

DRAFT August 5, 2008

Denver Metro Area & North Front Range

Ozone Action Plan

**Including
A Proposed Revision to the State Implementation Plan**

**Approved by:
Colorado Air Quality Control Commission**

Regional Air Quality Council

**North Front Range Transportation and
Air Quality Planning Council**

DRAFT August 5, 2008



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Table of Contents

OVERVIEW: OZONE ACTION PLAN

8-Hour Ozone State Implementation Plan (SIP)

CHAPTER I: FEDERAL REQUIREMENTS FOR OZONE ATTAINMENT SIP

CHAPTER II: OZONE MONITORING INFORMATION

CHAPTER III: BASE CASE EMISSIONS INVENTORIES

CHAPTER IV: CONTROL MEASURES

CHAPTER V: PHOTOCHEMICAL MODELING AND OTHER WEIGHT OF EVIDENCE ANALYSES FOR ATTAINMENT DETERMINATION

CHAPTER VI: VOC AND NOX MOTOR VEHICLE EMISSIONS BUDGETS

ATTACHMENT A: SIP RULE LANGUAGE

ATTACHMENT B: STATE-ONLY RULE LANGUAGE

Attachments are separate documents on the electronic version.

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OVERVIEW

2008 OZONE ACTION PLAN

This Overview section is provided for information only and shall not be construed to be part of the federally-enforceable State Implementation Plan.

On November 20, 2007, the U.S. Environmental Protection Agency (EPA) designated the Denver/North Front Range region as nonattainment for the 8-hour ozone standard of 0.08 parts per million (ppm) adopted in 1997. The State of Colorado must submit an attainment plan (referred to as a revision to the State Implementation Plan, or SIP) to EPA by July 1, 2009 that will bring the region back into attainment by November 2010 (based on data from 2008-2010 ozone seasons).

BACKGROUND

In 1997 EPA adopted a new, more stringent National Ambient Air Quality Standard (NAAQS) for ozone based on the latest ozone health effects information. The standard was set as a level of .08 ppm averaged over an 8-hour period. Attainment of the standard is based on the 4th maximum 8-hour ozone concentration recorded at each monitoring location each year, averaged over a three-year period.

State and regional agencies in the Denver metropolitan area entered into a voluntary agreement with EPA in December 2002 that laid out a process for achieving attainment with EPA's 1997 8-hour for ozone standard in an expeditious manner, but no later than December 31, 2007. Called the Early Action Compact for Ozone ("the EAC"), the agreement set 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. The EAC Ozone Action Plan (SIP) was adopted by the Colorado Air Quality Control Commission (AQCC) in March 2004 and submitted to EPA in the summer 2004. EPA promulgated approval of the Ozone Action Plan in the Federal Register ([Vol. 70 , Number 94, May 17, 2005](#)). A revision to the Ozone Action Plan to preserve the reductions estimated in the original plan was approved by the Air Quality Control Commission on December 17, 2006 and the Colorado State Legislature in spring 2007, and submitted to the EPA by the Governor in August 2007. EPA approved this revision in February 2008.

In April 2004, EPA designated and classified areas of the country that violated the 8-hour standard. Based on the 2001-2003 design values, the Denver Metro Area/North Front Range (DMA/NFR) area violated the 8-hour ozone standard at three monitors and was included on EPA's 2004 list of non-attainment areas. However, based on terms in the Early Action Compact, EPA deferred the non-attainment area designation pending the area continuing to meet the deadlines in the EAC and achieving the 8-hour standard by December 31, 2007 (based on data from the 2005-2007 ozone seasons).

Despite efforts in the EAC Ozone Action Plan that reduced ozone-causing emissions in the DMA/NFR, the area failed to achieve the standard due to high readings in July 2007, resulting in a three-year (2005-2007) Design Value of 0.085 ppm at one monitor (Rocky Flats North) which violated the 8-hour ozone NAAQS.

On November 20, 2007 the EPA did not continue the deferral of the effective date for non-attainment in the DMA/NFR 8-hour non-attainment area and the official non-attainment designation became effective at that time.

AIR QUALITY AGENCIES IN COLORADO

- **Regional Air Quality Council**

The Regional Air Quality Council is designated by Governor Ritter 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 primary task is to prepare state implementation plans (SIPs) for compliance with federal air quality standards. The RAQC consists of an 11-member board appointed by the Governor.

