	0.00	0.00	22.2
2002	70	62	0.00	0.00	24.5
2003	64	55	0.00	0.00	22.0
2004	43	42	0.00	0.00	19.7

** Annual average was calculated with one or more quarters having less than 75% data recovery.*

Castle Rock -- 310 3rd St.

Year	1st Max. (ug/m^3)	2nd Max. (ug/m^3)	Yearly Estim. Exceed.	3 yr. avg. Estim. Exceed.	Annual Avg. (ug/m^3)
2000	52	31	0.00	0.00	15.2
2001	26	22	0.00	0.00	14.8 *
2002 2003 2004	***sampling ended 7-1-2001***				

** Annual average was calculated with one or more quarters having less than 75% data recovery*

Table 3-2: PM_{10} Data Recovery Rates for Each Monitoring Site

PM_{10} Data Recovery (percent)

Denver Metro Area
2000 through 2004

Adams City -- 4301 E. 72nd Ave.

Year	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	Overall
2000	95	97	98	92	95
2001	96	13			27 *
2002 2003 2004	**** sampling ended 4-13-2001***				

Alsup Elementary -- 7101 Birch St.

Year	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	Overall
2000	***sampling began 1-9-2001***				
2001	88	97	98	96	94
2002	97	97	98	100	98
2003	96	99	99	100	98
2004	100	96	96	93	96

Brighton -- 22 S. 4th Ave.

Year	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	Overall
2000	97	90	**Construction 9/20/00-2/22/01*		66 **
2001	*Const.*	90	87	87	71 **
2002	100	93	100	93	97
2003	93	100	94	100	97
2004	100	100	100	93	98

***overall data completeness low due to roof construction 9-20-00 through 2-22-01.*

Welby -- 78th Ave. & Steele St.

Year	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	Overall
2000	75	87	100	93	89
2001	93	88	100	80	90
2002	53	0	69	100	56
2003	100	100	100	100	100
2004	100	93	100	80	93

Welby Continuous PM_{10} -- 78th Ave. & Steele St.

Year	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	Overall
2000	95	88	63 **	*** Sampler out 8/28/00-3/1/01*	
2001	29 **	96	99	95	80 **
2002	96	77	95	100	92
2003	97	86	100	96	95
2004	100	97	100	96	98

** Overall average is calculated based on 100% as a maximum recovery.*

Longmont -- 3rd Ave. & Kimbark St.

Year	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	Overall
2000	87	97	100	80	92
2001	93	94	100	97	97
2002	100	100	100	100	100
2003	100	93	81	93	92
2004	100	100	63	87	88

Boulder Chamber Bldg. -- 2440 Pearl St.

Year	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	Overall
2000	94	87	93	67	85
2001	100	100	100	93	98
2002	100	80	100	93	93
2003	93	67	100	87	87
2004	73	100	100	80	89

CAMP Primary hi-vol -- 2105 Broadway

Year	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	Overall
2000	100	93	100	93	96
2001	100	> 100	>100	100	100
2002	100	100	100	100	100
2003	87	100	100	100	97
2004	100	100	81	100	95

**Overall average is calculated based on 100% as a maximum recovery.*

CAMP Continuous PM_{10} -- 2105 Broadway

Year	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	Overall
2000	*** construction 6/99-11/00*			47 **	13 **
2001	93	99	100	100	98
2002	97	98	91	99	96
2003	81	96	100	87	91
2004	87	100	99	98	96

Gates Primary hi-vol -- 1050 S. Broadway

Year	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	Overall
2000	100	100	100	93	98
2001	53	94	87	100	84
2002	100	93	88	100	95
2003	100	100	94	87	95
2004	100	80	88	93	90

Denver Visitor's Center -- 225 W. Colfax Ave.

Year	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	Overall
2000	95	97	98	90	95
2001	91	*** Construction 6-30-01 through 8-8-01*		93	75 **
2002	100	92	96	92	95
2003	90	99	100	99	97
2004	99	92	95	97	96

*** overall data completeness low due to roof construction 6-13-01 through 8-8-01.*

CDPHE Laboratory Services Div. -- 8100 Lowry Blvd.

Year	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	Overall
2000	Sampling began 9-1-2000			84	84
2001	90	94	93	97	93
2002	90	93	100	97	95
2003	100	100	94	97	98
2004	97	94	100	97	97

Castle Rock -- 310 3rd St.

	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	Overall
2000	94	100	100	93	97
2001	67	75			71 *
2002	* Sampling ended 6-30-2001				
2003					
2004					

**Overall average is calculated based on 100% as a maximum recovery.*

CHAPTER 4: MAINTENANCE PLAN

This maintenance plan is a SIP revision and provides for maintenance of the relevant NAAQS in the area for the second ten-year period (through 2022) after redesignation to attainment/ maintenance by EPA on September 16, 2002.

The EPA has established the core elements listed below as necessary for approval of maintenance plans:

- Description of the control measures for the maintenance period
- Emission inventories for current and future years
- Maintenance demonstration
- Mobile source emissions budget
- Approved monitoring network
- Verification of continued attainment
- Contingency plan
- Subsequent maintenance plan revisions

A. Maintenance Plan Control Measures

1. Control Measures Included in the Maintenance Plan

The Denver metropolitan area will rely on the control programs listed below to demonstrate maintenance of the 24-hour PM_{10} standard through 2022. No emission reduction credit has been taken in the maintenance demonstration for any other current State or local control programs and no other such programs, strategies, or regulations shall be incorporated or deemed as enforceable measures for the purposes of this maintenance demonstration.

This maintenance plan does not include any "transportation control measures", as that term is defined at 40 CFR 93.101. Although section VIII.D of the Colorado State Implementation Plan for Particulate Matter (PM_{10}), Denver Metropolitan Nonattainment Area Element approved by the EPA in 1997 was entitled "TRANSPORTATION CONTROL MEASURES", the measures described in that section have not been incorporated into the SIP. Section VIII.D described the transportation network that was used to estimate the number of vehicle miles traveled in the nonattainment area, but it did not specify the inclusion of such measures in the SIP. In estimating the vehicle miles traveled for purposes of this maintenance plan, DRCOG made reasonable assumptions about the transportation network, but such assumptions are not codified as transportation control measures for incorporation into the SIP.

