REVISION TO THE COLORADO STATE IMPLEMENTATION PLAN

Concerning the removal of the
Colorado Clean Vehicle Fleet Program from the SIP,
and the adoption of a replacement program

Adopted by the
Colorado Air Quality Control Commission
March 16, 2000

INTRODUCTION

Colorado is submitting this SIP revision to EPA as a substitute for the clean-fuel vehicle program prescribed by section 246 of the Clean Air Act, 42 U.S.C. § 7586, for the Denver carbon monoxide (CO) nonattainment area. The submittal of a substitute program is authorized by section 182(c)(4)(B) of the Clean Air Act, 42 U.S.C. § 7511a(c)(4)(B).[1] Under this provision, EPA will approve such a substitute SIP revision if it will achieve long-term reductions in CO and toxic air emissions equal to those that would be achieved under part C of title II of the Clean Air Act.

The requirements described below will achieve long-term reductions in CO and toxic air emissions in the Denver CO nonattainment area equal to those that would be achieved under a clean-fuel vehicle program for the area meeting the requirements of part C of title II of the Clean Air Act.

BACKGROUND

As part of a project under the Colorado Environmental Leadership Program and the EPA Project XL Program, the United States Postal Service (USPS) has proposed to eliminate from the Denver CO nonattainment area, either through destruction or relocation, 794 delivery vehicles, and to replace them with lower-emitting flexible fuel vehicles that the USPS has contracted with Ford Motor Company to produce and deliver (hereinafter referred to as new FFVs). Also, the USPS has voluntarily agreed to meet certain other requirements to maintain the emissions reductions that will result from the destruction and relocation of the 794 delivery vehicles. With the USPS's consent, the State of Colorado is using the USPS's actions, and requirements the USPS has agreed to, as a substitute for the federally required clean-fuel vehicle program for the Denver CO nonattainment area. In order to qualify as a substitute program, these requirements must be made enforceable through a SIP revision approved by EPA. The USPS has consented to this approach (see the Final Project Agreement for U.S. Postal Service - Colorado Environmental Leadership Program and Project XL, dated May 22, 2000 (FPA).)

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[1]Section 182(c)(4)(B) of the Act refers to ozone-producing emissions; however, EPA has interpreted this section to allow for substitute programs for CO as well.

USPS REQUIREMENTS

Pursuant to this SIP revision, the USPS shall meet the following requirements:

1. The USPS shall destroy[2] 512 pre-1984 model year USPS vehicles that the USPS currently has in service in the Denver CO nonattainment area. Also, the USPS shall relocate 282 Long-Life Vehicles (1987-1991 model year USPS delivery vehicles) that the USPS currently has in service in the Denver CO nonattainment area. The vehicles to be relocated will be moved to other western cities and will replace older, higher emitting vehicles. The USPS shall meet the following schedule for vehicle destruction and relocation:

   1.1 Within 120 days of Ford's delivery of each of the 794 new FFVs, the USPS shall destroy one of such pre-1984 USPS vehicles or relocate one of such Long-Life Vehicles.

   1.2 Notwithstanding the foregoing, by July 31, 2001, the USPS shall destroy all 512 of such pre-1984 USPS vehicles and relocate all 282 of such Long-Life Vehicles.

2. The USPS shall only replace delivery vehicles that are part of its light-duty delivery fleet within the Denver CO nonattainment area with new light-duty delivery vehicles that meet applicable EPA emissions standards.

3. If the USPS increases the size of its light-duty delivery fleet within the Denver CO nonattainment area, the USPS shall only add new light-duty delivery vehicles that meet applicable EPA emissions standards.

4. Within 30 days of the date the USPS signs the FPA, the USPS shall provide to CDPHE a list of the postal service vehicles that will be destroyed, and those that will be relocated, pursuant to this SIP revision. The list shall include Vehicle Identification Numbers (VINs) for vehicles to be destroyed, VINs or equivalent identifiers for vehicles to be

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[2]For the purposes of this SIP revision, destruction requires that the USPS destroy the pre-1984 vehicles without compensation (except for scrap metal value), removing the battery (if desired), the catalytic converter (if desired), and any parts that must be removed by law. No other parts of the vehicle may be removed prior to destruction.

relocated, vehicle makes and models, vehicle model years, and location where each vehicle is currently stationed.

5. Beginning March 31, 2000, and every three months thereafter, through December 31, 2001, the USPS shall provide CDPHE with a report, signed by the USPS District Manager for Colorado/Wyoming certifying the report's accuracy, that includes the following information:

5.1 Number of new FFVs delivered in the reporting period (the three month period ending one month before the report due date) along with the cumulative total of new FFVs delivered in the Denver CO nonattainment area.

5.2 Date each new FFV was delivered during the reporting period.

5.3 How USPS intends to scrap the vehicles as set forth in footnote 2 above.

5.4 Number, make, model, VIN, model year, and emission levels of each vehicle destroyed pursuant to paragraph 1, above, during the reporting period, along with the date of destruction and certification that it was destroyed.

5.5 For each vehicle destroyed during the reporting period pursuant to paragraph 1, above, the USPS shall provide the relevant PS Form 4587 - Request to Repair, Replace, or Dispose of a Postal-Owned Vehicle. The USPS shall also certify that each of the vehicles has been destroyed and that each of the destroyed vehicles was in service in the Denver carbon monoxide nonattainment area immediately prior to destruction.

5.6 Cumulative number of vehicles destroyed pursuant to paragraph 1, above, through the end of the reporting period.

5.7 Number, make, model, VIN or equivalent identifier, and model year of each vehicle relocated pursuant to paragraph 1, above, during the reporting period, along with the date of relocation.

5.8 For each vehicle relocated pursuant to paragraph 1, above, during the reporting period, the USPS shall provide the bill of lading or other evidence of its relocation to the satisfaction of CDPHE. The USPS shall also certify that each of the relocated vehicles was in service in the Denver carbon monoxide nonattainment area immediately prior to relocation, and certify that each of the vehicles was

relocated to an area outside the Denver carbon monoxide nonattainment area, providing the vehicles' final destination.

5.9 Cumulative number of vehicles relocated pursuant to paragraph 1, above, through the end of the reporting period.

5.10 Number, make, model, VIN or equivalent identifier, model year, and emissions certification (or if there is no emissions certification, an estimate of the CO and VOC emissions) of each light-duty delivery vehicle the USPS has replaced within the Denver CO nonattainment area during the reporting period (other than vehicles replaced pursuant to paragraph 1, above), along with a description of the disposition of the replaced vehicle. For each vehicle replaced, the report must identify the corresponding replacement vehicle, including make, model, model year, VIN or equivalent identifier, and emissions certification.

5.11 Number, make, model, model year, VIN or equivalent identifier, and emissions certification of each vehicle added to the light-duty delivery fleet within the Denver CO nonattainment area during the reporting period. This subparagraph refers only to vehicles that are added that increase the overall size of the light-duty delivery fleet.

5.12 Anticipated schedule for delivery of remaining new FFVs.

5.13 Anticipated schedule for destruction and relocation of additional vehicles under paragraph 1, above. The schedule shall include times, dates, and locations for destruction and CDPHE will monitor the destruction of the vehicles.

6. After August 31, 2001, the USPS shall submit the report described in paragraph 5 on an annual basis, by September 30 of each year, through December 31, 2004.The reporting period shall be the 12 month period ending on August 31 of the year in which the report is submitted.

USPS CONSENT

The USPS consents to the incorporation of this document into the federally enforceable SIP and understands that, once incorporated into the SIP, this document will be enforceable pursuant to the federal Clean Air Act.

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DENVER REGIONAL ELEMENT
OF THE STATE AIR QUALITY
IMPLEMENTATION PLAN

Denver Regional Council of Governments
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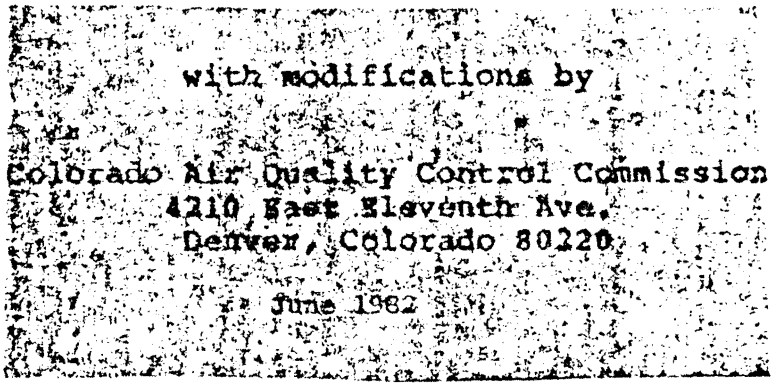

Preparation of this plan has been financed through an Air Quality Planning Grant under Section 175 of the Clean Air Act, as amended, from the U.S. Environmental Protection Agency administered by the U.S. Department of Transportation, Urban Mass Transportation Administration.

TABLE 9: DESCRIPTION OF MEASURES INCLUDED IN 1979 SIP

MEASURE	DESCRIPTION
Transit Improvement	The 1979 SIP set a goal of doubling of weekday rideship to 206,000 by December, 1982. Based on experience since 1979, this date has been changed to 1984. Includes the 16th Street Street Mall, Park-n-Ride facilities, and other transit improvement actions.
Rideshare Programs	The DRCOG areawide carpool locator service will have induced 6,900 commuters to change to carpooling by 1987. Through the efforts of various public and private agencies, it is assumed that 225 vanpools will be in operation by 1987.
Variable Work Hours Program	A compressed work week program has been implemented for federal employees which is assumed to reduce daily travel by 44,600 miles. The State and DRCOG will encourage the federal government to continue the program.
Regional Bicycle Plan	DRCOG developed a plan for commuter bicycle routes, with 330 miles currently in place. When fully implemented, the plan could reduce VMT by 77,900 miles per day.
Federal Motor Vehicle Emission Control Program (FMVECP)	The Federal Clean Air Act sets emission limits for new automobiles. The model assumes that these limits will be achieved for each model year through 1987, including high altitude compliance.
spection and intenance rogram	As adopted by the Colorado General Assembly, the Automobile Inspection and Readjustment (AIR) Program will annually inspect all 1968 and newer automobiles and light-duty trucks in the Front Range Area. Vehicles which fail the inspection will be readjusted to reduce emissions.
Santa Fe High Occupancy Vehicle (HOV) Lanes	Two additional lanes will be added to Santa Fe Drive (between Bowles and Florida.) They will be reserved during peak hours (one in the a.m.,one in the p.m.) for buses and carpools only.
Stationary Source Controls	Stationary sources are large fixed sources, usually industrial in nature, such as power plants, large furnaces, and factories. These sources are required to have "reasonably available control technology"(RACT) on emission points. New major sources in nonattainment areas have to provide "off-sets" to emissions from the source and acheive a lowest acheivable emission rate (LAER). Carbon monoxide controls for stationary sources are found principally in the Colorado Air Quality Control Commission Regulation Numbers 1,3,6 and 7 and the common provisions regulation. The regulations describe in detail the requirements that must be met by stationary sources. These regulations are listed below: Regulation No. 1: Emission Control Regulation for Particulates, Smokes and Sulphur Oxides. Regulation No. 3: Requirements for Emission Permits,Permit Review Procedures, Air Pollution Emission Notice, and Permit Fees. Regulation No. 6: Standards of Performamnce for New Stationary Sources. Regulation No. 7: Regulation to Control Emissions of Volatile Organic Compounds (VOCs).

Early Action Compact

Ozone Action Plan

Proposed Revision to the State Implementation Plan

Approved by:
Colorado Air Quality Control Commission
March 12, 2004

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8-Hour Ozone State Implementation Plan

INTRODUCTION

State and regional agencies in the Denver metropolitan area entered into a voluntary agreement with the U.S. Environmental Protection Agency in December 2002 that lays out a process for achieving attainment with EPA's new 8-hour ozone standard in an expeditious manner. Called an Early Action Compact for Ozone ("the EAC"), the agreement sets forth a schedule for the development of technical information and the adoption and implementation of the necessary control measures into the state implementation plan (SIP) in order to comply with the 8-hour standard by December 31, 2007 and maintain the standard beyond that date.

This document, the Early Action Compact Ozone Action Plan ("EAC Ozone Action Plan") contains the enforceable plan required by the Early Action Compact for bringing the Front Range 8-hour ozone control area into attainment with the 8-hour standard.

A. NATIONAL AMBIENT AIR QUALITY STANDARDS FOR OZONE

The Federal Clean Air Act (CAA) is the comprehensive law that regulates airborne emissions from area, mobile, and stationary sources nationwide. This law authorizes the EPA to establish NAAQS to protect public health and the environment. The EPA currently has two NAAQS for ozone, the 1-hour peak standard and the 8-hour standard.

1-Hour Standard and the Denver Metropolitan Area

An area must have a monitored hourly peak ozone concentration below 0.125 parts per million (ppm) to meet the 1-hour ozone standard. If an area exceeds the standard more than three times in three years, it is subject to a nonattainment designation.

The Denver metro area has not violated the 1-hour standard since 1988, and the area was redesignated to attainment for the 1-hour ozone NAAQS on September 11, 2001 (effective October 11, 2001).

8-Hour Standard and the Front Range Area

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 is equal to or greater than 0.085 ppm.

During the past several years, public education, outreach and voluntary measures have been implemented in the front range area as ozone concentrations have approached and occasionally exceeded the value permitted by the 8-hour ozone NAAQS. Based on the 2000-2002, 3-year average, the Denver metro region demonstrated compliance with the 8-hour ozone NAAQS. However, in summer 2003, elevated values of 8-hour ozone caused the Denver metro region 3-year average to violate the 8-hour ozone NAAQS in 2001-2003.

In April 2004, EPA will designate and classify areas of the country that violate the 8-hour standard. Based on the most recent three years of data (2001-03), the Front Range 8-hour ozone control area is slated to be designated non-attainment by EPA. However, by implementing the Early Action Compact, EPA will defer the non-attainment designation as long as region continues to meet the terms of the agreement and demonstrates attainment by December 31, 2007. Failure to meet the obligations of the agreement will result in immediate reversion to the traditional nonattainment process.

B. EARLY ACTION COMPACT FOR OZONE

EPA Early Action Compact Protocol

EPA developed the Protocol for Early Action Compacts (EAC Protocol) on June 19, 2002, supplemented on October 18, 2002. In exchange for relief from certain provisions of the nonattainment area requirements, the protocol establishes a two-step process that offers a more expeditious time line for achieving the 8-hour ozone standard than expected under EPA's 8-hour ozone standard implementation rulemaking.

The principles of the EAC Protocol to be executed by Local, State and EPA officials are:

- Early planning, implementation, and emission reductions leading to expeditious attainment and maintenance of the 8-hour ozone standard;
- Local area control of the measures to be employed, with broad-based public input;
- State support to ensure technical integrity of the early action plan;
- Formal incorporation of the early action plan into the state implementation plan (SIP);
- Deferral of the effective date of nonattainment designation and related requirements so long as all terms and milestones are met; and
- Safeguards to return areas to traditional nonattainment SIP requirements should terms and/or milestones are unfulfilled, with appropriate credit given for emission reduction measures implemented.

When EPA's 8-hour implementation guidelines call for designations, EPA will defer the effective date of any nonattainment designation and related requirements for participating areas that fail to meet the 8-hour ozone standard as long as all terms and milestones of the compact are being met. If the nonattainment designation is deferred, EPA will move expeditiously to designate the area as attainment and impose no additional requirements, provided that the monitors in the area reflect attainment by December 31, 2007.

If at any time the area does not meet all the terms of the compact, including meeting agreed-upon milestones, then it will forfeit its participation and its attainment or nonattainment designation (or redesignation if necessary) will become effective. The EPA will offer such an area no delays, exemptions or other favorable treatment because of its previous participation in this program.

If the area violates the standard as of December 31, 2007, and the area has had the effective date of any nonattainment designation deferred, such nonattainment designation will become effective. The State must then submit a revised attainment demonstration SIP revision according to the Clean Air Act (CAA) and EPA's 8-hour implementation rule, unless the 8-hour implementation schedule requires SIPs from 8-hour nonattainment areas before December 31, 2008. In that event, a revised attainment demonstration SIP revision for the participating area will be due as soon as possible but no later than December 31, 2008. In no event will EPA extend the attainment date for the area beyond that required by the CAA and/or EPA's 8-hour implementation rule. The region will not be allowed to renew this EAC after December 31, 2007, or to initiate a new compact if it has previously forfeited its participation.

Denver Area Early Action Compact

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 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 December 2003, in a letter to the Governor of the State of Colorado, the EPA proposed including a total of 11 counties in the north Front Range 8-Hour Nonattainment Area, including the 8 counties listed in the

Denver/Boulder/Greeley consolidated statistical metropolitan area (CMSA), plus Larimer, Morgan and Elbert counties. 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 Compact agreement established several planning milestones that must be met for the Compact to remain in effect. These milestones are:

- June 16, 2003 – Potential state, local and other emission reduction strategies identified and described *(milestone met)*;
- March 31, 2004 – RAQC must complete a proposed EAC Ozone Action Plan and submit the plan to the AQCC for public rulemaking hearing *(milestone met with proposal to AQCC on December 18, 2003)*
- December 31, 2004 – State must complete public rulemaking hearings, adopt the EAC Ozone Action Plan as part of the SIP, and submit the plan to EPA for approval
- September 30, 2005 – EPA must take final action on the SIP submittal
- December 31, 2005 – Additional emission reduction strategies implemented no later than this date
- December 31, 2007 – Attainment of the 8-hour standard demonstrated

The Compact agreement also establishes several other requirements that must be included in the early action SIP and planning process:

Reporting

The RAQC and the AQCC will assess and report progress towards milestones in a regular, public process, at least every six months, beginning in June 2003 and concluding on December 31, 2007.

Emissions Inventories

Emission inventories used in this EAC Ozone Action Plan were developed for summer episode day for the years 2002, 2007, and 2012 using EPA's MOBILE6 emissions model and the latest transportation information; area sources using a combination of EPA's NONROAD model data, latest demographics information, local equipment populations and usage rates, area source data, and local survey and information data, and the latest stationary sources emissions information, as required by the EAC. Future year inventories will sufficiently account for projected future growth in ozone precursor emissions through 2007, particularly from stationary, area, and mobile sources. Emissions inventories were compared and analyzed for trends in emission sources over time.

Dispersion Modeling

Base and future case dispersion modeling is required, and was performed for the EAC Ozone Action Plan. All modeling is SIP quality and performed within EPA's accepted margin of accuracy; is carefully documented; sufficiently accounts for projected future growth in ozone precursor emissions; will be concurrently reviewed by EPA; and was used to determine the effectiveness of NOx and/or VOC reductions. The control case was used to determine the relative effectiveness of different emission reduction strategies and to aid in the selection of appropriate emission reduction strategies. Modeling is 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). The modeling follows the guidance as facilitated by EPA Region 8.

Emission Reduction Strategies

All adopted Federal and State emission reduction strategies that have been or will be implemented by the December 31, 2007 attainment date are included in all emission inventories. The selected strategies will be implemented as soon as practical, but no later than December 31, 2005. The emission reduction strategies will be specific, quantified, permanent and enforceable. The strategies will also include specific implementation dates and detailed documentation and reporting processes.

Maintenance for Growth

The plan includes a component to address emissions growth at least 5 years beyond December 31, 2007, ensuring that the area will remain in attainment of the 8-hour standard during that period.

Public Involvement

Public involvement was conducted in all stages of planning by the signatory parties. Several stakeholder meetings were held, and public comment on the EAC Ozone Action Plan complies with the normal SIP revision and public hearing process.

AREA ENCOMPASSED BY THE EAC OZONE ACTION PLAN

At the time of the adoption of this plan by the Air Quality Control Commission, the EPA had proposed, but had not yet finalized, the boundaries of 8-hour ozone nonattainment area in Colorado. *See, EPA Responses to State and Tribal 8-Hour Ozone Air Quality Designation Recommendations*, 68 Federal register 68805 (December 10, 2003). This EAC Ozone Action Plan shall not apply outside the boundaries for the 8-hour ozone non-attainment area finally designated by the EPA.

The area of applicability of the plan should not be confused with the geographic area of the supporting air quality analysis. The air quality analysis includes emissions inventories from most of the western United States. The area of applicability includes county inventories that may ultimately be excluded from the nonattainment boundaries and, therefore, from the scope of this EAC Ozone Action Plan. Such inventories merely are a part of the technical basis for the attainment demonstration, and should not be construed to describe the scope of the plan. As indicated above, the geographic scope of the plan shall be determined by the final boundaries set by the U.S. EPA.

INTRODUCTION IS NOT PART OF THE SIP

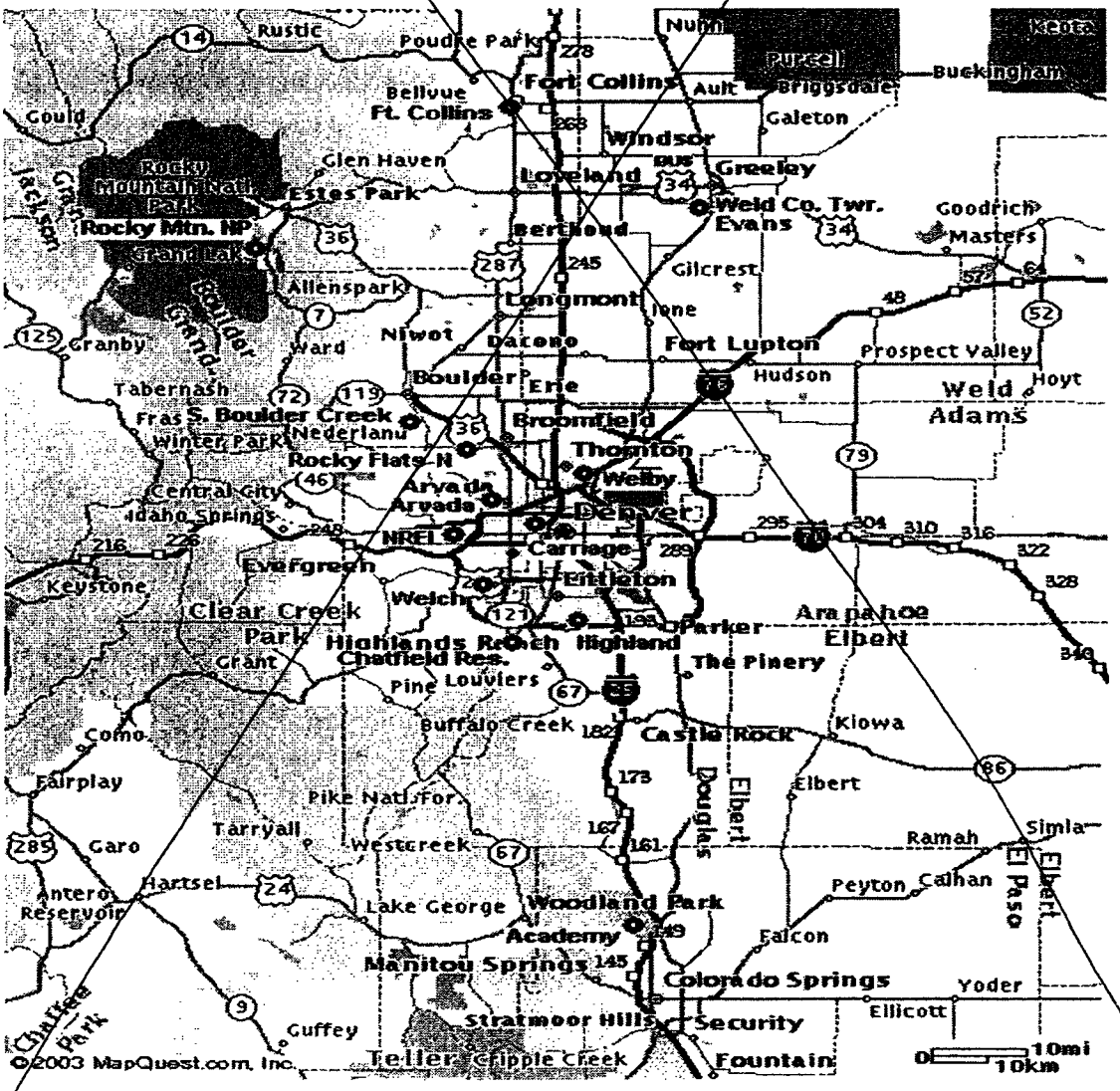
This Introduction section shall not be construed to be a federally-enforceable SIP, or incorporate the quoted provisions of the EAC into the SIP; except; however, the requirements of this plan shall not be applicable in any county or portion thereof excluded from the 8-hour ozone non-attainment area boundary by EPA as described above.

OZONE MONITORING INFORMATION

A. Ozone Monitoring Network

The current ozone ambient air monitoring network in the Denver area and along the Front Range consists of 12 stations operated by the Colorado Air Pollution Control Division (APCD) and one station operated by the National Park Service (NPS) in Rocky Mountain National Park. There have been other stations that have operated in the past. The geographical distribution of the Denver area monitors is presented in Figure 1.

Figure 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 ozone monitoring network shall not be construed to amend such monitoring SIP.

B. Quality Assurance Program

Ozone 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 Aerometric Information Retrieval System (AIRS) and are available for public review at the APCD and through EPA's AIRS database. Table 1 presents the data recovery rates for each monitoring site in the Denver and northern Front Range area. Percent data recovery is the number of valid sampling days occurring within the "ozone season", divided by the total number of days encompassing the "ozone season". A valid sampling day is one in which at least 75% of the hourly maxima are recorded.

Table 1
Ozone Data Recovery Rates for Each Monitoring Site

Years	**Welby** Data Recovery	**Highland** Data Recovery	**S. Boulder Creek** Data Recovery	**Boulder Marine St.** Data Recovery	**Carriage** Data Recovery
1998	99%	99%	99%	99%	98%
1999	99%	98%	99%	no data	94%
2000	99%	99%	98%	no data	89%
2001	95%	90%	98%	no data	94%
2002	94%	96%	96%	no data	96%
2003	95%	96%	98%	no data	99%

Years	**Chatfield** Data Recovery	**Arvada** Data Recovery	**Welch** Data Recovery	**R. Flats North** Data Recovery
1998	84%	98%	99%	97%
1999	72%	93%	99%	97%
2000	93%	98%	94%	99%
2001	90%	99%	97%	97%
2002	94%	98%	98%	95%
2003	93%	97%	97%	99%

Table 1 (continued)
Ozone Data Recovery Rates for Each Monitoring Site

Years	NREL Data Recovery	RMNP Data Recovery	Ft. Collins Data Recovery	Greeley/Weld County Data Recovery*
1998	100%	85%	99%	97%
1999	63%	98%	93%	97%
2000	98%	94%	98%	96%
2001	96%	100%	90%	99%
2002	99%	99%	85%	99%
2003	99%	100%	97%	96%

* The Greeley monitor was moved from 811 15th St. to the Weld County site at 3101 35th Ave. in 2002.

C. Monitoring Network/Verification of Continued Attainment

The APCD has and will continue to operate an appropriate air quality monitoring network of National Air Monitoring System (NAMS) and State/Local Air Monitoring System (SLAMS) monitors in accordance with 40 CFR Part 58 to verify the attainment of the 8-hour-hour ozone NAAQS. If measured mobile source parameters (e.g., vehicle miles traveled, congestion, fleet mix, etc.) change significantly over time, the APCD will perform the appropriate studies to determine whether additional and/or re-sited monitors are necessary. 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.

D. Monitoring Data

Tables 2 and 3 below present the monitoring data for the APCD's Denver and northern Front Range monitoring sites and the NPS Rocky Mountain National Park monitoring site. For each site, the fourth maximum 8-hour ozone concentrations along with the 3-year averages of the 4th maximum concentrations at each site are presented.

Table 2
4th Maximum 8-Hour Ozone Values

	AIRS #	1996 8-hr. O3 4th Max. (ppm)	1997 8-hr. O3 4th Max. (ppm)	1998 8-hr. O3 4th Max. (ppm)	1999 8-hr. O3 4th Max. (ppm)	2000 8-hr. O3 4th Max. (ppm	2001 8-hr. O3 4th Max. (ppm	2002 8-hr. O3 4th Max. (ppm	2003 8-hr. O3 4th Max. (ppm)
Welby	08-001-3001	0.074	0.071	0.083	0.071	0.062	0.064	0.068	0.066
Highland	08-005-0002	0.073	0.065	0.084	0.075	0.076	0.077	0.076	0.091
S. Boulder Creek	08-013-0011	0.075	0.072	**0.089**	0.075	0.072	0.071	0.078	0.082
Carriage	08-031-0014	0.068	0.066	**0.085**	0.068	0.071	0.072	0.073	**0.085**
Chatfield Res.	08-035-0002	0.079	0.075	0.081	0.075	0.080	0.077	0.083	**0.095**
Arvada	08-059-0002	0.073	0.070	**0.089**	0.072	0.076	0.074	0.073	0.083
Welch	08-059-0005	0.069	0.068	0.080	0.066	0.068	0.064	0.069	0.077
Rocky Flats North	08-059-0006	0.083	0.076	**0.092**	0.080	0.081	0.082	**0.088**	**0.091**
NREL	08-059-0011	0.082	0.075	**0.095**	0.080	0.083	0.081	0.081	**0.095**
Fort Collins	08-069-1004	0.066	0.064	0.072	0.063	0.070	0.067	0.072	0.075
Greeley	08-123-0007	0.070	0.069	0.075	0.069	0.069	0.074	(Shut down)	(Shut down)
Weld County Tower	08-123-0009	---	---	---	---	---	---	(0.080)	0.083
Rocky Mountain N.P.	---	0.072	0.069	0.080	0.074	0.078	0.070	**0.087**	**0.086**

Table 3
8-Hour Ozone
4th Maximum and Three-Year Average 4th Maximum Ozone Values

Site Name	2000 4th Max. Value (ppm)	2001 4th Max. Value (ppm)	2002 4th Max. Value (ppm)	2003 4th Max. Value (ppm)	2000-02 3-yr. Avg. 4th Max. Value (ppm)	2001-03 3-yr. Avg. 4th Max. Value (ppm)
Welby	0.062	0.064	0.068	0.066	0.065	0.066
Highland	0.076	0.077	0.076	0.091	0.076	0.081
S. Boulder Creek	0.072	0.071	0.078	0.082	0.074	0.077
Carriage	0.071	0.072	0.073	0.085	0.072	0.076
Chatfield Res.	0.080	0.077	0.083	0.095	0.080	**0.085**
Arvada	0.076	0.074	0.073	0.083	0.074	0.076
Welch	0.068	0.064	0.069	0.077	0.067	0.070
Rocky Flats North	0.081	0.082	0.088	0.091	0.084	**0.087**
NREL	0.083	0.081	0.081	0.095	0.082	**0.085**
Fort Collins	0.070	0.067	0.072	0.075	0.070	0.071
Greeley	0.069	0.074	(Shut down)	(Shut down)	---	---
Weld County Tower	---	---	(0.080)	(0.083)	(0.080)	(0.081)
Rocky Mtn. N.P.	0.078	0.070	0.087	0.086	0.078	0.081

CHAPTER I: BASE CASE EMISSIONS INVENTORIES

This section presents emission inventories for this EAC Ozone Action Plan for the 8-hour ozone control area 2002 base case and the 2007 base case used in the modeling scenarios. Inventories for the 8-hour ozone control area 2007 control case modeling will be presented later in this document and will include the additional control measures that are needed to demonstrate attainment of the 8-hour ozone NAAQS. All of the base and control case modeling inventories are for all of the eight counties in the Denver/Boulder/Greeley CMSA: Denver, Jefferson, Douglas, Broomfield, Boulder, Adams, Arapahoe and Weld plus Larimer, Morgan and Elbert counties. These inventories represent emissions estimates for an average episode day during the summer ozone season (May through September).