In July 2007, when it was clear that the region was in violation of the 8-hour ozone standard, Governor Bill Ritter directed the RAQC to develop an effective plan (SIP) to reduce ozone in the Denver/North Front Range area by September 2008. The Governor also urged the RAQC to propose measures that would further reduce ozone concentrations during the 2008 summer season and set as its immediate goal the reduction or elimination of ozone levels measured above 0.08 ppm. In addition, the Governor directed the RAQC to begin the process for considering additional measures that may be necessary to meet an anticipated lower federal standard for ozone.

- **North Front Range Transportation and Air Quality Planning Council**

The North Front Range Transportation and Air Quality Planning Council Planning Council is designated by the governor as the lead air quality planning organization for the North Front Range region. The North Front Range Transportation and Air Quality Planning Council Planning Council is a nonprofit public organization of 15 local and county governments in Larimer and Weld counties and is funded through federal and state grants, and local funds. The goal of the North Front Range Transportation and Air Quality Planning Council Planning Council is to enhance air quality and mobility among northern Colorado communities, and between the North Front Range and the Denver Metro area, by developing cooperative working relationships and financial partnerships among its member governments, the Colorado Department of Transportation (CDOT), Federal Highway Administration (FHA), the Federal Transit Administration (FTA), and the private sector.

The North Front Range Transportation and Air Quality Planning Council Planning Council is responsible for proposing air quality measures affecting the North Front Range and performing conformity determinations to ensure its transportation plans and programs comply with the state implementation plan.

- **Colorado Air Quality Control Commission**

The Colorado Air Quality Control Commission (AQCC) is the regulatory body with responsibility for adopting air quality regulations consistent with state statute. This includes the responsibility and the authority to adopt State Implementation Plans (SIPs) and 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.

DENVER METRO AREA/NORTH FRONT RANGE NON-ATTAINMENT AREA

The boundary of the DMA/NFR 8-hour ozone non-attainment area was established in EPA's April 2004 designation of nonattainment areas, as follows:

All of Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas, Jefferson Counties and portions of Larimer and Weld Counties.

A map describing the current non-attainment area boundaries is included in the Figure at the end of this section.

2008 OZONE ACTION PLAN

After several months of analysis and evaluation and after more than 40 stakeholder and public meetings, the Regional Air Quality Council has proposed an Ozone Action Plan to reduce ozone levels in the Denver/North Front Range area by 2010. The overall plan includes elements that will be included in the federally-enforceable State Implementation Plan (SIP), elements that are include as state-only enforceable measures in state regulation, and elements that need further evaluation for a possible SIP amendment in the near future. These elements are discussed briefly below and are summarized in the Table at the end of this section.

Measures proposed for the federally-enforceable SIP **(see attached SIP document for more details)**

- 1. Adopt more stringent cut-points for inspection/maintenance program in 7-county Denver metro area** – lower cut-points will identify more high-emitting vehicles that will result in repairs to reduce emissions (took effect May 2008);
- 2. Require 7.8 psi RVP (Reid vapor pressure) gasoline in the entire non-attainment area** – 7.8 RVP gasoline is already required in the former one-hour ozone non-attainment area (most of the 7-county Denver area) and will be required in portions of Larimer and Weld counties and eastern portions of Arapahoe and Adams counties, subject to EPA action;
- 3. Increase control requirements for oil and gas condensate tanks to 95% for all new and modified tanks greater than two tons per year (tpy) (by 2009) and all existing tanks greater than 10 tpy (by 2010)** – this will replace the current 75% system-wide control requirement in Regulation No. 7;
- 4. Require low bleed valves on all new and existing pneumatic valves in oil and gas operations (by 2009)** – exemptions would be granted for operations that require high-bleed valves for safety reasons;
- 5. Expand current requirements in Regulation No. 7 for Volatile Organic Compound (VOC) controls to the entire non-attainment area** – this will now require application of specific reasonably available control technology (RACT) for new and existing listed source categories and all new and existing major (greater than 100 tpy) stationary sources of VOCs in portions of Larimer and Weld counties and eastern portions of Adams and Arapahoe counties;
- 6. Remove current exemptions contained in Regulation No. 3 for selected small sources required to file air pollution emission notices and obtain permits** – this will result in the identification of more sources of VOCs and potentially additional control requirements;
- 7. Require general application of permit requirements in Regulation No. 3 and reasonably available control technology (RACT) for all stationary sources of VOC greater than two tons per year and NOx greater than five tons per year in the entire non-attainment area.**