The maintenance plan takes credit for the following federally-enforceable control measures, which, except where otherwise noted, are included in the SIP:

a. Federal fuels and tailpipe standards and regulations

Credit is taken in this maintenance plan for current federal regulations concerning motor vehicles, fuels, small engines, diesels, and non-road mobile sources. While credit is taken for these federal requirements, they are not part of the Colorado SIP.

b. Woodburning

Air Quality Control Commission Regulation No. 4 covers wood stoves, conventional fireplaces and woodburning on high pollution days, as approved by EPA as part of the federal SIP in 1997. This maintenance plan makes no changes to Regulation No. 4.

Many local governments in the Denver region have adopted ordinances or resolutions regulating woodburning activities within their jurisdictions. In its 1997 approval of the Denver region's PM_{10} SIP, EPA incorporated by reference local woodburning ordinances and resolutions adopted by Arvada, Aurora, Boulder, Broomfield, Denver, Douglas County, Englewood, Federal Heights, Glendale, Greenwood Village, Jefferson County, Lafayette, Lakewood, Littleton, Longmont, Mountain View, Sheridan, Thornton, and Westminster. These ordinances and resolutions remain in the SIP, unless they are removed or revised through a SIP revision.

Residential woodburning emissions are based on data derived from the Metropolitan Denver Woodburning Survey (2002).

c. Street Sanding

Air Quality Regulation No. 16 covers street sanding and sweeping requirements. Revisions to this regulation were adopted on April 19, 2001 in conjunction with the previously approved maintenance plan. Regulation No. 16 remains in the SIP and this maintenance plan makes no revisions to the regulation.

Regulation No. 16 currently requires the following:

1) 30% emissions reduction region-wide (20% in the foothills),
2) 50% emissions reduction in the central Denver area (bounded by 38th Ave., Federal Blvd., Louisiana Ave., and Downing St.),
3) 54% reduction on I-25 between University and 6th Avenue; and
4) 72% emission reduction in the central business district (bounded by Colfax Avenue, Broadway, 20th Street, Wynkoop and Speer Boulevard).

All of these requirements remain effective, until they are removed or revised by a future SIP revision.

d. Stationary Sources

Emissions from stationary sources of pollution are regulated by several Air Quality Control Commission Regulations:

1) Regulation No. 1 regulates emissions of particulates, smoke, sulfur dioxide, and nitrogen oxides and establishes limits on these pollutants from covered sources. Sections I-IV, Sections VI-IX, and Appendices A and B are already included in the approved SIP. This maintenance plan incorporates the regulatory limits in calculations of maximum allowable emissions for stationary sources. No additional revisions are made to Regulation No. 1 as part of the maintenance plan revision.

2) Revisions to Regulation No. 1 also stipulate that Section VIII, Restrictions on the Use of Oil as a Backup Fuel, shall apply in the Denver PM_{10} attainment/maintenance area in the same manner as it did for the Denver PM_{10} nonattainment area.

3) Regulation No. 3 lays out provisions of the State of Colorado's stationary source permitting program. Parts A and B of Regulation No. 3 are already included in the approved SIP. Part C implements the federal operating permit program and this reference to Part C of Regulation No. 3 shall not be construed to mean that these regulations are included in the SIP.

4) Regulation No. 6 implements the federal standards of performance for new stationary sources. This maintenance plan makes no changes to this regulation. This reference to Regulation No. 6 shall not be construed to mean that these regulations are included in the SIP.

5) The Common Provisions Regulation contains general provision applicable to all emission sources in Colorado. This maintenance plans makes no changes to this regulation.

The emission inventories for stationary sources supporting the maintenance demonstration have followed all relevant EPA rules and guidance documents for calculating such emissions. Further information, including individual emissions calculations for major stationary sources, is contained in the Technical Support Document accompanying this maintenance plan.

As an attainment/maintenance area since September 16, 2002, the State and federal attainment PSD permitting requirements remain in affect in the Denver metro area. This program requires

the application of Best Available Control Technology when constructing new or modified major stationary sources.

2. Control Measures Removed from the State Implementation Plan

a. Automobile Inspection and Readjustment (A.I.R.) Program

The Air Quality Control Commission Regulation No. 11 concerning the Automobile Inspection and Readjustment (A.I.R.) Program is hereby removed from the Denver PM_{10} SIP. The current program would receive only a small emissions reduction benefit and is no longer necessary in order to demonstrate continued maintenance of the PM_{10} standard.

Section 110(l) of the CAAA prevents the EPA from approving a plan revision if the revision would interfere with any applicable requirement concerning attainment of a standard and reasonable further progress, or any other applicable requirement of the CAAA. The A.I.R. Program will remain part of the Colorado SIP through the Ozone Action Plan for the 8-hour ozone standard and the maintenance plan for the 1-hour ozone standard. Since the A.I.R. program remains in the Colorado SIP, section 110(l) does not require a demonstration that removal of the A.I.R. Program from the PM_{10} maintenance plan would not interfere with any applicable requirements concerning pollutants other than PM_{10}. This maintenance plan obviates the need for any showings under 110(l) concerning PM_{10} if the State makes any further revisions to the A.I.R. Program contained in the Colorado SIP.

b. Measures Previously Removed from the SIP

The maintenance plan approved September 16, 2002 removed Regulation 12, concerning reductions of diesel vehicle emissions; Regulation 13, concerning the oxygenated gasoline program; and several permits for individual stationary sources: Public Service Company Cherokee Station, Purina Mills, Electron Corp., Trigen-Colorado Energy Corp., Rocky Mountain Bottle Co., and Conoco Refinery. No credit is taken for these strategies.