The emission estimates were developed based on the most recent demographic data and vehicle miles traveled (VMT) estimates contained in 1) DRCOG's conformity analysis for the updated fiscally constrained element of the 2025 Regional Transportation Plan, and 2) North Front Range Transportation and Air Quality Planning Council's (NFRTAQPC) 2025 Regional Transportation Plan. Table 4 presents this information.

Table 4
Demographic Data

DRCOG Demographics	2002	2007	2012
Population	2,492,627	2,718,479	2,944,330
Households	1,083,751	1,181,947	1,280,144
Employment	1,492,115	1,636,654	1,781,192
VMT	63,493,136	70,537,153	77,362,474
NFRTAQPC Demographics	**2002**	**2007**	**2012**
Population	332,030	403,534	463,121
Households	144,360	175,450	201,366
Employment	177,880	204,951	238,791
VMT	12,433,458	14,903,717	17,052,833

The 2002 and 2007 base case modeling inventories incorporate the control measures in place at that time. Control measures in place in 2002 and assumed for 2007 include:

1. 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. The credits change from 2002 to 2007 as EPA Tier II and low sulfur gasoline standards become effective.

2. Air Quality Control Commission Regulation No. 11 -- covering the Automobile Inspection and Readjustment (A.I.R.) program in place during the 2002 ozone season, which includes an enhanced Inspection/Maintenance (I/M). For 2007, a maximum of 50% fleet coverage is assumed for the remote sensing clean screen program in the DMA based on a proposed change in Reg. 11. Regulation No. 11 also contains state-only, basic I/M programs in the Colorado Springs and Fort Collins/Greeley areas. The computer modeling does not include any credit for the basic programs in the Colorado Springs and Fort Collins/Greeley areas and such basic programs are not part of, or being submitted for inclusion in, the SIP.

3. Air Quality Control Commission Regulations No. 3, No. 6, No. 7, and Common Provisions – covering gasoline station and industrial source control programs. The Common Provisions, Parts A and B of Regulation No. 3, and the VOC control requirements of Regulation No. 7 are already included in the approved SIP. Regulation No. 6 and Part C of Regulation No. 3 implement the federal standards of performance for new stationary sources and the federal operating permit program. This reference to Regulation No. 6 and Part C of Regulation No. 3 shall not be construed to mean that these regulations are included in the SIP.

4. Since 1991, gasoline sold in the Denver metro area during the summer ozone season (June 1 to September 15) has been subject to a national Reid Vapor Pressure (RVP) limit of 7.8 pounds per square inch (psi) in order to reduce fuel volatility. For ethanol-blended fuels, the RVP limit is 8.8 psi due to the federal 1.0 psi RVP waiver for ethanol. The EPA has granted waivers to allow a 9.0 psi RVP (10.0 psi for ethanol blends) gasoline in the Denver area instead of the more stringent 7.8 psi limit.

   For 2002, because of voluntary efforts to reduce the gasoline RVP, the RVP of the base gasoline was measured at 8.2 psi; ethanol (10% blend) market share was measured at 20%. In other words, 80% of the gasoline was at 8.2 psi RVP, and 20% of the gasoline was at 9.2 psi RVP.

   For purposes of the base case 2007 mobile source inventory, the RVP of the base gasoline is assumed to be 9.0 psi, as requested in the maintenance plan submitted by the Governor to support redesignation to attainment for the 1-hour ozone standard (Ozone Redesignation Request and Maintenance Plan for the Denver Metropolitan Area). The ethanol (10% blend) market share is assumed to be 25% based on future ethanol market share average projected by the

industry. In other words, 75% of the gasoline is assumed to be 9.0% psi RVP, and 25% of the gasoline is assumed to be 10.0 psi RVP.

All of the inventories were developed using EPA-approved emissions modeling methods, including EPA's MOBILE6 model and local VMT data for on-road mobile source emissions, EPA's non-road model and local demographic information for area and off-road sources, and reported actual emissions for point sources. Estimates for future emissions are based on the above-mentioned tools and the EPA's Economic Growth and Analysis System (EGAS) model for estimating future point sources activity, VMT growth for on-road mobile sources, and 2007 and 2012 demographic data for off-road and area sources. The EAC Ozone Action Plan's technical support document contains detailed information on model assumptions and parameters for each source category.

Summaries of the VOC and NOx base case inventories for the 8 county and the 11 county areas, for 2002 and 2007, are presented in Tables 5a and 5b, respectively, below. Emissions of NOx and VOCs are in tons per average episode day.. Additional detail on the categories of emissions can be found in the technical support document.

Wildfire Emissions Estimates

Wildfire emissions, though not included in Tables 5a and 5b, have been considered for the background ozone concentrations in the modeling effort. Wildfire emissions can vary wildly on a day-to-day basis depending on conditions. The average daily wildfire emissions in the modeling episodes are estimated at approximately 15 tpd for VOC, 323 tpd for CO and 7 tpd for NOx.

Table 5a
2002 and 2007 Base Case Emission Inventories
(tons per average episode day)
Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas, Jefferson and Weld Counties

Source Category	2002 VOCs (tons/day)	2007 VOCs (tons/day)	2002 NOx (tons/day)	2007 NOx (tons/day)
Flash	133.9	146.1	0	0
Gas Stations	22.3	16.0	0.1	0.1
Oil and Gas Production	4.1	4.5	0.2	0.2
Reciprocating Internal Combustion Engines	7.8	8.7	93.5	94.7
Other Stationary Sources	24.6	28.8	11.4	12.2
Total Point	**192.8**	**204.1**	**105.2**	**107.1**
Automotive After Market Products	27.2	29.0	0	0
Architectural Coatings	19.5	20.8	0	0
Household and Personal Products	17.0	18.2	0	0
Adhesives and Sealants	14.7	15.7	0	0
Pesticide Application	8.9	10.0	0	0
Other Area Sources	9.6	10.4	25.60	27.6
Total Area	**96.9**	**104.1**	**25.60**	**27.6**
Lawn & Garden	47.3	31.2	9.31	9.3
Other Off-road	25.8	22.5	78.7	73.2
Total Off-road	**73.1**	**53.7**	**87.99**	**82.5**
On-road Mobile	**152.8**	**117.5**	**157.8**	**119.3**
Total Anthropogenic	**515.6**	**479.4**	**376.6**	**336.5**
Total Biogenic	468.1	468.1	37.1	37.1
Total	**983.7**	**947.5**	**413.7**	**373.6**

Note: Inventories merely are a part of the technical basis for the attainment demonstration, and should not be construed to describe the scope of the plan. The geographic scope of the plan shall be determined by the final boundaries set by the U.S. EPA.

Table 5b
2002 and 2007 Base Case Emission Inventories
(tons per average episode day)
Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas, Jefferson, Weld, Elbert, Larimer and Morgan Counties

Source Category	2002 VOCs (tons/day)	2007 VOCs (tons/day)	2002 NOx (tons/day)	2007 NOx (tons/day)
Flash	134.3	147.2	0.0	0.0
Gas Stations	24.5	17.5	0.1	0.1
Oil and Gas Production	4.2	4.6	0.2	0.2
Reciprocating Internal Combustion Engines	9.0	9.9	125.8	129.7
Other Stationary Sources	28.0	30.1	14.1	15.0
Total Point	**200.0**	**209.3**	**140.1**	**144.9**
Automotive After Market Products	30.0	32.1	0.0	0.0
Architectural Coatings	21.5	23.0	0.0	0.0
Household and Personal Products	18.8	20.1	0.0	0.0
Adhesives and Sealants	16.3	17.4	0.0	0.0
Pesticide Application	11.7	13.1	0.0	0.0
Other Area Sources	12.9	14.0	30.4	32.7
Total Area	**111.3**	**119.6**	**30.4**	**32.7**
Lawn & Garden	53.0	35.0	10.4	10.4
Other Off-road	31.9	27.6	94.2	82.1
Total Off-road	**84.9**	**62.6**	**104.6**	**92.4**
On-road Mobile	**172.6**	**135.1**	**177.6**	**136.6**
Total Anthropogenic	**568.8**	**526.6**	**452.7**	**406.6**
Total Biogenic	799.46	799.5	52.3	52.3
Total	**1368.3**	**1326.1**	**505.0**	**458.9**

Note: Inventories merely are a part of the technical basis for the attainment demonstration, and should not be construed to describe the scope of the plan. The geographic scope of the plan shall be determined by the final boundaries set by the U.S. EPA.

CHAPTER II: CONTROL MEASURES

This section of the EAC Ozone Action Plan lists the additional control measures, above and beyond those assumed in the 2007 base case inventory described in Chapter 1 that are incorporated into the SIP to demonstrate attainment of the 8-hour ozone NAAQS by 2007 and maintenance of such standard through 2012. For purposes of this EAC Ozone Action Plan, and for inclusion of such control measures in the state implementation plan, the term "8-hour ozone control area" shall mean the area designated by the EPA as a deferred non-attainment area for the 8-hour ozone standard.

A. Reid Vapor Pressure

Since 1991, gasoline sold in the Denver area during the summer ozone season (June 1 to September 15 for gasoline RVP) has been subject to a national Reid Vapor Pressure (RVP) limit of 7.8 pounds per square inch (psi) in order to reduce fuel volatility. For ethanol blends the limit has been 8.8 psi. Since the Denver area has not violated the 1-hour ozone standard since the late 1980's, the state has requested, and EPA has granted, waivers to allow 9.0 psi RVP (10.0 psi for ethanol blends) gasoline in the Denver area instead of the more stringent 7.8 RVP limit.

Photochemical modeling analyses performed during this EAC process indicates little to no improvement (TSD Appendix L) in predicted ozone levels between a 7.8 and 8.1 RVP. APCD cost estimates indicate a doubling of costs to industry to provide 7.8 RVP over 8.1 RVP fuel. Because of these two considerations this EAC Ozone Action Plan proposes an 8.1 RVP fuel.

Therefore, since this EAC ozone action plan for the 8-hour ozone standard relies on an RVP level of 8.1 psi (9.1 psi for ethanol blends) in the 2007 control case inventory for the existing Denver 1-hour ozone attainment/maintenance area, the State of Colorado requests a three year waiver establishing an 8.1 psi (9.1 psi for ethanol blends) RVP level for the existing Denver 1-hour ozone attainment/maintenance area through the 2007 summer ozone season.

B. Condensate Tank Emissions Controls

The EAC Ozone Action Plan includes an amendment to Regulation No. 7 to require the reduction of flash emissions of volatile organic compounds from condensate collection, storage, processing and handling operations. The rule requires the installation of air pollution control technology to achieve at least a 47.5% reduction from uncontrolled emissions of volatile organic compounds from new and existing oil and gas exploration and production operations, natural gas compressor stations, and natural gas drip stations located within the 8-hour ozone control area designated by EPA. The rule includes an exemption if total emissions are less 30 tons per year.

C. Controls for Stationary Engines

The EAC Ozone Action Plan includes an amendment to Regulation No. 7 to require the installation of controls on new and existing rich burn and lean burn natural gas fired stationary reciprocating internal combustion engines (RICE) larger than 500 horsepower located in the 8-hour ozone control area. In this case, controls installed for uncontrolled rich burn RICE shall be non-selective catalyst reduction and an air fuel ratio controller or other equally effective air pollution control technology, and for uncontrolled lean burn RICE shall be oxidation catalyst reduction, or other equally effective air pollution control technology. Existing lean burn RICE may obtain an exemption upon demonstration that cost of emissions control will exceed $5000/ton of VOC reduced.

D. Controls for Dehydrators

The EAC Ozone Action Plan includes an amendment to Regulation No. 7 to require the reduction of emissions of volatile organic compounds from new and existing dehydration towers at oil and gas operations with emissions in excess of 15 tons per year.

E. Revisions to Regulation No. 11 - Automobile Inspection and Readjustment Program

The EAC Ozone Action plan includes an amendment to Regulation No. 11 to reduce the coverage of the remote sensing clean screen area in order to reduce the disbenefit of the program and to reflect the practical reality of potential coverage. No more than 50 percent of the fleet of gasoline vehicles in the enhanced program area will be evaluated with remote sensing during any twelve-month period after December 31, 2005.

Previously adopted state-only regulations establishing hydrocarbon limits and requiring gas cap pressure checks are hereby included.

CHAPTER III: PHOTOCHEMICAL MODELING & OTHER WEIGHT OF EVIDENCE ANALYSES FOR ATTAINMENT DEMONSTRATION

A. Photochemical Modeling for the 2002 and 2007 Base Case Scenarios

Photochemical grid modeling was required and performed under the EAC Ozone Action Plan for the 8-Hour Ozone Control Area. The goal of the EAC's 8-hour ozone modeling analysis was to conduct a comprehensive photochemical modeling study for the Denver-north front range region that can be used as the technical basis for demonstrating attainment with the 8-hour ozone NAAQS.

The photochemical model "Comprehensive Air Quality Model with Extensions" (CAMx) from the consultants ENVIRON International Corporation and Alpine Geophysics Atmospheric Sciences Group was used for this study. Meteorological fields for input into CAMx were produced using the Mesoscale Meteorological Model (MM5). Model ready emissions data for the 2002 and 2007 base case were processed through the Emissions Processing System (EPS2x). The photochemical modeling study was conducted in accordance with EPA modeling guidance for ozone and a prepared modeling protocol. The modeling protocol was specifically designed to identify the processes responsible for 8-hour ozone exceedances in the region and to develop realistic emissions reduction strategies for the ozone exceedances.

Several technical documents are available that detail the meteorological, emissions, and photochemical modeling and are included in the Technical Support Document for this plan. Technical support documentation for modeling include:

- Modeling Protocol, Episode Selection, and Domain Definition
- Episode Selection for the Denver Early Action Ozone Compact
- Evaluation of MM5 Simulations of the Summer '02 Denver Ozone Season and Embedded High 8-hr Ozone Episodes
- Development of the 2002 Base Case Modeling Inventory
- Development of the 2007 Base Case Modeling Inventory
- Preliminary Photochemical Base Case Modeling and Model Performance Evaluation for the Summer '02 Denver Ozone Season and Embedded High 8-hour Ozone Episodes
- Draft Final Air Quality Modeling for the Denver EAC Ozone Compact, 2007 Base Case, Control Strategy and Sensitivity Analysis Modeling
- Draft Additional Air Quality Modeling Analysis to address 8-Hour ozone Attainment for the Denver EAC

B. Base Case Relative Reduction Factors (RRF)

The modeling produces base case relative reduction factors (RRF) for receptors in the modeling domain where ozone monitors are located. In general, the RRF for each monitor is equal to the mean 2007 base case modeled 8-hour ozone concentration divided by the mean 2002 base case modeled 8-hour concentration. Specifically, each RRF is the summation of all 2007 daily 8-hour predicted maximum concentrations greater than 0.070 ppm "nearby" (within 15 kilometers) a monitor during a given episode divided by the summation of all 2002 daily 8-hour predicted maximum concentrations greater than 0.070 ppm within 15 kilometers of the monitor during a given episode as shown below. (Based on EPA's May 1999 "Draft Guidance On the Use of Models and Other Analyses in Attainment Demonstrations for the 8-Hour Ozone NAAQS.")

$$\text{Relative Reduction Factor (RRF)} = \frac{\text{Mean 2007 Base Case Modeled 8-hour Ozone Conc. (ppm)}}{\text{Mean 2002 Base Case Modeled 8-hour Ozone Conc. (ppm)}}$$

An RRF for each monitoring site for modeled (predicted) days greater than 0.070 ppm is presented in Table 6.

C. Estimated Future (2007) Base Case Design Value

Once the RRFs are developed, the RRF for each monitoring site is multiplied by the monitoring site's base case design value to determine a future case design value for each site, as shown below, indicating if attainment is demonstrated at each site.

$$\text{Estimated Future Design Value (ppm)} = \text{RRF} * \text{Current Design Value (ppm)}$$

The modeling, though it has met EPA guidelines for use in the EAC process, under predicts actual monitored values by approximately 20%. This results in predicted values in the 8-hour ozone control area, for the 2002 base case less than or very close to 0.070 ppm, which approaches the levels of background ozone, which is estimated to be approximately 0.055 to 0.065 ppm. When expected emission reductions are applied in the 2007 base case or control case and modeled, the resultant predicted values are

similarly very close to 0.070 ppm for many of the days. The resultant RRF calculation offers very slight incremental changes in future ozone design values due to reductions in emissions. This condition is referred to as "stiffness" in the model.

Table 6 presents the current (2001-2003) base case design values for each monitoring site, the base case RRFs for modeled days greater than 0.070 ppm, and the future base case design values for each site. If the future (2007) base case design values are less than 0.085 ppm, then attainment is demonstrated and no additional control measures are needed.

Table 6
2007 Base Case Design Values for Each Monitoring Site for Modeled Days greater than 0.070 ppm

Site Name	8-Hour Ozone Current (2001-2003) Base Case Design Values (ppm)	Base Case Relative Reduction Factors	8-Hour Ozone Future (2007) Base Case Design Values (ppm)
Welby	0.066	1.0072	0.0665
Arvada	0.077	0.9975	0.0758
NREL	**0.085**	0.9946	0.0845
Rocky Flats North	**0.087**	0.9942	**0.0865**
S. Boulder Creek	0.077	0.9939	0.0765
Fort Collins	0.071	0.9930	0.0705
Carriage	0.076	0.9881	0.0751
Welch	0.070	0.9848	0.0689
Weld County Tower	(0.082)	0.9845	0.0797
Highland	0.081	0.9844	0.0797
Chatfield Res.	**0.085**	0.9807	0.0834
Rocky Mtn. N.P.	0.081	0.9772	0.0792

As can be noted attainment at all of the monitors is achieved (design values less than 0.085 ppm) in 2007 for the 8-hour ozone control area with the exception of Rocky Flats North (design value 0.0865 ppm), as a result of the reductions expected from existing programs and regulations. Additional control measures discussed in Chapter II have been applied to bring the Rocky Flats North monitor into attainment.

D. Weight of Evidence Analysis

EPA's 8-hour ozone modeling guidance suggests a weight of evidence attainment determination if the maximum modeled 8-hour ozone Design Value is between 0.084 ppm and 0.089 ppm at more than one monitor. EPA also allows for an attainment

determination based on weight of evidence if the maximum, modeled 8-hour ozone Design Value is less than 90 ppb (0.090 ppm).

Results of corroboratory analyses may be used in a weight of evidence determination to conclude that attainment is likely despite modeled results, which do not quite pass the attainment and/or screening tests. Such corroboratory analyses could include further analysis of modeling detail, emissions trends related to air quality, observation based models (NOx/VOC ratios), other corroborative evidence such as quantifying model uncertainties, considering other design value years, additional data collection, and possibly excluding episode days with ozone concentrations close to 0.070 ppm.

E. 2007 Control Case Emission Inventories

Reductions from control measures described in Chapter II have been applied to the 2007 base case emissions inventories as follows:

- Reid Vapor Pressure of base gasoline assumed to be 8.1 psi (maintains 1.0 psi waiver for ethanol-blended gasoline at 25% market share) – estimated 9 tpd VOC reduction to direct on-road mobile source emissions and 1 tpd VOC reduction in refueling (gas station) emissions.
- Flash emissions controls – estimated 55 tpd reduction in VOC
- Reciprocating internal combustion engine (RICE) controls – approximately 5.5 tpd VOC and 19 tpd NOx reduction
- Dehydrator controls – approximately 0.5 tpd VOC

The total emission reduction, compared to the 2002 base case, for these four control strategies (together with the federal and existing state controls assumed for the 2007 base case) is approximately 106 tons per day VOC and 58 tons per day NOx in the 8-county area (Denver metropolitan area plus Weld County). Emissions reductions associated with the application of these strategies to in Elbert, Larimer and Morgan counties have not been quantified and have not been included in the modeling. The resultant 2007 inventory based on the total RVP reduction plus Flash, RICE and Dehydrator control package noted above is presented in Tables 7a & 8a (VOC) for the 8-county area and 7b & 8b (NOx) for the11-county area below. As previously noted in Chapter I all of the inventories presented represent a typical average episode day. In the modeling, all anthropogenic source categories can be varied by weekday, weekend day and/or hour of the day, and on-road mobile and biogenic sources are varied by differing meteorological conditions and diurnally varied by temperature.

Table 7a
VOC Emission Inventories
(tons per average episode day)
Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas, Jefferson and Weld Counties

Source Category	2002 Base (tons/day)	2007 Base (tons/day)	2007 Control (tons/day)	2012 Control (tons/day)
Flash	133.9	146.1	91.3	100.9
Gas Stations	22.3	16.0	14.8	10.2
Oil and Gas Production	4.1	4.5	3.7	4.1
Reciprocating Internal Combustion Engines	7.8	8.7	4.8	5.4
Other Stationary Sources	24.6	28.8	28.7	32.3
Total Point	**192.8**	**204.1**	**143.3**	**152.9**
Automotive After Market Products	27.2	29.0	29.0	31.5
Architectural Coatings	19.5	20.8	20.8	22.6
Household and Personal Products	17.0	18.2	1 8.2	19.8
Adhesives and Sealants	14.7	15.7	15.7	17.1
Pesticide Application	8.9	10.0	10.0	11.5
Other Area Sources	9.6	10.4	10.4	11.6
Total Area	**96.9**	**104.1**	**104.1**	**114.0**
Lawn & Garden	47.3	31.2	31.0	26.7
Other Off-road	25.8	22.5	22.6	21.0
Total Off-road	**73.1**	**53.7**	**53.5**	**47.7**
Total On-road Mobile	**152.8**	**117.5**	**108.4**	**76.0**
Total Anthropogenic	**515.6**	**479.4**	**409.3**	**390.6**
Total Biogenic	468.1	468.1	468.1	468.1
Total	**983.7**	**947.5**	**877.4**	**858.7**

Note: Inventories merely are a part of the technical basis for the attainment demonstration, and should not be construed to describe the scope of the plan. The geographic scope of the plan shall be determined by the final boundaries set by the U.S. EPA.

Table 7b
VOC Emission Inventories
(tons per average episode day)
Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas, Jefferson and Weld Counties plus Larimer, Morgan and Elbert Counties

Source Category	2002 Base (tons/day)	2007 Base (tons/day)	2007 Control (tons/day)	2012 Control (tons/day)
Flash	134.3	147.2	92.0	101.7
Gas Stations	24.5	17.5	16.3	11.3
Oil and Gas Production	4.2	4.6	3.7	4.2
Reciprocating Internal Combustion Engines	9.0	9.9	6.0	6.7
Other Stationary Sources	28.0	30.1	30.1	35.4
Total Point	**200.0**	**209.3**	**148.1**	**159.2**
Automotive After Market Products	30.0	32.1	32.1	34.9
Architectural Coatings	21.5	23.0	23.0	25.0
Household and Personal Products	18.8	20.1	20.1	21.9
Adhesives and Sealants	16.3	17.4	17.4	18.9
Pesticide Application	11.7	13.1	13.1	15.0
Other Area Sources	12.9	14.0	14.0	15.6
Total Area	**111.3**	**119.6**	**119.6**	**131.3**
Lawn & Garden	53.0	35.0	34.7	30.0
Other Off-road	31.9	27.6	27.9	26.2
Total Off-road	**84.9**	**62.6**	**62.6**	**56.2**
Total On-road Mobile	**172.6**	**135.1**	**126.0**	**89.0**
Total Anthropogenic	**568.8**	**526.6**	**456.4**	**435.7**
Total Biogenic	799.46	799.5	799.5	799.5
Total	**1368.3**	**1326.1**	**1255.8**	**1235.2**

Note: Inventories merely are a part of the technical basis for the attainment demonstration, and should not be construed to describe the scope of the plan. The geographic scope of the plan shall be determined by the final boundaries set by the U.S. EPA.

Table 8a
NOx Emission Inventories
(tons per average episode day)
Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas, Jefferson and Weld Counties

Source Category	2002 Base (tons/day)	2007 Base (tons/day)	2007 Control (tons/day)	2012 Control (tons/day)
Flash	0	0	0	0
Gas Stations	0.1	0.1	0.1	0.1
Oil and Gas Production	0.2	0.2	0.2	0.2
Reciprocating Internal Combustion Engines	93.5	94.7	75.8	82.8
Other Stationary Sources	11.4	12.2	12.2	13.4
Total Point	**105.2**	**107.1**	**88.3**	**96.5**
Automotive After Market Products	0	0	0	0
Architectural Coatings	0	0	0	0
Household and Personal Products	0	0	0	0
Adhesives and Sealants	0	0	0	0
Pesticide Application	0	0	0	0
Other Area Sources	25.60	27.6	27.6	31.1
Total Area	**25.60**	**27.6**	**27.6**	**31.1**
Lawn & Garden	9.31	9.3	9.4	9.3
Other Off-road	78.7	73.2	73.2	65.5
Total Off-road	**87.99**	**82.5**	**82.6**	**74.8**
Total On-road Mobile	**157.8**	**119.3**	**119**	**77.7**
Total Anthropogenic	**376.6**	**336.5**	**317.5**	**280.1**
Total Biogenic	37.1	37.1	37.1	37.1
Total	**413.7**	**373.6**	**354.6**	**317.2**

Note: Inventories merely are a part of the technical basis for the attainment demonstration, and should not be construed to describe the scope of the plan. The geographic scope of the plan shall be determined by the final boundaries set by the U.S. EPA.

Table 8b
NOx Emission Inventories
(tons per average episode day)
Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas, Jefferson and Weld Counties plus Larimer, Morgan and Elbert Counties

Source Category	2002 Base (tons/day)	2007 Base (tons/day)	2007 Control (tons/day)	2012 Control (tons/day)
Flash	0.0	0.0	0.0	0.0
Gas Stations	0.1	0.1	0.1	0.1
Oil and Gas Production	0.2	0.2	0.2	0.2
Reciprocating Internal Combustion Engines	125.8	129.7	110.9	121.3
Other Stationary Sources	14.1	15.0	15.0	16.5
Total Point	**140.1**	**144.9**	**126.1**	**138.1**
Automotive After Market Products	0.0	0.0	0.0	0.0
Architectural Coatings	0.0	0.0	0.0	0.0
Household and Personal Products	0.0	0.0	0.0	0.0
Adhesives and Sealants	0.0	0.0	0.0	0.0
Pesticide Application	0.0	0.0	0.0	0.0
Other Area Sources	30.4	32.7	32.7	36.7
Total Area	**30.4**	**32.7**	**32.7**	**36.7**
Lawn & Garden	10.4	10.4	10.5	10.4
Other Off-road	94.2	82.1	82.8	74.1
Total Off-road	**104.6**	**92.4**	**93.3**	**84.6**
Total On-road Mobile	**177.6**	**136.6**	**136.3**	**90.1**
Total Anthropogenic	**452.7**	**406.6**	**388.4**	**349.4**
Total Biogenic	52.3	52.3	52.3	52.3
Total	**505.0**	**458.9**	**440.7**	**401.8**

Note: Inventories merely are a part of the technical basis for the attainment demonstration, and should not be construed to describe the scope of the plan. The geographic scope of the plan shall be determined by the final boundaries set by the U.S. EPA.

F. 2007 Control Case Demonstration

The four individual scenarios above have been modeled in CAMx as a SIP control strategy package. As discussed earlier in this Chapter III, the 2007 base case and 2007 SIP control case modeling produces relative reduction factors (RRF) for receptors in the modeling domain where ozone monitors are located.

As noted, the RRF is applied to the base case (2001-2003) design values for each monitor to calculate the 2007 control case design values based on the formula:

2007 Control Case Design Value = RRF * Base Case (2001-03 Design Value)

The RRF and the Design Value for each monitor resulting from the 2007 control case analysis are presented for the modeled days greater than 0.070 ppm and the modeled days greater than 0.080 ppm in the following table:

Table 9
2007 Control Case Design Values for Each Monitoring Site for Modeled Days greater than 0.070 ppm and Modeled Days greater than 0.080 ppm at Rocky Flats N.

Site Name	8-Hour Ozone Base Case Design Values 2001-2003 (ppm)	Days > 0.070 ppm at All Monitor Sites		Days > 0.080 ppm at Rocky Flat N. Site	
		2007 Control Case RRF	2007 Control Case Design Values (ppm)	2007 Control Case RRF	2007 Control Case Design Values (ppm)
Welby	0.066	0.9993	0.0660	1.0165	0.0671
Arvada	0.077	0.9923	0.0754	0.9871	0.0750
NREL	**0.085**	0.9891	0.0841	0.9748	0.0829
Rocky Flats North	**0.087**	0.9888	**0.0860**	0.9811	**0.0854**
S. Boulder Creek	0.077	0.9879	0.0761	0.9811	0.0755
Fort Collins	0.071	0.9854	0.0700	0.9769	0.0694
Carriage	0.077	0.9830	0.0747	0.9785	0.0744
Welch	0.070	0.9798	0.0686	0.9748	0.0682
Highland	0.081	0.9795	0.0793	0.9877	0.0800
Weld County Tower	(0.082)*	0.9780	0.0792	0.9788	0.0793
Chatfield Res.	**0.085**	0.9761	0.0830	0.9779	0.0831
Rocky Mtn. N.P.	0.081	0.9711	0.0787	0.9659	0.0782

* Based on 2002 & 2003 data. Greeley monitor shut down 2001; Weld County Tower monitor started in 2002.

Attainment is demonstrated when the 2007 Control Case Design Value at each monitor is at 0.085 ppm or less.

As can be seen in the above Table 9, for all days greater than 0.070 ppm all of monitors achieve attainment with predicted design values below 0.085 ppm, except the Rocky Flats North monitor. Considering days greater than 0.080 ppm, all monitors achieve greater reduction in design values as a result of the application of control strategies.

However, the Rocky Flats North monitor is still slightly above 0.085 ppm as a result of the 2007 control case analysis. In the next section, the weight of evidence determination provides more corroborating evidence and technical analysis beyond the dispersion modeling to support a conclusion that attainment is likely to occur.

G. Weight of Evidence Determination

EPA modeling guidance indicates that, if a result of the modeling attainment demonstration is between 0.084 ppm and 0.089 ppm at more than one site, a weight of evidence (WOE) determination should be performed. As can be seen in the above Table 9, all other monitors have 2007 control case design values less than 0.084 ppm. Since the design value at the Rocky Flats North monitor is well below 0.090 ppm, the EPA guidance indicates that more corroborating evidence based on other analyses can be sufficiently convincing to support a conclusion that attainment is likely to occur despite the outcome of dispersion modeling tests.

As discussed by the modeling contractor, Environ (2004), the modeling results appear to be very stiff, that is, the estimated 8-hour ozone Design Values are not very sensitive to local emission controls. The reasons for this stiffness are as follows:

- Anomalous Meteorological Conditions in 2003 -The 2003 ozone season was noted for anomalous temperatures and mixing heights causing more conducive ozone forming meteorological conditions than are reflected in the June 2002 modeling episode. Thus the future design value is overestimated using the observed 2001-2003 design value, and the local control strategies applied are not as effective using the June 2002 modeling episode.
- Under Prediction Tendency of Model - Although the model achieved most of EPA's performance goals, it exhibited a general under prediction tendency so that less ozone was likely attributable to the local emissions than likely occurred in actuality.

Weight Of Evidence Analyses

- **Anomalous Meteorological Conditions in 2003**

  Meteorological data is provided in the Technical Support Document (TSD) Appendix O - Weight of Evidence – Inter-Office Memorandum, Reddy February 9, 2004 that demonstrates that lower than average mixing heights and record setting maximum temperatures occurred in 2003.

