

**The SIP Planning Process:  
An Overview of  
The Clean Air Act's (CAA) Requirements for  
State Implementation Plan (SIP)  
Development & Approval  
January 8, 2010**

## **Overview of CAA Requirements**

### **National Ambient Air Quality Standards**

The State Implementation Plan (SIP) planning process begins with the National Ambient Air Quality Standards (NAAQS). The Environmental Protection Agency (EPA) is required by the Clean Air Act (CAA) to set NAAQS for criteria air pollutants considered harmful to public health and the environment. The CAA provides EPA with the authority to promulgate two types of NAAQS:

- Primary standards to set limits to protect public health, including the health of sensitive populations, such as asthmatics, children and elderly, and
- Secondary standards to set limits to protect public welfare, including protection against decreased visibility, damage to crops, animals, vegetation and buildings

EPA has promulgated NAAQS for six pollutants:

- Particulate Matter (PM10, PM2.5)
- Sulfur Dioxide (SO<sub>2</sub>)
- Nitrogen Oxide (NO<sub>2</sub>)
- Carbon Monoxide (CO)
- Ozone (1Hr & 8HR O<sub>3</sub>)
- Lead (Pb)

SIPs are generally required (under section 110 of the CAA and 40 CFR Part 51) for areas that do not attain the established criteria pollutants standards.

### **State Implementation Plans (SIPs)**

SIPs are each state's plan describing all of the air pollution control measures and strategies adopted by the state and approved by EPA for attaining the NAAQS by a statutory deadline and maintaining the NAAQS into the future. The states must involve the public and industries through hearings and opportunities to comment on the development of each state plan.

A SIP, strictly speaking, is everything codified in a state's Subpart of 40 CFR 52 (each state has its own subpart in Part 52). However, the term "SIP" is commonly used to refer to SIP revision documents, which could consist of attainment demonstrations, control strategy elements, contingency measures, maintenance demonstrations or other required SIP elements relative to a specific criteria pollutant.

## Infrastructure SIP Requirements

The requirement for a SIP is found in Section 110 (a)(1) of the CAA, which indicates a SIP is due three years after promulgation of a new or revised NAAQS.

Basic infrastructure requirements of SIPs are found in Section 110 (a)(2(A)– (M) and, in general, address the following:

- the establishment and implementation of enforceable emission limitations;
- the monitoring, compiling, and analyzing of ambient air quality data;
- preconstruction reviews and permitting of new and modified major stationary sources;
- consulting with and providing for the participation of local governments that are affected by the plan;
- interstate transport of pollutants;
- assurance that the State has the adequate funds and authority to enforce the SIP Element and the associated regulations; and
- permit fees for stationary sources.

An infrastructure SIP is required 3 years after promulgation by statutory deadline regardless of whether or not the state has any non-attainment areas. Even if the state believes that no update is necessary to satisfy 110 (1) & (2), it must provide for public participation on that determination.

## Elements of Control Strategy SIPs

In general a SIP requires a collection of programs and resources, including:

- SIP Control Strategies – Strategies or measures are required that achieve emissions reductions to meet the air quality standards considering technical feasibility, costs and other health or environmental impacts. EPA approvable control strategies are defined as quantifiable, verifiable, enforceable and permanent.
- Federal Measures – Reduction credits, for Federal regulations or standards for mobile/fuel, area and nonroad sources, are generally assumed in a SIP but the measures are not considered to be SIP measures.
- Part D - Plan Requirements for Nonattainment Areas including:
  - Classification and attainment dates based on the severity of nonattainment and the availability and feasibility of the pollution control measures
  - Plan submission no later than 3 years from the date of the nonattainment designation
  - Implementation of all Reasonably Available Control Measures (RACM) as expeditiously as practicable, including such reductions in emissions from existing sources in the area as may be obtained through the adoption, at a minimum, of Reasonably Available Control Technology (RACT)
  - Reasonable Further Progress
  - Emissions Inventory – a comprehensive, accurate, current inventory of actual emissions from all sources of the relevant pollutant or pollutants in such area, including such periodic revisions as the Administrator may determine
  - A New Source Review (NSR) permit program for new or modified major stationary sources requiring Lowest Achievable Emissions Rates (LAER) and offsetting emissions reductions.
  - Contingency measures – specific measures to be undertaken if the area fails to make reasonable further progress, or to attain the standard by the attainment date. Such measures shall take effect without further action by the State or the Administrator.
  - Specific provisions for nonattainment areas for each criteria pollutant
- Attainment/Maintenance Demonstrations – Various methods/tools described in EPA guidance documents are used to predict future air quality levels and the effects of emissions reductions and emissions reduction strategies. These tools also produce required attainment/maintenance demonstrations. Important tools include:

- Monitored Data – data from an approved network of monitoring devices (reference or equivalent monitors/methods) throughout a region which provide actual measurements of the concentrations in the air. This ambient air quality data once quality assured and entered in to the EPA Air Quality System (AQS) is used to calculate the given geographical region's Design Value. A region's ultimate attainment of a standard can only be determined from monitored data.
- Emissions Inventories – compiled data of the sources and categories of emissions to the air for a given pollutant (or its precursors), and how much is emitted by each source or source category. In some instances, a simple comparison of a base and future year emissions inventories is used to predict or demonstrate attainment or maintenance of a standard
- Computer Modeling – dispersion modeling integrates emissions inventories, chemical speciation and reactions, and meteorological data to estimate air quality levels.
- Conformity & Motor Vehicle Emissions Budget (MVEB) – Section 176(c) of the CAA of 1990 requires that all transportation plans, programs, and projects using federal funds conform to air quality implementation plans. EPA's implementing rules specify an emission budget which established a cap on motor vehicle related emissions that cannot be exceeded by predicted transportation system emissions in the future. The emissions budget applies as a ceiling on emissions in the year for which it is defined. The budget remains in place for all subsequent years until a different budget for another year is defined. A SIP revision can modify an established budget. Mobile vehicle emissions budgets are used by Metropolitan Planning Organizations (MPOs), like the Denver Regional Council of Governments (DRCOG), to demonstrate Transportation Conformity of their programs and plans.

## **The SIP Development Process in Colorado**

SIP development begins with a violation of a NAAQS, followed by a formal recommendation of nonattainment status for the region by the governor and a formal designation of nonattainment by the EPA. The formal designation of nonattainment by the EPA will include a classification (Marginal, Moderate, Serious etc) dependent on the severity of the violation level. The classification of the violation also contains determination of attainment dates, plan submission dates and specific plan requirements defined under Part D of the CAA for CO, PM and ozone.

The Denver Metro Area, and for that matter the Colorado Front Range, has a mature SIP process, and therefore has an established Infrastructure SIP in place, requiring only minor updates or submissions, as needed, by the State. Once a nonattainment designation has been established, a SIP revision is developed, which generally is a control strategy SIP that takes into account creditable control strategy reductions, implements applicable provisions of the Clean Air Act, and demonstrates rate of progress, attainment or maintenance.

The work of SIP development and revision in Colorado is guided by the interagency consultation process as described in Colorado Air Quality Regulation (AQR) No. 10, Criteria for Conformity Analysis.

### **SIP Development – Roles and Responsibilities**

AQR No. 10 sets out the minimum requirements for interagency involvement consultation (Federal, State, regional and local) and resolution of conflict related to development of the SIP and transportation conformity. In responding to CAA requirements for SIP development, the local lead air quality planning agency, in close consultation and support from the Air Pollution Control

Division, takes the lead in developing solutions for pollution problems that require special understanding of local industries, geography, housing, and travel patterns, as well as other factors. The roles and responsibilities of each of the agencies involved in the SIP development process are as follows:

- **Regional Air Quality Council (RAQC)** - Section 174 of the Clean Air Act requires that SIPs be prepared by an organization certified by the Governor. The agency so designated by the Governor of Colorado as the lead air quality planning agency for the 7-county Denver Metropolitan Area is the RAQC. In this capacity, the mission of the RAQC is to evaluate 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 responsibility is to develop pollutant-specific SIPs for compliance with federal air quality standards, prepare emissions budgets and submit the proposed SIP to the AQCC for adoption.