B. Emission Inventories

This section presents emission inventories for the maintenance plan. Emission inventories are provided for the 2001 base-attainment year, the 2009 and 2010 interim years, the 2015 interim budget year, the 2020 interim year, and the 2022 maintenance year.

The 2001 base inventory incorporates the estimated actual emissions and control measures in place at that time. The 2009, 2010, 2015, 2020, and 2022 inventories incorporate the maintenance plan control measures described above and projections of future emission levels from all sources.

All of the inventories are for the "modeling domain" of the Denver attainment maintenance area (see Figure 4-1) and provide emissions estimates for an average winter weekday after a snow event. Because of technical modeling limitations, the modeling domain is smaller than the attainment/maintenance area, though it includes all areas of expected maximum PM_{10} concentrations. The modeling domain is also used to establish the motor vehicle emissions budgets for the region as discussed in subsequent sections of this plan.

All of the inventories were developed using EPA-approved emissions modeling methods and updated transportation and demographics data from DRCOG. The PM_{10} maintenance plan Technical Support Document contains detailed information on model assumptions and parameters for each source category.

The emissions inventories include forecasted estimates from Denver International Airport (DIA) operations and construction. The Technical Support Document contains a table of DIA-specific emissions for purposes of general conformity demonstrations.

1. Demographic and Transportation Data

The emission estimates were updated based on the most recent demographic and VMT estimates contained in DRCOG's conformity analysis for the updated fiscally constrained element of the Fiscally-Constrained 2030 Regional Transportation Plan (January 2005). These data are summarized in the following table:

Table 4-1: Demographic and Transportation Data
PM_{10} Modeling Domain

Period	2001	2005	2015	2020	2030
Population	2,034,861	2,146,319	2,432,326	2,612,345	2,972,384
Households	812,273	868,183	994,133	1,074,706	1,235,853
Employment	1,171,970	1,122,934	1,434,530	1,533,233	1,730,639
Daily VMT	49,783,121	53,208,574	65,722,110	71,484,844	82,081,684

2. Emissions Inventory Data

The detailed emissions inventories for 2001, 2009, 2010, 2015, 2020, and 2022 are presented in Table 4.2.

C. Maintenance Demonstration

This maintenance plan provides for maintenance of the NAAQS through the year 2022, the 20-year period after the 2002 redesignation. EPA guidance and policy requires the same level of modeling for maintenance plans as that which was performed for the attainment demonstration (September 4, 1992 EPA memorandum from John Calcagni to EPA regional offices). Therefore, this maintenance demonstration is made through the use of area-wide dispersion and roll-forward modeling for the years 2001, 2009, 2010, 2015, 2020 and 2022, consistent with the modeling protocol approved for the 1995 attainment SIP (approved in 1997).

The modeling process includes dispersion modeling over five years of meteorological data (1985-89) with a regional air model (RAM) for primary PM_{10} area, mobile and minor point sources, and an industrial source complex (ISC) model for primary PM_{10} from major point sources modeled at allowable emissions levels. For this maintenance plan the total secondary concentration for 2001 was established by using the highest winter secondary concentration from the ambient $PM_{2.5}$ database gathered between March 2001 and March 2005. The ammonium nitrate and ammonium sulfate fractions applied to the baseline secondary concentration value are based on the maximum secondary values from the above database. A background component is also included based on five years of monitoring data from Estes Park and Limon and five years of meteorological data from Stapleton Airport.

Since the modeling process is based on five years of meteorological data, the 6th highest value from all receptors is used to determine if the standard has been met. The combined result of the dispersion models, roll-forward secondary model and background shows the highest 24-hour 6th maximum PM_{10} concentrations in 2001 at receptor 724 near Broadway & Colfax, in 2009, 2010 and 2015 at *receptor 474 near Sante Fe Drive and Hampden Avenue, and* in 2020 and 2022 at receptor 1007 near 68th and Colorado Boulevard. Table 4.3 demonstrates maintenance of the standard during the entire period of the maintenance plan from 2001 through 2022.