  Trend analysis using the 4th maximum concentration at Rocky Flats North, and the Zurbenko-Rao Decomposition Method demonstrates that irrespective of

temperature (and all weather effects for which temperature is a good surrogate) ozone concentrations will trend below the 8-hour ozone standard in future years - TSD Appendix O - Weight of Evidence – Inter-Office Memorandum, Reddy, February 9, 2004

- **Under Prediction Tendency of Model**

Under prediction of the model by approximately 20% is well documented in the 2002 model performance evaluation report. TSD Appendix H.

An analysis of the use of modeled days greater than 70 ppb and modeled days greater than 80 ppb in Table 10 below indicates the stiffness in the modeled data for the days greater than 70 ppb from June 27 through June 30. Only the July 1 episode day has modeled values greater than 70 ppb across the entire monitoring network. Only the July episode day with an estimated 8-hour ozone concentration of 85 ppb is close to both the Design Value (87 ppb) and the observed value on this day (89 ppb). TSD Appendices B, K & L

Analysis of modeled episode days greater than 80 ppb in Table 9 previously presented indicates all monitors for the 2007 control case are below 0.085 ppm, with the exception the Rocky Flat North monitor, which, although slightly above 0.085 ppm demonstrates, through the improved reduction from the observed 2001-2003 design value, that on a day that the modeled performed closer to the Design Value and the observed value, the local control strategies were more effective and sufficient to support the conclusion of attainment. TSD Appendix L

Back Trajectory analyses prepared by the APCD and Environ indicate that local emissions contribute to the high ozone concentrations at the Rocky Flats monitor during this episode. Appendices O

Table 10
Modeled 2002 Base Case and 2007 Base Case (ppb)

2 Base Case: run11a		25-June	26-Jun	27-Jun	28-Jun	29-Jun	30-Jun	1-Jul		
Site	DV	2176	2177	2178	2179	2180	2181	2182	#Days>70	#Days>80
Weld County Tow	81	61	57.2	65.2	60.6	69.4	66.9	**70.9**	1	
Rocky Mtn. NP	81	63.1	64.3	67.4	62	**71.4**	**76**	**79.1**	3	
Fort Collins	71	63.2	62.6	69.5	59	65.4	**70.7**	**73.5**	2	
USAF Academy	73	56.6	63.5	56.6	66.6	61	69.4	**70.6**	1	
Welch	70	58.9	66.5	69.8	**71.7**	65.7	**73**	**87.2**	3	1
Rocky Flats Nor	87	62.8	62.7	**70.9**	62.1	**70.5**	**73.8**	**84.5**	4	1
NREL	85	60.4	64.6	**70.9**	64.9	63.1	**73.8**	**87.2**	3	1
Arvada	76	59.8	60	**70.8**	63.1	69.1	**71.8**	**85.1**	3	1
Welby	66	56.6	55.2	62.6	66.5	**70**	66.2	**72.7**	2	
S. Boulder Creek	77	63	62.8	**70.9**	63	**70.9**	**74.1**	**84.5**	4	1
Carriage	76	58.4	62.3	68.8	67.9	66.6	**71.9**	**83.8**	2	1
Highland	81	57.4	66.3	62.7	**73**	69.7	**71.9**	**81.6**	3	1
Chatfield Res.	85	57.9	66.5	63.4	**73**	69.7	**71.9**	**85.9**	3	1

2007 Base Case: 07run11a.a2								
Site	DV	2176	2177	2178	2179	2180	2181	2182
Weld County Tow	81	60.2	56.6	65.1	59.6	68	66.2	**69.8**
Rocky Mtn. NP	81	63.6	63.5	66	61	**69.7**	**74.8**	**76.9**
Fort Collins	71	62.8	62.2	68.8	58.3	64.2	**71.1**	**72**
USAF Academy	73	56.4	62.5	55.9	64.1	59.1	68	**68.1**
Welch	70	59.1	67.3	69.2	**70.1**	64.6	**72.8**	**85.5**
Rocky Flats Nor	87	64.2	62.3	**70.7**	61.6	69.3	**74.4**	**83.4**
NREL	85	60.8	66.2	**70.7**	65.4	62.6	**74.4**	**85.5**
Arvada	76	60.5	61.8	**70.7**	62.5	68.5	**72**	**84.5**
Welby	66	56.4	55.8	64.7	64.9	**69.3**	69	**74.4**
S. Boulder Creek	77	64.4	62.6	**70.7**	62.1	**70**	**74.4**	**83.4**
Carriage	76	59.6	64.9	69.5	68.2	66.7	**71.3**	**82.5**
Highland	81	57.2	67	63.1	**70.6**	66.9	**71.3**	**81.1**
Chatfield Res.	85	58.1	67.1	61.4	**70.6**	66.9	**71.3**	**84.5**

- **Additional Model Metrics**

Grid-Hours > 84 ppb: The relative change from the 2002 base case to the 2007 control case in the number of grid cell – hours during the modeling episode in which the estimated 8-hour ozone concentrations are greater than 84 ppb is calculated to be 88%, which is over the "large" reduction (80%) suggested by EPA to be consistent with a conclusion that the proposed control strategy package meets the 8-hour standard. TSD Appendix L

Grid-Cell > 84 ppb: The relative change from the 2002 base case to the 2007 control case in the number of grid cells during the modeling episode in which the

estimated 8-hour ozone concentrations are greater than 84 ppb is calculated to be 80%. This meets the "large" reduction (80%) suggested by EPA to be consistent with a conclusion that the proposed control strategy package meets the 8-hour standard. TSD Appendix L

Relative Difference (RD): The Relative Difference (RD) in 8-Hour ozone concentrations greater than 84 ppb computed as the ratio of the average of estimated excess 8-hour ozone above 84 ppb of the future-year simulation to the base-year base case is calculated at 93% further supporting the conclusion that the proposed control strategy package meets the 8-hour standard. TSD Appendix L

VOC-NOX Sensitivity: Sensitivity model runs looking at reduction of VOC, NOx and VOC and NOx indicate that VOC reductions are more important to reductions in ozone at the critical monitor than NOx reductions confirming the validity of the proposed control package focusing on VOC reductions. TSD Appendix J & K

- **Additional Analyses**

Monitored Speciation Data: Recent ambient monitored precursor data indicates similarity between ambient data and emissions estimates. Very close correlation between flash emissions speciation data and ambient measurements in Weld County the source of almost all of the Flash emission in the inventory. TSD Appendix C & N

Ambient Monitoring & Emissions Trends: Monitored trends and emissions trends of CO and PM10 and emissions trends are declining supporting the concept that over all air quality is improving due to controls in place in the region. TSD Appendix C

Design Value and Emissions Trends: Analysis of 3-year period design values for 8-hour ozone and precursor emissions indicates that both are trending down. TSD Appendix C

PBL Height and Boundary Condition Analysis: Modeling of the 2002 base case investigated the impacts of changes in PBL Heights and Boundary conditions to maximize appropriate assumptions in future modeling. TSD Appendix G & H

H. 2012 Maintenance Year Emission Inventory and Maintenance Demonstration

EPA's Early Action Compact Protocol guidance requires that areas demonstrate long-term maintenance of the 8-hour ozone NAAQS through the year 2012. Although photochemical modeling analysis is required for the 2007 attainment demonstration, a simple comparison of emission inventories is sufficient to demonstrate maintenance. For this plan, the 2007 control case emission inventory, which is supported by a weight of evidence determination of attainment, is compared with the 2012 inventory. When total emissions in 2012 are less than total emissions in 2007 that are supported by a determination of attainment, continued maintenance is demonstrated. The 2012 inventories assume that the 2007 control measures remain in place throughout the maintenance period through 2012. The 2012 inventory also accounts for federal emission control measures taking effect from 2007 through 2012.

The 2007 control case inventories for the 8 county area and the 11 county area and the 2012 maintenance inventories are presented previously in Tables 7a & 7b and 8a & 8b.

PM-10 Redesignation Request and Maintenance Plan For the Denver Metropolitan Area

Adopted by:
Colorado Air Quality Control Commission
April 19, 2001

Colorado Department of Public Health and Environment

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TABLE OF CONTENTS

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.

REDESIGNATION REQUEST AND MAINTENANCE PLAN

Chapter 3, *Requirements for Redesignation*, is the State's request to the U.S. Environmental Protection Agency (EPA) to redesignate the Denver area to attainment for the one-hour ozone standard.

Chapter 4, *Maintenance Plan*, is being submitted for inclusion in the federally-enforceable State Implementation Plan and includes control measures and other requirements to ensure maintenance of the PM-10 standard through the year 2015.

INTRODUCTION AND BACKGROUND

CHAPTER 1: INTRODUCTION

The State of Colorado, in coordination with the Regional Air Quality Council (RAQC), is requesting that the U.S. Environmental Protection Agency (EPA) redesignate the Denver metropolitan nonattainment area to attainment status for the 24-hour PM_{10} National Ambient Air Quality Standard. The Denver metropolitan area has been designated as a PM_{10} nonattainment area since 1987, but has not violated this 24-hour PM_{10} standard since 1993. Therefore, the area is now eligible for redesignation.

The 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 through 2015. The 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" nonattainment area for PM_{10} . The Denver area was then designated a "moderate" nonattainment 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.

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. Required Components of a Redesignation Request

Sections 107(d)(3)(d) and (e) of the Clean Air Act define the criteria an area must meet before being redesignated to attainment/maintenance status. Upon submittal and EPA approval of this Maintenance Plan, the Denver metropolitan area will meet all of these criteria.

1. Attainment of the Standard

The State must show that the area has attained the national standards for PM_{10}.

2. State Implementation Plan Approval

The area must have a fully approved PM_{10} State Implementation Plan.

3. Improvement in Air Quality due to Permanent and Enforceable Emissions Reductions

The State must demonstrate that the improvement in air quality leading to attainment of the standard is due to permanent and federally enforceable emissions reductions.

4. CAA Section 110 and Part D Requirements

The State must meet all requirements of Section 110 and Part D of the CAA. Section 110 describes general requirements for SIPs, while Part D pertains to general requirements applicable to all nonattainment areas.

5. Maintenance Plan

The area must have a fully approved PM_{10} Maintenance Plan that meets the requirements of CAA Section 175a, including a demonstration that the area will maintain the standard for a period of at least 10 years following redesignation by EPA. The plan must also contain contingency measures that could be implemented if a violation of the standard is monitored at any time during the maintenance period.

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 was 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. Future year emission inventories have been updated as an input into the modeling analysis.

1. Emission Inventories

Estimates of future emissions of PM-10 and PM-10 precursors (NOx and SO_2) are derived using a variety of EPA-approved methods. Inventories are developed for categories of mobile, area, and point sources for 2002, 2003, 2005, 2010, and 2015.

The emission inventories are calculated using estimates of future 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.

2. Dispersion Models

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

a. Regional Air Model (RAM)

Primary PM_{10} emissions from area sources, mobile sources and minor point sources are evaluated using 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 evaluated using the short-term version of the ISC model, which is also a steady-state Gaussian plume model. ISC is used to assess concentrations from a wide variety of sources associated with industrial source complexes. ISC can account for settling and dry deposition of particulates, downwash area, plume rise and limited terrain adjustment. Major sources are modeled at their maximum hourly design rates, with regulation and permit supported emissions limits and controls. ISC was run using the same five years of meteorological data.

3. Secondary Particulate Roll-Foward Model

Since there were no EPA-approved dispersion models that could estimate the formation and concentration of secondary particles, a surrogate approach had to be developed for the attainment SIP 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.

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 source 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 winter time sanding 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 reduction 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 this maintenance plan.

2. Previous State-only Requirements

In 1999 a state-only provision was added to Regulation16 (effective October 2000) requiring an overall 30% emissions reduction (20% in the foothills) from sanding/sweeping operations. This regulation allows each agency to determine their own plan for achieving the requirement based on guidance provided on the benefit of various strategies. Specific SIP requirements for the Central Business District, the Sweep Box area (38th, Downing, Louisiana and Federal) and the remaining metro area were not changed in the 1999 regulation.

Although the state-only provision did not become effective until October 2000, the regional average emissions reduction in the 1999-2000 winter season was approximately 44%.

3. Conformity Commitments

As part of its conformity determination for the 2020 Regional Transportation Plan and implementing transportation improvement programs Denver Regional Council of Governments (DRCOG) received commitments for specific sanding reductions and increased sweeping from local governments, CDOT and RTD in 1998 for the years 2001, 2011 and 2020. These commitments are used by DRCOG to demonstrate that the region's PM_{10} mobile source related emissions conform to the PM_{10} Emissions Budgets established in the SIP process. In general, the commitments for 2011 and 2020 go beyond the current state-only requirements; however, DRCOG only uses those commitments necessary to demonstrate conformity.

4. Maintenance Plan Analysis

Analysis for the maintenance plan indicates that it will be necessary to take SIP credit for the current 30% emission reductions requirement in Regulation 16 to demonstrate maintenance of the standard in 2002 and beyond.

In addition, additional reductions will be needed to demonstrate maintenance in 2002 and beyond. Analysis indicates a 50% emission reduction in the central Denver area (bounded by 38th, Downing, Louisiana, and Federal) and a 72% emission reduction in the central business district (bounded by Colfax Avenue, Broadway, 20th Street, Wynkoop and Speer Boulevard) will show maintenance of the standard. The City and County of Denver already plans to achieve

these reductions during the 2001/02 winter season and has committed to including these reductions in the SIP.

Therefore, Regulation 16 has been revised as follows:

1. Current state-only requirement of 30% emissions reduction regionwide (20% in the foothills) will become part of the SIP.

2. 50% emissions reduction will be required in the central Denver area (bounded by 38th, Downing, Louisiana, and Federal), effective beginning the 2001/02 winter season.

3. 54% emissions reduction on I-25 from 6th Avenue to University (which is equivalent to the previous Regulation 16 and SIP requirement of 50% reduction in applied sand and sweeping within four days).

4. 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 Regional Transportation Plan and 2001-2006 Transportation Improvement Program (November 2000).

b. MOBILE5 mobile sources emissions model estimates for NOx .

c. Inventory adjustment factors supplied by EPA to reflect credits from recently promulgated Tier II/ gasoline sulfur standards.

d. PART5 mobile source particulate emissions model for estimates of primary PM-10 emissions from gasoline and diesel vehicles.

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 NOx emissions by more than 90%.

The maintenance plan does not take credit for diesel emission and fuel standards promulgated by EPA in December 2000. These new standards will significantly reduce emissions of fine particulates and NOx from diesel vehicles.

3. Vehicle Inspection/Maintenance

The maintenance plan included the gasoline vehicle inspection/maintenance program contained in revisions adopted by the Air Quality Control Commission on January 10, 2000 and submitted to EPA on May 10, 2000 as part of the carbon monoxide maintenance plan and redesignation request. The program implements a remote sensing clean screen program beginning 2002 and contains increasingly tighter emission testing cutpoints for NOx implemented between 2002 and 2006.

4. Diesel Inspection/Maintenance

The maintenance plan removes Regulation No. 12 that implements the region's diesel inspection/maintenance program from the SIP. No emission reduction is taken for this strategy in the plan.

The program is expected to remain as a state-only requirement and improvements may be made to increase the effectiveness of the program.

5. Oxygenated Gasoline

The maintenance plan removes Regulation No. 13 concerning oxygenated gasoline from the PM-10 maintenance plan. No emission credit is taken for this strategy in the plan. Regulation No. 13 remains part of the carbon monoxide maintenance plan.

6. Transportation System Improvements

The mobile source modeling is based upon the transportation network contained in DRCOG's updated fiscally-constrained Regional Transportation Plan (November 2000). 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.

D. Stationary Sources

1. Modeling and Emissions Calculation Criteria

This maintenance plans employs the same modeling approach and rationale for stationary sources approved by EPA for use in the PM-10 attainment SIP. The analysis distinguishes between major and minor stationary sources of PM-10, NOx and SO_2 for purposes of inventory development and air quality modeling.

Consistent with EPA regulations and guidance, major stationary sources generally are modeled 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.

Allowable emission estimates for major stationary sources were updated using the Title V permit applications for these sources. In most instances the emission estimates were verified with the sources.

Minor sources were modeled using their actual emissions. To account for future growth in minor sources, these emissions were grown into the future using population growth factors.

2. Major Sources of PM-10

Major sources of PM-10 for purposes of 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. These sources are modeled at their maximum allowable emissions using the ISC model described in section A above. These sources are summarized below.

Table 2.1: Major PM-10 Sources in PM-10 Modeling Domain

Source	**Maximum Allowable PM-10 Emissions** *(tons per year)*
Cherokee Electric Generating Station	3297
Arapahoe Electric Generating Station (2002)	1444
Arapahoe Electric Generating Station (2003-2015)	1001
Trigen Colorado Energy	838
Zuni Electric Generating Station	555
Ultramar Diamond Shamrock Refinery	241
Conoco Refinery	226
Robinson Brick	186

Enforceable emission limitations for all of these sources except the two refineries are contained in Regulation No. 1. For the Conoco and Ultramar Diamond Shamrock refineries, emissions are modeled at their maximum potential to emit based on AP-42 emission factors. The specific emission limitations or emission rates are converted into grams/second and modeled using actual facility stack parameters.

3. Major Sources of NOx 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 NOx and SO_2 from stationary sources. EPA determined that any major stationary source emitting NOx 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 NOx and SO_2. EPA concluded 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 this criteria, the stationary sources modeled at their maximum allowable emission rates for NOx and SO_2 are listed in Table 2.2.

Table 2.2: Major NOx and SO_2 Sources

Source	Maximum Allowable Emissions *(tons per year)*	
	NOx	SO_2
Cherokee Electric Generating Station (2002-2004)	23,577	34,683
Cherokee Electric Generating Station (2005-2015)	21,382	34,683
Arapahoe Electric Generating Station (2002)	14,250	17,498
Arapahoe Electric Generating Station (2003-2015)	7,770	10,224
Valmont Electric Generating Station	4,474	8,890
Trigen-Colorado Energy Corp.	3,962	6,959
Rocky Mountain Bottle	424	369

For roll-forward modeling to estimate their potential contribution to secondary particulate concentrations, the maximum allowable daily emissions are calculated using the maximum allowable emission rate (lb/mmbtu, lb/hour, tons per year, etc.) and the rated design capacity of the facility. Where an annual permit limit restricts the annual hours of operation, the maximum hourly rate is used to calculate the maximum daily rate.

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 NOx 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 this maintenance plan includes the following new limitations for metro area power plants:

- 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 is effective upon approval of the redesignation request by EPA.

  This limit is essentially equivalent to the existing 20% annual SO_2 removal requirement in Regulation 1 for Arapahoe Unit 4 and in a permit for Cherokee Units 1 and 4. However, the limitation is now expressed on a more straight-forward basis over a shorter averaging time.

- Retirement of Arapahoe Units 1 and 2 as a federally-enforceable control measure, effective January 1, 2003 and upon approval of the redesignation request by EPA. Through an enforceable agreement with the State of Colorado, Public Service Company committed to retire Arapahoe Units 1 and 2 permanently by the effective date. Since these units will not be operating after January 1, 2003, these units are not included in any future year emission inventory calculations beyond 2002.

  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.

- 0.60 lb/mmbtu NOx limit for Cherokee Unit 1, based on a 30-day rolling average. This limit is effective January 1, 2005 provided EPA approves the redesignation request. This unit is already well within this limitation with the application of overfire air and low-NOx burners.

Also as part of this enforceable emission reduction agreement with the State of Colorado, Public Service Company will go significantly beyond current regulatory requirements by reducing its current overall SO_2 emissions by at least 50% at its metro area power plants. However, this SO_2 emission reduction program is not included in the SIP and no credit is taken for the emission reductions that will be 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 NOx limits established by 40 CFR Part 60 (New Source Performance Performance Standards). Boilers 1, 2, and 3 do not have regulatory NOx limits and therefore are modeled at their maximum potential to emit using AP-42 emission factors.

3. Rocky Mountain Bottle

Rocky Mountain Bottle Company is subject to a permit issued by the State of Colorado that establishes hourly limits for NOx 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 for modeling purposes.

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

Unit	PM_{10} limit *(lb/mmbtu)*	Regulation	NOx limit *(lb/mmbtu)*	Regulation	SO_2 limit *(lb/mmbtu)*	Regulation
Cherokee						
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) (0.96)	40 CFR Part 76 (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						
3	0.1	Reg. No. 1	0.8 (3) (0.98)	40 CFR Part 76 (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.	maximum potential to emit	31 lb/hr ea.	maximum potential to emit	n/a	
Valmont						
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			n/a	
2 gas turbines	3 lb/hr(5) ea.		31 lb/hr ea.	maximum potential to emit	n/a	
Trigen						
1 & 2 (gas)	0.11	Reg. No. 1	no limit	maximum potential to emit	n/a	
3	0.12	Reg. No. 1	no limit	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 potential to emit; (4) 3-hour average, (5) Valmont is not located in the primary PM-10 modeling domain.

REDESIGNATION REQUEST
AND
MAINTENANCE PLAN

CHAPTER 3: REQUIREMENTS FOR REDESIGNATION

The State of Colorado, in coordination with the Regional Air Quality Council (RAQC), requests that the U.S. Environmental Protection Agency (EPA) redesignate the Denver metropolitan nonattainment area to attainment status for the 24-hour PM_{10} National Ambient Air Quality Standards (NAAQS). The Denver metropolitan area was designated as a moderate PM_{10} nonattainment area since 1990, but has not violated the 24-hour standard since 1993. The Denver area has never violated the annual PM_{10} NAAQS. Therefore, the area is now eligible for redesignation.

A. Required Components of a Redesignation Request

Sections 107(d)(3)(D) and (E) of the CAA define the following five required components of a redesignation request.

- **Attainment of the PM_{10} NAAQS**
- **State Implementation Plan Approval**
- **Improvement in Air Quality Due to Permanent and Enforceable Emissions Reductions**
- **CAA Section 110 and Part D Requirements**
- **Approved Maintenance Plan**

The first four requirements are addressed below in this chapter. The fifth requirement, the Maintenance Plan, is addressed in Chapter 4.

B. Attainment of the 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 has attained 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.

1. Denver Area Historical Perspective

Historically, the particulate matter standard had been frequently violated in the 1970's, 1980's, and early 1990's throughout the Denver metropolitan area. There has only been one exceedance of the 24-hour standard during the 1994 through 1999 period. 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.

2. PM_{10} Monitoring Network

The current PM_{10} ambient air monitoring network in the Denver area consists of eleven stations operated by the Colorado Air Pollution Control Division. There have been other stations that have operated in the past as well as special purpose monitoring efforts that are ongoing (such as at the Rocky Flats facility). 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.

3. 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 1995 through 2000 are also shown in the following graphs.

4. 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 Aerometric Information Retrieval System (AIRS) and are available for public review at the APCD and through EPA's AIRS 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

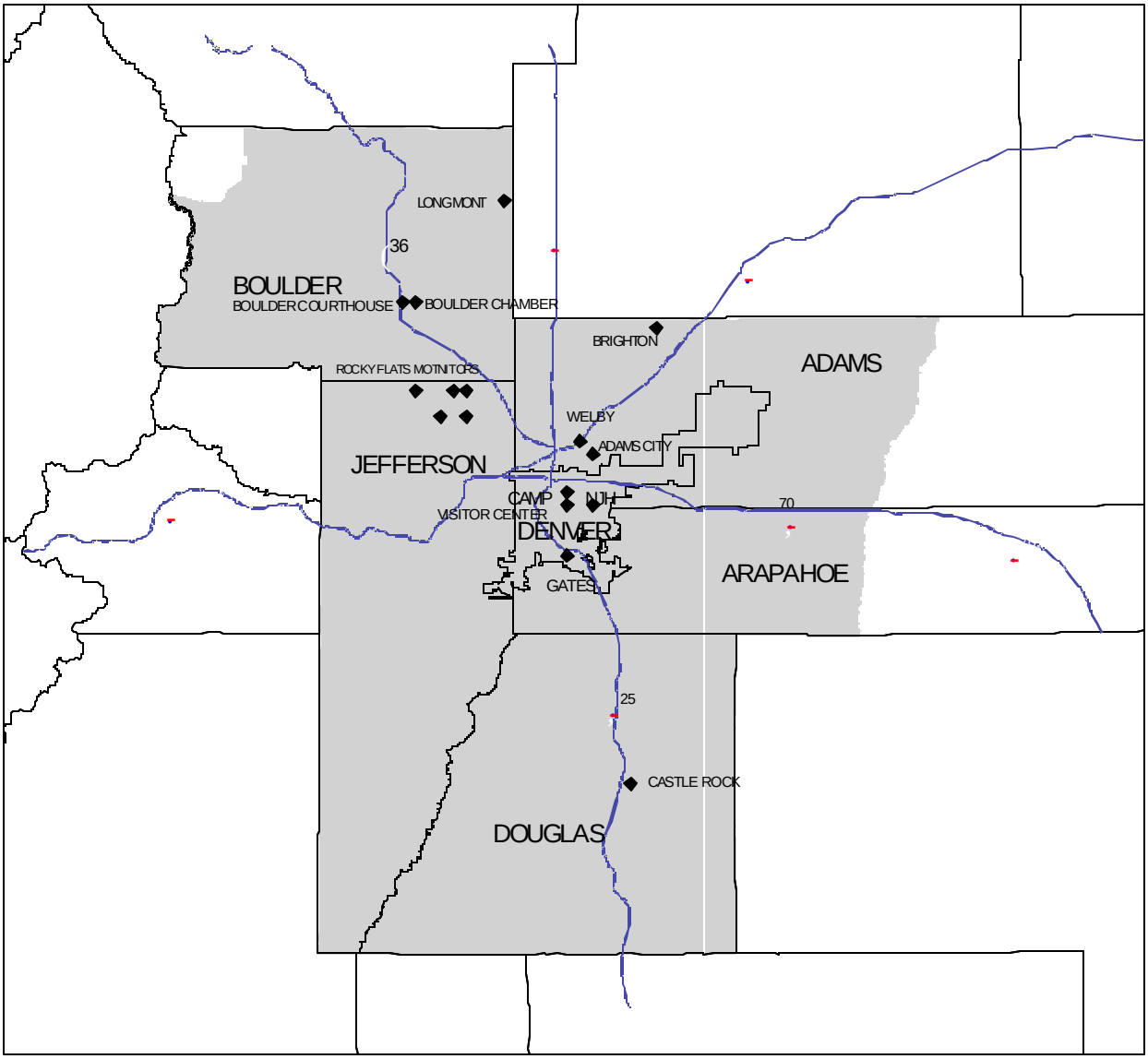

Table 3-1. Monitoring Data and Three-Year Average of Expected Exceedances of the PM_{10} NAAQS

PM_{10} Concentrations 1995 through 2000

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)
1995	99	97	0.00	0.34	33
1996	98	96	0.00	0.00	34
1997	98	98	0.00	0.00	35
1998	118	99	0.00	0.00	36
1999	160	141	1.16	0.39	37
2000	135	134	0.00	0.39	43

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)
1995	101	84	0.00	0.00	21
1996	57	54	0.00	0.00	23 *
1997	86	71	0.00	0.00	23
1998	64	55	0.00	0.00	21
1999	42	35	0.00	0.00	19
2000	69	46	0.00	0.00	20*

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)
1995	73	46	0.00	0.00	21
1996	59	57	0.00	0.00	21 *
1997	60	46	0.00	0.00	22
1998	40	39	0.00	0.00	22
1999	44	42	0.00	0.00	22
2000	45	43	0.00	0.00	24

** 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)
1995	55	44	0.00	0.00	17
1996	59	58	0.00	0.00	19
1997	59	53	0.00	0.00	17*
1998	62	56	0.00	0.00	19
1999	50	49	0.00	0.00	15
2000	70	33	0.00	0.00	13*

Boulder--14th & Spruce

Year	1st Max. (ug/m^3)	2nd Max. (ug/m^3)	Yearly Estim. Exceed.	3 yr. avg. Estim. Exceed.	Annual Avg. (ug/m^3)
1995	35	29	0.00	0.00	13 *
1996	41	31	0.00	0.00	16
1997	28	27	0.00	0.00	15
1998	***sampling ended 9-30-97***				
1999					
2000					

Longmont--3rd & Kimbark

Year	1st Max. (ug/m^3)	2nd Max. (ug/m^3)	Yearly Estim. Exceed.	3 yr. avg. Estim. Exceed.	Annual Avg. (ug/m^3)
1995	91	61	0.00	0.00	19
1996	66	59	0.00	0.00	19
1997	44	41	0.00	0.00	18
1998	50	38	0.00	0.00	19
1999	58	56	0.00	0.00	21*
2000	91	68	0.00	0.00	23

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)
1995	51	45	0.00	N / A	20
1996	39	35	0.00	0.00	20 *
1997	43	42	0.00	0.00	21
1998	47	45	0.00	0.00	24
1999	46	43	0.00	0.00	23*
2000	41	39	0.00	0.00	22*

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

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)
1995	52	50	0.00	0.00	28
1996	59	54	0.00	0.00	28
1997	67	66	0.00	0.00	26
1998	48	47	0.00	0.00	27
1999	52	49	0.00	0.00	30
2000	60	57	0.00	0.00	34*

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)
1995	75	65	0.00	0.00	21
1996	74	67	0.00	0.00	20
1997	86	71	0.00	0.00	23*
1998	108	81	0.00	0.00	31
1999	67	64	0.00	0.00	27*
2000	78	59	0.00	0.00	28*

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)
1995	57	45	0.00	0.00	27
1996	63	53	0.00	0.00	28
1997	94	93	0.00	0.00	29
1998	71	69	0.00	0.00	27
1999	61	47	0.00	0.00	28
2000	58	54	0.00	0.00	28

Denver Visitor's Center--225 W. Colfax

Year	1st Max. (ug/m^3)	2nd Max. (ug/m^3)	Yearly Estim. Exceed.	3 yr. avg. Estim. Exceed.	Annual Avg. (ug/m^3)
1995	91	80	0.00	0.36	21
1996	81	70	0.00	0.00	23
1997	68	66	0.00	0.00	22
1998	77	75	0.00	0.00	30 *
1999	96	83	0.00	0.00	27
2000	74	72	0.00	0.00	29

* *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)
1995	34	32	0.00	0.00	15 *
1996	28	26	0.00	0.00	15 *
1997	54	54	0.00	0.00	21 *
1998	51	47	0.00	0.00	16 *
1999	49	24	0.00	0.00	16*
2000	52	31	0.00	0.00	15

Arvada–8101 Ralston Road

Year	1st Max. (ug/m^3)	2nd Max. (ug/m^3)	Yearly Estim. Exceed.	3 yr. avg. Estim. Exceed.	Annual Avg. (ug/m^3)
1995	41	36	0.00	0.00	18
1996	56	38	0.00	0.00	20
1997	70	70	0.00	0.00	21 *
1998	47	46	0.00	0.00	23
1999	***sampling ended 12-31-98***				
2000					

Golden--911 10th 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)
1995	38	37	0.00	0.00	16
1996	43	31	0.00	0.00	16 *
1997	33	28	0.00	0.00	24 *
1998	***sampling ended 6-30-97***				
1999					
2000					

* *Annual average was calculated with one or more quarters h*aving 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

1995 through 2000

Adams City--4301 E. 72nd Ave.

Year	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	Overall
1995	> 100	> 100	> 100	> 100	100
1996	> 100	> 100	> 100	> 100	100
1997	> 100	> 100	> 100	> 100	100
1998	> 100	> 100	> 100	> 100	100
1999	> 100	> 100	> 100	> 100	100
2000	95	97	98	92	95

Brighton--22 S. 4th Ave.

Year	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	Overall
1995	> 100	> 100	> 100	> 100	100
1996	> 100	> 100	> 100	> 100	100
1997	> 100	> 100	100	88	97
1998	100	90	90	94	93
1999	90	97	87	84	90
2000	97	87	Construction 9/20/00-2/22/01		

Welby--78th Ave. & Steele St.