The RAQC works with its agency partners and a wide range of stakeholders to develop proposed SIPs. The RAQC works with the Air Pollution Control Division to develop the technical basis the plan, including emission inventories and air quality modeling, and takes the lead in identifying and analyzing potential control measures. In consultation with DRCOG and others, the RAQC develops proposed emission budgets for purposes of transportation conformity.

The end result is the RAQC, in conjunction with APCD, prepares a proposed SIP revision, along with implementing regulations, for formal proposal to the Air Quality Control Commission.

- **Air Pollution Control Division (APCD)** – The APCD of the Colorado Department of Health and Environment (CDPHE) is responsible for:
  - Preparing emissions inventories for all source categories;
  - Conducting air quality modeling;
  - Performing attainment demonstrations;
  - Assisting the RAQC with analyzing potential control measures;
  - Providing technical and policy input on emissions budgets; and
- **Denver Regional Council of Governments (DRCOG)** – As the Metropolitan Planning Organization (MPO), DRCOG is responsible for:
  - Developing transportation and socioeconomic data and planning assumptions and provide such data and planning assumptions to the RAQC and APCD for use in air quality analyses;
  - Performing transportation modeling and documentation of transportation control measures needed for SIP development and conformity assessments;
  - Providing technical and policy input on emissions budgets; and
  - Performing conformity determinations for transportation plans and programs and ensuring their consistency with air quality plans.
- **Colorado Department of Transportation (CDOT)** is responsible for:
  - Providing technical input on proposed revisions to motor vehicle emissions factors;
  - Providing technical support and input for the SIP; and
  - Commenting on transportation control measures and other aspects of the SIP that may affect the operation, construction or maintenance of the State's transportation system.

## **Air Quality Control Commission Adoption**

The Air Quality Control Commission is the state regulatory body with responsibility for adopting SIPs for submittal to EPA and other air quality regulations consistent with state statute. Once the RAQC submits a SIP revision to the AQCC, a formal public rulemaking process is implemented to consider and ultimately adopt the SIP revision and implementing regulations. This 90-day process includes prehearing statements and conferences with interested parties. The process also provides the public an opportunity to review and comment on a SIP revision before it is adopted. The Commission may adopt the SIP revision as proposed or make any changes it deems appropriate.

## **Legislative Review**

Before a SIP can be submitted to EPA for approval, it is subject to review by the General Assembly. Each January the AQCC submits a summary report to the Legislative Council indicating the additions or changes to the state implementation plans that were adopted during the prior year. If Legislative Council or a member of the General Assembly does not request review of a SIP element by February 15, the SIP is deemed approved and the Governor may submit the plan to EPA for approval. However, if Legislative Council or any member of the General Assembly requests a review of a SIP element, the General Assembly may address elements of the SIP through introduction of a bill through the legislative process. Upon completion of the legislative process, the Governor may submit the plan and any revisions to EPA for approval.

## **EPA Approval**

Under timelines spelled out in the Clean Air Act, EPA must determine completeness of the SIP submission within six months after submittal by the State. EPA has an additional 12 months to grant approval, disapproval, or partial or limited approval. Once approved by EPA the SIP revision, including control measures and regulations, become federally enforceable by EPA to ensure that the reductions deemed necessary in the planning process will be achieved.

## **Disapproved SIPs**

In cases where the EPA has found deficiencies in the SIP submittal, the state has 18 months after the finding of disapproval or inadequacy to correct the deficiencies. In addition, Section 179 of the CAA contains penalties, referred to as "sanctions," which EPA can impose in areas not satisfying the CAA SIP requirements.

Within two years after finding the state has not submitted a plan that meets the minimum criteria under Section 110 or disapproves the SIP submission in whole or part, EPA must issue and enforce a Federal Implementation Plan (FIP) including federal regulations and programs to ensure attainment and maintenance of the NAAQS, unless the State has corrected the deficiency and submitted a revised plan to EPA.

## **Request for Redesignation**

Once a nonattainment area has attained the standard and maintained attainment for a proscribed length of time, the state may request redesignation to attainment by satisfying the five requirements (Section 107 of CAA) below:

- Three years of violation free data
- Fully approved 110 SIP (Infrastructure SIP elements)
- Met Part D SIP Requirements applicable at the time of redesignation
- Improvements in air quality due to enforceable reductions (versus weather or economic downturn)
- Approved maintenance plan according to CAA Section 175a demonstrating maintenance for 10 years following redesignation, including contingency measures

The RAQC, in conjunction with the APCD, has pursued and received redesignated status from nonattainment to attainment/maintenance for Carbon Monoxide, PM10 and 1-hour Ozone for the Denver Metro area.

**The following sections summarize the SIP Elements that have been developed for the Denver Nonattainment Area.**

# Carbon Monoxide Colorado State Implementation Plan

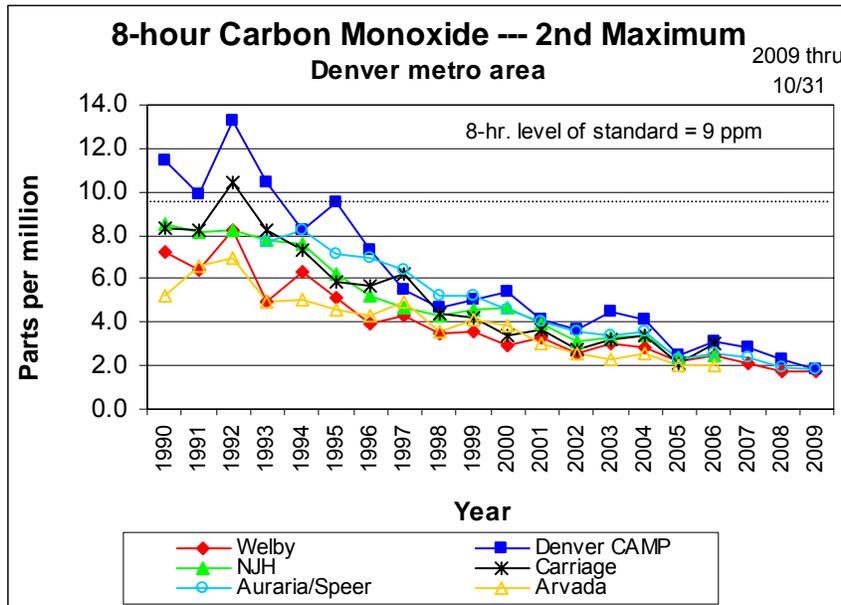
Copies of the State Implementation Plans (SIPs) can be found on [www.RAQc.org](http://www.RAQc.org), under Archives tab, then State Implementation Plans. Information can be sorted by pollutant.

## Carbon Monoxide Standards

The Environmental Protection Agency (EPA) has two standards for carbon monoxide (CO), a rolling 8-hour average concentration of 9.0 parts per million (ppm), and a 1-hour concentration of 35 parts per million. The National Ambient Air Quality Standard (NAAQS) for carbon monoxide allows for no more than one exceedance of either standard in each calendar year. A violation occurs when two or more exceedances of the standard are recorded at the same monitoring site during a calendar year.

The Denver metropolitan area was originally designated as nonattainment for carbon monoxide under provisions of the 1977 Clean Air Act (CAA) Amendments. This designation was reaffirmed by the 1990 CAA Amendments when the Denver area was classified as a moderate carbon monoxide nonattainment area for a violation of the 8-hour standard.

**Chart A: Carbon Monoxide Trends**



# Carbon Monoxide State Implementation Plans

## **1994 Carbon Monoxide Attainment SIP**

*Adopted by AQCC: June 1994*

*Approved by EPA: March 1997 (62 FR10690)*

The Regional Air Quality Council (RAQC), in conjunction with the Air Pollution Control Division (APCD), developed this plan to demonstrate attainment with the carbon monoxide standard by December 31, 2000. The plan also requested that the area be reclassified to a serious area because attainment could not be demonstrated by the moderate area deadline of December 31, 1995 with reasonable control measures.