Measures proposed as state-only measures in state regulation

1. **Implement an motor vehicle inspection/maintenance program in the North Front Range (Larimer and Weld counties)** – the structure of this program is yet to be determined and will be established by the AQCC in Regulation No. 11;
2. **Continue implementing the high-emitter pilot program in the Denver metro area** -- the program began January 1, 2008 and, based on the results of the pilot program, may lead to a full-scale high-emitter program in the future;
3. **Tighten up collector plate requirements in state law** – current collector plate requirements limit emission tests on vehicles more than 25 years old; the RAQC is working with stakeholders to develop legislation that will limit collector plates to true collector vehicles and close the emissions testing loophole for old, non-collector vehicles;
4. **Increase control requirements for oil and gas condensate tanks to 95% for and all existing tanks greater than 2 tpy (between 2011 and 2012)** – Regulation No. 7 will be amended to increase the number of tanks controlled in the nonattainment area beyond the 10 tpy threshold included in the SIP and will be enforced as a state-only control measure;
5. **Implement control requirements for reciprocating internal combustion engines (RICE) statewide** – the requirements would mirror requirements currently in place in the Denver/North Front Range non-attainment area.

Potential strategies requiring additional evaluation for a near-term ozone plan/SIP amendment

1. **Evaluate potential ozone fuels strategies** – includes 7.0 RVP gasoline, federal reformulated gasoline, and eliminating the one-pound psi RVP waiver for ethanol blended gasoline;
2. **Evaluate emission controls for large industrial sources of NO_x** – includes power plants, large industrial boilers, and cement kilns;
3. **Evaluate statewide control requirements for new oil and gas condensate tanks and pneumatic valves** – patterned after requirements in the Denver/North Front Range non-attainment area;
4. **Evaluate the feasibility of adopting California requirements for paints, solvents and consumer products** – California has more stringent formulation requirements for these products than the pending federal rule.

NEW 8-HOUR OZONE STANDARD

In March 2008 EPA established a new, more stringent standard for ozone based on a review of the most recent health effects information. The new 8-hour standard is set at a level of 0.075 ppm (or 75 parts per billion) averaged over an eight-hour period. As with the 1997 standard, 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 will occur when the three-year average is equal to or greater than 0.076 ppm (or 76 ppb).

Under EPA's rule establishing the new standard, the Governor is required to make recommendations for areas of non-attainment by March 2009. EPA will review the Governor's recommendations and make final non-attainment determinations in March 2010. States will have to submit revised state implementation plans for the new ozone standard by March 2013. EPA will later establish attainment dates for areas, which will range between 2013 to 2030 based on the severity and classification of the area.

In the meantime, all the 1997 8-hour ozone standards and all the associated regulatory requirements remain in place. States and non-attainment areas should continue their plans for implementing the 1997 standards. EPA will address transition issues from the 1997 standards to the 2008 standards in a separate future rulemaking.

Currently, through summer 2008, eight monitors along the DMA/North Front Range currently violate of the new 0.075 ppm 8-hour ozone standard. This proposed Attainment SIP is not intended to address attainment of the 0.075 ppm 8-hour ozone standard. However, the Regional Air Quality Council and the Colorado Department of Public Health and Environment will continue to consider measures that move the region towards attainment of the new 8-hour ozone standard as expeditiously as practical.

Status of Development of Emission Control Strategies for Ozone

Strategies Under Development for 2008 Proposed Ozone Action Plan <i>(All strategies apply to the entire Denver/North Front Range nonattainment area (NAA) unless otherwise noted)</i>				Potential Strategies Requiring Additional Evaluation for Near-Term Plan/SIP Amendment	
Recommended Measures for Federally-Enforceable State Implementation Plan (SIP)		<i>Potential Emission Reduction</i>	Recommend Measures Adopted and Enforced as State-only Measures		<i>Potential Emission Reduction</i>
➤ More stringent Reg. 11 I/M cutpoints (Denver area) – adopted, effective May 1, 2008		~ 1 tpd VOC, ~3 tpd NOx, ~13 tpd CO	➤ Inspection/maintenance program in North Front Range (structure to be determined)		~ 1 tpd VOC, ~1 tpd NOx, ~17 tpd CO
➤ 7.8 RVP gasoline regulatory requirement in North Front Range (consistent with Denver area)		~ 3 tpd VOC	➤ Mandatory high-emitter <u>pilot</u> program (Denver area) – began January 1, 2008		<i>unknown at this time</i>
			➤ Tighten up collector plate requirements for older vehicles (statewide)		< 1 tpd VOC ~ 7 tpd CO
➤ Increase condensate tank control (95%) <ul style="list-style-type: none"> ▪ for all new/modified tanks >2 tpy (2009) ▪ for all existing tanks >10 tpy (2010) 		VOC ~ 5-9 tpd ~19-30 tpd	➤ Increase condensate tank control (95%) <ul style="list-style-type: none"> ▪ for all existing tanks >5 tpy (2011) ▪ for all existing tanks >2 tpy (2012) 		VOC ~ 30-35 tpd ~9-12 tpd
➤ Pneumatic valves controls - require low/no bleed valves on all new and existing valves by 2009		~ 23 tpd VOC	➤ Statewide Oil & Gas regulations -- Controls on existing reciprocating internal combustion engines		<i>unknown at this time</i>
➤ Expand Reg. 7 (VOC control requirements) to entire NAA		<i>unknown at this time</i>			
➤ Remove current exemptions in Reg. 3 for selected small sources required to file air pollution emission notices and obtain permits		<i>unknown at this time</i>			
➤ Require Reasonably Available Control Technology (RACT) for minor sources in NAA (Reg. 3)		<i>unknown at this time</i>			
					➤ California Paints/Solvents/Consumer Products Rule
TOTAL EMISSION REDUCTIONS		VOC NOx CO ~51-66 tpd ~ 3 tpd ~13 tpd	VOC NOx CO ~41-49 tpd NA >24 tpd		~ 8 tpd VOC