Figure 4.1: PM-10 Modeling Domain

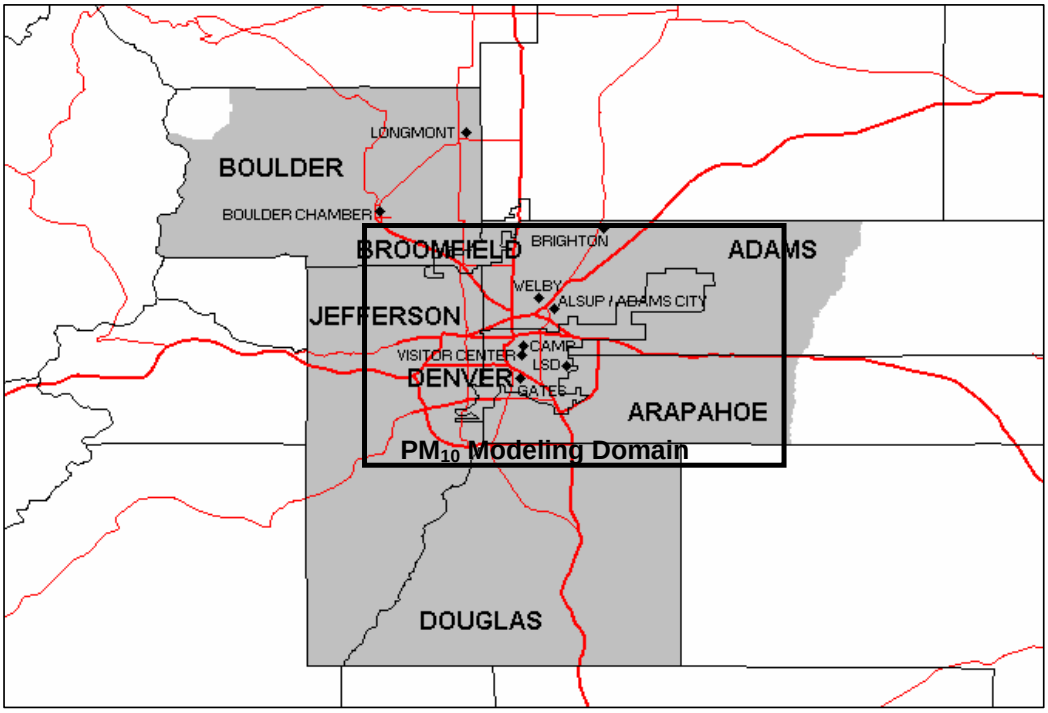

TABLE 4.2: Primary and Secondary Emissions Inventory

Primary PM_{10}	**2001**	**2009**	**2010**	**2015**	**2020**	**2022**
Aircraft/Airport	0.5	0.5	0.5	0.6	0.7	0.7
Commercial Cooking	2.2	2.3	2.4	2.7	2.9	3.0
Construction	6.3	6.8	7.0	7.9	8.5	8.7
Fuel Combustion	1.3	1.4	1.5	1.6	1.7	1.7
Railroads	0.1	0.1	0.1	0.2	0.2	0.2
Structure Fires	0.1	0.1	0.1	0.1	0.1	0.1
Unpaved Roads	1.6	1.6	1.6	1.6	1.6	1.6
Woodburning	6.5	6.6	6.6	6.6	6.7	6.7
Commercial Equipment	0.4	0.3	0.3	0.2	0.2	0.2
Construction Equipment	0.9	0.7	0.6	0.4	0.2	0.1
Industrial Equipment	0.2	0.1	0.1	0.1	0.0	0.0
Other Non-Road	0.3	0.3	0.3	0.4	0.4	0.4
Gridded Point Sources	6.7	7.8	8.0	8.9	9.9	10.3
Potential to Emit Pt. Sces.*	2.2	21.6	21.6	21.6	21.6	21.6
Mobile Source	33.1	41.7	42.4	46.6	50.7	52.1
Total Primary PM_{10}	**62.3**	**92.0**	**93.3**	**99.4**	**105.3**	**107.5**
Nitrogen Oxides	**2001**	**2009**	**2010**	**2015**	**2020**	**2022**
Aircraft/Airport	8.5	9.8	10.2	10.8	11.7	12.2
Fuel Combustion	16.3	18.1	18.3	19.4	20.8	21.4
Railroads	4.6	5.4	5.5	6.7	7.3	7.6
Woodburning	0.6	0.6	0.6	0.6	0.6	0.6
Other Nonroad	20.6	14.5	13.7	9.9	7.3	6.9
Gridded Point Sources	5.0	5.3	5.4	5.8	6.5	6.7
Potential to Emit Pt Sces.*	67.5	149.0	149.2	149.6	150.9	151.4
Mobile Source	131.9	77.9	73.4	50.0	38.9	37.6
Total Nitrogen Oxides	**255.1**	**280.6**	**276.4**	**252.8**	**244.1**	**244.4**
Sulfur Dioxide	**2001**	**2009**	**2010**	**2015**	**2020**	**2022**
Aircraft/Airport	0.7	0.9	1.0	1.0	1.1	1.2
Fuel Combustion	0.3	0.3	0.3	0.3	0.3	0.3
Railroads	0.2	0.3	0.3	0.3	0.4	0.4
Woodburning	0.1	0.1	0.1	0.1	0.1	0.1
Other Nonroad	0.6	0.4	0.4	0.1	0.1	0.1
Gridded Point Sources	0.8	0.9	0.9	1.0	1.1	1.1
Potential to Emit Pt Sces.*	93.6	178.1	178.2	178.9	179.7	180.9
Mobile Source	4.9	0.8	0.5	0.6	0.7	0.7
Total SO_2	**101.3**	**181.8**	**181.7**	**182.4**	**183.5**	**184.9**

* *Based on Title V permit applications, many point sources have higher operating design rates than those included in the original rates, resulting in higher potential emissions. Actual emissions of NO_X and SO_2 will be much lower in future years.*

Table 4.3: Maintenance Demonstration
Standard = 150 ug/m^3

Year	*Modeling Receptor*	*Julian Day*	*Total Concentration ug/m3*	*Area/Mobile/ Minor Pt. Src. (RAM) ug/m3*	*Major Point Source (ISC) ug/m3*	*Secondary Roll-Forward ug/m3*	*Background ug/m3*
2001	*724**	*88059*	*126.1*	*82.9*	*0.4*	*27.0*	*15.8*
2009	*474*	*87359*	*134.9*	*45.2*	*38.5*	*33.8*	*17.4*
2010	*474*	*87359*	*135.1*	*45.7*	*38.5*	*33.5*	*17.4*
2015	*474*	*85328*	*137.5*	*54.4*	*37.1*	*31.6*	*14.4*
2020	*1007*	*87359*	*142.1*	*90.6*	*3.1*	*30.9*	*17.4*
2022	*1007*	*87359*	*145.2*	*92.6*	*4.1*	*31.0*	*17.4*

**Receptor 724 is near Colfax Avenue and Broadway; receptor 474 is near Sante Fe Drive and Hampden Avenue; receptor 1007 is near Colorado Boulevard and 68th Avenue.*

The Technical Support Document for this maintenance plan describes in detail the assumptions and methodologies used for all modeling work.

D. PM_{10} and NO_X Motor Vehicle Emissions Budgets

1. Requirements for Establishing & Trading Emission Budgets

The transportation conformity provisions of section 176(c)(2)(A) of the CAA require regional transportation plans and programs to show that "...emissions expected from implementation of plans and programs are consistent with estimates of emissions from motor vehicles and necessary emissions reductions contained in the applicable implementation plan..."