### **Attainment Demonstration**

The CAA Amendments of 1990 require a SIP to demonstrate attainment using EPA approved air quality models. The preferred EPA models used in this attainment demonstration were the Urban Airshed Model (UAM) for area wide modeling and the CAL3QHC hot spot model.

### **SIP Control Measures**

Specific control measures developed for the December 31, 2000 attainment demonstration and included in State Air Quality Regulations (AQR) are as follows:

- 3.1% oxygenated gasoline (AQR No 13)
- Revised emission standards (cut points) for pre-82 vehicles (AQR No. 11)
- Enhanced Inspection/Maintenance program as required by CAA, with revised emissions standards (AQR No. 11)

Additional measures taken into account in projecting future emissions of carbon monoxide include:

- Federal Tailpipe Standards and Fleet turnover (not a SIP measure)
- Transportation System Improvements in the 1995 TIP planned to be completed by 1997 (not SIP measures)
- Wood Burning Control Measures (AQR No. 4) from PM10 SIP including:
  - Episodic high pollution days when wood burning is restricted to certified clean-burning devices
  - Great Stove and Fireplace Change out program that promoted conversion to certified clean-burning devices or natural gas
  - Restrictions on conventional wood burning fireplaces in new construction
  - Prohibition on the resale of uncertified wood burning devices
- Stationary Source applicable control rules/regulations including Common Provision Regulation, and AQR Nos. 1, 3 & 6
- Federally mandated Clean Fuel Fleet Program implemented by AQR No. 17 (no SIP credit taken for this program)

### **Motor Vehicle Emissions Budgets**

EPA's conformity rule requires the Denver area to establish motor-vehicle emissions budgets for both the milestone year (1995) and the attainment year (2000) for the nonattainment area. The emissions budget is the portion of the emissions inventory attributed to motor vehicles. In the case where the total emissions from all sources is less than required to demonstrate the milestone or attainment, the SIP may explicitly quantify the "safety margin" and include some or all of it in the motor vehicle emissions budget.

The SIP established a motor vehicle emissions budget for the 1995 milestone year based on the 2.7% oxygenated gasoline program, the first year of the enhanced I/M program and the base transportation system network. This budget remained in effect through 1999.

The SIP established a motor vehicle emissions budget for the 2000 attainment year based on the 3.1% oxygenated gasoline program, the Enhanced I/M program (including revised cut points for pre-82 vehicles) and a portion of the projected emissions savings from the contingency plan transportation control measures (TCMs). Some available "safety margin" was left unused as a precaution against uncertainty in estimating reductions.

### **Contingency Provisions**

In a serious nonattainment area, it is required that contingency measures take effect immediately upon failure to attain the CO standard by December 31, 2000 and/or if estimated actual Vehicle Miles Traveled (VMT) exceeds projected VMT. The contingency measures must offset one year's growth of VMT and must be implemented with minimal further action by the State.

The contingency measures in the proposed implementation plan were as follows:

- Maximize utilization of transit in Central Denver area with the EcoPass or equivalent travel reduction measure for downtown Denver employer programs and Auraria annual student transit pass program
- Convert Broadway and Lincoln Avenue bus-only lanes to high occupancy vehicle (HOV) lanes during peak periods
- Development of four (4) Transportation Management Associations (TMAs) by 1996
- Implement DRCOG's Traffic Signalization Improvement Program from the FY 1993-95 and FY 1995-2000 Transportation Improvement Programs (TIP) funded by Congestion Mitigation/Air Quality (CMAQ) dollars

Though included in the CO SIP as contingency measure, these measures were actually implemented early to give a greater margin of safety in meeting the CO standard.

### **2000 Carbon Monoxide Maintenance Plan and Redesignation Request**

*Adopted by AQCC: January 2000*

*Approved by EPA: December 14, 2001 (66 FR 64751)*

Because the region had not violated the CO NAAQS since 1995 (see Chart A), the region was eligible for redesignation to attainment status. The RAQC, in conjunction with the APCD, developed this SIP Revision to request redesignation to attainment of the CO NAAQS and to demonstrate maintenance of the standard for 10 years after redesignation.

### **Maintenance Demonstration**

Following EPA guidance and policy which requires the same level of modeling for maintenance plans as that which was performed for the attainment demonstration this maintenance demonstration was made through the use of area-wide dispersion modeling using UAM, along with selected intersection hot-spot modeling using CAL3QHC, for the years 2006 and 2013.

### **SIP Control Measures**

Specific control measures developed for the maintenance demonstration were as follows:

- AQR No. 11 – covering the Automobile Inspection and Readjustment (A.I.R.) Program – as amended on January 10, 2000 to implement a remote sensing, clean screen program that reduced the number of vehicles subjected to routine inspection
- AQR No. 13 – covering the oxygenated gasoline program – as amended on January 10, 2000 to gradually reduce the minimum oxygen content requirement to 1.5% in 2005 and maintain that level through 2011 and raise the minimum oxygen content requirement to 1.7% in 2012-13

Additional measures taken into account in projecting future emissions of CO included:

- Federal Tailpipe Standards and Fleet turnover including those for small engines and non-road mobile sources (not a SIP measure)

- Wood burning Control Measures (AQR No. 4) included in the 1994 Attainment SIP
- Stationary Source applicable control rules/regulations including Common Provision Regulation, and AQR Nos. 1, 3 & 6

Specific programs and requirements that were removed from the State Implementation Plan upon redesignation and approval of this Maintenance Plan by EPA were:

- the contingency measures included in the 1994 Attainment SIP
- the requirement for VMT tracking
- the requirement for periodic emission inventories
- The Clean Fuels Fleet Program was not necessary to maintain the carbon monoxide standard and no credit for the program was taken in this maintenance demonstration. The State replaced the Clean Fuels Fleet Program with a substitute program in a later, separate submittal.

### **Motor Vehicle Emissions Budget**

Utilizing EPA MOBILE5 the RAQC and APCD analyzed motor vehicle emissions for 2001, 2006 and 2013 in this revision. This Maintenance Plan established emissions budgets for the years 2001, and 2003 and beyond.

### **Contingency Provisions**

Contingency provisions were included in the Maintenance Plan to assure that the State would promptly correct any violation of the CO NAAQS standard which occurred after redesignation to attainment. The provisions included a list of measures removed from the SIP, which by law must remain as potential contingency measures, as well as additional potential control measures. The Maintenance Plan included a tracking and triggering mechanism (monitoring/violation) and a process for review of the potential measures. The necessary contingency measures were required to be adopted and implemented within one year after a violation occurs.

### **2003 Carbon Monoxide Maintenance Plan Revision**

*Adopted by AQCC: June 2003*

*Approved by EPA: September 2004 (69 FR 55752 & 69 FR 55790)*

In 2003, the RAQC, in conjunction with the APCD, developed a Carbon Monoxide Maintenance Plan Revision to revise the motor vehicle emissions inventories and budgets based on EPA's new mobile source emissions model, MOBILE6. EPA guidance allowed areas to revise their motor vehicle emissions inventories and budgets using MOBILE6 without revising the entire SIP or completing additional modeling if:

- the SIP continued to demonstrate attainment or maintenance when the MOBILE5-based motor vehicle emission inventories are replaced with MOBILE 6 base year and attainment/maintenance year inventories; and,
- the State can document that the growth and control strategy assumptions for non-motor vehicle sources continued to be valid and any minor updates did not change the overall conclusion of the SIP.

This Maintenance Plan Revision followed the same format as the previously approved Maintenance Plan. Most sections of the document remained unchanged or only slightly changed. Only sections discussing emission inventories for current and future years, maintenance demonstration, and mobile source emissions budgets contain substantive revisions based on the introduction of MOBILE6 emission inventories.