Year	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	Overall
1995	> 100	> 100	> 100	> 100	100
1996	> 100	> 100	> 100	> 100	100
1997	> 100	> 100	> 100	> 100	100
1998	> 100	93	100	81	94
1999	100	100	100	93	98
2000	75	87	100	93	89

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

Year	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	Overall
1995	> 100	> 100	> 100	> 100	100
1996	> 100	> 100	> 100	> 100	100
1997	> 100	> 100	> 100	> 100	100
1998	> 100	> 100	> 100	> 100	100
1999	> 100	> 100	> 100	> 100	100
2000	> 100	> 100	> 100	Sampler out 8/28/00-	

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

Boulder--14th & Spruce

Year	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	Overall
1995	87	100	94	73	89
1996	87	100	100	100	97
1997	100	93	93	N / A	96
1998					
1999		***sampling ended 9-30-97***			
2000					

Longmont--3rd & Kimbark

Year	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	Overall
1995	> 100	> 100	> 100	> 100	100
1996	> 100	> 100	> 100	> 100	100
1997	> 100	> 100	93	100	98
1998	67	100	94	77	85
1999	87	100	87	70	86
2000	87	97	100	80	91

Boulder Chamber Bldg.--2440 Pearl St.

Year	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	Overall
1995	100	93	100	87	95
1996	87	73	100	87	87
1997	100	87	80	94	90
1998	70	97	94	> 100	90
1999	93	100	93	69	89
2000	94	87	93	67	85

CAMP Primary hi-vol--2105 Broadway

Year	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	Overall
1995	80	93	94	> 100	92
1996	100	93	94	80	92
1997	100	100	87	> 100	97
1998	87	87	93	81	87
1999	100	90	***construction 6-99***		96
2000	60	93	100	93	96

**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
1995	> 100	> 100	> 100	> 100	100
1996	> 100	> 100	> 100	> 100	100
1997	> 100	> 100	> 100	> 100	100
1998	> 100	> 100	> 100	> 100	100
1999	> 100	> 100	construction 6-99		100
2000	construction 6/99-11/01			>100	100

Gates Primary hi-vol--1050 S. Broadway

Year	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	Overall
1995	93	100	100	93	97
1996	100	100	100	100	100
1997	100	93	93	100	97
1998	100	80	93	88	90
1999	93	100	100	100	98
2000	100	100	100	93	98

Denver Visitor's Center--225 W. Colfax

Year	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	Overall
1995	> 100	> 100	> 100	> 100	100
1996	> 100	> 100	> 100	> 100	100
1997	> 100	> 100	> 100	> 100	100
1998	> 100	> 100	> 100	> 100	100
1999	> 100	> 100	> 100	> 100	100
2000	> 100	> 100	> 100	> 100	100

Castle Rock--310 3rd St.

Year	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	Overall
1995	67	73	88	73	75
1996	80	60	81	93	79
1997	87	53	93	81	79
1998	7	93	100	100	75
1999	67	93	87	87	83
2000	94	100	100	93	97

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

Arvada--8101 Ralston Road

Year	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	Overall
1995	93	100	100	100	98
1996	93	100	100	100	98
1997	87	87	**73**	100	87
1998	100	87	100	81	92
1999					
2000	***sampling ended 12-31-98***				

Golden--911 10th St.

Year	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	Overall
1995	93	93	88	93	92
1996	93	100	100	73	92
1997	33	33	N / A	N / A	33
1998					
1999	***sampling ended 6-30-97***				
2000					

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

C. Approval of the PM_{10} Nonattainment SIP Element for the Denver Area

A comprehensive PM_{10} nonattainment SIP Element for Denver was approved by the EPA on April 17, 1997 (62 FR 18716).

D. Improvement in Air Quality Due to Permanent and Enforceable Emission Reductions

It is reasonable to attribute the improvement in ambient PM_{10} concentrations in the Denver area to emission reductions which are permanent and enforceable. The Denver area has met the national standard for PM_{10} as a result of effective State and federal emission reduction measures, as opposed to temporary or "chance" events.

A downturn in the economy is clearly not responsible for the improvement in ambient particulate levels in the Denver metropolitan area. Over the last ten years, the region has experienced strong growth while at the same time achieving a continuous attainment of the 24-hour and annual PM_{10} NAAQS. The Colorado State Demographer's Office reports that between 1990 and 2000, job growth in the Denver area increased at an annual rate of approximately three percent, population increased by about two percent each year, and personal income increased by approximately seven percent each year. In its 1997 Vehicle Miles Traveled (VMT) forecasting and tracking report, the Colorado Department of Transportation (CDOT) estimated a VMT increase of approximately eight percent between 1995 and 2000.

The existing control measures that have brought the Denver Metro area into attainment of the 24-hour PM_{10} standard include a mix of re-entrained fugitive dust controls, woodburning restrictions, the state's vehicle inspection/maintenance program and industrial source control regulations as follows:

1. Re-entrained Fugitive Dust Controls

One of the more important PM_{10} control measures for the Denver metropolitan area is the restrictions on street sanding and required street sweeping as defined in Regulation No. 16. Street sand is required to meet stringent specifications to reduce the amount of fines and increase the durability of the sanding materials. Most metro-area governments were required to reduce the amount of street sand applied to their roadways by 20 percent from a base sanding amount; the City of Denver was required to reduce the amount of sand applied by 30-50 percent. Additionally, mandatory street sweeping is required in the central area after each sanding event.

2. Woodburning Restrictions

Woodburning has been restricted in the Denver metro area a number of different ways. First, wood stoves have become cleaner as State and federal emission control requirements have been phased in beginning in the mid 1980's. Since 1991, Colorado's Regulation No. 4 requires all new stoves meet "phase III" requirements for reduced particulate emissions (phase III is equivalent to EPA's national phase II requirements). Regulation No. 4 also prohibits conventional woodburning fireplaces in new construction (which became effective in 1993). This ban has dramatically slowed the growth in wood smoke emissions and has encouraged conversion of existing fireplaces to natural gas. Finally, and most significantly, Regulation No. 4 prohibits most

wood burning activity on “high pollution days” between November 1 and March 31 throughout the metro area. This mandatory woodburning curtailment program began in the mid 1980's.

3. Vehicle Inspection & Maintenance Program

Colorado's Automobile Inspection and Readjustment (AIR) Program is described in AQCC Regulation No. 11 and has been applicable in the Denver area since 1981. The AIR Program works to reduce NO_x pollutants from gasoline-powered motor vehicles by requiring them to meet emission standards through periodic tailpipe tests, maintenance, and specific repairs. NO_x emissions react in the atmosphere to form fine particulates. The AIR Program was updated in 1994 to meet the requirements of the Clean Air Act Amendments of 1990, and a more stringent and effective “enhanced” inspection program began in 1995. The enhanced program uses a loaded-mode dynamometer test called I/M 240 for 1982 and newer vehicles and an idle test for older vehicles and heavy trucks.

4. Industrial Source Controls

The State’s comprehensive permit rules, AQCC Regulations No. 1, 3, and 6, control PM_{10}, SO_2 and NO_x matter emissions from power plants and industrial facilities. These rules also cap PM_{10} , SO_2 and NO_x emissions from new or modified major stationary sources. The State continues to enhance its permit and control programs, while simultaneously pursuing a strong inspection and enforcement presence, as authorized by the AQCC’s “Common Provisions” regulation.

E. CAA Section 110 and Part D Requirements

For the purposes of redesignation, all of the general nonattainment area requirements of CAA Section 110 and Part D must be met. In general, the requirements of Section 110(a)(2) are:

- 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;
- 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.

Colorado Revised Statute 25-7-111 requires the APCD to administer and enforce the air quality programs adopted by the AQCC. With a staff of 150 people and a budget of approximately $13 million, the APCD has committed to implementing and enforcing the air quality plans and regulations applicable to the Denver Metropolitan PM_{10} attainment/maintenance area.

The CAA's Part D, pertaining to nonattainment plan provisions, requires the following items to be addressed:

- the implementation of reasonably available control measures, including reasonably available control technologies (RACT) for existing sources
- reasonable further progress (RFP) towards meeting attainment
- the identification and quantification of allowable emissions for new and modified stationary sources
- a stationary source permitting program
- other measures: enforceable emission limitations, other control measures, schedule for compliance
- compliance with section 110 provisions
- contingency measures

All of the requirements of Section 110 and Part D have been met, as is required for approval of this maintenance plan and redesignation request. Most of the requirements for Section 110 and Part D are general requirements applicable to the state implementation in general, not just the state implementation plan for controlling PM_{10} in the Denver area. All such general requirements are already included in the state implementation plan and have already been approved by EPA. Any requirements of Section 110 and Part D that apply specifically to the control of PM_{10} in the Denver attainment/maintenance area are addressed elsewhere in this maintenance plan.

Other Part D requirements that are applicable in nonattainment and maintenance areas include the general and transportation conformity provisions of CAA Section 176 (c). These provisions ensure that federally funded or approved projects and actions conform to the Denver State Implementation Plan Element/Maintenance Plan for PM_{10} prior to the projects or actions being implemented. The State has already submitted to EPA a State Implementation Plan revision implementing the requirements of section 176(c).

CHAPTER 4: MAINTENANCE PLAN

Section 107(d)(3)(E) of the CAA stipulates that for a nonattainment area to be redesignated to attainment, EPA must fully approve a maintenance plan which meets the requirements of CAA Section 175A. The maintenance plan is a SIP revision and must provide for maintenance of the relevant NAAQS in the area for at least ten years after redesignation by EPA.

Because EPA is allowed up to two years to approve redesignation requests after receiving a complete submittal, and given the time needed to complete the State processes for AQCC rule-making and legislative approval, the milestone year for this maintenance plan is 2015.

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 2015. 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. This includes EPA's regulations adopted in February 2000 for Tier II/gasoline sulfur standards. While credit is taken for these federal requirements, they are not part of the Colorado SIP. The plan does not include nor take credit for EPA's standards for diesel vehicles and diesel sulfur, which were promulgated in December 2000.

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.

c. Street Sanding

Air Quality Control Commission Regulation No. 16 covers street sanding and sweeping requirements. Revisions to this regulation were adopted on April 19, 2001 in conjunction with this maintenance plan and impose additional SIP requirements (See Appendix A).

The revised Regulation No. 16 that is part of this maintenance plan requires:

- 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)

All of these requirements will be effective during the winter season of 2001/02 and throughout the period of the maintenance plan.

d. Automobile Inspection/Maintenance

Air Quality Control Commission Regulation No. 11 covers the Automobile Inspection and Readjustment (A.I.R.) Program as amended on January 10, 2000 and submitted to the EPA for approval on May 10, 2000 as part of the Denver area redesignation request and maintenance plan for carbon monoxide. The regulation establishes current and future cutpoints for NO_x emissions and implements a remote sensing clean screen program to augment the current inspection program. This maintenance plan makes no additional changes to Regulation No. 11.

e. Stationary Sources

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

- 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 limits in the regulation in calculations of maximum allowable emissions for stationary sources.

  Revisions to Regulation No. 1 that were adopted as part of this maintenance plan includes the following limitations for metro area power plants:

  - 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 is effective upon approval of the redesignation request by EPA.

  - Retirement of Arapahoe Units 1 and 2, effective January 1, 2003 and upon approval of the redesignation request by EPA. 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.

  - 0.60 lb/mmbtu NOx limit for Cherokee Unit 1, based on a 30-day rolling average. This limit is effective January 1, 2005 provided EPA approves the redesignation request.

  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.

- 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.

  Although this maintenance plan makes no revisions to Regulation No. 3, revisions to the Ambient Air Quality Standards Regulation adopted as part of this maintenance plan retain the existing requirements for minor sources of PM_{10} and PM_{10} precursors to use reasonably available control technology (Part B, Section IV.D (2)(d)(i) and (ii)].

- Regulation No. 6 implements the federal standards of performance for new stationary sources. This maintenance plans 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.

- ♦ 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.

In accordance with State and federal regulations and policies, the State and federal nonattainment NSR requirements will revert to the State and federal attainment PSD permitting requirements once EPA approves this redesignation request and maintenance plan. 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

In its 1997 approval of the PM-10 SIP, EPA approved several control measures that are no longer necessary in the SIP in order to demonstrate continued maintenance of the standard. The State of Colorado requests removal of the following measures from the SIP as part of this maintenance plan:

a. Diesel Inspection/Maintenance Program

Regulation No. 12, concerning the reduction of diesel vehicle emissions, is hereby removed from the SIP. Since the current diesel inspection/maintenance program would receive only a small emission reduction benefit in the current SIP modeling, no credit is taken for this strategy in the emission inventory calculations and maintenance demonstration.

b. Oxygenated Gasoline Program

Regulation No. 13, concerning the oxygenated gasoline program, is hereby removed from the PM_{10} SIP element. Since oxygenated gasoline results in only a small reduction in direct PM-10 emissions, no credit is taken for this strategy in the emission inventory calculations and maintenance demonstration. Regulation No. 13 remains part of the carbon monoxide maintenance plan.

c. Individual Stationary Source Permits

In its 1997 approval of the PM-10 SIP, EPA incorporated by reference several permits for individual stationary sources (40 CFR 52.320(c)(61)(i)(D) and (E), and 52.320(82)(i). This maintenance plan hereby removes all of these referenced permits from the SIP: Public Service Company Cherokee station, Purina Mills, Electron Corp., Trigen-Colorado Energy Corp., Rocky Mountain Bottle Co., and Conoco refinery. The State of Colorado has determined they do not need to be incorporated in the SIP since no credit for permit limits is taken in the plan's maintenance demonstration. Permit limits are contained in underlying regulations or these sources are modeled at their maximum potential to emit.

B. Emission Inventories

This section presents emission inventories for the maintenance plan. Emission inventories are provided for the 1995 attainment year, the 2002, 2003, 2005 and 2010 interim years, and the 2015 maintenance year.

The 1995 inventory incorporates the projected emissions and control measures in place at that time (as documented in the February 1995 edition of the Denver PM-10 nonattainment SIP Element). The 2002, 2003, 2005, 2010 and 2015 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 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 2020 Regional Transportation Plan (November 2000). These data are summarized in the following table:

Table 4-1: Demographic and Transportation Data

PM-10 Modeling Domain

	1995	2002	2005	2010	2015
Population	1,663,791	1,992,128	2,115,292	2,273,835	2,422,561
Households	693,688	836,158	890,629	961,692	1,031,744
Employment	1,005,129	1,180,036	1,285,223	1,420,487	1,504,693
Daily VMT	37,220,631	51,043,670	55,137,245	62,712,672	66,493,588

2. Emissions Inventory Data

The detailed emissions inventories for 1995, 2002, 2003, 2005, 2010 and 2015 are presented in Table 4.2.

C. Maintenance Demonstration

As required by CAA Section 175A(a), each request for redesignation shall be accompanied by a SIP revision which provides for maintenance of the NAAQS for at least 10 years after 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 2002, 2003, 2005, 2010 and 2015, 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. Future secondary particulate concentrations are based on a baseline (1989) secondary concentration determined from Chemical Mass Balance analysis and the change in total NOx and SO_2 emissions from baseline to future years. 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 highest 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 model and background for 2002 shows the highest 24-hour 6th maximum PM_{10} concentrations at a receptor just north of the Cherokee Electrical Generating Station in Adams County. For 2003, 2005, 2010 and 2015, the modeling shows highest 24-hour 6th maximum PM_{10} concentrations at the CAMP (20th & Broadway) monitor. The table below demonstrates maintenance of the standard during the entire period of the maintenance plan from 2002 through 2015.

Figure 4.1: PM-10 Modeling Domain

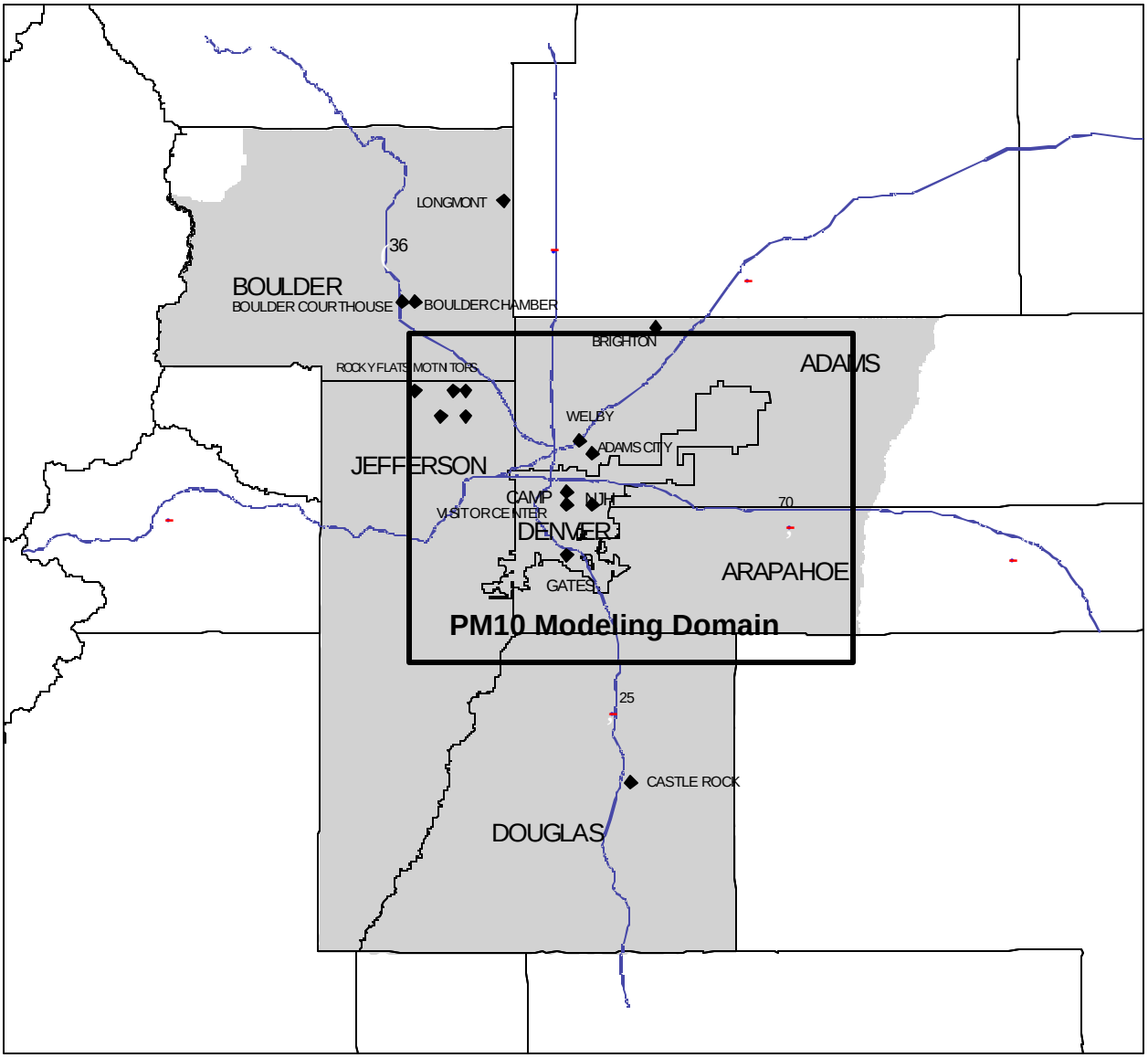

TABLE 4.2: PRIMARY AND SECONDARY EMISSIONS INVENTORY

PRIMARY PM_{10} Source Category	**1995 attain.* *(tpwd)***	**2002 maint. *(tpwd)***	**2003 maint. *(tpwd)***	**2005 maint. *(tpwd)***	**2010 maint. *tpwd***	**2015 maint. *tpwd***
NATURAL GAS	1.0	1.2	1.2	1.3	1.4	1.5
WOODSTOVE	1.7	1.9	1.9	2.0	2.2	2.3
FIREPLACE	2.4	1.6	1.6	1.3	1.0	0.7
AIRPORT	0.6	0.6	0.6	0.6	0.7	0.7
RAILROAD	0.1	0.1	0.1	0.1	0.1	0.1
INDUSTRIAL EQUIPMENT	0.1	0.1	0.1	0.1	0.1	0.1
CONSTRUCTION EQUIPMENT	0.4	0.3	0.3	0.2	0.3	0.3
WIND EROSION	0.0	0.0	0.0	0.0	0.0	0.0
IRRIGATED WIND EROSION	0.0	0.0	0.0	0.0	0.0	0.0
DRYLAND TILLING	0.0	0.0	0.0	0.0	0.0	0.0
CONSTRUCTION	2.9	4.0	4.0	4.1	3.9	3.7
UNPAVED ROAD	7.9	6.9	6.9	6.9	6.9	6.9
ON-ROAD (exh/sand/dust)	41.2	42.3	43.3	44.8	48.5	51.1
CHARBROILERS	1.0	1.2	1.2	1.3	1.4	1.5
POINT SOURCE (minor)	5.8	7.6	7.9	8.2	8.8	9.4
POINT SOURCE (major)**	1.9	18.5	17.3	17.3	17.3	17.3
TOTAL PRIMARY PM_{10}	**66.9**	**86.3**	**86.5**	**88.1**	**92.5**	**95.6**
NOx Source Category	**1995 tpwd**	**2002 tpwd**	**2003 tpwd**	**2005 tpwd**	**2010 tpwd**	**2015 tpwd**
POINT SOURCES***	137.8	151.2	133.9	128.8	130.4	132.2
NATURAL GAS	32.7	38.9	39.9	41.9	45.8	48.8
WOOD BURNING	0.5	0.6	0.6	0.7	0.9	1.0
AIRPORT NO_X	11.4	13.7	13.9	16.8	20.6	24.2
OTHER NON-ROAD	10.9	11.2	11.1	10.9	9.7	9.2
MOBILE EXHAUST	119.4	137.7	130.4	109.6	104.0	87.8
TOTAL NO_X	**312.7**	**353.3**	**329.8**	**308.8**	**311.3**	**303.3**
SO_2 Source Category	**1995 tpwd**	**2002 tpwd**	**2003 tpwd**	**2005 tpwd**	**2010 tpwd**	**2015 tpwd**
POINT SOURCES***	175.5	200.2	180.5	181.1	182.0	183.1
NATURAL GAS	0.2	0.2	0.2	0.3	0.3	0.3
WOOD BURNING	0.0	0.1	0.1	0.1	0.1	0.1
AIRPORT	1.0	1.1	1.2	1.2	1.3	1.4
OTHER NON-ROAD	0.9	1.2	1.3	1.3	1.5	1.7
MOBILE EXHAUST	2.5	5.6	5.8	6.1	2.1	2.2
TOTAL SO_2	**180.1**	**208.4**	**189.1**	**190.0**	**187.3**	**188.8**

* From original attainment SIP.

** In the original SIP, five sources were considered to be major sources and the maximum allowable emissions calculation was based on the maximum operating rates with existing control equipment. In this maintenance plan, these sources are modeled at their allowable emission rates according to regulation or permit, resulting in much higher potential emissions.

*** 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 NOx and SO_2 will be much lower in future years.

Table 4.3: Maintenance Demonstration

Standard = 150 ug/m^3

Year	Receptor	Julian Day	Total Concentration *ug/m^3*	Area/Mobile/ Minor Pt. Src. (RAM) *ug/m^3*	Major Point Source (ISC) *ug/m^3*	Secondary Roll-Forward *ug/m^3*	Background *ug/m^3*
2002	973	88340	148.6	80.9	0.64	52.6	14.4
2003	CAMP	85007	144.9	81.1	0.01	48.4	15.4
2005	CAMP	87327	140.3	75.7	0.32	46.6	17.7
2010	CAMP	87327	145.2	80.5	0.32	46.6	17.7
2015	CAMP	87327	148.8	84.7	0.32	46.1	17.7

The technical support document for this maintenance plan describes in detail the assumptions and methodologies used for all modeling work.

D. PM-10 and NOx Motor Vehicle Emissions Budgets

1. Requirements for Establishing 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, August 15, 1997) 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.

For transportation plan analysis years after the last year of the maintenance plan (in this case, 2015), 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.

2. Pollutants of Coverage

This maintenance plan establishes separate motor vehicle emission budgets for total primary PM-10 and NOx 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/m^3). 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. PM-10 and NOx Budgets

As shown in the maintenance demonstration earlier in this plan, the 2002, 2003, 2005, 2010 and 2015 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.

This maintenance plan allocates the available "safety margin" as illustrated below:

Table 4.4: Allocation of Available Safety Margin in 2015

Standard = 150 ug/m^3

Maximum Allowable Concentration	149.9 ug/m^3
Maintenance Demonstration - 2015 (Table 4.3)	148.8 ug/m^3
Available "safety margin" below standard	1.1 ug/m^3
Secondary Concentration (Table 4.3)	46.1 ug/m^3
Allowable Secondary Concentration	47.2 ug/m^3
Allowable NOx+SO2 Emissions**	505 tpd
2015 NOx+SO2 Emissions (Table 4.2)	492 tpd
Available "safety margin" for NOx emissions	13 tpd
Motor vehicle NOx emissions in 2015 (Table 4.2)	88 tpd
NOx emissions budget	101 tpd

**PM-10 emissions kept constant. 10.7 tpd of NOx equals 1 ug/m^3

The budget allocates the entire “safety margin” to the NOx budget while keeping the PM-10 budget the same as the level of PM-10 emissions in the maintenance demonstration. It is generally believed that NOx is more difficult for local control measures, while PM-10 can be reduced more readily through the local conformity commitment process. In addition, estimates of future NOx emissions from new mobile source emission models are more uncertain at this time.

Therefore, this maintenance plan establishes emission budgets in the maintenance year and beyond as follows:

Table 4.5: Motor Vehicle Emissions Budgets for PM-10 and NOx

	PM-10 (tpd)	NOx (tpd)
2015 and beyond	51	101

For transportation plan analysis years prior to the last year of the maintenance plan, consistent with EPA’s conformity regulation, conformity findings prepared by DRCOG will need to make a qualitative finding that there are no factors which would cause or contribute to a new violation or exacerbate an existing violation. The region’s established interagency conformity consultation process shall determine what must be considered in order to make such a finding.

Consistent with EPA’s conformity regulation, this maintenance plan deletes the existing SIP requirement for dispersion modeling as part of future regional conformity determinations. Consistency with the emission budgets is the only federal requirement.

5. 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 2020 Transportation Plan and 2001-2006 TIP, upon which this maintenance plan is also based. Therefore, the 2020 Transportation Plan and the current and subsequent TIPs are presumed to be consistent with this maintenance plan for purposes of considering PM_{10} construction-related emissions in future conformity determinations. Thus, the construction-related emissions from the 2020 Transportation Plan and current and subsequent TIPs are accounted for in the maintenance demonstration, as are any new or revised transportation plans or improvement programs with construction-related emissions equal to, or less than, the construction-related emissions from the 2020 Transportation Plan and 2001-2006 TIP.

DRCOG may presume that any future plan or program, or amendment to a plan or program, will have construction-related emissions less than, or equal to, the 2020 Transportation Plan and 2001-2006 TIP if the number of lane miles to be constructed, on an annualized basis, in such new or amended plan or program are less than or equal to the maximum number of lane-miles to be constructed, on an annualized basis, pursuant to the 2020 Transportation Plan and 2001-2006 TIP. For purposes of making this determination, the term "lane-miles" shall mean one mile of a transit line or one mile of a lane on a roadway on the regional plan. If the number of lane miles to be constructed in a new or amended plan or program exceed the number of lane miles to be constructed pursuant to the 2020 Transportation Plan and 2001-2006 TIP, the existing interagency consultation process will be used to determine how the additional construction-related emissions, if any, will be analyzed or mitigated for purposes of the regional emissions analysis.

E. Monitoring Network / Verification of Continued Attainment

Once the Denver metropolitan area has been redesignated to attainment status by EPA, 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 :

- Repeal sections IV.A.2, IV.B.3, IV.D, IV.D.1, IV.D.2, IV.D.3 and IV.D.4 of Regulation No. 11, Part A, which provisions were adopted by the AQCC on January 10, 2000 as part of the Carbon Monoxide Maintenance Plan. Such provisions amended the automobile inspection and readjustment program to add a clean screen program based on remote sensing.

- 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:

- Increased street sweeping requirements
- Expanded, mandatory use of alternative de-icers
- More stringent street sand specifications
- Road paving requirements
- Further woodburning restrictions
- Re-establishing new source review permitting requirements for stationary sources
- NOx RACT for stationary sources
- Transportation control measures designed to reduce vehicle miles traveled
- Improved diesel inspection/maintenance Program
- Retrofit program for heavy-duty diesel truck engines
- 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 NOx 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.

3. 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

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. Colorado commits to revise the maintenance plan under the one-year option described in the supplemental notice of proposed rule at 65 FR 46383 (July 28, 2000) and within twelve months of the later of the official release of: (1) MOBILE6, (2) the MOBILE6 particulate emissions replacement for PART5 (MOBILE6.1), or (3) the MOBILE6 guidance to enable Colorado to model its vehicle inspection/maintenance program for the model years after 1995.

As stated earlier, it is required that a maintenance plan revision be submitted to the EPA eight years after the original redesignation request/maintenance plan is approved - the purpose of this revision is to provide for maintenance of the NAAQS for an additional ten years following the first ten-year period. The State of Colorado commits to submit a revised maintenance plan eight years after redesignation to attainment, as required by the CAA.

H. Nonseverability and Waiver

Unless waived by the Colorado Department of Public Health and Environment, the provisions of this maintenance plan shall be nonseverable. If the redesignation of the Denver PM_{10} nonattainment area as an attainment area or any provisions of this maintenance plan are disapproved by EPA or otherwise ruled invalid, such disapproval or invalidity shall apply to this maintenance plan in its entirety. The Colorado Department of Public Health and Environment may, however, waive this nonseverability clause.

Carbon Monoxide Maintenance Plan For the Denver Metropolitan Area

Revision to the Maintenance Plan Previously Approved
By the U.S. Environmental Protection Agency
On December 14, 2001

Approved by:
Colorado Air Quality Control Commission
June 19, 2003

Contact Information:

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REVISED MAINTENANCE PLAN

CARBON MONOXIDE MAINTENANCE PLAN FOR THE DENVER METROPOLITAN AREA

Revision to Maintenance Plan Previously Approved by U.S. Environmental Protection Agency on December 14, 2001

The State of Colorado, in coordination with the Regional Air Quality Council, is submitting this Carbon Monoxide (CO) Maintenance Plan Revision to revise the motor vehicle emissions inventories and budget based on EPA's mobile source emissions estimating model, MOBILE6, which was officially released in January 2002.

The previously approved Denver Metro Area Carbon Monoxide Maintenance Plan, which was submitted by the Governor on May 10, 2000, was formally approved by the EPA (66 FR 64751) on December 14, 2001 (effective date January 14, 2002). In that action the Denver Metro Area was redesignated by the EPA from a "serious" CO non-attainment area to attainment of the CO National Ambient Air Quality Standard (NAAQS). In addition, revisions to Air Quality Regulations No. 11 (Inspection/Maintenance) and No. 13 (Oxygenated Fuels), Ambient Air Quality Standards Regulation and the CO transportation conformity (motor vehicle emissions) budget were approved in that action

In January 2002, EPA issued policy guidance for states and local areas to use when developing SIP revisions using MOBILE 6 (*"Policy Guidance on the Use of MOBILE6 for SIP Development and Transportation Conformity," January 18, 2002*). The guidance allows areas to revise their motor vehicle emissions inventories and budgets using MOBILE6 without revising the entire SIP or completing additional modeling if :

1) the SIP continues 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,
2) the State can document that the growth and control strategy assumptions for non-motor vehicle sources continue to be valid and any minor updates do not change the overall conclusion of the SIP.