EPA's transportation conformity regulation (40 CFR 93.118) also requires that motor vehicle emission budget(s) must be established for the last year of the maintenance plan, and may be established for any other years deemed appropriate. If the maintenance plan does not establish motor vehicle emissions budgets for any years other than the last year of the maintenance plan, the conformity regulation requires a "demonstration of consistency with the motor vehicle emissions budget(s) must be accompanied by a qualitative finding that there are no factors which would cause or contribute to a new violation or exacerbate an existing violation in the years before the last year of the maintenance plan." The normal interagency consultation process required by the regulation shall determine what must be considered in order to make such a finding.

Per 40 CFR 93.118, the maintenance plan establishes a budget for maintenance year 2022 and beyond, which becomes effective upon determination of adequacy by the EPA. The maintenance plan also establishes a revised budget for 2015, the maintenance year in the previously approved

maintenance plan. Budgets for the period 2015-2021 become effective upon EPA approval of this maintenance plan revision.

For transportation plan analysis years after the last year of the maintenance plan (in this case, 2022), a conformity determination must show that emissions are less than or equal to the maintenance plan's motor vehicle emissions budget(s) for the last year of the maintenance plan.

In addition, per 40 CFR 93.124(c), emissions can be traded between the established PM_{10} and NO_X budgets if there is an approved trading mechanism included in the maintenance plan to allow trading to take place.

2. Pollutants of Coverage

This maintenance plan establishes separate motor vehicle emission budgets for total primary PM_{10} and NO_X as a PM_{10} precursor. Available information indicates that SO_2 emissions from mobile sources are an insignificant contributor to secondary particulate formation in the Denver area (much less than 1 ug/m3). Therefore, an emission budget for SO_2 is not established.

3. Geographic Area of Coverage

This maintenance plan establishes regional budgets for the PM_{10} modeling domain, which for technical modeling reasons is less than the entire nonattainment area (See Figure 4.1 previously). All of the emission estimates and air quality modeling in the maintenance plan are based on this domain. Future conformity determinations shall also project future mobile source emission for this same domain, unless the geographic coverage of the budget is changed through a future SIP revision.

4. 2022 PM_{10} and NO_X Budgets

As shown in the maintenance demonstration earlier in this plan, the 2010, 2015, 2020 and 2022 regional emissions inventories for primary PM_{10} and PM_{10} precursors are below the level necessary to demonstrate continued maintenance of the PM_{10} standard (150 ug/m^3). As a result, EPA's conformity regulation (40 CFR 93.124) allows the implementation plan to quantify explicitly the amount by which motor vehicle emissions could be higher while still demonstrating compliance with the maintenance requirement. The implementation plan can then allocate some or all of this additional "safety margin" to the emissions budget(s) for conformity purposes.

The available safety margin in 2022 as shown in Table 4.4 below is 4.7 ug/m3. Expressed in tons per day, this is equivalent to 57.8 TPD of NO_X emissions or 4.2 TPD of PM_{10} based on results and relationships established in the modeling analysis for 2001 as follows:

- *actual PM_{10} RAM inventory / averaged key receptor RAM PM_{10} concentration*
  60.1 TPD PM_{10} / 68.0 ug/m3 PM_{10} = 0.9 TPD PM_{10}/ug/m3 PM_{10}

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- *actual NO_X total inventory / NO_X fraction of max. winter PM_{10} concentration (2001-05)*
  255.1 TPD NO_X / 20.8 ug/m3 PM_{10} = 12.3 TPD NO_X /ug/m3 PM_{10}

Allocation of all of the available safety margin to NO_X results in mobile source emissions budgets of 95.4 TPD NO_X and 52.1 TPD PM_{10}, or while allocation of all of the available safety margin to PM_{10} results in mobile source emissions budgets of 37.6 TPD NO_X and 56.3 TPD PM_{10} as illustrated in the following table:

Table 4.4: 2022 Available NO_X or PM_{10} Safety Margin

	NO_X		PM_{10}	
Maximum Allowable Concentration	**149.9**	**ug/m3**	**149.9**	**ug/m3**
Maintenance Demonstration	**145.2**	**ug/m3**	**145.2**	**ug/m3**
Available "safety margin" (micrograms/meter3)	**4.7**	**ug/m3**	**4.7**	**ug/m3**
Available "safety margin" (tons per day)	**57.8**	**tpd***	**4.2**	**tpd ****
2022 Mobile Sources	**37.6**	**tpd**	**52.1**	**tpd**
2022 MS Emissions Budget w/all SM applied to NO_X or PM_{10}	**95.4**	**tpd**	**56.3**	**tpd**

* 1 ug/m3 = 12.3 tpd NO_X

** 1 ug/m3 = 0.9 tpd PM_{10}

This maintenance plan allocates all available safety margin to the motor vehicle emissions budget and allocates a portion of the available safety margin to PM_{10} and a portion to NO_X as shown in the following table:

Table 4.5: 2022 Allocation of Available Safety Margin & Development of Mobile Source Emissions Budgets

	NO_X		PM_{10}	
Available "safety margin"	**4.7**	**ug/m3**	**4.7**	**ug/m3**
Allocate a portion of PM_{10} "safety margin"			**-3.2**	**ug/m3**
Remaining Safety Margin available to NO_X	**1.5**	**ug/m3**		
Available Safety Margin (TPD)	**18.5**	**tpd***	**2.9**	**tpd****
Allocated Safety Margin (TPD)	**18.4**	**tpd**	**2.9**	**tpd**
2022 Mobile Sources	**37.6**	**tpd**	**52.1**	**tpd**
2022 Mobile Sources Emissions Budgets	**56.0**	**tpd**	**55.0**	**tpd**

Deleted: PM10

* 1 ug/m3 = 12.3 tpd NO_X

** 1 ug/m3 = 0.9 tpd PM_{10}

Therefore, this maintenance plan establishes mobile vehicle emissions budgets for the maintenance year 2022 and beyond as follow:

Table 4.6: Motor Vehicle Emissions Budgets for NO_X and PM_{10} For 2022 and Beyond

	NO_X (tpd)	PM_{10} (tpd)
2022 and Beyond	**56**	**55**

5. 2015 PM_{10} and NO_X Budgets

The current 2015 motor vehicle emissions budgets were established in the previously approved maintenance plan with MOBILE5 and DRCOG transportation networks and data available at that time. As discussed previously, 2015 is an EPA approved budget year in the previously approved maintenance plan (September 16, 2002). The 2015 budgets will be revised in this maintenance plan, allocating a portion of available safety margin to both PM_{10} and NO_X, and using the same methodology as the 2022 budgets.