### **Maintenance Demonstration**

The Maintenance Plan Revision addressed the guidance document's outlined procedures as follows:

- The Maintenance Plan Revision merely replaced the existing MOBILE5 maintenance plan motor vehicle emissions inventories with MOBILE6 base (attainment) and maintenance year inventories, while maintaining the strategies reflected in the previously approved maintenance plan. The resulting maintenance year and interim year inventories continued to be lower than the base (attainment) year inventory, thereby demonstrating continued maintenance of the standard as required by the guidance.
- The non-motor vehicle source emissions estimates remain unchanged in this revision and the growth and control assumptions for these sources remained valid.

### **Motor Vehicle Emissions Budget**

This Maintenance Plan established a new motor vehicle emissions budget for the period from the last year of the maintenance plan (2013) and beyond for the boundaries of the attainment/maintenance area based on the MOBILE6 modeling.

### **2005 Carbon Monoxide Maintenance Plan Revision**

*Adopted by AQCC: December 2005*

*Approved by EPA: August 17, 2007 (72 Fr 46148)*

In 2005, the RAQC, in conjunction with the APCD, developed a Carbon Monoxide Maintenance Plan Revision to provide for maintenance of the CO National Ambient Air Quality Standard (NAAQS) for an additional 10-year period following the first 10-year period after redesignation to attainment as required by the Clean Air Act (CAA) 175A(b) and the EPA. The maintenance year for this revision is 2021 (20 years after redesignation).

### **Maintenance Demonstration**

This revision to the CO Maintenance Plan relied on area-wide gridded emissions inventory comparisons and selected intersection hot-spot (CAL3QHC) analysis to demonstrate maintenance of the standard through the 2021 maintenance year.

### **SIP Control Measures**

In developing this CO Maintenance Plan Revision, the RAQC and the APCD conducted a comprehensive reevaluation of mobile source control programs with the MOBILE6.2 model and the latest transportation data sets from Denver Regional Council of Governments' (DRCOG) 2030 Regional Transportation Plan (RTP).

The Inspection/Maintenance (AQR No.11) and Oxygenated Fuels (AQR No.13) programs were removed from Denver metro area CO SIP effective December 31, 2007. With the removal of these regulations from the CO SIP, the Denver metropolitan area continued to rely on the following control programs contained in the CO Maintenance Plan approved on September 16, 2004 to demonstrate maintenance of the carbon monoxide standards through 2021:

- Federal Tailpipe Standards and Fleet turnover including those for small engines and non-road mobile sources (not a SIP measure)
- Wood burning Control Measures (AQR No. 4)
- Stationary Source applicable control rules/regulations including Common Provision Regulation, and AQR Nos.1, 3 & 6

While these programs were removed from the CO SIP, the Inspection/Maintenance (AQR No. 11) program remained part of the Colorado SIP as a control measure in the 8-hour Ozone SIP, and the Oxygenated Fuels (AQR No. 13) program remained as a state-only program.

**Motor Vehicle Emission Budgets**

This Maintenance Plan established a revised motor vehicle emissions budget for the period 2013 through 2020 and established a motor vehicle emissions budget from the last year of the Maintenance Plan (2021) and beyond for the boundaries of the attainment/maintenance area.

**Subsequent Maintenance Plan Revisions**

No additional revisions of the CO Maintenance Plan are required by the CAA as long as the region continues to maintain the CO standard. If future changes in mobile source models or other unforeseen considerations raise potential issues with maintaining the CO standard, the State and the RAQC will address the need to revise the maintenance plan at that time.

# Particulate Matter Colorado State Implementation Plan

Copies of the State Implementation Plans (SIPs) can be found on [www.RAQC.org](http://www.RAQC.org), under Archives tab, then State Implementation Plans. Information can be sorted by pollutant.

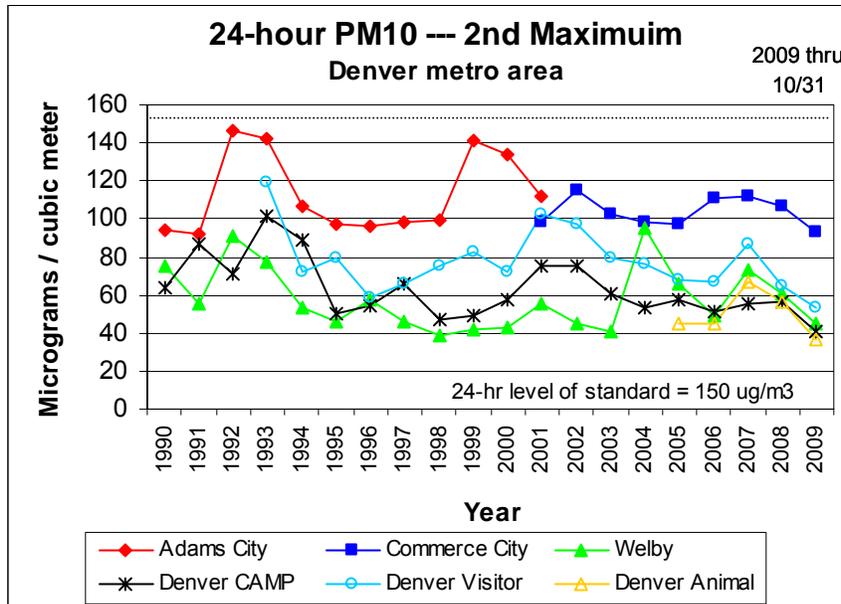
## Particulate Matter Standards

### PM10 Standard

In 1971, the Environmental Protection Agency (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 PM10). The current PM10 NAAQS allow for a 24-hour average of 150 ug/m<sup>3</sup>. Essentially, the 24-hour PM10 NAAQS may not be exceeded more than three times over any three-year period.

In 1987, based on relatively high TSP levels, the Denver area was designated as a “Group I” non-attainment area for PM10. The Denver area was designated a “moderate” non-attainment area in 1990 pursuant to the Clean Air Act Amendment (CAAA) of 1990 for the 24-hour PM10 NAAQS. The area has never violated the annual PM10 NAAQS, which was revoked by EPA on September 21, 2006.

**Chart B: PM10 Trends**

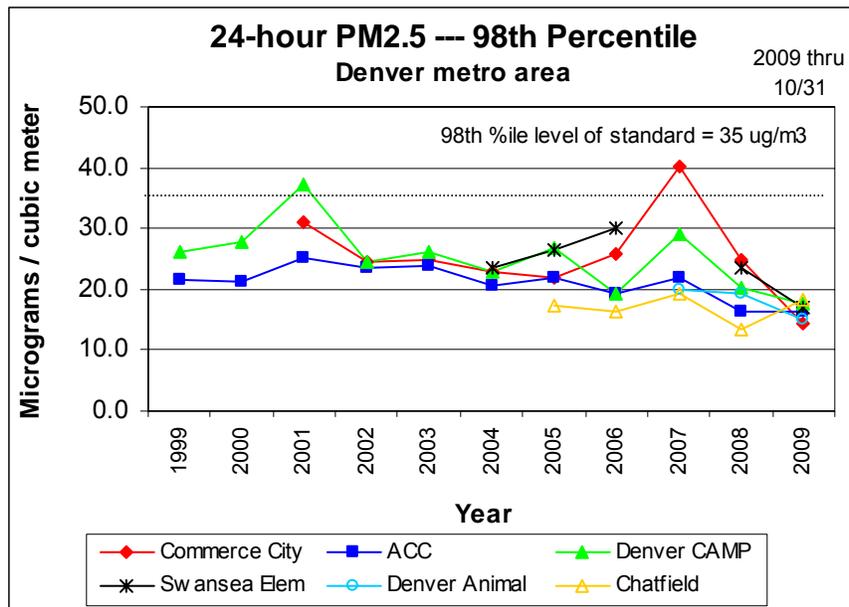


## **PM2.5 Standard**

In 1997, the EPA established new NAAQS for fine particulates with an aerodynamic diameter of less than or equal to 2.5 microns (commonly referred to as PM2.5). The 24-Hour PM2.5 standard was set at 65 ug/m3, while the annual average standard was set at 15 ug/m3.