This proposed revision is based on the procedures outlined in this guidance. The revised maintenance plan merely replaces 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 resultant maintenance year and interim year inventories continue 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 remain valid.

Since this revision to the Denver area SIP is an update to a previously approved maintenance plan, the 2013 maintenance year contained in the previously approved maintenance plan remains the appropriate maintenance year for this revision.

The most recent three years (2000-02) of monitored data which are presented in Section A, show the Denver area has maintained attainment of the standard since the redesignation was approved.

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

This maintenance plan revision follows the same format as the previously approved maintenance plan. Most sections noted above remain unchanged or only slightly changed. Only sections 2, 3 and 4 listed above contain substantive revisions based on the introduction of MOBILE6 emission inventories.

A. CONTINUED ATTAINMENT OF THE CARBON MONOXIDE STANDARD

Attainment of the national ambient air quality standard for carbon monoxide is demonstrated when two consecutive years of monitoring data for each site show no more than one exceedance per year of the 8-hour (9 ppm) and 1-hour (35 ppm) standards. Monitoring data for 2001-02 demonstrates that the Denver metropolitan area continues to attain/maintain the national standard for carbon monoxide as required by 40 CFR 50.8. Data from 2000 is provided to demonstrate continual attainment/maintenance since the previously approved Maintenance Plan was adopted. This is based on quality assured monitoring data representative of the location of expected maximum concentrations of carbon monoxide in the area (downtown Denver).

The current carbon monoxide ambient monitoring network consists of 7 sites operated by the Colorado Air Pollution Control Division. The sites are listed along with summary data from 2000 and 2002 in Tables 1, 2 and 3.

The monitoring data presented in Tables 1, 2 and 3 verify that the Denver area continues to attain the national standard for carbon monoxide. Data recovery rates for the monitors exceed the 75% completeness requirements for all years, and all state and federal quality assurance procedures have been complied with, further substantiating their validity as indicators of ambient carbon monoxide levels in the Denver metropolitan area. Figure1, Historical Monitoring Data for the CO NAAQS by Monitor Site, includes long term monitoring records of each monitoring site

which demonstrate that the Denver area has been in attainment with the national ambient air quality standard for carbon monoxide since 1996 and has had a continuous downward trend in CO levels since 1992. Figure 2 shows the geographic distribution of the monitors.

Table 1
2000 Carbon Monoxide Data Summary for the Denver Metropolitan Area
Standards: 1-hour: 35 ppm*; 8-hour: 9-ppm**

Site Name	1-Hour		8-Hour	
	Maximum ppm	2nd Maximum ppm	Maximum ppm	2nd Maximum ppm
Welby, 78th Ave & Steele St.	4.3	4.3	3.0	2.9
Boulder, 2150 28th St	10.0	9.6	6.8	4.3
Denver CAMP, 2105 Broadway***	17.1	12.8	8.5	5.4
Denver, NJH, 14th Ave. & Albion St.	8.7	7.6	4.8	4.7
Denver Carriage, 23rd Ave & Julian St.	5.8	5.6	4.1	3.4
Denver Speer & Auraria, Firehouse #6	9.3	8.6	5.0	4.6
Arvada, 57th Ave. & Garrison St.	7.1	6.2	3.9	3.8

* Due to mathematical rounding, a value of 35.5 ppm or greater is necessary to exceed the standard.
** Due to mathematical rounding, a value or 9.5 ppm or greater is necessary to exceed the standard.
*** Site was closed for reconstruction part of the year.

Table 2
2001 Carbon Monoxide Data Summary for the Denver Metropolitan Area
Standards: 1-hour: 35 ppm*; 8-hour: 9-ppm**

Site Name	1-Hour		8-Hour	
	Maximum ppm	2nd Maximum	Maximum	2nd Maximum ppm
Welby, 78th Ave & Steele St.	6.1	5.8	3.4	3.3
Boulder, 2150 28th St	9.1	6.8	4.5	3.4
Denver CAMP, 2105 Broadway	14.4	9.3	4.4	4.1
Denver, NJH, 14th Ave. & Albion St.	9.7	8.5	4.0	3.9
Denver Carriage, 23rd Ave & Julian St.	7.1	6.5	3.8	3.7
Denver Speer & Auraria, Firehouse #6	7.8	7.0	4.6	4.0
Arvada, 57th Ave. & Garrison St.	6.2	5.0	3.1	3.0

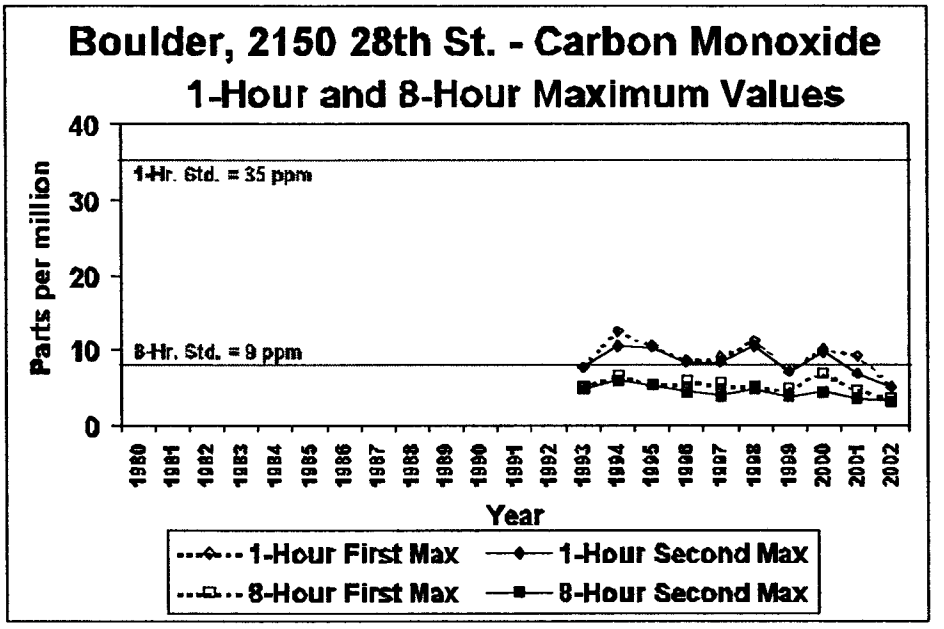
* Due to mathematical rounding, a value of 35.5 ppm or greater is necessary to exceed the standard.
** Due to mathematical rounding, a value or 9.5 ppm or greater is necessary to exceed the standard.

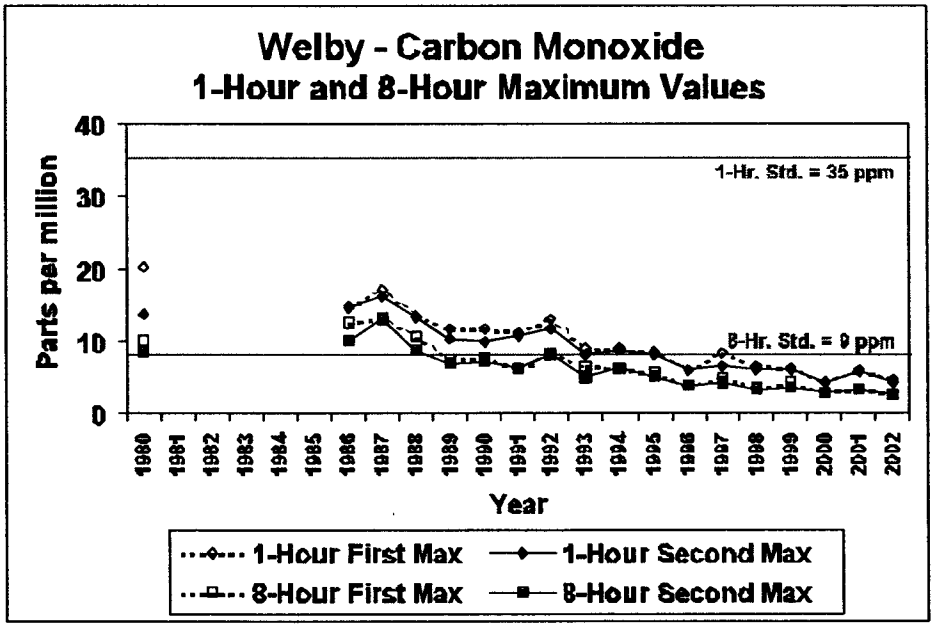
Table 3
2002 Carbon Monoxide Data Summary for the Denver Metropolitan Area*
Standards: 1-hour: 35 ppm*; 8-hour: 9-ppm**

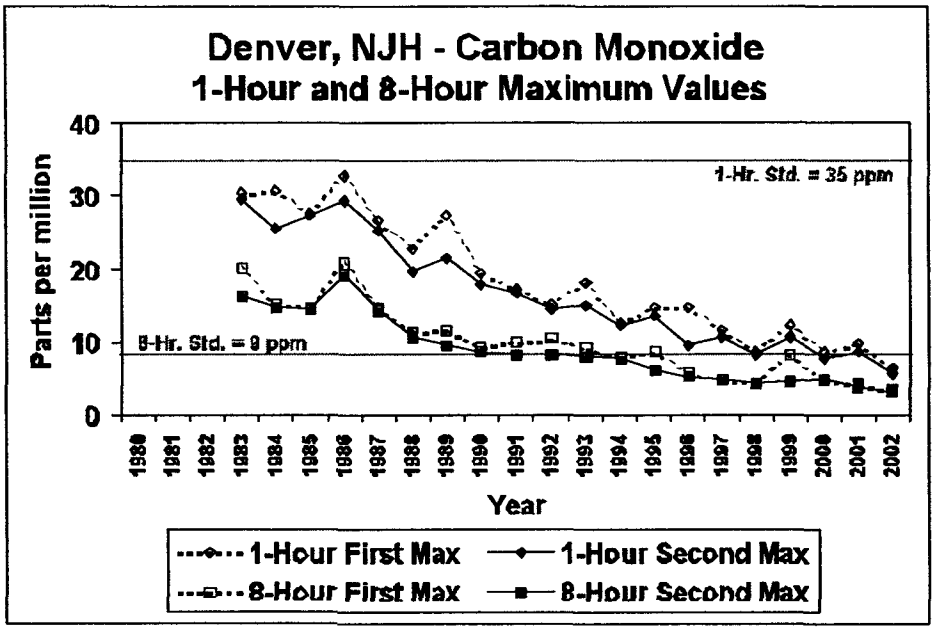
Site Name	1-Hour		8-Hour	
	Maximu	2nd Maximum	Maximu	2nd Maximum ppm
Welby, 78th Ave & Steele St.	4.8	4.4	2.8	2.6
Boulder, 2150 28th St	5.0	5.0	3.5	3.0
Denver CAMP, 2105 Broadway	7.4	7.4	3.7	3.7
Denver, NJH, 14th Ave. & Albion St.	6.3	5.6	3.5	3.1
Denver Carriage, 23rd Ave & Julian St.	4.9	4.6	3.7	2.7
Denver Speer & Auraria, Firehouse #6	8.5	7.5	3.9	3.6
Arvada, 57th Ave. & Garrison St.	4.9	4.7	3.0	2.6

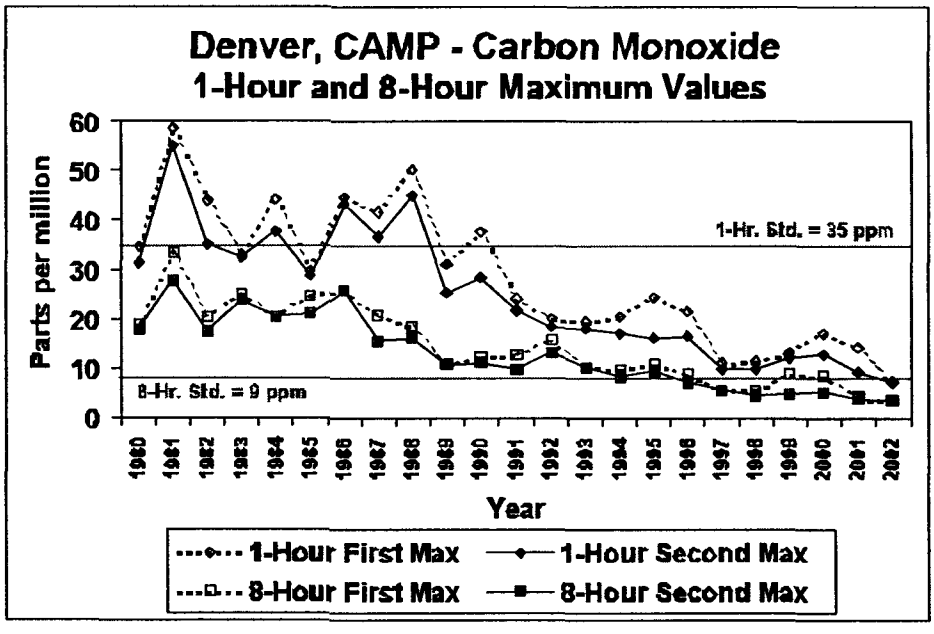
* Due to mathematical rounding, a value of 35.5 ppm or greater is necessary to exceed the standard.
** Due to mathematical rounding, a value or 9.5 ppm or greater is necessary to exceed the standard.
*** Preliminary data.

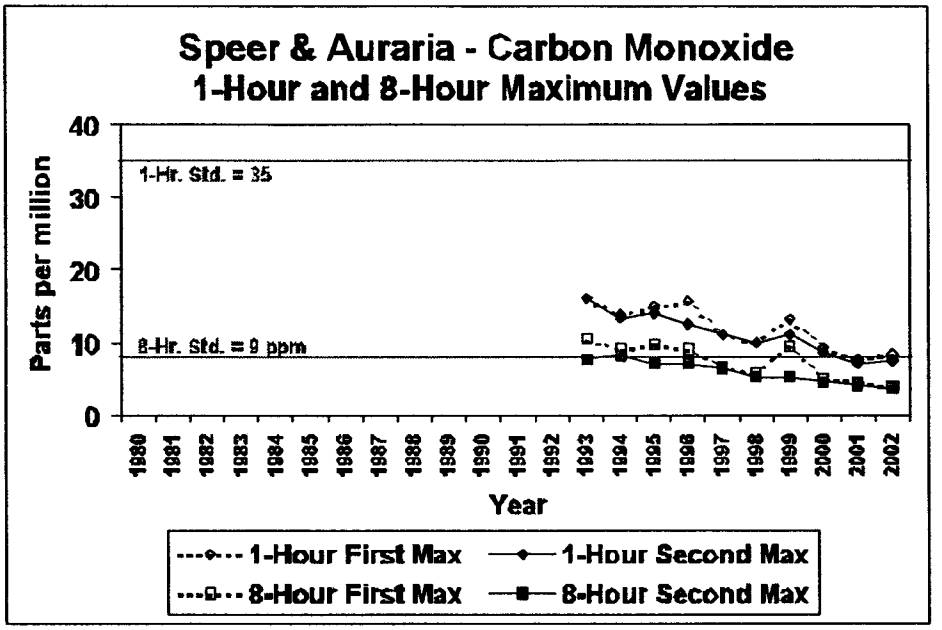
Figure 1
Historical Monitoring Data for the CO NAAQS by Monitor Site

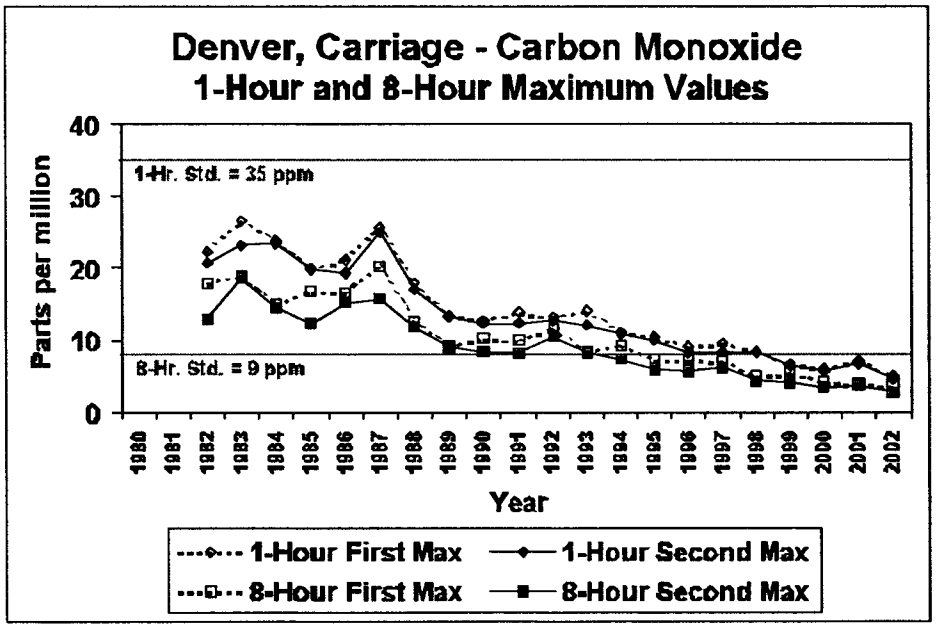





Denver, NJH - Carbon Monoxide
1-Hour and 8-Hour Maximum Values
Parts per million
40
30
20
10
0
1-Hr. Std. = 35 ppm
8-Hr. Std. = 9 ppm
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
Year
1-Hour First Max
1-Hour Second Max
8-Hour First Max
8-Hour Second Max


Denver, CAMP - Carbon Monoxide
1-Hour and 8-Hour Maximum Values
Parts per million
60
50
40
30
20
10
0
1-Hr. Std. = 35 ppm
8-Hr. Std. = 9 ppm
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
Year
1-Hour First Max
1-Hour Second Max
8-Hour First Max
8-Hour Second Max


Speer & Auraria - Carbon Monoxide
1-Hour and 8-Hour Maximum Values
Parts per million
40
30
20
10
0
1-Hr. Std. = 35
8-Hr. Std. = 9 ppm
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
Year
1-Hour First Max
1-Hour Second Max
8-Hour First Max
8-Hour Second Max


Denver, Carriage - Carbon Monoxide
1-Hour and 8-Hour Maximum Values
Parts per million
40
30
20
10
0
1-Hr. Std. = 35 ppm
8-Hr. Std. = 9 ppm
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
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2000
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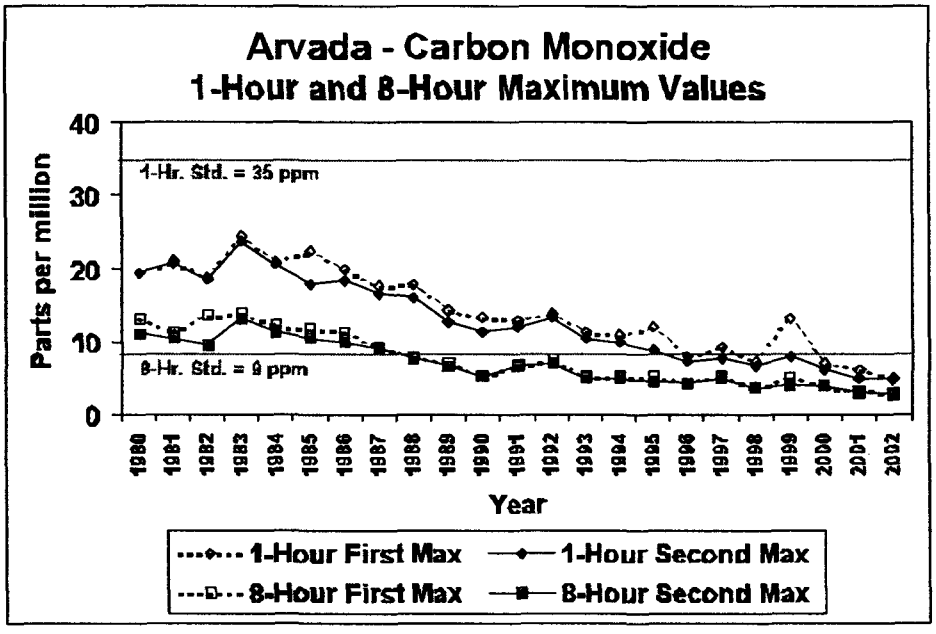
2002
Year
1-Hour First Max
1-Hour Second Max
8-Hour First Max
8-Hour Second Max



B. MAINTENANCE PLAN CONTROL MEASURES

The Denver metropolitan area will continue to rely on the control programs contained in the Maintenance Plan approved on December 14, 2001 to demonstrate maintenance of the carbon monoxide standards through 2013. No substantive changes have been made to these programs or their implementing regulations.

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.

Specific programs and requirements that ceased to be part of the State Implementation Plan upon redesignation and approval of Maintenance Plan by EPA on December 14, 2001 are: 1) the contingency measures included in the 1994 attainment SIP; 2) the requirement for VMT tracking; and 3) the requirement for periodic emission inventories. The Clean Fuels Fleet Program is 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 through a separate submittal, which was also approved by the EPA on December 14, 2001.

The specific enforceable control measures that continue to be a part of the Maintenance plan are listed below.

1. 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.

2. Air Quality Control Commission Regulation No. 11 -- covering the Automobile Inspection and Readjustment (A.I.R.) Program. The Maintenance plan revision makes no changes to this regulation.

   Implementation Update: The implementation of the Clean Screen element of the A.I.R Program has not met the schedule defined in the regulation noted above nor assumed in the previously approved mobile source modeling with MOBILE5. However, the Clean Screen program results in a disbenefit (lowering estimated reductions) to the Denver metro area motor vehicle emissions and therefore its lack of implementation does not negatively impact the motor vehicle emissions inventory calculation.

3. Air Quality Control Commission Regulation No. 13 -- covering the oxygenated gasoline program. This Maintenance plan makes no revisions to this regulation.

   Implementation Update: The schedule within the regulation has been maintained and is reflected in the motor vehicle emissions estimates.

4. Air Quality Control Commission Regulation No. 4 -- covering wood burning control programs. The Maintenance plan makes no revisions to the wood burning control programs.

5. Air Quality Control Commission Regulations No. 3, No. 6 and Common Provisions – covering industrial source control programs. The Common Provisions, and Parts A and B of Regulation No. 3, are already included in the approved SIP. Regulation No. 6, and Part C of Regulation No. 3, implement the federal standards of performance for new stationary sources and the federal operating permit program. The Maintenance plan makes no revisions to these regulations. This reference to Regulation No. 6 and Part C of Regulation No. 3 shall not be construed to mean that these regulations are included in the SIP.

6. In accordance with State and federal regulations and policies, the State and federal nonattainment New Source Review (NSR) requirements in effect for the Denver area reverted to the State and federal attainment Prevention of Significant Deterioration (PSD) permitting requirements once EPA approved the redesignation request and maintenance plan. This maintenance plan revision makes no changes to these PSD permitting requirements.

C. EMISSION INVENTORIES

This section presents the emission inventories portion of the maintenance plan. Emission inventories are provided for the 2001 attainment year, the 2006 interim year, and the 2013 maintenance year (see Table 4).

The 2001 inventory from the 1994 Denver Nonattainment SIP Element incorporates the nonattainment control measures described in that SIP element. The 2006 and 2013 inventories incorporate the maintenance plan control measures described above. The mobile source control measures from 2001, 2006 and 2013 for this revision to the maintenance plan have been included in the revised MOBILE6.2 motor vehicle emissions estimates.

All of the inventories are for the Denver metropolitan area carbon monoxide attainment/maintenance area (see Figure 2) and provide emissions estimates for a weekday during the winter carbon monoxide season (November through February). The carbon monoxide attainment/maintenance area is somewhat smaller than the modeling domain. The carbon monoxide attainment/maintenance area is used to establish the mobile source 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 the demographics data from the maintenance plan previously approved on December 14, 2001. A comparison with Denver Regional Council of Governments' (DRCOG's) latest demographics data based on the 2000 census have been included to show that the growth assumptions in the previously approved maintenance plan continue to be valid for use in this revised Maintenance Plan. The transportation data for this revised Maintenance Plan has been updated with the most recently available data sets from DRCOG used for the 2025 Regional Transportation Plan (adopted in April 2002). The technical support document for this revised maintenance plan summarizes information on the assumed methodology, growth surrogate and/or control assumptions for each non-motor vehicle (point and area) source category. The area, non-road mobile and point source inventories in the previously approved plan remain valid as discussed below and are not changed in this revision.

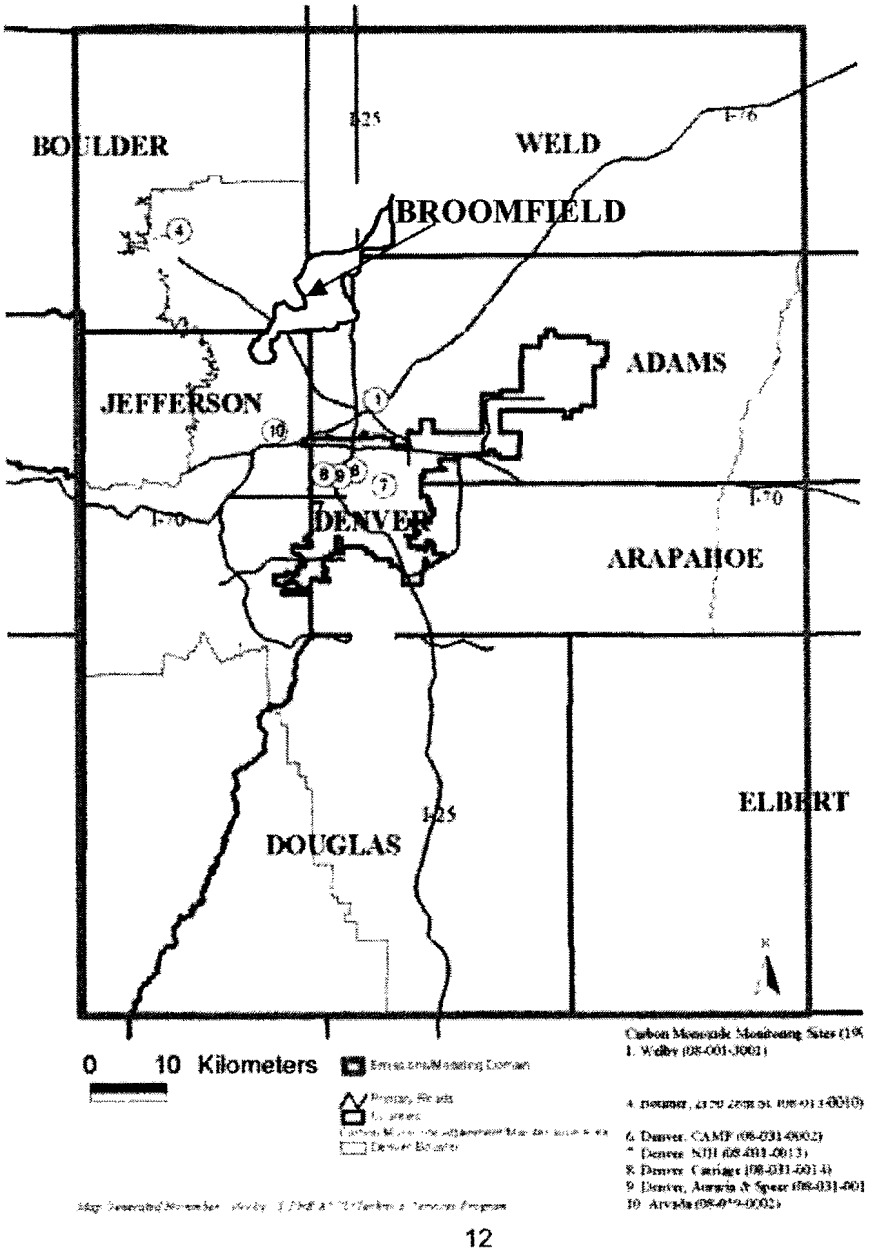
Section 2.5.1 of the previously approved Technical Support Document, dated January 10, 2001 specifically discusses emissions estimates for the Denver International Airport (DIA). In that section, the Air Pollution Control Division specifically identifies and accounts for DIA emissions in the previously approved Maintenance Plan. Therefore, for the purposes of general conformity demonstration DIA should use the emissions inventory from Table 16 of the previously approved Technical Support Document. There have been no changes in future emission estimates for DIA and therefore estimates contained in the previously approved maintenance plan remain valid and are not changed in this revision.

Table 4
Emission Inventories for the Denver
Carbon Monoxide Attainment Area
Carbon Monoxide Emissions (tons/day)

Source Category	2001 Attainment Inventory	2006 Interim Year Inventory	2013 Maintenance Year Inventory
Point Sources[1]	31.6	25.6	25.6
Wood burning	46.5	29.0	22.4
Natural Gas	6.6	8.3	9.3
Structural Fires	3.6	4.7	5.2
Agriculture Equip.	0.0	0.0	0.0
Airport - Aircraft	15.3	21.6	23.7
Airport Service Equip.	7.6	7.2	7.7
Construction Equip.	9.4	7.4	7.7
Industrial Equip.	23.0	20.9	21.7
Light Commercial Equip.	129.0	118.9	123.9
Helicopters	0.3	0.3	0.3
Railroads	0.3	0.3	0.3
POINT & AREA SOURCE SUBTOTAL	273	244	248
MOBILE6 On-Road Mobile	1638	1614	1125
REVISED SIP TOTAL	**1911**	**1858**	**1373**

(1) Point source reduction is due to use of actual instead of allowable emissions for non-elevated sources.
Note: The significant figures in this table are used to show the small contribution of certain source categories. They are not intended to indicate a level of accuracy in the inventories. Totals may not add due to rounding.

Figure 2
Map of Denver Metropolitan Attainment/Maintenance Area, Modeling Domain, and Location of Carbon Monoxide Monitors



1. Demographic and Transportation Data

The previously approved maintenance plan (December 14, 2001) was developed based on the latest available information from DRCOG. Table 5 shows the 2006 and 2013 demographic data used to develop the previously approved maintenance plan emission inventories.

Table 5
Demographic Data Used to Develop Emission Inventories
For the Denver Carbon Monoxide Inventory/Modeling Domain
Used in the Previously Approved Maintenance Plan
And this Revised Maintenance Plan

Period	Population	Households	Employment
2001	2,364,000	970,000	1,415,500
2006	2,616,000	1,097,000	1,568,000
2013	2,889,000	1,244,000	1,718,000

Since development of the previously approved Maintenance plan, the 2000 census was completed and updated demographic (Table 6) and transportation (Table 7) data sets were generated and used by DRCOG to develop the recent 2025 Regional Transportation Plan. Inspection of the data for 2013, shown below in Table 6 indicates that the household and employment estimates are slightly less in the latest (2025 RTP) data set than the above data set used in the previously approved maintenance plan. Population estimates are slightly higher (approximately 0.5%), but population is only used for approximately 0.5% (10 tpd) of the total inventory. Therefore, since the growth and demographic data used in the previously approved maintenance plan are consistent with updated estimates, the non-mobile source category emissions estimates from the previously approved maintenance plan are still valid and are used to establish the attainment area inventory in this revision.

Table 6
Demographic Data Used to Develop
The DRCOG 2025 Regional Transportation Plan
(based on the 2000 census)

Period	Population	Households	Employment
2001	2,414,804	957,780	1,360,814
2006	2,617,645	1,050,166	1,495,791
2013	2,902,912	1,172,902	1,678,079

2. Methodology and Control Assumptions for Source Categories

a) Mobile Sources

The mobile source emission estimates contained in this revised maintenance plan are based on updated 2025 transportation data sets provided by DRCOG (see Table 7). These are the same data sets contained in DRCOG's most recent update of its 2025 Regional Transportation Plan (April 2002). As a result, vehicle miles traveled (VMT) estimates have been revised accordingly.