TABLE 4.7: 2015 Allocation of Available Safety Margin & Development of Mobile Source Emissions Budgets

	NO_X		PM_{10}	
Maximum Allowable Concentration	**149.9**	**ug/m3**	**149.9**	**ug/m3**
Maintenance Demonstration	**137.5**	**ug/m3**	**137.5**	**ug/m3**
Available "safety margin"	**12.4**	**ug/m3**	**12.4**	**ug/m3**
Allocate a portion of PM_{10} "safety margin"			**-8.2**	**ug/m3**
Remaining Safety Margin available to NO_X	**4.2**	**ug/m3**		
Available "safety margin"	**51.7**	**tpd**	**7.4**	**tpd ****
Allocated "safety margin"	**20.0**	**tpd**	**7.4**	**tpd**
2015 Mobile Sources	**50.0**	**tpd***	**46.6**	**tpd**
2015 MS Emissions Budget	**70.0**	**tpd**	**54.0**	**tpd**

* 1 ug/m3 = 12.3 tpd NO_X

** 1 ug/m3 = 0.9 tpd PM_{10}

Therefore, this maintenance plan establishes mobile vehicle emissions budgets for the budget 2015 through 2021 as follows:

Table 4.8: 2015 Motor Vehicle Emissions Budgets for NO_X and PM_{10}

	NO_X (tpd)	PM_{10} (tpd)
2015	**70**	**54**

For analysis years prior to 2015, the 2006 attainment budget is technically still applicable under 40 CRF93.118(b)(2)(iv).

Until such time the budgets as described in this section are approved by EPA, the 2015 PM_{10} and NO_X emissions budgets for the Denver PM_{10} attainment/maintenance area shall remain at 101 tpd for NO_X and 51 tpd for PM_{10}. Upon approval of the 2015 budgets contained in this maintenance plan, the previous 2015 budgets of 101 tpd for NO_X and 51 tpd for PM_{10} shall expire.

Consistent with EPA's conformity regulation, the previously approved maintenance plan deleted the SIP requirement for dispersion modeling as part of future regional conformity determinations. Consistency with the emission budgets is the only federal requirement.

6. Emissions Budget Trading of NO_X and PM_{10}

Motor vehicle emissions budgets are specific numbers for a specific year, and once established in an approved SIP remain in existence for long periods of time or until they are revised through a SIP revision. The mobile source and transportation models used to estimate motor vehicle emissions have changed and will continue to change over time. Recent experience with changing models has necessitated SIP revisions to facilitate the conformity process.

This maintenance plan establishes an emission budget trading protocol for trading between emissions budgets for primary PM_{10} and the PM_{10} precursor, NO_X, based on the technical analysis in this plan. Trading allows for the establishment of many sets of pairs of PM_{10} and NO_X emissions budgets in TPD, which are equivalent to the same total PM_{10} concentration. Emissions trading (PM_{10} for NO_X or NO_X for PM_{10}) allows the region initially to establish a reasonable, specific set of PM_{10} and NO_X emissions budgets while still allowing for adjustments to the budget as future circumstances change.

The technical analysis in this plan has established relationships between primary PM_{10} and the PM_{10} precursor, NO_X, as shown in Section D.4. and as follows:

- 1 ug/m3 PM_{10} = 12.3 TPD NO_X = 0.9 TPD PM_{10}

which is further equated in terms of tons per day as follows:

- 1.0 TPD PM_{10} = 13.6 TPD NO_X

EPA has required that a 10% safety factor be applied to reflect uncertainties in the modeling. Therefore, when trading NO_X for PM_{10} the trading ratio will be 15 TPD NO_X (1.1 * 13.6) = 1.0 TPD PM_{10}, and when trading PM_{10} for NO_X, the trading ratio will be
1.0 TPD PM_{10} = 12 TPD NO_X (0.9 * 13.6).

The Metropolitan Planning Organization (MPO) responsible for demonstrating transportation conformity is authorized, as necessary to supplement the PM_{10} and NO_X emission budgets using the following procedures for a given transportation conformity determination:

- Initially, a demonstration of consistency or lack thereof shall be made with the specific PM_{10} and NO_X motor vehicle emissions budgets for 2015 and for 2022, which have been established in this maintenance plan and are listed in Tables 4.6 and 4.8 above.

- Prior to any emissions trading, the MPO shall consider all reasonably available local control measures to meet the specific established budgets. If the budgets cannot be met, the MPO shall demonstrate the need for trading through the normal interagency consultation and review process described in Air Quality Regulation No. 10, which includes regional, state and federal air quality and transportation agencies.

- Trading of NO_X for PM_{10} or PM_{10} for NO_X to adjust emission budgets for purposes of demonstrating transportation conformity shall be allowed using the emission trading formulas as follows:

    - For any trades necessary to increase a primary PM_{10} budget, 15.0 TPD of NO_X will be taken from the NO_X budget to increase the primary PM_{10} budget by 1.0 TPD, a ratio of 15 to 1.

    - For trades necessary to increase a NO_X budget, 1.0 TPD of primary PM_{10} will be taken from the primary PM_{10} budget to increase the NO_X budget by 12.0 TPD, a ratio of 1 to 12.