In 2006, the EPA lowered the 24 Hour PM2.5 NAAQS from 65 ug/m3 to 35 ug/m3, retaining the form of the standard as the 3 year average of the 98th percentile reading. At the same time, EPA retained the annual average PM2.5 NAAQS at 15 ug/m3 and the form of that standard at the 3 year average of the annual average. The Denver metropolitan area has never violated either of the two standards.

**Chart C: PM2.5 Trends**



## **PM10 Standard State Implementation Plans**

### **1993 PM10 Attainment SIP**

*Adopted by AQCC: May 1993*

*Approved by EPA: July 1994 (59 FR 37698) – limited approval;*

*April 1997 (62 FR 18716) – final approval*

In response to requirements in the CAAA of 1990, the Regional Air Quality Council (RAQC), in conjunction with the Air Pollution Control Division (APCD), developed a PM10 Attainment Plan which demonstrated attainment by 1995 and maintenance through 1998.

### **Attainment Demonstration**

The CAA and EPA guidance required the SIP to demonstrate attainment of the PM10 standard through air quality dispersion modeling. Several dispersion models and modeling techniques were approved by the EPA and employed in this SIP analysis as follows:

- Regional Air Model (RAM) – Primary PM10 emissions from area sources including non-road and on-road mobile sources were evaluated using the RAM, a computer based model

formulated around the assumption of dispersion. This tool was useful in an urban setting with flat terrain.

- Industrial Source Complex (ISC) model – Primary PM10 emissions from major stationary sources were evaluated using the short term version of the ISC model, also a steady-state Gaussian plume model useful in assessing concentrations of a variety of sources associated with industrial source complexes.
- Chemical Mass Balance (CMB) receptor model and linear “roll forward modeling – Approved dispersion modeling to analyze the impact of the PM10 precursor emissions formation of secondary particles did not exist at the time. In this SIP, CMB receptor modeling was used to determine total particulate contribution, which was apportioned based on the inventory of nitrogen dioxide (NOx) and sulfur dioxide (SOx) emissions. Simple linear “roll forward” modeling based on changes in inventory was used to predict future secondary concentrations.

### **SIP Control Measures**

Specific control measures developed for this plan are as follows:

- Street Sanding (Colorado Air Quality Control Regulation (AQR) No. 16) providing PM10 emissions reductions of approximately 20% region-wide and 35% within the City and County of Denver and Intertate-25 corridor;
- Wood burning (Colorado AQR No. 4 and local ordinances) providing PM10 emissions reductions by more than 50%; and
- Industrial source (Colorado AQR No. 1) emissions limits on PM10 precursors (NOx and SO2) providing emissions reductions of approximately 20%.

Additional measures taken into account for projecting future emissions of PM10 and PM10 precursors include:

- Mobile source emissions reduction programs mandated by the CAAA of 1990 that address new tailpipe standards for light-duty cars and trucks, urban bus standards, diesel fuel standards and standards for other heavy duty vehicles;
- Inspection/Maintenance for both light and heavy-duty diesel vehicles (Colorado AQR No. 12);
- Oxygenated fuels program (Colorado AQR No. 13), and
- All existing permits and applicable provisions of AQRs No. 1 & 3 enforced for both minor and major industrial sources of PM10, NOx and SO2.

### **Contingency Measures**

Contingency measures were not required to be submitted to EPA as a SIP revision until November 15, 1993, therefore this SIP revision did not include contingency measures.

### **Limited Approval**

EPA granted only limited approval of this PM10 Attainment SIP. The limited approval approved the emissions limitations and the control measures presented in the SIP as part of the federally-enforceable implementation plan, but EPA included a request for additional controls to address an underestimation of winter time secondary particulate concentrations and revised permit limitations at two stationary sources.

### **1993 PM10 Attainment SIP Revision – Contingency Plan Element**

*Adopted by AQCC: November 1993*

*Approved by EPA: April 1997 (62 FR 18716)*

### **Contingency Plan**

This Contingency Plan included a street sweeping program that covered all the freeways, ramps, major regional arterials, principle arterials, and minor arterials in the central Denver area. The roads would be swept using broom sweepers or a more effective sweeping technology within four

days after each sanding event. The plan also allowed the option of achieving an equivalent emission reduction by reducing the amount and/or changing the type of sand and or deicer applied. The emissions reduction could be achieved by a combination of sanding reductions and increased sweeping. If an optional equivalent strategy were to be implemented, the APCD would have provided an emissions reduction analysis to verify that the required reduction would be achieved.

### **1994 PM10 Attainment SIP Revision**

*Adopted by AQCC: October 1994; December 1994; and March 1995*

*Approved by EPA: April 1997 (62 FR 18716)*

#### **SIP Control Measures**

As a result of the EPA's requirement to adopt additional control measures to demonstrate attainment by December 31, 1994, the State adopted the Contingency Plan as an attainment control measure and included it in the attainment demonstration in this 1994 PM10 Attainment SIP Revision.

The 1993 SIP was revised using the Contingency Plan measures to provide the required additional controls, which included revisions to Colorado AQR No. 16 concerning street sanding/sweeping and provided an additional 15% PM10 emissions reduction increase (from an approximate 35% to 50% emissions reduction) within the City and County of Denver and Intertate-25 corridor. Use of the adopted Contingency Plan control measures for the attainment demonstration then necessitated analysis and adoption of a new contingency plan (see below) to comply with the CAA.

The AQCC adopted revised permit limitations at two stationary sources (a glass manufacturing plant and a brewery owned by Coors Brewing Company) on December 15, 1994 noted as required above in EPA's limited approval of the May 1993 SIP.

#### **Motor Vehicle Emissions Budgets**

The AQCC established Motor Vehicle Emission Budgets (MVEB) for both primary PM-10 and NOx as a PM-10 precursor. The Commission established a PM-10 budget of 60 tons per day, which was to expire on January 1, 1998 and revert to 44 tons per day for future conformity determinations.

After legislative review of the adopted plan, the General Assembly amended the MVEB through SB 95-110. The General Assembly ruled the 44 tons per day reversion shall not be part of the state implementation plan and shall apply only as a regulation adopted exclusively under state authority. The 60 tons per day budget shall be included in the state implementation plan and apply for purposes of federal transportation conformity, unless the budget is modified by the Commission through future rulemaking.

#### **Contingency Plan**

The AQCC adopted a new Contingency Plan on March 16, 1995. The potential contingency measures that were considered included a change in sweeper technology in the Central Business District (CBD) of Denver, increased reduction in applied sand in the CBD, additional reduction in applied sand region-wide, transportation control measures identified in the CO SIP Contingency Plan and a potential fuel switch from coal to gas at area power plants.

#### **Approval of Comprehensive SIP Revisions**

EPA addressed these three SIP elements (required additional controls and MVEBs, revised emissions limits, and a new contingency plan) in a comprehensive manner and approved them in one action in spring 1997.

## **PM<sub>10</sub> Redesignation Request and Maintenance Plan for the Denver Metropolitan Area**

*Adopted by AQCC: April 2001*

*Approved by EPA: September 2002 (67 FR 58335)*

The Denver metropolitan area last violated the 24-hour PM<sub>10</sub> standard in 1993 and has maintained attainment ever since (see Chart B). As a result the Denver nonattainment area was eligible to request redesignation to attainment status for the 24-hour PM<sub>10</sub> NAAQS which required development of a 10 year maintenance plan beyond redesignation. In 2000, the RAQC, in conjunction with the APCD, developed a Maintenance Plan that demonstrated continued maintenance of the standard through 2015.

### **Maintenance Demonstration**

Following EPA guidance and policy which requires the same level of modeling for maintenance plans as that which was performed for the attainment demonstration this maintenance demonstration is made through the use of RAM, ISC and CMB receptor modeling for the 2015 maintenance year.