Table 7
2025 RTP Transportation Data Used
To Develop this Revised Maintenance Plan

Period	Daily VMT	
	Attainment/ Maintenance	Modeling Domain
2001	56,797,068	61,362,264
2006	62,725,758	68,123,584
2013	71,045,166	77,750,300

Mobile source inventories in this proposed revision are based on a full MOBILE6 run, 2025 RTP-based VMT, Denver metro area vehicle registration and vehicle mix numbers and the RSD clean screen utility developed by EPA. The inventories are based on MOBILE6.2 credits for the inspection/maintenance and oxygenated gasoline programs described in the maintenance plan.

The Technical Support Document contains documentation of the modeling methodology using MOBILE6.2.

b) Point Sources

As described in the technical support document of the previously approved plan, the maximum potential to emit for elevated point sources (55% of the modeling domain point source estimate in 2006 and 2013) and the actual ground level point source emissions were used in the dispersion modeling to demonstrate maintenance in 2006 and 2013. Additionally, there is a regulatory mechanism for new sources greater than 50 tons per year in an attainment area, requiring a modeling demonstration of compliance with ambient air quality standards before issuance of a permit. Also, the previous dispersion modeling done for the previously approved plan indicates that point sources because of their location and the direction of plumes on design days has little or no impact of the maintenance demonstration.

Specific information for point sources in the attainment/maintenance area is summarized in the technical support document for this revised maintenance plan ,

including the number of new sources permitted since the previously approved maintenance plan was developed. However, the thoroughness of the original analysis in accounting for potential growth and its lack of impact on ambient concentrations verifies the validity of using the point source estimates from the previously approved plan to establish the attainment/maintenance area point source inventory in this revised plan.

c) **Non-road and Area Sources**

The calculation methodology used in the previously approved plan remains unchanged. The only controls assumed for non-road categories were existing federal regulations, no changes occurred in woodburning controls, and the appropriate demographic-based growth factors as discussed above are slightly lower (3-6%) based on the 2025 RTP demographic data. Therefore, the non-road and area source category estimates from the approved plan are valid for use in this revised plan. The Technical Support Document provides a specific discussion of growth and control strategy assumptions for each source category.

d) **Aircraft and Airport Services**

Substantial effort was made by Denver International Airport staff to develop the emission estimates contained in Table 16 of the original Technical Support Document of the previously approved maintenance plan. Recent discussions with DIA staff indicate that though actual activity is less than projected in the previously approved plan, the future projections remain appropriate. Therefore, the estimated emissions from the previously approved plan are valid for this revised plan.

D. MAINTENANCE DEMONSTRATION

The previously approved maintenance demonstration was made through the use of area-wide dispersion modeling using the 2006 and 2013 emission inventories (including MOBILE5 motor vehicle emissions estimates) along with meteorological data from December 5, 1988 which was the design day for the 1994 Carbon Monoxide SIP, and selected intersection hot-spot modeling. The combined results of the dispersion and intersection modeling showed no 8-hour maximum carbon monoxide concentration greater than or equal to 9.0 ppm anywhere in the modeling domain with the implementation of the proposed control measures. The technical support document for the previously approved maintenance plan describes in detail the assumptions and methodologies used for all modeling work.

EPA's "Policy Guidance on the Use of MOBILE6 for SIP Development and Transportation Conformity," (dated January 18, 2002), indicates that SIP revisions based on MOBILE6 must continue to demonstrate maintenance of the standard when MOBILE5-based motor vehicle emission inventories are replaced with MOBILE6 inventories. The guidance indicates that areas can revise their motor vehicle emissions inventories and budgets using MOBILE6 without revising the entire SIP or completing additional modeling if:

1) the SIP continues to demonstrate attainment or maintenance when the MOBILE5-based motor vehicle emission inventories are replaced with MOBILE6 base year and attainment/maintenance year inventories; and,

2) the State can document that the growth and control strategy assumptions for non-motor vehicle sources continue to be valid and any minor updates do not change the overall conclusion of the SIP.

If both of the above criteria are met, the guidance indicates the State can simply re-submit the original SIP with the revised MOBILE6 motor vehicle emission inventories.

The guidance goes on to indicate that "if a carbon monoxide (CO) maintenance plan relied on either a relative or absolute demonstration [in the original maintenance plan], the first criterion could be satisfied by documenting that the relative emissions reductions between the base year and the maintenance year are the same or greater using MOBILE6 as compared to MOBILE5."

This revised maintenance plan replaces MOBILE5 estimates with MOBILE6.2 estimates, and bases the maintenance demonstration on the showing that the interim (2006) year and maintenance (2013) year emissions are lower than the attainment (2001) year with MOBILE6.2. The maintenance (2013) year emissions with MOBILE6.2 are, in fact, 28.2% lower than the attainment (2001) year, while the comparable total emissions with MOBILE5 used in the dispersion modeling are only 3.9% lower in 2013 as shown below in Table 8.

Table 8
Comparison of Attainment Area Inventory Changes and Percent for Attainment, Interim & Maintenance Years
(tons per day)

Year	2001	2006	2013
Previously Approved SIP Inventory *(based on MOBILE5)*	1083	1020	1041
		-5.8%	*-3.9%*
Revised SIP Inventory *(based on MOBILE6.2)*	1911	1858	1373
		-2.8%	*-28.2%*

Maintenance of Standard During Strategy Phase-In

This maintenance plan revision will become effective upon EPA approval, which is expected to occur after the 2003/2004 winter season and likely by mid-2004. In order to demonstrate that the Denver metro area will continue to stay in compliance with the carbon monoxide standard between the time EPA approves the plan in 2004 and 2006, when the oxygenated gasoline and I/M program changes are fully phased in, APCD generated total emission inventories during that period. Inventories were prepared for the start of the 2004/2005 winter season (November 2004) when further reductions in gasoline oxygen content and increases in RSD coverage targets are in effect.

Inventories were also prepared for January 2005 and January 2006 to reflect emissions during those winter seasons based on the continued phase-in of strategies.

Compared with the revised attainment area inventory for 2001, emission estimates for future interim maintenance periods are less than the level necessary to demonstrate continued maintenance of the standard (1911 tons per day). The results of this analysis are shown below in Table 9.

Table 9
Maintenance of Standard During Strategy Phase-in
(2001 Attainment Area Inventory = 1911 TPD)

Period	Total Emission Inventory (TPD)	Gasoline Oxygen Content	Percent of Fleet Evaluated Using Remote Sensing	Transient Test Cutpoints- g/mi (CO/HC/NOX)[1]
Nov. 15, 2004	1840	1.9%	*60%*	20 /0.8/ 2.0
Jan. 1, 2005	1811	1.9%	*60%*	20 /0.8/ 2.0
Jan. 1, 2006	1858	1.5%	*80%*	10 /0.6/ 1.5

1) 2001 cutpoints are 20/2.0/4.0

E. CARBON MONOXIDE MOTOR VEHICLE EMISSIONS BUDGET

1. Requirements for Establishing 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, August 15, 1997) 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.

For transportation plan analysis years after the last year of the maintenance plan (in this case, 2013), 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.

EPA's conformity regulation (40 CFR 93.124) also 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.

Additionally, however, EPA's "Policy Guidance on the Use of MOBILE6 for SIP Development and Transportation Conformity," (dated January 18, 2002), notes "that regardless of the technique used for attainment or maintenance demonstrations, a more rigorous assessment of the SIP's demonstration may be necessary if a State decides to reallocate possible excess emission reductions to the motor vehicle emissions budget as a safety factor". Since this plan allocates available excess emissions reductions to the motor vehicle emissions budget, the EPA recommended a "more rigorous assessment" to ensure allocation of excess emissions will still demonstrate maintenance in 2013 throughout the region. This methodology is described in more detail below.

2. Emission Budget in Maintenance Plan Approved December 14, 2001

The carbon monoxide motor vehicle emissions budget contained in the maintenance plan approved December 14, 2001, which was based on MOBILE5, was 800 tons per day for the metro Denver attainment/maintenance area for the years 2002 and beyond. No "safety margin" was allocated since maintenance year mobile source emissions were only 1% less than attainment year mobile source emissions. This maintenance plan revision removes the MOBILE5-based emissions budget from the state implementation plan and replaces it with the MOBILE6.2-based emissions budget set out below.

3. Revised Motor Vehicle Emissions Budget for Maintenance Year (2013) and Beyond Using MOBILE6

This maintenance plan establishes a motor vehicle emissions budget for the period from the last year of the maintenance plan (2013) and beyond. The budget is established for the boundaries of the attainment/maintenance area.

As shown in the maintenance demonstration earlier in this plan, the 2013 mobile source emissions inventory for carbon monoxide is 28.2% below the level necessary to demonstrate continued maintenance of the CO standard. As a result, the maintenance plan may allocate some or all of the additional "safety margin" to the emission budget for conformity purposes, consistent with EPA's conformity regulation.

This maintenance plan estimates the available "safety margin" using the EPA recommended "more rigorous assessment" methodology and allocates a portion to the motor vehicle emission budget as illustrated in Table 10 below. This maintenance plan allocates 395 tons of the potential "safety margin" to the motor vehicle emission budget. The remaining 19 tons are reserved to account for future point and area source growth and other modeling uncertainties. Mobile source emissions based on MOBILE6 are expected to continue to decline during this period.

The "more rigorous assessment" includes an intersection modeling analysis similar to that performed in both the original attainment SIP and the previously approved maintenance plan. The intersection modeling analysis utilizes a background concentration combined with CAL3QHC intersection (hot spot) modeling of selected intersections. The six intersections included in the

analysis are the same high-traffic intersections included in the original attainment SIP and the previously approved maintenance plan.

The background concentration for each intersection utilizes the highest second maximum CO concentration at nearby ambient monitors for the period 2000-2002. The CAL3QHC intersection modeling uses 2013 MOBILE6.2 emissions factors and DRCOG traffic data. The background concentration and CAL3QHC modeling value are then combined for each intersection. If the resulting concentration is greater than 9 ppm, the background concentration is reduced by the necessary percentage to bring the total value below 9 ppm. Since it is assumed the background concentrations are influenced by regional emissions of CO, the regional emissions (1911 tons per day in 2001) are reduced by the same percentage to determine the allowable regional emissions. Subtracting the emissions from point and area sources results in the allowable mobile source emissions for purposes for calculating the excess emissions that can be allocated to the motor vehicle emission budget.

Table 11 summarizes the results of the intersection modeling analysis based on allocation of excess emissions and the final motor vehicle emission budget. The only intersection that restricted the allocation of the full amount of the potential excess emissions was the Foothills/Arapahoe intersection in Boulder. The initial background concentration of 4.3 ppm was reduced by approximately seven percent, which then served as the basis for the remaining excess emissions and budget calculations.

This intersection modeling analysis and more rigorous assessment is described in more detail in the Technical Support Document.

The motor vehicle emissions budget of 1520 tons per day for 2013 and beyond will be used to determine whether plans, programs, and projects comply with the SIP in applicable horizon years. This new budget will take effect for future transportation conformity determinations upon EPA approval of this Maintenance plan revision.

Future maintenance plan revisions, including those required periodically by the Clean Air Act, will reevaluate the motor vehicle emissions budget and may make adjustments as necessary based on the most recent information and future emission projections.

Until such time the budget takes effect pursuant to this section, the carbon monoxide emissions budget for the Denver carbon monoxide attainment/maintenance area shall remain at 800 tons per day for the years 2002 and beyond. Upon approval of the emissions budget contained in this maintenance plan revision, the 800 tons per day budget shall expire.

Table 10
Proposed Motor Vehicle Emissions Budget
2013 and Beyond
Based on allocation of available safety margin

	Tons per Day	Explanation
Total Attainment Inventory - 2001	1911	*2001 Baseline Inventory from all sources that establishes attainment level of emissions in the attainment/maintenance area*
Estimated Area & Point Source Emissions - 2013	248	*Total estimated emissions from point and area sources in 2013*
Estimated Mobile Source Emissions - 2013	1125	*Estimated mobile source emissions in 2013 based on MOBILE6 and SIP control strategies*
Total Emission Inventory – 2013	1373	
Potential "Safety Margin" – 2013	548	*Difference between 2001 and 2013 total emission inventories*
Allowable Mobile Source Emissions - 2013	1539	*Total mobile source emissions (after subtracting 2013 area/point source emissions) that would still demonstrate attainment of the standard based upon EPA's recommended "more rigorous assessment"*
Available "Safety Margin"	414	*Difference between allowable mobile source emissions (1539 tpd) and estimated mobile source emissions (1125 tpd), which equals the available "safety margin" that may be allocated to the motor vehicle emissions budget*
Portion of "Safety Margin" reserved	19	*Portion of available "safety margin" that is reserved to account for point/area source growth and other modeling uncertainties*
"Safety Margin" assigned to motor vehicle emissions budget	395	*Difference between available "safety margin' (414 tpd) and "safety margin" reserved (19 tpd), which equals the portion of the "safety margin" assigned to the motor vehicle emissions budget*
Proposed 2013 and Beyond Motor Vehicle Emissions Budget	**1520**	*Total of estimated 2013 mobile source emissions (1125 tpd) and "safety margin" assigned to the budget 395 tpd), which establishes the motor vehicle emission budget for the maintenance year (2013) and beyond, consistent with EPA conformity regulation*

Table 11
Intersection Modeling Results Based on Allocation of Excess Emissions in Motor Vehicle Emission Budget

(Emission Budget = 1520 tons per day)

Intersection	Background ppm	CAL3QHC ppm	Total ppm
Broadway & Champa	5.00	1.47	6.47
Foothills & Arapahoe	3.98	4.97	8.95
1st & University	4.35	4.05	8.40
Hampden & University	3.52	4.83	8.35
Parker & Illiff	3.52	3.29	6.81
Arapahoe & University	3.52	4.62	8.14

F. MONITORING NETWORK / VERIFICATION OF CONTINUED ATTAINMENT

This section remains unchanged from the maintenance plan approved by EPA on December 14, 2001.

Since the Denver metropolitan area has been redesignated to attainment status by EPA, the APCD operates and continues 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 carbon monoxide standard. If measured mobile source parameters (e.g., vehicle miles traveled, congestion, fleet mix, etc.) change significantly over time, the APCD will perform the appropriate studies to determine whether additional and/or re-sited monitors are necessary. 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.

G. CONTINGENCY PROVISIONS

This section remains unchanged from the maintenance plan approved by EPA on December 14, 2001.

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 carbon monoxide standard which occurs after redesignation to attainment. Attainment areas are not required to have preselected contingency measures, and this plan removes any commitment to contingency measures contained in the 1994 Denver Carbon monoxide nonattainment SIP Element.

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 time-frame to correct the violation by implementing one or more of the contingency measures. 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. List of Potential Contingency Measures

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

a. A 3.1% oxygenated fuels program from November 8 through February 7, with 2.0% oxygen content required from November 1 through November 7.

b. An enhanced vehicle inspection and maintenance program as described in AQCC Regulation No. 11 prior to the modifications adopted on January 10, 2000 as part of this Maintenance plan (*approved by EPA on December 14, 2001).*

c. Transportation control measures that were included in the 1994 attainment SIP as contingency measures, but were required to be implemented because growth in vehicle miles traveled exceeded SIP projections. These measures include transportation management associations, financial incentives for EcoPass, Auraria transit pass, and improved traffic signalization.[1]

In addition to this list of potential contingency measures, the State may evaluate other potential strategies in order to address any future violations in the most appropriate and effective manner possible.

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[1]The 1994 attainment SIP also included as a potential contingency measure the conversion of the Broadway/Lincoln bus lanes to bus/HOV lanes, but this measure was never implemented due to the high volume of buses still using these lanes even after the light-rail line from Broadway and I-25 to downtown became operational.

2. Tracking and Triggering Mechanisms

- **Tracking**

The primary tracking plan for the Denver metropolitan area consists of continuous carbon monoxide 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 carbon monoxide standard within 30 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 carbon monoxide 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.

- **Triggering**

An exceedance of the carbon monoxide standard (any value over 9.5 ppm) 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 carbon monoxide standard. Specifically, a second value of 9.5 ppm or higher at the same monitor during any calendar year.

3. Process for Recommending and Implementing Contingency Measures

The State will move forward with mandatory implementation of contingency measures under the SIP if a violation (a second exceedance in a calendar year) of the carbon monoxide standard occurs.

No more than 60 days after being notified by the APCD that a violation of the carbon monoxide standard 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.

H. SUBSEQUENT MAINTENANCE PLAN REVISIONS

As stated earlier, it is required that a maintenance plan revision be submitted to the EPA eight years after the original redesignation request/maintenance plan is approved. The purpose of this revision is to provide for maintenance of the NAAQS for an additional ten years following the first ten-year period. The State of Colorado commits to submit a revised maintenance plan eight years after

redesignation to attainment, as required by the CAA and EPA. Based upon EPA's approval of the maintenance plan on December 14, 2001, a revised maintenance plan demonstrating maintenance for an additional 10-year period will be required no later than December 2009.

The RAQC and the State anticipates conducting a comprehensive reevaluation of control strategies with MOBILE6.2 and revising this plan within the next two years.

Ozone Redesignation Request
And Maintenance Plan
For the Denver Metropolitan Area

Approved by:

Colorado Air Quality Control Commission
January 11, 2001

Colorado Department
of Public Health
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Table of Contents

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, *Requirements for Redesignation*, is the State's request to the U.S. Environmental Protection Agency (EPA) to redesignate the Denver area to attainment for the one-hour ozone standard.

Chapter 3, *Maintenance Plan*, is being submitted for inclusion in the federally-enforceable State Implementation Plan and provides for maintenance of the one-hour ozone standard through the year 2013.

CHAPTER 1: INTRODUCTION

The State of Colorado, in coordination with the Regional Air Quality Council (RAQC), is requesting that the U.S. Environmental Protection Agency (EPA) redesignate the Denver metropolitan nonattainment area to attainment status for the 1-hour Ozone National Ambient Air Quality Standard. From 1978 through June 1998 the Denver metropolitan area had been designated as an ozone nonattainment area, but has not violated this 1-hour ozone standard since 1987.

A redesignation request and maintenance plan was originally submitted in August 1996. However, in early 1997, during the EPA review period, a legal question was raised by EPA regarding statutory "sunset" provisions for the plan and the I/M program. Also, a new 8-hour standard was promulgated by EPA in July, 1997. The 1-hour standard was revoked for Denver in June, 1998 rendering the original submittal moot at that time. Due to legal problems with implementing the 8-hour standard, the EPA promulgated reinstatement of the 1-hour ozone standard on July 20, 2000. Since in this interim period the region has not violated the 1-hour standard, the region is still eligible for redesignation. The original maintenance plan has been revised to address the original questions raised by the EPA and to update the technical analysis and provide for a 10 year maintenance demonstration.

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 Ozone

In 1971 the EPA set National Ambient Air Quality Standards (NAAQS) for several air pollutants, including photochemical oxidants. In 1979, the EPA changed the photochemical oxidant standard to a national ozone standard of 0.12 parts per million of ozone in ambient air, based on a one-hour averaging time for the measurement. This is usually shortened to 0.12 parts per million, or 0.12 ppm. In 1997 the EPA promulgated an 8-hour national ozone standard, and in 1998 revoked the 1-hour national ozone standard for Denver. Because of legal problems impacting implementation of the 8-hour standard, the EPA has promulgated reinstatement of the national 1-hour ozone standard of 0.12 ppm.

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 ozone 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 discussed above the EPA has attempted to revise the standard, but is currently involved in a federal lawsuit over implementation of the new 8-hour standard.

The formal statement of the ozone NAAQS appears in the Code of Federal Regulations (CFR Part 50.9), which says:

> *The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 parts per million is equal to or less than one, as determined in Appendix H.*

Appendix H to Part 50 provides an interpretation of the standard and a procedure for estimating the number of exceedances per year. Other EPA guidance documents provide detailed procedures for evaluating air monitoring data and determining attainment of the national standard.

In general demonstrating attainment requires collecting representative air monitoring data using EPA approved reference or equivalent methods and procedures meeting 40 CFR 58, Appendix A, Quality Assurance Requirements. The three most recent years are examined. All locations within an area have to meet the standard, so a determination is made at each monitoring site. Attainment is achieved when the average annual number of expected exceedances is less than or equal to one. In practice, no monitor can have more than three days with exceedances of 0.125 ppm during the three most recent calendar years. Air quality measurements in the Denver Metro nonattainment area satisfy this requirement, as shown in Chapter 2.B.: Attainment of the One-Hour NAAQS.

B. Health and Welfare Effects of Ozone

Ozone is a reactive chemical compound - a molecule consisting of three oxygen atoms with the chemical symbol O_3, which is formed by a photochemical reaction between Volatile Organic Compounds (VOC) and Nitrogen Oxides (NO_x) in the presence of sunlight and is usually associated with elevated ambient temperatures. Ozone is a strong oxidizing agent with potential

to damage living or inanimate things with which it comes in contact. When present in the lower atmosphere, even at low concentrations, ozone is harmful to human health and to property. The most common human health effects are breathing impairment. These are thought to be reversible acute effects, but there is some emerging evidence of chronic effects from long term exposure. Ozone damages trees and other natural vegetation, reduces agricultural productivity, and cause or accelerates deterioration of building materials, surface coatings, rubber, plastic products and textiles.

C. Denver Ozone Area Designation History

On March 3, 1978 the EPA designated the Denver Metro Area as nonattainment for the Ozone NAAQS (43 FR 8976). This designation 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. The Denver Metro Nonattainment Area had not shown a violation of the ozone standard during the three year period from January 1, 1987 to December 31, 1989, and therefore was classified as a "transitional" ozone nonattainment area under section 185A of the amended Act.

On June 5, 1998, the EPA revoked the 1-hour ozone standard for the Denver metro area. On July 20, 2000 the EPA promulgated reinstatement of the 1-hour ozone standard for the Denver metro area.

D. Denver Metropolitan Ozone Nonattainment Area

The Denver Metro area ozone nonattainment and 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 Arapaho Counties.*

A map describing the nonattainment and attainment maintenance area boundaries is included in Chapter 2, Figure 2-1.

E. Required Components of a Redesignation Request

Sections 107(d)(3)(d) and (e) of the Clean Air Act define the criteria an area must meet before being redesignated to attainment/maintenance status. With the submittal of this Maintenance Plan, the Denver metropolitan area meets all of these criteria.

1. Attainment of the standard

The State must show that the area has attained the national standards for ozone.

2. **State Implementation Plan approval**
The area must have a fully approved Ozone State Implementation Plan.

3. **Improvement in air quality due to permanent and enforceable emissions reductions**
The State must demonstrate that the improvement in air quality leading to attainment of the standard is due to permanent and federally enforceable emissions reductions.

4. **CAA Section 110 and Part D requirements**
The State must meet all requirements of Section 110 and Part D of the CAA. Section 110 describes general requirements for SIPs, while Part D pertains to general requirements applicable to all nonattainment areas.

5. **Maintenance Plan**
The area must have a fully approved Ozone Maintenance Plan that meets the requirements of CAA Section 175a, including a demonstration that the area will maintain the standard for a period of at least 10 years following redesignation by EPA. The plan must also contain contingency measures that could be implemented if a violation of the standard is monitored at any time during the maintenance period.

CHAPTER 2: REQUIREMENTS FOR REDESIGNATION

The State of Colorado, in coordination with the Regional Air Quality Council (RAQC), requests that the U.S. Environmental Protection Agency (EPA) redesignate the Denver metropolitan nonattainment area to attainment status for the one-hour ozone National Ambient Air Quality Standards (NAAQS). The Denver metropolitan area has been designated as an ozone nonattainment area since the 1970's, but has not violated the standard since 1987. Therefore, the area is now eligible for redesignation.

A. Required Components of a Redesignation Request

Sections 107(d)(3)(D) and (E) of the CAA define the following five required components of a redesignation request.

- **Attainment of the One-Hour Ozone NAAQS**
- **State Implementation Plan Approval**
- **Improvement in Air Quality Due to Permanent and Enforceable Emissions Reductions**
- **CAA Section 110 and Part D Requirements**
- **Maintenance Plan**

The first four requirements are addressed below in this chapter. The fifth requirement, the Maintenance Plan, is addressed in Chapter 3.

B. Attainment of the One-Hour Ozone NAAQS

Attainment of the one-hour ozone NAAQS, which is 0.12 parts per million (ppm) of ozone in ambient air (based on a one-hour averaging time for the measurement) is demonstrated when the average annual number of expected exceedances is less than or equal to one. In practice, no monitor can have more than three days with exceedances of 0.125 ppm during the three most recent calendar years. The following information demonstrates, as required by Section 107(d)(3)(E) of the Clean Air Act, that the Denver metropolitan area has attained the national one-hour standard for ozone. Since ozone is a regional pollutant, this demonstration is based on quality assured monitoring data collected throughout the Denver area, with focus on the monitors located in the western portion of the metro area near the foothills.

1. Denver Area Historical Perspective

Historically, the one-hour ozone standard had been frequently violated in the 1970's and 1980's throughout the Denver metropolitan area. There have been occasional exceedances, but no violations, in the 1990's. With the implementation of emission control programs aimed at reducing automobile and industrial emissions, ozone concentrations have stabilized at levels below the NAAQS. Although there have been sporadic exceedances recorded by the extensive network of monitors, the area has not shown a violation of the NAAQS since the three-year January 1, 1986 to December 31, 1988 period.

2. Ozone Monitoring Network

The current ozone ambient air monitoring network in the Denver area consists of nine stations operated by the Colorado Air Pollution Control Division, though there have been other stations that have operated in the past. The geographical distribution of the monitors is presented in Figure 2-1.

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 ozone monitoring network shall not be construed to amend such monitoring SIP.

3. Monitoring Results and Attainment Demonstration

The ozone NAAQS requires that the average annual number of expected exceedances, according to 40 CFR 50.9, is less than or equal to one over a three year period. An exceedance is described as any maximum hourly average concentration greater than 0.12 ppm. Due to rounding conventions, an exceedance requires a concentration of 0.125 ppm or greater. The term “expected number of exceedances” is used because the standard attempts to account for missing sampling days. This mathematical estimate of missing sampling days will increase the “expected number of exceedances” by a fractional amount. The monitoring data presented in Table 2-1 verify that the Denver area is attaining the one-hour ozone NAAQS. Since 1990, the three-year average of expected values greater than 0.125 ppm is less than or equal to one. Summary data from 1985 through 1999 is shown in the graphs in Figure 2-2. Data for the 2000 season is summarized in Table 2-2.

4. Quality Assurance Program

Ozone 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 Aerometric Information Retrieval System (AIRS) and are available for public review at the APCD and through EPA’s AIRS database. Table 2-3 presents the data recovery rates for each monitoring site.

Figure 2-1.
Map of the Denver Metropolitan Ozone
Attainment/Maintenance Area and Monitoring Sites

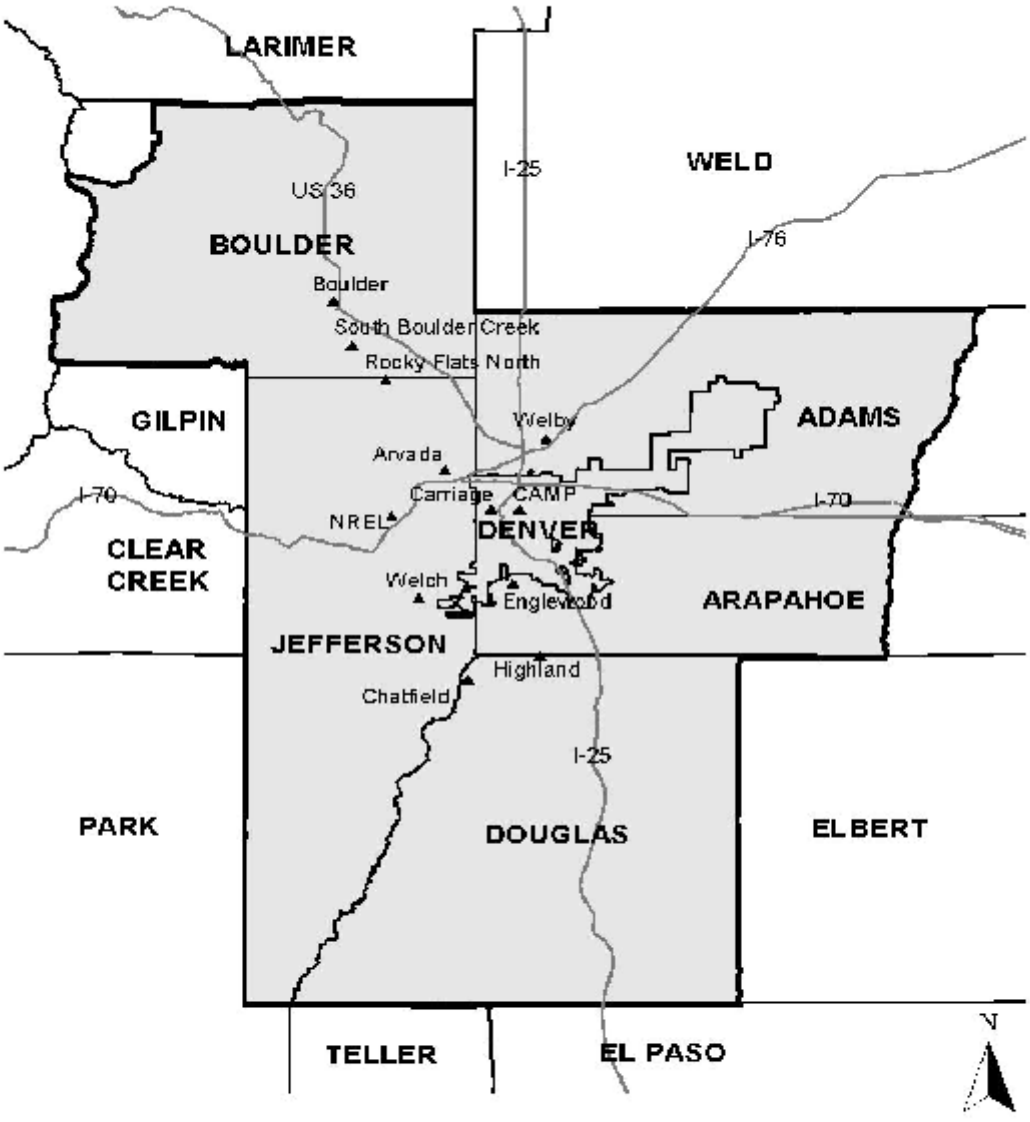


Table 2-1. Three-Year Average of Expected Exceedances of the One-Hour Ozone NAAQS

Monitoring Site	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Boulder Marine St.	0.4	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-
S. Boulder Creek	/	/	/	()	()	1.0	0.0	0.0	0.0	0.0	0.0
Rocky Flats North	/	/	()	()	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Welby	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Arvada	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Carriage	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CAMP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-
NREL	/	/	/	()	()	0.3	0.3	0.3	0.0	0.0	0.0
Englewood	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-	-
Welch	()	()	()	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Highland	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Chatfield	/	/	/	/	/	()	()	0.0	0.4	0.4	0.4