- The MPO shall include the following information in the transportation conformity determination:

    - The budget for primary PM_{10} and NO_X for each required year of the conformity demonstration, before trading allowed by this maintenance plan has been employed;

    - The portion of the primary PM_{10} budget that will be used to supplement the NO_X budget, or, in the alternative, the portion of the NO_X budget that will used to supplement the primary PM_{10} budget, in tons per day, for each required year of the conformity demonstration;

    - The increase in the NO_X budget or primary PM_{10} budget that results from use of the applicable formula specified above, along with relevant calculations;

- The resulting primary PM_{10} and NO_X budgets, in tons per year, for each required year of the conformity demonstration, after the trading allowed by this maintenance plan has been employed;

- To demonstrate conformity, the MPO shall then compare projected emissions to the adjusted PM_{10} and NO_X motor vehicle emissions budgets.

Trades in either direction would be made on a case-by-case basis, decided for each plan/TIP conformity determination.

The trading formulae applied to the 2022 and 2015 budgets are presented as a curve in the following charts:

Chart 1: NO_X / PM_{10} Trading Curve Using 2022 Emissions Budgets

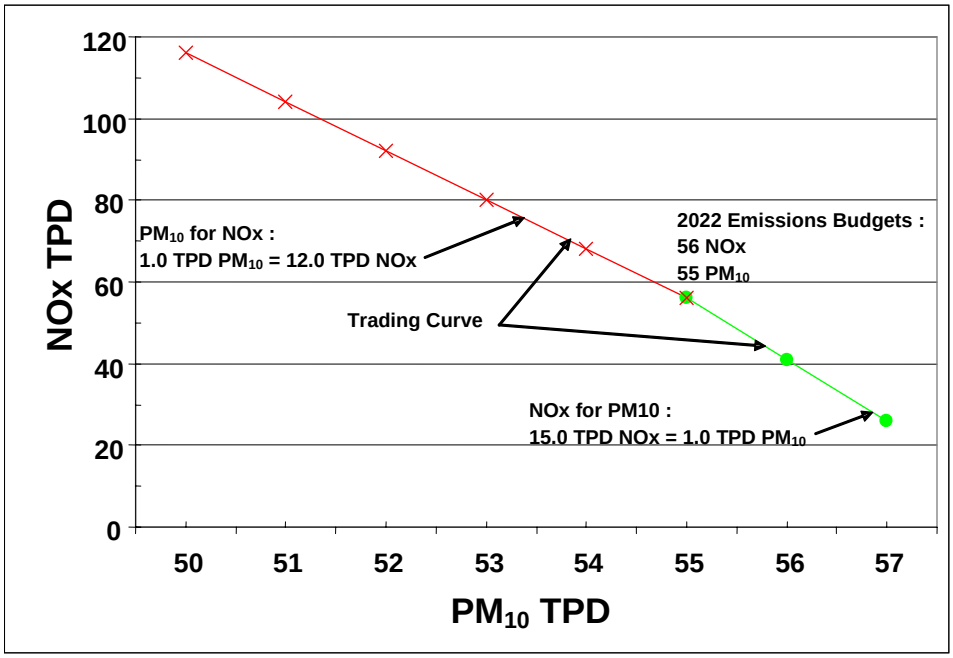
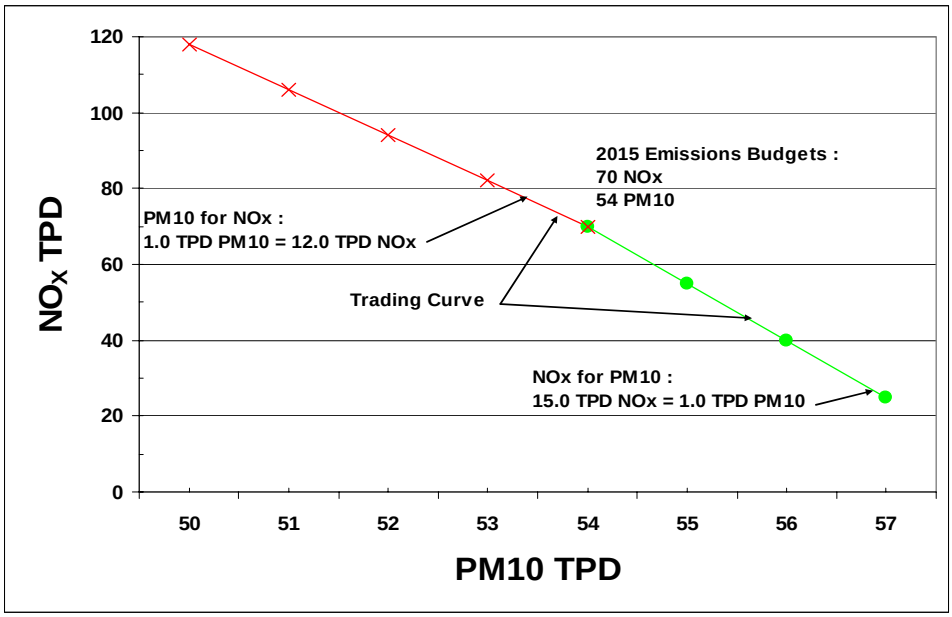


Chart 2: NO_X / PM_{10} Trading Curve Using 2015 Emissions Budgets



7. Construction-Related Emissions

EPA's transportation conformity regulation 40 CFR 93.122(d) requires all PM_{10} nonattainment and maintenance areas to include highway and transit construction-related PM_{10} emissions in their regional conformity analysis if their PM_{10} SIP identifies construction as a contributor to the PM_{10} problem. The regulation does not require areas to specifically identify highway and transit project construction as a source of PM_{10} in the SIP.

This maintenance plan includes PM_{10} emission estimates for construction activities in general. All types of construction, including highway and transit construction, are assumed to be included in this analysis.

The construction emissions inventory in this maintenance plan was developed using the same economic activity factors that DRCOG used to develop its most recent 2030 Transportation Plan and 2005-2010 TIP, upon which this maintenance plan is also based.

E. Monitoring Network / Verification of Continued Attainment

The APCD will continue to operate an appropriate air quality monitoring network of NAMS and SLAMS monitors in accordance with 40 CFR Part 58 to verify the continued attainment of the PM_{10} NAAQS. Annual review of the NAMS/SLAMS air quality surveillance system will be

conducted in accordance with 40 CFR 58.20(d) to determine whether the system continues to meet the monitoring objectives presented in Appendix D of 40 CFR Part 58.