### **SIP Control Measures**

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

- Federal fuels and tailpipe standards and regulations including Tier II/gasoline sulfur standards of February 2000. While credit is taken for these federal requirements, they are not part of the Colorado SIP.
- Woodburning – AQR No.4 and local ordinances unchanged
- Street Sanding – AQR No. 16 revised April 19, 2001 to require:
  - 30% emissions reduction region-wide (20% in the foothills),
  - 50% emissions reduction in the central Denver area (bounded by 38th Ave., Federal Blvd., Louisiana Ave., and Downing St.),
  - 54% reduction on I-25 between University and 6th Avenue; and
  - 72% emission reduction in the central business district (bounded by Colfax Avenue, Broadway, 20th Street, Wynkoop and Speer Boulevard)
- Automobile Inspection and Readjustment (A.I.R.) Program – AQR No. 11 as amended on January 10, 2000
- Stationary Source emissions limitations revised in AQR No. 1 including SO<sub>2</sub> limits at Cherokee #1 & #4 and Arapaho #4, retirement of Arapaho #1 & #2 and NO<sub>x</sub> limits on Cherokee #1

As part of this Maintenance Plan the State of Colorado requested removal of the following measures from the SIP:

- Diesel Inspection/Maintenance Program – AQR No. 12
- Oxygenated Gasoline Program – AQR No. 13
- Individual Stationary Source Permits – This Maintenance Plan removed permits from the SIP previously included by reference for the following companies: Public Service Company Cherokee station, Purina Mills, Electron Corp., Trigen-Colorado Energy Corp., Rocky Mountain Bottle Co., and Conoco refinery. The State of Colorado determined they did not need to be incorporated in the SIP since no credit for permit limits was taken in the plan's maintenance demonstration. Permit limits are contained in underlying regulations or these sources were modeled at their maximum potential to emit.

### **Motor Vehicle Emissions Budgets**

This Maintenance Plan established PM<sub>10</sub> and NO<sub>x</sub> emissions budgets for the maintenance year, 2015, and beyond. Since EPA's new emissions model, MOBILE6, was not available for use in this maintenance plan credit for the Tier II/gasoline sulfur standards is based on inventory

adjustment factors to MOBILE5 supplied by EPA. The State committed to revise the maintenance plan at an appropriate interval after MOBILE6 and MOBILE6 guidance became available.

### **Contingency Provisions**

Contingency provisions were included in the Maintenance Plan to assure that the State will promptly correct any violation of the PM-10 NAAQS standard which occurs after redesignation to attainment. The provisions included a list of potential control measures (including measures previously removed from the SIP) to be considered in an expeditious manner, a triggering mechanism (violation) and a process for review of the potential measures. The necessary contingency measures are required to be adopted and implemented within one year after a violation occurs.

### **2005 PM10 Maintenance Plan Revision**

*Adopted by AQCC: December 2005*

*Approved by EPA: November 2007 (72 FR 62615)*

The CAA Section 175A(b) requires development of a second maintenance plan that demonstrates continued attainment for an additional 10 year period. In 2005 the RAQC, in conjunction with the APCD, developed a revised Maintenance Plan that demonstrated maintenance of the PM10 standard through 2022 (20 years after redesignation in 2002).

### **Maintenance Demonstration**

Following EPA guidance and policy which requires the same level of modeling for maintenance plans as that which was performed for the attainment demonstration this maintenance demonstration was made through the use of RAM, ISC and CMB receptor modeling for the interim (2015) year and 2022 maintenance year.

### **SIP Control Measures**

In developing this Maintenance Plan Revision the RAQC and the APCD conducted a comprehensive reevaluation of mobile source control programs with MOBILE6.2 and the latest transportation data sets from the Denver Regional Council of Governments' (DRCOG) 2030 Regional Transportation Plan.

This revision removed the AQR No. 11 (Automobile Inspection and Readjustment (A.I.R.) Program) from the Denver metro area PM10 SIP. However, all other control strategies included in the previously approved maintenance plan remain unchanged in this revision.

### **Motor Vehicle Emissions Budgets**

This 2006 maintenance plan replaced current mobile source tailpipe emissions with mobile source tailpipe emissions using MOBILE6.2 to fulfill the commitment made in the previously approved 2001 maintenance plan. A revised interim MVEB for PM10 & NOx was established for 2015-2021 and a maintenance year MVEB for PM10 & NOx was established for 2022 and beyond.

Based on the technical analysis, an emission budget trading protocol was established in this maintenance plan for trading between emissions budgets for primary PM10 and the PM10 precursor, NOx. Trading allowed for the establishment of many sets of pairs of PM10 and NOx emissions budgets in tons per day (tpd), which are equivalent to the same total PM10 concentration. Emissions trading (PM10 for NOx or NOx for PM10) allowed the region initially to establish a reasonable, specific set of PM10 and NOx emissions budgets while still allowing for adjustments to the budget as future circumstances change. Specific trading curves for the 2015-2021 budget and the 2022 and beyond budget were included in this plan.

A procedure was provided in this maintenance plan for supplementing the established budgets with emissions budgets using the trading protocol, including the normal interagency consultation and review process described in AQR No. 10 (Conformity), which includes regional, state and federal air quality and transportation agencies.

**Contingency Provisions**

The contingency provisions remain unchanged from those included in the previously approved Maintenance Plan.

**Subsequent Maintenance Plan Revisions**

No additional revisions of the PM10 Maintenance Plan are required by the CAA as long as the region continues to maintain the PM10 standard. If future changes in mobile source models or other unforeseen considerations raise potential issues with maintaining the PM10 standard, the State and the RAQC will address the need to revise the maintenance plan at that time.

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# Ozone

## Colorado State Implementation Plan

Copies of the State Implementation Plans (SIPs) can be found on [www.RAQC.org](http://www.RAQC.org), under Archives tab, then State Implementation Plans. Information can be sorted by pollutant.

### Ozone Standards

#### 1-Hour Ozone Standard

A revised ozone standard (0.12 parts per million (ppm) over a one hour period) was promulgated by the Environmental Protection Agency (EPA) in 1978. A violation occurs when an area exceeds the ozone standard more than three times in three years at a given monitor. In March 1978 the EPA designated the Denver Metro Area (DMA) as nonattainment for the Ozone NAAQS.

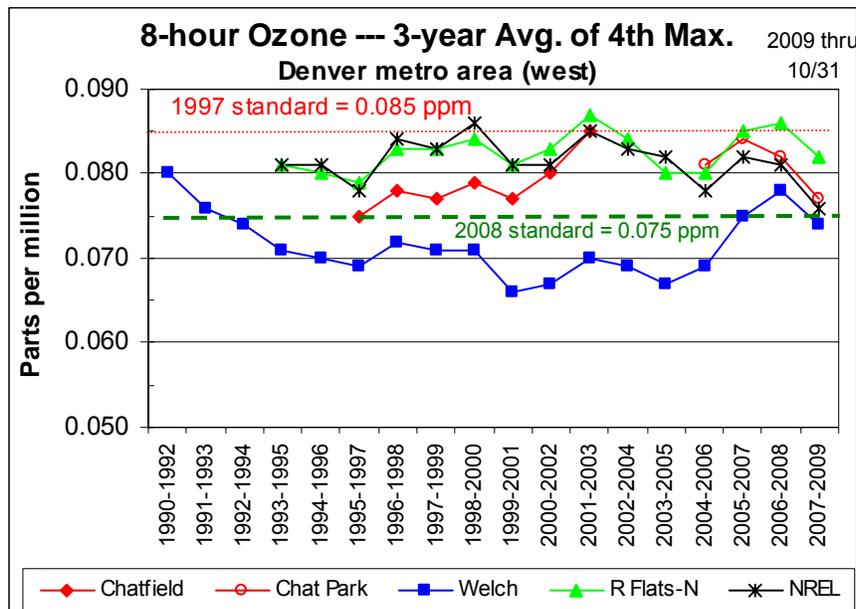
The EPA revoked the 1-hour standard for the DMA in April 2009 (73 FR 17897). The revocation was effective November 20, 2008, which is one year after the region's deferred nonattainment status for the 8-hour ozone standard was not extended by the EPA.