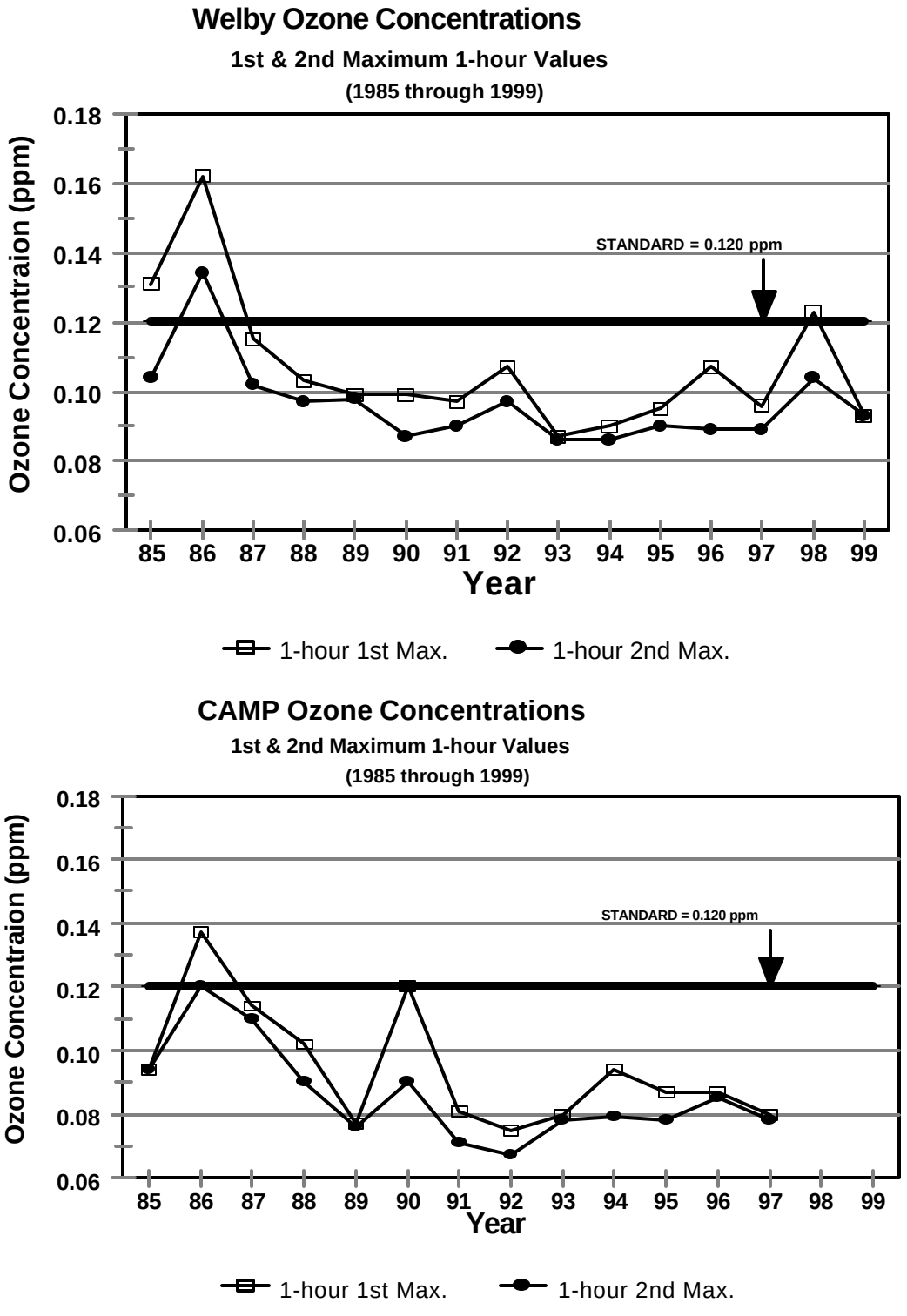
- the monitoring site is no longer operating
/ the monitoring site had not been established
() the 3-year average of expected exceedances could not yet be determined

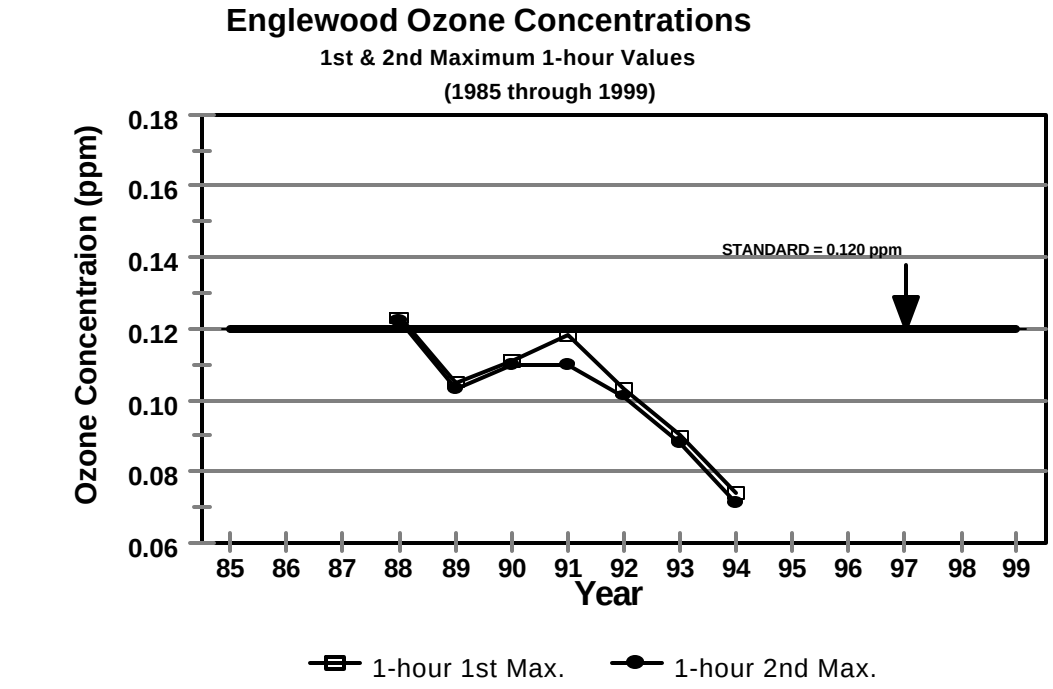
Table 2-2. 1st & 2nd Maximum 1-Hour Ozone Values (ppm) by Monitor Site (2000)

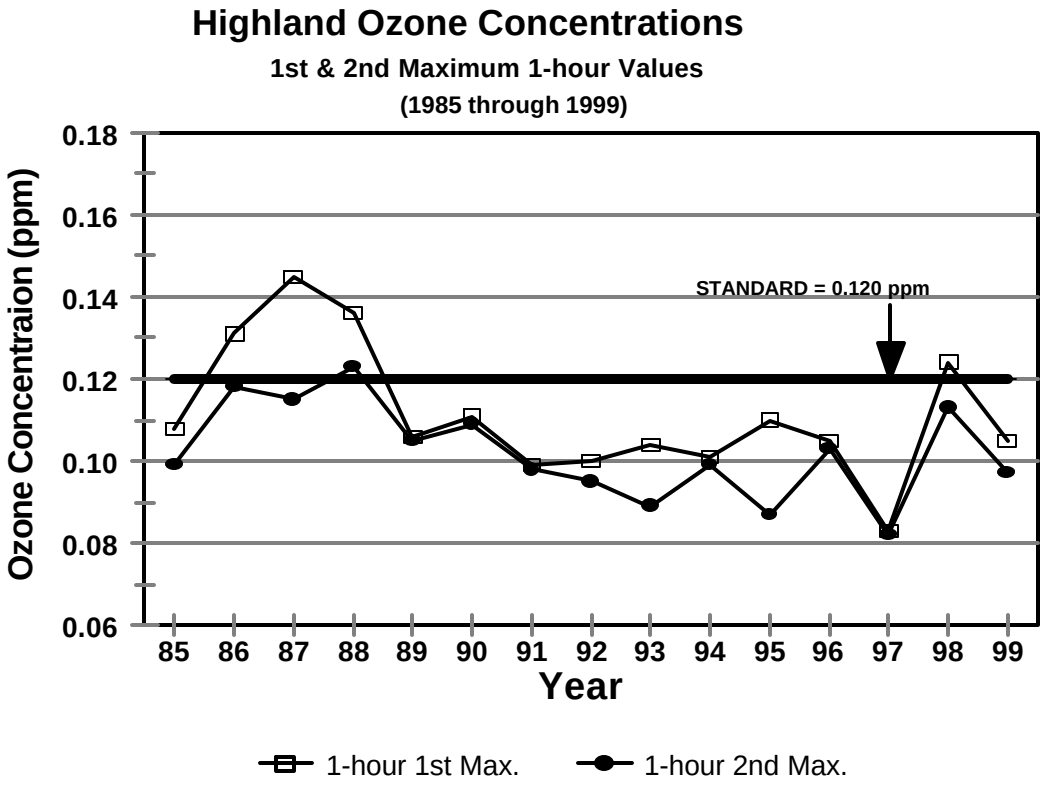
Monitor Site	Welby	Highland	Arvada	Carriage	Chatfield
1st Max.	.080	.111	.102	.098	.106
2nd Max.	.076	.097	.096	.091	.104

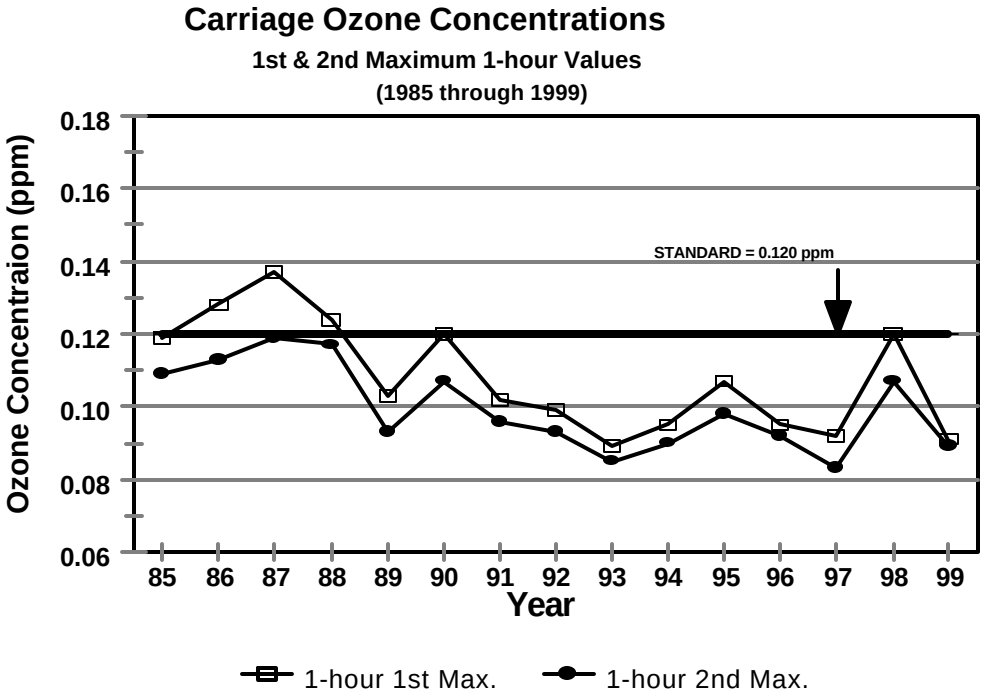
Monitor Site	NREL	S. Boulder Creek	Welch	Rocky Flats N.	-
1st Max.	.118	.099	.098	.103	-
2nd Max.	.107	.090	.087	.097	-

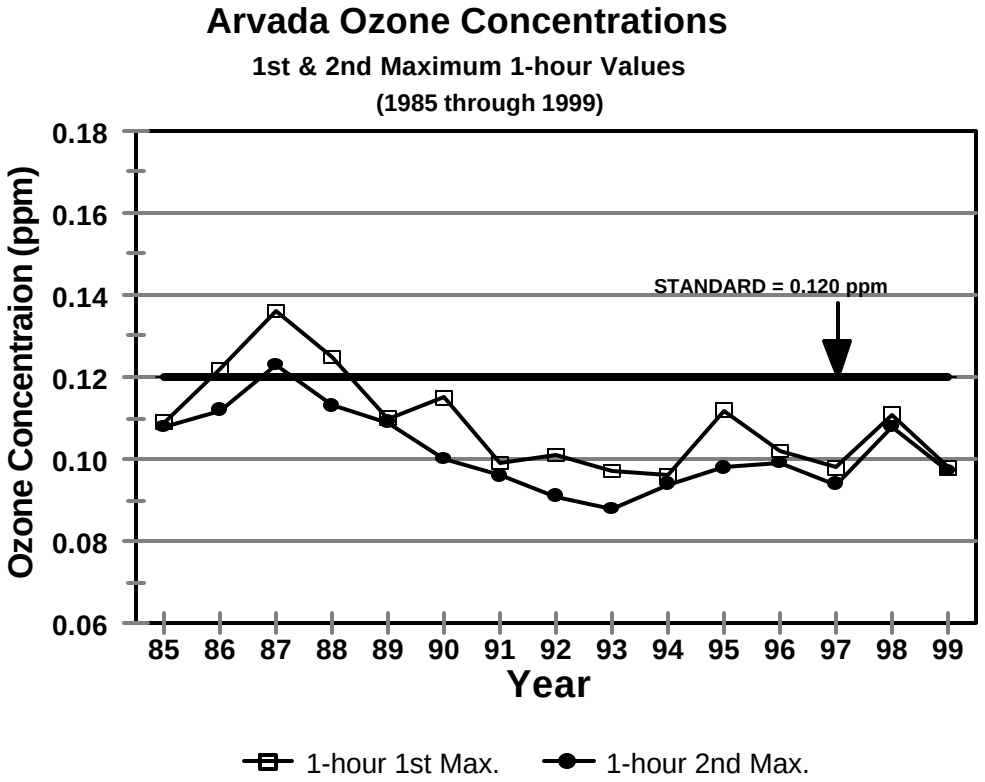
Figure 2-2.
Historical Monitoring Data for the One-Hour Ozone NAAQS by Monitoring Site (1985-1999)



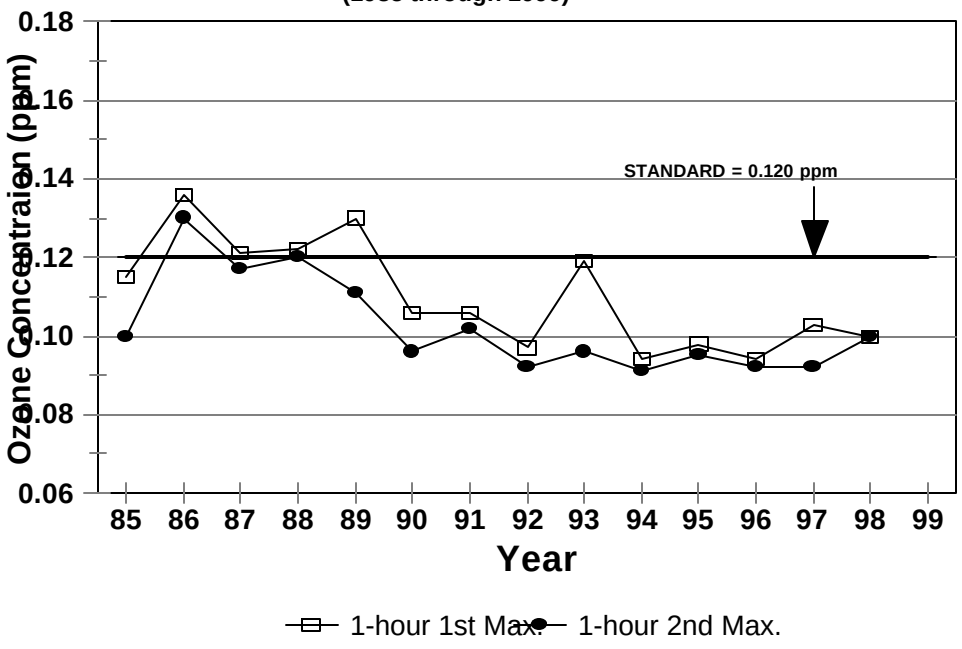

Englewood Ozone Concentrations
1st & 2nd Maximum 1-hour Values
(1985 through 1999)
Ozone Concentraion (ppm)
0.18
0.16
0.14
0.12
0.10
0.08
0.06
STANDARD = 0.120 ppm
85 86 87 88 89 90 91 92 93 94 95 96 97 98 99
Year
1-hour 1st Max.
1-hour 2nd Max.


Highland Ozone Concentrations
1st & 2nd Maximum 1-hour Values
(1985 through 1999)
Ozone Concentraion (ppm)
0.18
0.16
0.14
0.12
0.10
0.08
0.06
STANDARD = 0.120 ppm
85 86 87 88 89 90 91 92 93 94 95 96 97 98 99
Year
1-hour 1st Max.
1-hour 2nd Max.

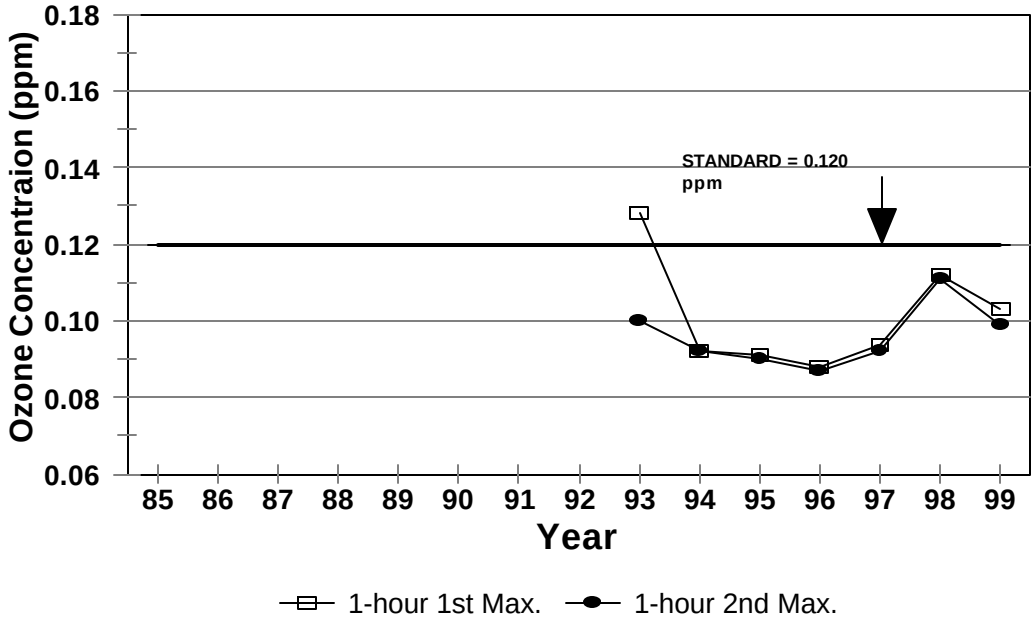

Carriage Ozone Concentrations
1st & 2nd Maximum 1-hour Values
(1985 through 1999)
Ozone Concentraion (ppm)
0.18
0.16
0.14
0.12
0.10
0.08
0.06
STANDARD = 0.120 ppm
85 86 87 88 89 90 91 92 93 94 95 96 97 98 99
Year
1-hour 1st Max.
1-hour 2nd Max.

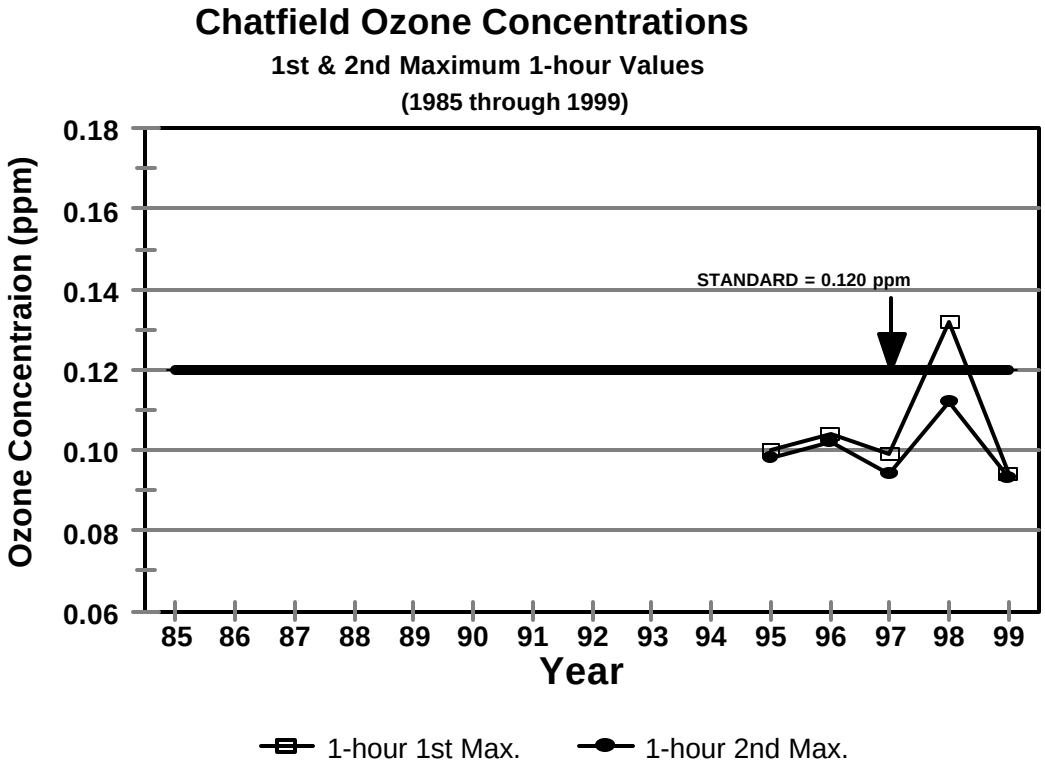

Arvada Ozone Concentrations
1st & 2nd Maximum 1-hour Values
(1985 through 1999)
Ozone Concentraion (ppm)
0.18
0.16
0.14
0.12
0.10
0.08
0.06
STANDARD = 0.120 ppm
85 86 87 88 89 90 91 92 93 94 95 96 97 98 99
Year
1-hour 1st Max.
1-hour 2nd Max.

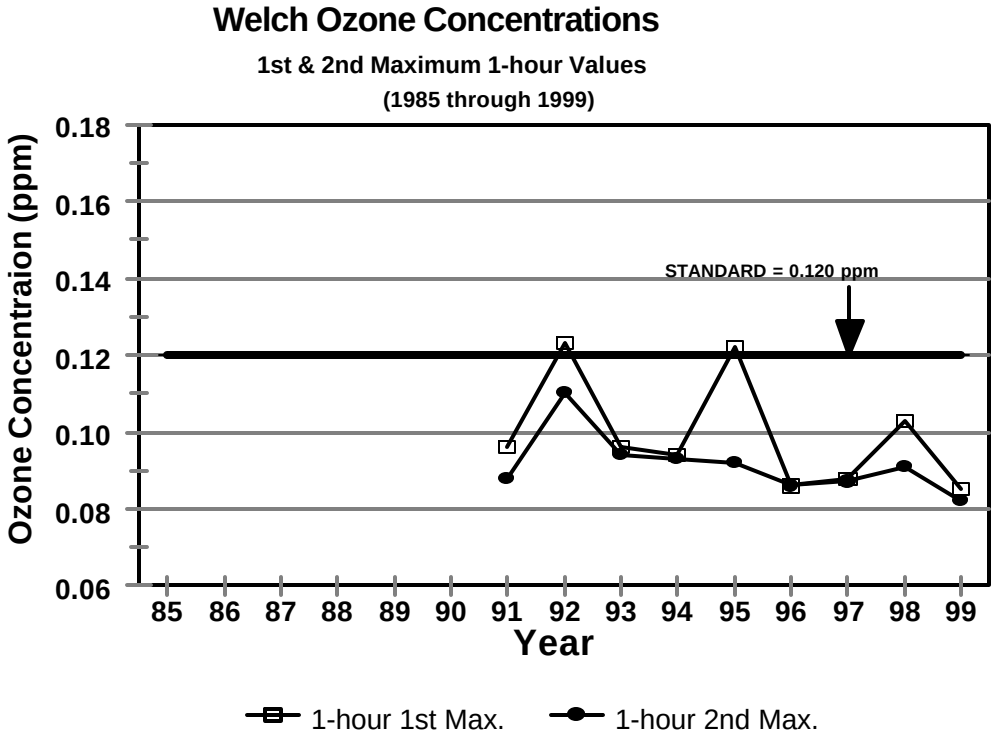
Boulder Marine Ozone Concentrations
1st & 2nd Maximum 1-hour Values
(1985 through 1999)



S. Boulder Creek Ozone Concentrations
1st & 2nd Maximum 1-hour Values
(1985 through



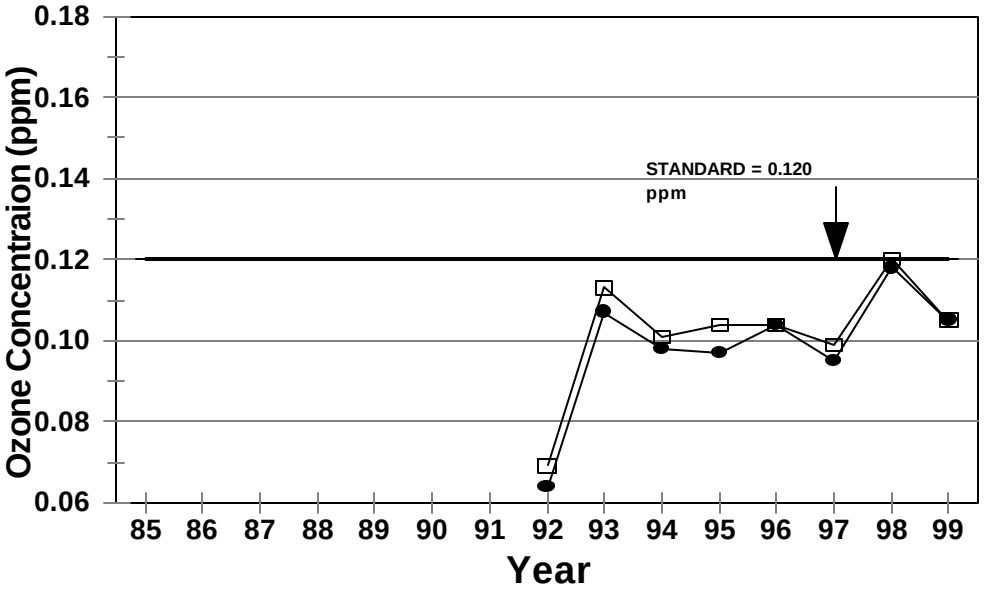

Chatfield Ozone Concentrations
1st & 2nd Maximum 1-hour Values
(1985 through 1999)
Ozone Concentraion (ppm)
0.18
0.16
0.14
0.12
0.10
0.08
0.06
STANDARD = 0.120 ppm
85 86 87 88 89 90 91 92 93 94 95 96 97 98 99
Year
1-hour 1st Max.
1-hour 2nd Max.


Welch Ozone Concentrations
1st & 2nd Maximum 1-hour Values
(1985 through 1999)
Ozone Concentraion (ppm)
0.18
0.16
0.14
0.12
0.10
0.08
0.06
STANDARD = 0.120 ppm
85 86 87 88 89 90 91 92 93 94 95 96 97 98 99
Year
1-hour 1st Max.
1-hour 2nd Max.

R. Flats North Ozone Concentrations

1st & 2nd Maximum 1-hour Values

(1985 through 1999)



NREL Ozone Concentrations

1st & 2nd Maximum 1-hour Values

(1985 through 1999)

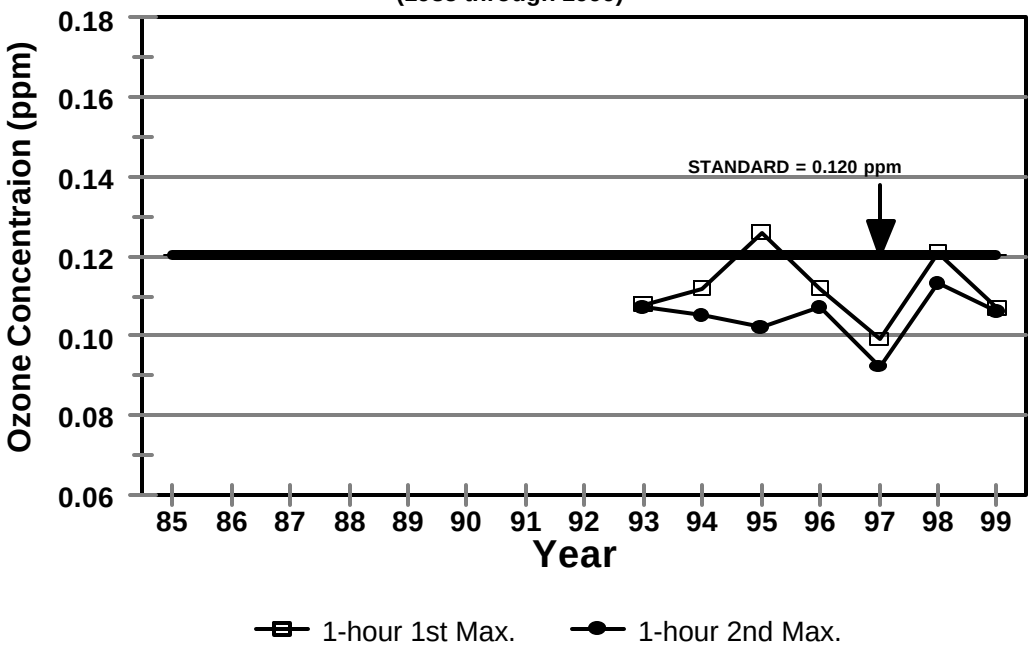


Table 2-3. Ozone Data Recovery Rates for Each Monitoring Site

Years	Welby Data Recovery	Highland Data Recovery	Englewood Data Recovery	S. Boulder Creek Data Recovery	Boulder Marine St. Data Recovery	CAMP Data Recovery
1985	93%	99%	no data	no data	99%	93%
1986	81%	95%	no data	no data	99%	97%
1987	99%	98%	no data	no data	97%	99%
1988	92%	93%	71%	no data	96%	98%
1989	99%	96%	95%	no data	86%	99%
1990	84%	78%	98%	no data	86%	97%
1991	99%	99%	91%	no data	92%	98%
1992	98%	99%	98%	no data	99%	99%
1993	92%	97%	96%	33%	99%	99%
1994	96%	95%	48%	50%	96%	99%
1995	97%	98%	no data	71%	96%	99%
1996	98%	99%	no data	76%	98%	99%
1997	86%	87%	no data	99%	96%	99%
1998	99%	99%	no data	99%	99%	no data
1999	99%	98%	no data	99%	no data	no data
2000	99%	99%	no data	98%	no data	no data

Years	Carriage Data Recovery	Chatfield Data Recovery	Arvada Data Recovery	Welch Data Recovery	R. Flats N. Data Recovery	NREL Data Recovery
1985	92%	no data	99%	no data	no data	no data
1986	100%	no data	97%	no data	no data	no data
1987	99%	no data	97%	no data	no data	no data
1988	99%	no data	98%	no data	no data	no data
1989	93%	no data	98%	no data	no data	no data
1990	84%	no data	94%	no data	no data	no data
1991	90%	no data	85%	11%	no data	no data
1992	98%	no data	93%	98%	6%	no data
1993	95%	no data	99%	86%	93%	46%
1994	98%	no data	97%	99%	99%	55%
1995	96%	75%	95%	96%	86%	99%
1996	89%	99%	99%	99%	96%	99%
1997	96%	93%	99%	86%	98%	99%
1998	98%	84%	98%	99%	97%	100%
1999	94%	72%	93%	99%	97%	63%
2000	89%	93%	98%	94%	99%	98%

Percent data recovery is the number of valid sampling days occurring within the "ozone season", divided by the total number of days encompassing the "ozone season". A valid sampling day is one in which at least 75% of the hourly maxima are recorded. The EPA specified "ozone season" is March 1 through September 30, encompassing 214 days.