The State will also track and document measured mobile source parameters (e.g., vehicle miles traveled, congestion, fleet mix, etc.) and new and modified stationary source permits. If these and the resulting emissions change significantly over time, the APCD will perform the appropriate studies to determine 1) whether additional and/or re-sited monitors are necessary and 2) whether mobile and stationary source emission projections are on target.

F. Contingency Provisions

Section 175A(d) of the CAA requires that the maintenance plan contain contingency provisions to assure that the State will promptly correct any violation of the PM_{10} NAAQS standard which occurs after redesignation to attainment. Attainment areas are not required to have preselected contingency measures, just a list of measures that could be considered for future implementation.

The contingency plan must also ensure that the contingency measures are adopted expeditiously once the need is triggered. The primary elements of the contingency plan are: 1) the list of potential contingency measures; 2) the tracking and triggering mechanisms to determine when contingency measures are needed; and 3) a description of the process for recommending and implementing the contingency measures.

The triggering of the contingency plan does not automatically require a revision of the SIP, nor is the area necessarily redesignated once again to nonattainment. Instead, the State will normally have an appropriate amount of time to correct the violation by implementing one or more contingency measures as necessary. In the event that violations continue to occur after contingency measures have been implemented, additional contingency measures will be implemented until the violations are corrected.

1. Potential Contingency Measures

Section 175A(d) of the CAA requires the Maintenance Plan to include as potential contingency measures all of the control measures contained in the SIP before redesignation which were relaxed or modified through the Maintenance Plan. For the Denver metropolitan area, this includes:

- An enhanced vehicle inspection and maintenance program as described in AQCC Regulation No. 11 prior to the modifications adopted on January 10, 2000 approved by EPA on December 14, 2001 with the addition of any onboard diagnostic components as required by Federal law.

- Regulation No. 12 concerning the diesel inspection/maintenance program.

- Regulation No. 13 concerning the oxygenated gasoline program.

- Permit terms and limits that were included in stationary source permits previously incorporated into the state implementation plan at 40 CFR 52.320(82); 62 FR 18716 (April 17, 1997).

In addition to these potential contingency measures, the State may evaluate other potential strategies in order to address any future violations in the most appropriate and cost-effective manner possible. Other potential measures include, but are not limited to:

- o Increased street sweeping requirements
- o Expanded, mandatory use of alternative de-icers
- o More stringent street sand specification
- o Road paving requirements
- o Further woodburning restrictions
- o Re-establishing new source review permitting requirements for stationary sources
- o NO_X RACT for stationary sources
- o Transportation control measures designed to reduce vehicle miles traveled
- o Improved diesel inspection/maintenance program
- o Retrofit program for heavy-duty diesel truck engines
- o Other emission control measures appropriate for the area based on the consideration of cost-effectiveness, PM_{10} emission reduction potential, economic and social considerations, or other factors that the State deems appropriate.

2. Tracking and Triggering Mechanisms

a. Tracking

The primary tracking plan for the Denver metropolitan area consists of continuous PM_{10} monitoring by APCD as described above. APCD will notify EPA, the AQCC, the RAQC, and local governments in the Denver area of any exceedance of the 24-hour NAAQS within 45 days of occurrence.

The ongoing regional transportation planning process carried out by the Denver Regional Council of Governments, in coordination with the RAQC, APCD, AQCC, and EPA, will serve as another means of tracking mobile source PM_{10} and NO_X precursor emissions into the future.

Since revisions to the region's transportation improvement programs are prepared every two years, and must go through a transportation conformity finding, this process will be used to periodically review progress toward meeting the VMT and mobile source emissions projections in this maintenance plan.

b. Triggering Contingency Measures

An exceedance of the 24-hour PM_{10} NAAQS may trigger a voluntary, local process by the RAQC and APCD to identify and evaluate potential contingency measures. However, the only federally-enforceable trigger for mandatory implementation of contingency measures shall be a violation of the NAAQS. Specifically, the three-year average of expected exceedances at a monitoring site would have to be greater than 1.0 for a violation to occur.

c. Process for Recommending and Implementing Contingency Measures

The State will move forward with mandatory implementation of contingency measures under the SIP if a violation of the PM_{10} NAAQS occurs.

No more than 60 days after being notified by the APCD that a violation of the 24-hour PM_{10} NAAQS has occurred, the RAQC, in coordination with the APCD and AQCC, will initiate a subcommittee process to begin evaluating potential contingency measures. The subcommittee will present recommendations to the RAQC within 120 days of notification and the RAQC will present recommended contingency measures to the AQCC within 180 days of notification.

The AQCC will then hold a public hearing to consider the contingency measures recommended by the RAQC, along with any other contingency measures the Commission believes may be appropriate to effectively address the violation. The necessary contingency measures will be adopted and implemented within one year after a violation occurs.

G. Subsequent Maintenance Plan Revisions

This maintenance plan fulfills the commitment made in the previously approved maintenance plan to update the maintenance plan analysis with MOBILE6.

The previously approved maintenance plan addressed the period 1995 through 2015 and demonstrated, as required in CAAA 175A(a), that the PM_{10} standard will be maintained for the initial ten-year period (through 2012) after redesignation in 2002. In accordance with CAA 176A(b) it is required that a maintenance plan revision be submitted to the EPA within eight years after the original redesignation to address maintenance of the standard for a second ten-year period beyond redesignation. The purpose of this maintenance plan revision is to provide for maintenance of the PM_{10} standard for the additional ten years (through 2022) following the first ten-year period.

No additional revisions of the PM_{10} Maintenance Plan are anticipated at this time. If future changes in mobile source models or other unforeseen considerations raise potential issues with maintaining the PM_{10} standard, the State and the RAQC will address the need to revise the maintenance plan at that time.