#### 8-Hour Ozone Standard

In 1997 EPA established a new, more stringent standard for ozone. The new 8-hour standard is set at a level of 0.08 ppm (or 80 parts per billion) averaged over an eight-hour period. To take into account extreme and variable meteorological conditions that can influence ozone formation, a violation of the standard occurs when the three-year average of the fourth maximum values at a monitor exceeds the federal standard.

Due to rounding of monitoring values, a violation occurs when the three-year average of the fourth maximum values is equal to or greater than 0.085 ppm.

**Chart D: Ozone Trends**



# 1-Hour Ozone Standard State Implementation Plans

## **1982 Ozone Attainment SIP**

*Adopted by AQCC: June 1982*

*Adopted by EPA: December 1983 (48 FR 55284)*

In 1979, Denver Regional Council of Governor (DRCOG), the lead air quality planning agency for the Denver metro area at that time, in conjunction with the State of Colorado, began to develop a list of measures to include in the 1-hour Ozone Attainment Element of the state SIP.

### **SIP Control Measures**

The measures developed by DRCOG and modified by the Air Quality Control Commission (AQCC) in 1982 included the following:

- Transit Improvements – doubling weekday ridership by 1984
- Rideshare programs – create 225 van pools by 1987
- Variable Work Hours Program – create compressed work week program for federal employees
- Regional Bicycle Plan – develop plan for commuter bicycle routes
- Federal Motor Vehicle Emissions Control Program – Federal Clean Air Act (CAA) emissions limits for new vehicles
- Inspection and Maintenance Program – Automobile Inspection and Readjustment (A.I.R.) Program – annual inspection of all 1968 and newer vehicles and readjustment of failing vehicles
- Santa Fe High Occupancy Vehicle Lanes – two lanes on Santa Fe between Bowles and Florida during peak morning and evening hours
- Stationary Source Controls – source are required to achieve “reasonably available control technology” (RACT). New sources in nonattainment areas are required to provide “offsets” for emissions and achieve “lowest achievable emissions rates” (LAER). These controls are achieved in Colorado under the AQCC Air Quality Regulation (AQR) Nos. 1, 3, 6, and 7 and Common Provisions.

## **1990 Ozone Attainment SIP Revision**

*Adopted by AQCC: September 1989; August 1990*

*Approved by EPA: May 1995 (60 FR 28055)*

In 1989 the State of Colorado submitted SIP revisions consisting of amendments to AQR No. 7 (Regulation to control emissions of volatile organic compounds) to conform to Federal requirements and improve the clarity and enforceability of the regulation. In its review of the September 27, 1989 State submittal, EPA identified several areas where the regulation still did not meet EPA requirements. In August 1990, the State submitted additional revisions to AQR No. 7 to address the deficiencies. These revisions to the SIP were approved by EPA in May 1995. Therefore, the Denver metropolitan area SIP Element National Ambient Air Quality Standards (NAAQS) was fully approved under Section 110(k) of the Act for the 1-hour ozone NAAQS.

## **1995 Ozone Maintenance Plan and Redesignation Request**

*Adopted by AQCC: December 1995*

*Approved by EPA: No official action taken*

The original designation of nonattainment for the 1-hour standard was reaffirmed by EPA on November 6, 1991 (56 FR 56694) pursuant to section 107(d) (1) of the Clean Air Act, as amended in 1990. Since the Denver Metro Nonattainment Area had not shown a violation of the 1-hour ozone standard during the three year period 1987-89, the Denver Metro area was

classified as a "transitional" ozone nonattainment area under section 185A of the amended Act and could move forward with developing a maintenance plan and a redesignation request.

In 1993, the APCD expanded its ozone monitoring network based modeling to better characterize maximum concentrations. By the end of 1995, the region was able to verify attainment of the 1-hour ozone standard based on the monitored data collected during the 1993-95 period.

In 1995, the RAQC, in conjunction with the APCD, developed a Maintenance Plan and Redesignation Request based on the 1993 verified attainment year that was adopted by AQCC and submitted to EPA in August 1996. In early 1997, during the EPA review period, a legal question was raised by EPA regarding statutory "sunset" provisions for the plan and the Inspection/Maintenance (I/M) program.

In the meantime, a new 8-hour standard was promulgated by EPA in July 1997, and the 1-hour standard was revoked for Denver in June 1998, rendering this original submittal moot at that time. However, due to legal issues with implementing the 8-hour standard, the EPA promulgated reinstatement of the 1-hour ozone standard in July 2000. EPA never acted officially on this SIP submittal, instead the State decided to submit a new Maintenance Plan. Ultimately, EPA revoked the 1-hour standard for the DMA in April 2009 (73 FR 17897) which was effective November 20, 2008.

## **2001 Ozone Maintenance Plan and Redesignation Request**

*Adopted by AQCC: January 2001*

*Adopted by EPA: September 2001 (66 FR 48708)*

Since the region still maintained compliance with the 1-hour standard, the region was still eligible for redesignation. In 2000, the RAQC, in conjunction with the APCD, revised the 1995 Maintenance Plan to address the original questions raised by the EPA, update the technical analysis and provide for a 10-year maintenance demonstration. The plan did not contain any new local measures, but relied on continued implementation of existing measures and on new federal programs to maintain the standard through 2013.

### **Maintenance Demonstration**

Following EPA guidance and policy, this maintenance demonstration was made by a simple comparison of the projected 2006 and 2013 emissions with the 1993 emissions, which is the year the Denver Metro area verified attainment of the 1-hour ozone standard.

### **SIP Control Measures**

Control measures contained in the plan include:

- Federal tailpipe standards and regulations, including those for small engines and nonroad mobile sources. Credit is taken for these federal requirements but they are not part of the Colorado SIP.
- AQR No. 11 -- covering the A.I.R. Program -- as amended on January 10, 2000, which added the Remote Sensing Clean Screen program.
- AQR No. 3, No. 6, No. 7, and Common Provisions -- covering industrial source control programs.
- National Reid Vapor Pressure (RVP) limit of 9.0 pounds per square inch (psi) for gasoline (10.0 psi for ethanol blends)
- Transportation control measures included in the 1982 approved ozone SIP which were already implemented.
  - Transit improvements
  - Rideshare programs
  - Variable work hours program for federal employees

- Regional bicycle plan
- Two lanes on Santa Fe Drive reserved for High Occupancy Vehicles

### **Motor Vehicle Emissions Budgets**

This Maintenance Plan applied the available mobile source "safety margin" in 2006 and 2013 to the motor vehicle emissions budget for ozone precursors (volatile organic compounds (VOC) and nitrogen oxides (NOx)), resulting in emission budgets established at 1993 attainment year mobile source emission levels for the year 2002 and beyond, which included the 2013 maintenance year.

### **Contingency Provisions**

Section 175A(d) of the CAA requires that the maintenance plan contain contingency provisions to assure that the State will promptly and expeditiously correct any violation of the 1-hour ozone NAAQS, which occurs after redesignation to attainment. The primary elements of this contingency plan are:

- a list of potential contingency measures, including measures removed from the SIP in the Maintenance Plan;
- continuous ozone monitoring by the Air Pollution Control Division (APCD) which provides the tracking plan for the Denver metropolitan area to determine when contingency measures are needed;
- a violation of the 1-hour ozone NAAQS as the federally-enforceable trigger for mandatory implementation of contingency measures; and
- a plan to recommend and implement specific contingency measures within one year of violation.