C. Approval of the Ozone Nonattainment SIP Element for the Denver Area

Various plans and programs to reduce volatile organic compounds (VOCs) and nitrogen oxides (NOx), which are precursor emissions that form ozone in the atmosphere, from motor vehicles and industrial facilities were adopted by the State of Colorado and the U.S. Environmental Protection Agency in the 1980's. The Colorado Ozone SIP Element was approved by EPA on December 12, 1983 (48 FR 55284). A revision to the SIP, consisting of revisions to Regulation No. 7, was approved by EPA on May 30, 1995 (60 FR 28055). The Clean Air Act Amendments of 1990 established additional federal requirements for motor vehicle and industrial sources, but no amendments to the State's SIP were required. Therefore, the Denver metropolitan area SIP Element for the one-hour ozone NAAQS is fully approved under Section 110(k) of the Act.

D. Improvement in Air Quality Due to Permanent and Enforceable Emission Reductions

It is reasonable to attribute the improvement in ambient ozone concentrations in the Denver area to emission reductions which are permanent and enforceable. The Denver area has met the national standard for ozone as a result of effective State and federal emission reduction measures, as opposed to temporary or "chance" events.

A downturn in the economy is clearly not responsible for the improvement in ambient ozone levels in the Denver metropolitan area. Over the last ten years, the region has experienced strong growth while at the same time achieving a continuous attainment of the one-hour ozone NAAQS. The Colorado State Demographer's Office reports that between 1990 and 2000, job growth in the Denver area increased at an annual rate of approximately three percent, population increased by about two percent each year, and personal income increased by approximately seven percent each year. In its 1997 Vehicle Miles Traveled (VMT) forecasting and tracking report, the Colorado Department of Transportation (CDOT) estimated a VMT increase of approximately eight percent between 1995 and 2000.

The existing control measures that have brought the Denver Metro are into attainment of the one-hour ozone standard include a mix of federal tailpipe standards, and the state's vehicle inspection/maintenance program and industrial source control regulations as follows:

1. Federal Tailpipe Standards

One of the more important mobile source control measures for the Denver metropolitan area and the nation is the Federal Motor Vehicle Emissions Control Program (FMVECP), established in 1968. The Clean Air Act of 1970 and its 1977 Amendments led to the advent of catalytic converters in 1975 and computerized engine control systems in 1981. The 1990 CAA Amendments required additional control measures, including stricter emission standards for cars, light duty trucks, minivans and sport/utility vehicles; and an extended warranty and recall period. Federal standards will continue to provide emission reduction benefits as older vehicles are retired and vehicles meeting the newest standards enter the fleet.

2. Vehicle Inspection & Maintenance Program

Colorado's Automobile Inspection and Readjustment (AIR) Program is described in AQCC Regulation No. 11 and has been applicable in the Denver area since 1981. The AIR Program works to reduce VOC and NOx pollutants from gasoline-powered motor vehicles by requiring them to meet emission standards through periodic tailpipe tests, maintenance, and specific repairs. The AIR Program was updated in 1994 to meet the requirements of the Clean Air Act Amendments of 1990, and a more stringent and effective "enhanced" inspection program began in 1995. The enhanced program uses a loaded-mode dynamometer test called I/M 240 for 1982 and newer vehicles and an idle test for older vehicles and heavy trucks.

3. Industrial Source Controls

The State's comprehensive permit rules, AQCC Regulations No. 3 and 6, control emissions from industrial facilities and limits VOC and NOx emissions from new or modified major stationary sources. The State continues to enhance its permit and control programs, while simultaneously pursuing a strong inspection and enforcement presence, as authorized by the AQCC's "Common Provisions" regulation. Additionally, the State has Regulation No. 7, "Regulation to Control Emissions of Volatile Organic Compounds", which contains reasonably available requirements for commercial and industrial sources of VOCs.

E. CAA Section 110 and Part D Requirements

For the purposes of redesignation, all of the general nonattainment area requirements of CAA Section 110 and Part D must be met. In general, the requirements of Section 110(a)(2) are:

- 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;
- 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.

Colorado Revised Statute 25-7-111 requires the APCD to administer and enforce the air quality programs adopted by the AQCC. With a staff of 150 people and a budget of approximately $13 million, the APCD has committed to implementing and enforcing the air quality plans and regulations applicable to the Denver Metropolitan ozone attainment/ maintenance area.

The CAA's Part D, pertaining to nonattainment plan provisions, requires the following items to be addressed:

- the implementation of reasonably available control measures, including reasonably available control technologies (RACT) for existing sources
- reasonable further progress (RFP) towards meeting attainment

- the identification and quantification of allowable emissions for new and modified stationary sources
- a stationary source permitting program
- other measures: enforceable emission limitations, other control measures, schedule for compliance
- compliance with section 110 provisions
- contingency measures

All of the requirements of Section 110 and Part D have been met, as is required for approval of this maintenance plan and redesignation request. Most of the requirements for Section 110 and Part D are general requirements applicable to the state implementation in general, not just the state implementation plan for controlling ozone in the Denver area. All such general requirements are already included in the state implementation plan and have already been approved by EPA. Any requirements of Section 110 and Part D that apply specifically to the control of ozone in the Denver attainment/maintenance area are addressed elsewhere in this maintenance plan.

Other Part D requirements that are applicable in nonattainment and maintenance areas include the general and transportation conformity provisions of CAA Section 176 (c). These provisions ensure that federally funded or approved projects and actions conform to the Denver State Implementaton Plan Element/Maintenance Plan for ozone prior to the projects or actions being implemented. The State has already submitted to EPA a State Implementation Plan revision implementing the requirements of section 176(c).

CHAPTER 3: MAINTENANCE PLAN

Section 107(d)(3)(E) of the CAA stipulates that for a nonattainment area to be redesignated to attainment, EPA must fully approve a maintenance plan which meets the requirements of CAA Section 175A. The maintenance plan is a SIP revision and must provide for maintenance of the relevant NAAQS in the area for at least ten years after redesignation by EPA.

Because EPA is allowed up to two years to approve redesignation requests after receiving a complete submittal, and given the time needed to complete the State processes for legislative approval and AQCC rule-making, the milestone year for this maintenance plan is 2013.

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

The Denver metropolitan area will rely on the control programs listed below to demonstrate maintenance of the one-hour ozone standard through 2013. 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.

Control measures contained in the plan include:

1. 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.

2. Air Quality Control Commission Regulation No. 11 -- covering the Automobile Inspection and Readjustment (A.I.R.) Program -- as amended on January 10, 2000 and submitted to the EPA for approval on May 10, 2000 as part of the Denver area redesignation request and maintenance plan for carbon monoxide.

3. Air Quality Control Commission Regulations No. 3, No. 6, No. 7, and Common Provisions – covering industrial source control programs. The Common Provisions, Parts A and B of Regulation No. 3, and the VOC control requirements of Regulation No. 7 are already included in the approved SIP. Regulation No. 6, and Part C of Regulation No. 3, implement the federal standards of performance for new stationary sources and the federal operating permit program. The Maintenance Plan makes no changes to these regulations. This reference to Regulation No. 6 and Part C of Regulation No. 3 shall not be construed to mean that these regulations are included in the SIP.

   In accordance with State and federal regulations and policies, the State and federal nonattainment NSR requirements (that once again become effective for the Denver area on January 16, 2001) will revert to the State and federal attainment PSD permitting requirements once EPA approves this redesignation request and maintenance plan.

   Additionally, Regulation No. 3, Part B, Sections III.D.1.f was changed on March 21, 1996 to make it clear that permitting requirements for gasoline stations in the Denver Metropolitan ozone attainment maintenance area will continue to apply once the area is redesignated to attainment/maintenance. Also, Regulation No. 7, Section I, Applicability, was revised to state that the VOC control requirements of the rule continue to apply once the area is redesignated to attainment/maintenance. These rule revisions were submitted to EPA for approval by the Governor in August 1996.

4. Since 1991, gasoline sold in the Denver area during the summer ozone season (June 1 to September 15 for gasoline RVP) has been subject to a national Reid Vapor Pressure (RVP) limit of 7.8 pounds per square inch (psi) in order to reduce fuel volatility. For ethanol-blended fuels, the RVP limit is 8.8 psi. Since the Denver area has not violated the 1-hour standard since the late 1980's, the State has requested, and EPA has granted, waivers to allow a 9.0 psi RVP (10.0 psi for ethanol blends) gasoline in the Denver area instead of the more stringent 7.8 psi limit.

   Since this maintenance plan incorporates a gasoline RVP limit of 9.0 psi, and since maintenance of the 1-hour ozone standard is shown for the entire time period from 1993 through 2013 with this limit, the State of Colorado requests that the 9.0 psi RVP limit (10.0 psi for ethanol blends) be made permanent for the Denver attainment maintenance area upon approval of the maintenance plan and redesignation request by EPA.

5. The following transportation control measures were included in the 1982 state implementation plan for ozone in the Denver nonattainment area (approved by EPA on December 12, 1983 (48 FR 55284). These measures, which are further described in Table 9 of the 1982 SIP, have all been implemented.
   a. Transit improvements;
   b. Rideshare programs;
   c. A variable work hours program for federal employees;
   d. A regional bicyle plan;
   e. Two lanes on Santa Fe Drive reserved or High Occupancy Vehicles.

B. Emission Inventories

This section presents emission inventories for the maintenance plan. Emission inventories are provided for the 1993 attainment year, the 2006 interim year, and the 2013 maintenance year.

The 1993 inventory incorporates the actual emissions and control measures in place at that time. The 2006 and 2013 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 Denver attainment maintenance area (see Figure 2-1) and provide emissions estimates for a typical summer weekday during the summer ozone season (May through September). The ozone attainment maintenance area is used to establish the mobile source emissions budget for the region as discussed in subsequent sections of this plan.

All of the inventories were developed using EPA-approved emissions modeling methods, including MOBILE 5b, and updated transportation and demographics data from DRCOG. No credit in this analysis was taken for EPA's recently adopted Tier 2/Low Sulfur automobile emission standards at this time, though these new standards will result in significantly reduced VOC and NOx emissions from motor vehicles. The ozone maintenance plan technical support document contains detailed information on model assumptions and parameters for each source category.

1. Demographic and Transportation Data

At EPA's recommendation, this maintenance plan analysis is based on the emissions analysis that was performed for the recently completed Denver CO Redesignation Request and Maintenance Plan. The emission estimates were updated based on the most recent VMT estimates contained in DRCOG's conformity analysis for the updated fiscally constrained element of the Metro Vision 2020 regional transportation plan.

For comparison purposes, Table 3.1 shows the 2006 and 2013 VMT data used to develop the CO maintenance plan emission inventories and the 2010 and 2020 VMT estimates used in the conformity analysis. The new 2013 estimate was interpolated between 2010 and 2020.

Table 3.1: Comparison of VMT Estimates -- Ozone Attainment Maintenance Area
(millions of daily VMT)

Period	CO Maintenance Plan	Updated 2020 Conformity Analysis	Difference
2006	63.8	n/a	
2010		74.4	
2013	73.8	77.6	+ 5.2%
2020		85.0	

2. Emissions Inventory Data

The detailed emissions inventories for 1993, 2006 and 2013 are presented in Appendix A. Summaries of the VOC and NO_x inventories are presented in Tables 3.2 and 3.3. The on-road mobile source numbers were increased by 5.2% to account for the updated VMT estimates :

Table 3.2: SUMMARY VOC INVENTORY
Tons per Summer Day

	1993	2006	2013
ON ROAD MOBILE			
Exhaust	91	65	56
Evaporative	28	20	18
Subtotal	**119**	**84**	**74**
POINT SOURCES			
Major	23	26	27
Minor	23	27	29
Subtotal	**46**	**52**	**56**
AREA SOURCES	**74**	**73**	**80**
NON-ROAD MOBILE	**58**	**39**	**38**
Subtotal	**296**	**248**	**248**
BIOGENIC	**211**	**211**	**211**
TOTAL	**507**	**460**	**459**

Table 3.3: SUMMARY NOx INVENTORY
Tons per Summer Day

	1993	2006	2013
ON ROAD MOBILE	**134**	**115**	**117**
POINT SOURCES			
Major	113	114	116
Minor	9	10	10
Subtotal	**122**	**123**	**126**
AREA SOURCES	**7**	**10**	**11**
NON-ROAD MOBILE	**65**	**57**	**50**
Subtotal	**328**	**305**	**304**
BIOGENIC	**4**	**4**	**4**
TOTAL	**332**	**309**	**308**

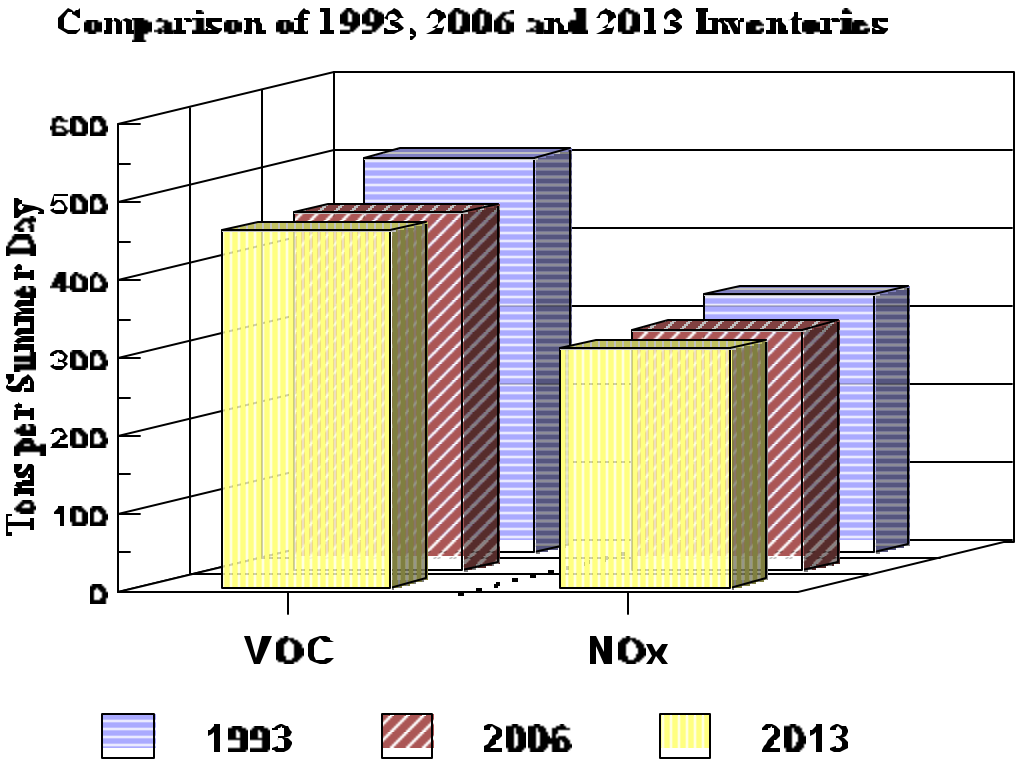
NOTE: Emissions estimates have been rounded to the nearest ton. Totals may not added due to rounding.
For more detail see Appendix A - Emissions Inventories.

The emissions inventories include forecasted estimates from Denver International Airport (DIA) operations and construction.

C. Maintenance Demonstration

As required by CAA Section 175A(a), each request for redesignation shall be accompanied by a SIP revision which provides for maintenance of the NAAQS for at least 10 years after redesignation. Following EPA guidance and policy (September 4, 1992 EPA memorandum from John Calcagni to EPA regional offices), this maintenance demonstration is made by comparing projected 2006 and 2013 emissions with the attainment year 1993 emissions. If 2006 and 2013 emissions are less than 1993 emissions, then maintenance is demonstrated. As illustrated in the emission inventory table, future year VOC and NOx emissions in the Denver area are less than 1993 emissions, and maintenance is shown.

A comparison of the differences in the attainment, interim and maintenance year inventories of the ozone precursors, VOC and NO_x, are further demonstrated in the following chart:



The emission inventories show a steady downward trend in both VOC and NOx emissions, mainly because of more stringent motor vehicle tailpipe standards and federal standards on other source categories. Because of this steady downward trend and the fact future year emissions are considerably below 1993 levels, no increases in emissions are expected in intervening years between now and 2013 that will threaten the demonstration of maintenance.

D. Motor Vehicle Ozone Precursors Emissions Budget

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..."

As noted above, the 2006 and 2013 regional emissions inventories for ozone precursors are below the level necessary to demonstrate continued maintenance of the ozone standard. Therefore, EPA's conformity regulation (40 CFR 93.124, August 15, 1997) 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" for VOC and NO_X in the interim and maintenance years is demonstrated in the following table, with the level of emissions in 1993 demonstrating maintenance of the standard:

Table 3.4: Changes in Inventory and Potential Margin of Safety

	VOC INVENTORY (tpsd) *rounded to the nearest ton*					**NO_X INVENTORY (tpsd)** *rounded to the nearest ton*				
	1993	**2006**	**2006 Safety Margin***	**2013**	**2013 Safety Margin***	**1993**	**2006**	**2006 Safety Margin***	**2013**	**2013 Safety Margin***
Mobile Sources	119	84	(35)	74	(45)	134	115	(19)	117	(17)
All Other Anthropogenic Sources	177	164	(13)	174	(3)	194	190	(4)	187	(7)
Biogenic Sources	211	211	0	211	0	4	4	0	4	0
TOTAL INVENTORY	507	460	(47)	459	(48)	332	309	(23)	308	(24)

*"Safety margin" is difference between future year emissions and 1993 attainment year emissions. Totals may not add due to rounding.

This maintenance plan applies the available mobile source "safety margin" in 2006 and 2013 to the motor vehicle emissions budget for ozone precursors (VOC and NOx), resulting in emission budgets established at 1993 mobile source emission levels.

EPA's 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.

For years after the last year of the maintenance plan (in this case, 2013), 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.

This maintenance plan establishes the same emission budgets for all years 2002 and beyond, as summarized in the table below:

Table 3.5: Motor Vehicle Emissions Budgets for VOC and NO_X
Ozone Attainment/Maintenance Area

	VOC (tpsd)	NO_X (tpsd)
2002 and beyond	119	134

E. Monitoring Network / Verification of Continued Attainment

Once the Denver metropolitan area has been redesignated to attainment status by EPA, 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 one-hour ozone NAAQS. If measured mobile source parameters (e.g., vehicle miles traveled, congestion, fleet mix, etc.) change significantly over time, the APCD will perform the appropriate studies to determine whether additional and/or re-sited monitors are necessary. 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.

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 one-hour ozone NAAQS standard which occurs after redesignation to attainment. Attainment areas are not required to have preselected contingency measures, just a list of measure 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 of the 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 the enhanced vehicle inspection and maintenance program as described in AQCC Regulation No. 11 prior to the modifications adopted on January 10, 2000 as part of this Maintenance Plan. These modifications changed the I/M program by providing for the remote sensing clean screen program.

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

- **Reid Vapor Pressure Reduction**

Colorado may consider requiring the reduction of gasoline RVP to below 9.0 psi throughout the Denver metro region during the summer ozone season. Consistent with provisions of the CAAA, this contingency measure may only be implemented upon the occurrence of an actual ozone violation. This possible contingency measure will require a Federal Register action by the EPA to change the Colorado RVP Table on 40 CFR 80.27, since this maintenance plan requests a permanent RVP limit of 9.0 psi upon approval of the plan by EPA. Full implementation of this measure will be required within 9 to 12 months of the decision to apply this measure.

- **Inspection/Maintenance Program Changes and Additions**

Colorado may consider changing the cutpoints for VOCs and/or NO_x and adding evaporative controls to the existing Denver metro area enhanced I/M program. Once in effect the changes will take a full testing cycle (24 months) for full implementation.

- **Reinstate New Source Review Program**

Upon violation, Colorado may consider reinstatement of the nonattainment NSR program as a potential contingency measure.

- **Consumer and Commercial Products**

Colorado may consider regulations to restrict the sale, offer for sale or manufacture for sale any consumer product, such as personal care products, automotive and industrial maintenance products and pesticides products, which contain volatile organic compounds in excess of

specified limits, within the Denver metro area. Once adopted and in effect, stock turnover would be the limiting factor to full implementation.

- **Architectural Surface Coatings**

Colorado may consider regulations to restrict the sale, supply, offer for sale or solicit the application of architectural coatings, which contain volatile organic compounds in excess of specified limits, within the Denver Metro area. Once adopted and in effect, stock turnover would be the limiting factor to full implementation.

- **Lawn and Garden Equipment Use**

Colorado may consider regulations to restrict the use of gasoline powered lawn mowers on announced ozone alert days in the Denver Metro area. It is estimated that with an appropriate informational campaign that the citizens will respond, based on the response to woodburning controls.

- **NO_x RACT for Major Sources**

If it is determined through additional analysis that NO_x controls would contribute to achievement of the ozone NAAQS, Colorado may consider the adoption of regulations to control NO_x emissions at a level determined to be Reasonably Available Control Technology (RACT) in the Denver metro area.

2. Tracking and Triggering Mechanisms

a. Tracking

The primary tracking plan for the Denver metropolitan area consists of continuous ozone 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 one-hour NAAQS within 30 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 VOC and NOx 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 one-hour ozone NAAQS (any one-hour value over 0.125 ppm) 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 one-hour ozone 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.

3. 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 one-hour ozone NAAQS occurs.

No more than 60 days after being notified by the APCD that a violation of the one-hour ozone 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

As stated earlier, it is required that a maintenance plan revision be submitted to the EPA eight years after the original redesignation request/maintenance plan is approved - the purpose of this revision is to provide for maintenance of the NAAQS for an additional ten years following the first ten-year period. The State of Colorado commits to submit a revised maintenance plan eight years after redesignation to attainment, as required by the CAA and EPA.

APPENDIX A

Emissions Inventories

Emissions Inventories - - Denver Ozone Attainment Maintenance Area

SOURCE CATEGORY	1993 NOx (tpsd)	1993 VOC (tpsd)	2006 NOx (tpsd)	2006 VOC (tpsd)	2013 NOx (tpsd)	2013 VOC (tpsd)
POINT SOURCES						
Major	112.7	22.8	113.9	25.7	116.3	27.1
Minor	9.1	23.0	9.5	26.7	9.7	28.7
POINT SOURCE-SUBTOTAL	121.8	45.8	123.4	52.4	126.0	55.8
ON-ROAD						
Exhaust, Running Loss, Resting Loss	134.0	90.7	115.2	64.6	117.2	55.8
Evaporative and Refueling Loss	0.0	28.3	0.0	19.8	0.0	17.8
ON-ROAD-SUBTOTAL	134.0	119.0	115.2	84.4	117.2	73.6
NON-ROAD						
Aircraft	7.1	1.9	12.7	1.9	17.2	2.1
Locomotives	3.7	0.3	2.5	0.3	1.2	0.1
Construction Equipment	38.5	6.5	28.5	3.8	20.0	2.9
Industrial Equipment	4.5	2.0	3.6	1.6	3.1	1.6
Lawn and Garden/Logging	0.7	28.0	0.7	14.4	0.7	15.0
Farm Equipment	4.3	0.9	3.4	0.5	2.8	0.4
Airport Service Equipment	4.2	0.4	3.2	0.6	2.6	0.7
Light Commercial	1.1	7.7	1.2	5.0	1.0	4.9
Recreational Vehicles	0.0	2.6	0.0	3.2	0.0	3.5
Recreational Vessels	1.0	7.2	1.2	7.4	1.4	7.1
NON-ROAD-SUBTOTAL	65.1	57.5	57.0	38.7	50.0	38.3
AREA SOURCES						
Gasoline Distribution-Transport	0.0	0.3	0.0	0.4	0.0	0.5
Gasoline Distribution-Breathing Loss	0.0	0.6	0.0	0.8	0.0	0.9
Dry Cleaning*	0.0	0.0	0.0	0.0	0.0	0.0
Degreasing	0.0	12.8	0.0	6.6	0.0	7.3
Architectural Surface Coating	0.0	15.7	0.0	16.8	0.0	18.5
Auto Refinishing	0.0	13.6	0.0	12.8	0.0	14.0
Traffic Marking/Stripping	0.0	2.4	0.0	3.3	0.0	3.6
Graphic Arts	0.0	3.2	0.0	4.3	0.0	4.7
Asphalt Use	0.0	0.0	0.0	0.0	0.0	0.0
Pesticide Application	0.0	0.1	0.0	0.2	0.0	0.2
Commercial/Consumer Solvent Use	0.0	19.4	0.0	20.7	0.0	22.8
Publicly Owned Treatment Works	0.0	0.0	0.0	0.0	0.0	0.0
Wastewater Treatment	0.0	0.0	0.0	0.0	0.0	0.0
Treatment, Storage, and Disposal Facilities	0.0	0.0	0.0	0.0	0.0	0.0
Landfills	0.0	2.1	0.0	2.8	0.0	3.1
Leaking Underground Storage Tanks	0.0	1.4	0.0	1.4	0.0	1.4
Wood stove/Fireplaces	0.0	0.0	0.0	0.0	0.0	0.0
Bakeries	0.0	1.2	0.0	1.6	0.0	1.8
Natural Gas	6.8	0.4	9.7	0.5	10.8	0.6
Coal	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Oil	0.0	0.0	0.0	0.0	0.0	0.0
Breweries, Wineries, Distillaries	0.0	0.0	0.0	0.0	0.0	0.0
Accidental Releases	0.0	0.0	0.0	0.0	0.0	0.0
Synthetical Organic Chemical Tanks	0.0	0.0	0.0	0.0	0.0	0.0
Tank Truck, Rail Car, Drum Cleaning	0.0	0.0	0.0	0.0	0.0	0.0
Incineration	0.0	0.0	0.0	0.0	0.0	0.0
Forest fires/perscribed burns	0.0	0.0	0.0	0.0	0.0	0.0
Structural Fires	0.1	0.5	0.1	0.6	0.1	0.6
Open burning/Ag burning	0.0	0.0	0.0	0.0	0.0	0.0
Aircraft Engine Testing	0.0	0.0	0.0	0.0	0.0	0.0
Charcoal Grilling	0.0	0.0	0.0	0.0	0.0	0.0
AREA SOURCE-SUBTOTAL	6.9	73.7	9.8	72.8	10.9	80.0
TOTAL FROM ANTHROPOGENIC SOURCES	327.8	296.0	305.4	248.3	304.1	247.7
BIOGENIC	3.7	211.2	3.7	211.2	3.7	211.2
TOTAL FROM ALL SOURCES	331.5	507.2	309.1	459.5	307.8	458.9
Diff all other - mobile sources	197.5	388.2	193.9	375.1	190.6	385.3

tpsd = tons per summer day

* Perchloroethylene, the primary solvent used in dry cleaning, is no longer considered to be a photochemical species

NOTE: Emission rates are reported with one decimal place precision to provide representation for smaller source categories. This level of precision is not intended to suggest a level of accuracy

APPENDIX B

Changes to AQCC
Ambient Air Quality Standards Regulation

V. Emission Budgets for Nonattainment Areas in the State of Colorado

V.A. Budgets

V.A.1. The following Motor Vehicle Emissions Budgets shall be utilized to assess the conformity of Transportation Plans, TIPs, and where appropriate, Projects, for the applicable periods and geographic areas indicated:

Denver Nonattainment Area (Modeling Domain)	PM_{10}: 1995: 41.2 tons/day 1996-97: 44 tons/day 1998-2005: 54 tons/day 2006 and Beyond: 60 tons/day Nitrogen Oxides 1995 and Beyond: 119.4 tons/day
Denver Attainment Maintenance Area	Ozone Precursors (attainment/maintenance area boundary): NO_X 2002 and Beyond 134 tpsd VOC 2002 and Beyond 119 tpsd tpsd = tons per summer day Carbon Monoxide (attainment/maintenance area boundary) 2000 1,125 tpd 2000 825 tpd 2002 and Beyond 800 tpd
Aspen (MODELING AREA)	PM_{10} 2015 and Beyond: 16,244 lbs/day
Cañon City	PM_{10} 1994-96: 4,981 lbs./day 1997 and Beyond: 7,439 lbs./day
Lamar	PM_{10} 1994-96: 1,829 lbs./day 1997 and Beyond: 1,884 lbs./day
Pagosa Springs (Modeling Area)	PM_{10} 2012 and Beyond: 7,486 lbs./day

Steamboat Springs (Modeling Area)	PM_{10} 1999-2001: 2002 and Beyond:	 16,661 lbs./day 20,682 lbs./day
Telluride (Modeling Area)	PM_{10} 2012 and Beyond:	 10,001 lbs./day
Longmont	Carbon Monoxide 1998 and Beyond:	 27 tons/day
Colorado Springs	Carbon Monoxide 2001 and Beyond:	 270 tons/day

V.A.2. Geographic Coverage

Unless otherwise specified, the geographic coverage of each of the area Motor Vehicle Emissions Budgets shall be the nonattainment or attainment maintenance area as defined in the respective state implementation plans.

V.A.3. The Motor Vehicle Emissions Budget for PM_{10} applies to total primary PM_{10} emissions, including emissions from tailpipe exhaust, unpaved roads (except for the Denver PM_{10} nonattainment area), reentrained road dust and street sand. It does not include precursor or secondary emissions, which, where appropriate, are covered under separate budgets.

V.A.4. Effective Dates

V.A.4.a. Denver Carbon Monoxide

The 800 tons-per-day carbon monoxide emission budget established in section V.A.1. shall take effect as a matter of state law when such budget takes effect as a matter of federal law pursuant to 40 CFR section 93.118. Until such time as the 800 tons-per-day budget takes effect pursuant to this section and 40 CFR section 93.118, the carbon monoxide emission budgets for the Denver CO Nonattainment Area shall be 1,125 tons per day for the period 1995-2000 and 825 tons per day for the period 2001 and beyond.

V.A.4.b. Colorado Springs Carbon Monoxide

The 270 tons-per-day carbon monoxide emission budget established in section V.A.1. shall take effect as a matter of state law when such budget takes effect as a matter of federal law pursuant to 40 CFR section 93.118. Until such time as the 270 tons-per-day budget takes effect pursuant to this section and 40 CFR section 93.118, the carbon monoxide emission budget for Colorado Springs CO Attainment/Maintenance Area shall be 212 tons-per-day.

V.A.4.c. Pagosa Springs PM-10

The 7,486 pounds-per-day PM-10 emission budget established in section V.A.1. shall take effect as a matter of state law when such budget takes effect as a matter of federal law pursuant to 40 CFR

section 93.118. Until such time as the 7,486 pounds-per-day budget takes effect pursuant to this section and 40 CFR section 93.118, the PM-10 emission budget for the Pagosa Springs PM-10 Nonattainment Area shall be 6,281 pounds-per-day

V.A.4.d. Telluride PM-10

The 10,001 pounds-per-day PM-10 emission budget established in section V.A.1. shall take effect as a matter of state law when such budget takes effect as a matter of federal law pursuant to 40 CFR section 93.118. Until such time as the 10,001 pounds-per-day budget takes effect pursuant to this section and 40 CFR section 93.118, the PM-10 emission budget for the Telluride PM-10 Nonattainment Area shall be 14,687 pounds-per-day.

V.A.4.e. Aspen PM-10

The 15,716 pounds-per-day PM-10 emission budget established in section V.A.1. shall take effect as a matter of state law when such budget takes effect as a matter of federal law pursuant to 40 CFR section 93.118. Until such time as the 15,716 pounds-per-day budget takes effect pursuant to this section and 40 CFR section 93.118, the PM-10 emission budget for the Aspen PM-10 Nonattainment Area shall be 13,974 pounds-per-day.

V.A.4.f. Denver Ozone

The 134 and 119 tpsd emission budgets established in section V.A.1. shall take effect as a matter of state law when such budget takes effect as a matter of federal law pursuant to 40 CFR section 93.118. Until such time as the 134 and 119 tpsd budgets take effect pursuant to this section and 40 CFR section 93.118, the criteria set out in 40 CFR 93.119 shall apply in lieu of the emissions budgets for ozone precursors for any determination required by federal law.