## **8-Hour Ozone Standard State Implementation Plans**

### **2004 Early Action Compact (EAC) Ozone Action Plan (OAP)**

*Adopted by AQCC: March 2004*

*Adopted by EPA: May 2005 (70 FR 28239)*

In December 2002 State and regional agencies with responsibilities for air quality and transportation planning in the Denver metro area entered into a Memorandum of Agreement (MOA) with EPA Region 8 consistent with terms specified in the EPA's Early Action Compact (EAC) Protocol. Signatories to the agreement were:

- Denver Regional Air Quality Council (RAQC)
- Colorado Air Quality Control Commission (AQCC)
- Colorado Department of Public Health and Environment (CDPHE)
- Denver Regional Council of Governments (DRCOG)
- Colorado Department of Transportation (CDOT)
- U.S. Environmental Protection Agency, Region 8
- In January and February 2004 the county commissioners of Weld, Larimer, Morgan and Elbert counties agreed to join the EAC and sign the MOA.

The EAC MOA allowed for a deferral of nonattainment designation based on the development of an Ozone Action Plan (OAP), a SIP revision, to achieve attainment sooner (12/31/07) than would have been required under the normal CAA nonattainment process (approximately by the summer of 2009).

In 2003, the RAQC in conjunction with the APCD, began developing the OAP to achieve attainment in the Denver Metro and Northern Front Range area with EPA's new 1997 8-hour ozone standard (0.08 ppm averaged over an 8-hour period) in an expeditious manner, but no

later than December 31, 2007. The OAP was developed following the protocols of the EPA voluntary EAC program.

### **Attainment/Maintenance Demonstration**

Photochemical dispersion modeling for base (2002) and future (2007) base and control conditions were required by the EPA to demonstrate attainment by summer 2007. The modeling was based on the "Draft Guidance on the Use of Models and Other Analyses in Attainment Demonstrations for the 8-hour Ozone NAAQS" (EPA-454/R-99-004, May 1999) and an established modeling protocol. The photochemical grid model, Comprehensive Air Quality Model with Extensions (CAMx) was utilized along with appropriate meteorological, emissions and chemistry modeling programs according to the guidance as facilitated by EPA Region 8.

### **SIP Control Measures**

Additional control measures above those assumed for the 2007 base case inventories incorporated into this SIP included:

- National Reid Vapor Pressure (RVP) limit of 8.1 pounds per square inch (psi) for gasoline (9.1 psi for ethanol blends)
- Amendments to AQR No. 7 (Regulation to Control Emissions of VOCs) requiring controls on:
  - oil & gas condensate tanks
  - reciprocating internal combustion engines
  - dehydrators
- Amendment the AQR No. 11 (A.I.R. Program) reducing the coverage of the Clean Screen program to 50% of the fleet in a 12 month period

The 2007 base case modeling inventories assumed control measures in place at that time as follows:

- Federal tailpipe standards and regulations, including those for small engines and non-road mobile sources. Credit is taken for these federal requirements, including EPA Tier II and low sulfur gasoline standards, but they are not part of the Colorado SIP.
- Air Quality Control Commission Regulations No. 3, No. 6, No. 7, and Common Provisions – covering gasoline station and industrial source control programs

### **Approval**

The OAP was approved by the EPA on May 17, 2005, but the RVP waiver was not granted. The National RVP limit of 7.8 psi for gasoline (8.8 psi for ethanol blends) was required in 7-county Denver Metro area beginning in the summer of 2004.

### **2006 Revision to Early Action Compact (EAC) Ozone Action Plan (OAP)**

*Adopted by AQCC: December 2006*

*Adopted by EPA: February 2008 (73 FR 8194)*

Review and reporting of data in late 2005 as required by the EAC revealed that unexpected rapid growth in the Oil & Gas industry in the DJ Basin surpassed the original estimate in the OAP. Even with the current controls emissions were estimated to be greater than anticipated in the approved EAC OAP for 2007 and 2012.

In 2006, the RAQC, in conjunction with the APCD, strengthened the 2004 OAP control measures to preserve the modeled emissions inventories at their 2007 and 2012 levels.

## **SIP Control Measures**

The AQR No. 7 was further amended to increase the system-wide control of condensate tank VOC flash emissions from 47.5% to 75% for the 2007 ozone season, and 78% reduction for the 2012 ozone season.

## **2008 8-Hour Ozone Attainment Plan**

*Adopted by AQCC: December 2008*

*Approved by EPA: Pending, required by the end of 2010*

Despite efforts in the EAC OAP that reduced ozone-causing emissions in the Denver Metro Area/North Front Range (DMA/NFR), the region failed to achieve the standard due to high readings in July 2007, which violated the 8-hour ozone standard in the 2005-2007 three-year timeframe (see Chart D). On November 20, 2007, the EPA did not continue the deferral of the effective date for nonattainment in the DMA/NFR 8-hour nonattainment area granted in the EAC and the official nonattainment designation became effective at that time. The State was required to submit a SIP Revision, a revised 8-hour Ozone Attainment Plan, to EPA by July 2009.

In the second half of 2007 the RAQC, in conjunction with the APCD, developed a new Ozone Action Plan, including an 8-hour Ozone Attainment Plan Revision with federally-enforceable measures, a number of state-only measures and measures identified for further analysis.

## **Attainment Demonstration**

As a former EAC area, the Denver/North Front Range nonattainment area was subject to 40 CFR 81.300(e)(3)(ii)(D) that requires a new attainment demonstration with photochemical air quality modeling. The CAMx modeling platform described in the 2004 SIP revision was used in this SIP Revision to demonstrate attainment of the standard in 2010 according to the updated EPA guidance (April 15, 2007) and modeling protocol.

## **SIP Control Measures**

Additional control measures, above and beyond those assumed in the 2010 base case inventory that are incorporated in this 2010 attainment demonstration included:

- AQR No. 7 was further amended to require:
  - the system-wide reduction of condensate tank flash VOC emissions of 81% for tanks  $\geq$  2 tons per year (tpy) for the 2009 ozone season;
  - 85% system -wide control for tanks  $\geq$  2 tpy for the 2010 ozone season;
  - 90% system -wide control for tanks  $\geq$  2 tpy for the 2011 ozone season with technology that achieves a 95% reduction in VOC emissions; and
  - installation and operation of auto igniters on all tanks  $\geq$  2 tpy effective May 1, 2010.
- AQR No. 7 was amended to remove or revise APEN and permitting exemptions
- The interaction of AQR No. 3 minor source RACT requirements and Regulation No. 7 RACT requirements was clarified for application to an ozone nonattainment area.

The 2010 base case modeling inventories assume control measures in place at that time as follows:

- Federal tailpipe standards and regulations, including those for small engines and non-road mobile sources. Credit is taken for these federal requirements but they are not part of the Colorado SIP.
- AQR No. 11 – the Automobile Inspection and Readjustment (A.I.R.) program assuming a 50% coverage of the Clean Screen program
- Air Quality Control Commission Regulations No. 3, No. 6, No. 7, and Common Provisions – covering gasoline station and industrial source control programs
- RVP of the base gasoline is assumed to be 7.8 psi for the Denver metropolitan portion of nonattainment area, with an ethanol market share of 85%, and for the Larimer and Weld

portion of the nonattainment area the RVP was assumed to be 9.0 psi with an ethanol share of 25%

### **Motor Vehicle Emissions Budgets**

For purposes of this SIP, Motor Vehicle Emissions Budgets for VOC and NO<sub>x</sub> are established for the 2010 attainment year and beyond. Budgets were specifically established for two sub-regional areas and for the entire nonattainment area for purposes of transportation conformity. The two subareas are defined as follows:

- Southern Subarea—Area denoted by the ozone nonattainment area south of the Boulder County northern boundary and extended through southern Weld County to the Morgan County line. This area includes the nonattainment portion of DRCOG's' regional planning area and the southern Weld County portion of the Upper Front Range TPR.
- Northern Subarea—Area denoted by the ozone nonattainment area north of the Boulder County northern boundary and extended through southern Weld County to the Morgan County line. This area includes the North Front Range Transportation and Air Quality Planning Council transportation planning area as well as the northern ozone nonattainment area portion the Upper Front Range TPR in Larimer and Weld counties.

The nonattainment-area wide budgets shall be used for the initial conformity determination; however, consistent with EPA regulations and guidance, the Metropolitan Planning Organizations (MPOs) may use the subarea budgets for subsequent conformity determinations.