Denver Metro Area & North Front Range

8-Hour Ozone Attainment Plan

A Proposed Revision to the State Implementation Plan

**Approved by:
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CHAPTER I

FEDERAL REQUIREMENTS FOR PREPARING 8-HOUR OZONE ATTAINMENT SIP REVISION

Clean Air Act Requirements

The Clean Air Act Amendments of 1990 established a classification system for ozone nonattainment areas based on the severity of the area's ozone problem as measured by the area's ozone design value. In April 2004 EPA issued a rule classifying all the areas designated nonattainment for the 8-hour standard. However, this rule was vacated by the U.S. Court of Appeals in December 2007 and EPA has yet issued a new rule consistent with the Court's decision.

EPA has indicated the Denver/North Front Range nonattainment area based on its 2005-2007 design value, will likely be classified as a Marginal area and subject to the provisions of Section 181 and 182(a) of the Clean Air Act Amendments of 1990. In addition, as a former Early Action Compact area, the Denver/North Front Range nonattainment area is subject to 40 CFR 81.300(e)(3)(ii)(D) that requires a new attainment demonstration with photochemical air quality modeling.

The core elements that EPA has indicated as necessary for an approvable revised attainment plan for the Denver/North Front Range nonattainment area under the Marginal classification are as follows:

- Photochemical grid modeling based on the latest EPA modeling guidance
- Emissions inventories for the base and future modeling years
- Modeled attainment demonstration for summer 2010 (3 years after designation)
- Required controls must be effective no later than prior to the beginning of the 2010 summer ozone season (May 1, 2010).
- Mobile vehicle emissions budgets for the attainment year (2010)
- Reasonably Available Control Measures - demonstration that controls needed for attainment have been achieved as expeditiously as possible.
- New Source Review applicable to VOC & NOx major sources of 100 tpy with offsets of 1.1 to 1.
- Construction permits required for new and modified major stationary sources

Additional elements that EPA has indicated are not necessary for an approvable revised state implementation plan for the Denver/North Front Range nonattainment area under the Marginal classification are as follows:

- Contingency measures are not required; however, upon failure to attain the area would be reclassified to a higher classification and additional control requirements may be required (Section 182(a));
- A Reasonably Available Control Technology pre-1990 fix-up is not required because it was achieved with Redesignation of the Denver metro 1-hour ozone area to attainment-maintenance (Section 182(a)(2)(A));
- Corrections to the pre-1990 Inspection/Maintenance program are not required because it was achieved with Redesignation of the Denver metro 1-hour ozone area to attainment-maintenance (Section 182(a)(2)(B));

Photochemical Grid Modeling

As a former EAC area, an attainment demonstration using photochemical grid dispersion modeling is required, and was performed for the revised 8-hour Ozone Attainment SIP. All modeling is based on "Guidance on the Use of Models and Other Analyses for Demonstrating Attainment of Air Quality Goals for Ozone, PM_{2.5} and Regional Haze" (EPA-454/B-07-002, April 15, 2007). The modeling follows the guidance as facilitated by EPA Region 8. The modeling 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 NO_x and/or VOC reductions. The 2010 Base Case was tested with 16 sensitivity tests to determine the relative effectiveness of different emission reduction controls and to aid in the selection of appropriate emission reduction strategies.

Emissions Inventories

Emission inventories used in this revised 8-hour ozone attainment SIP were developed for a typical summer episode day for the years 2006 and 2010 using EPA's MOBILE6 emissions model and the latest transportation information; area sources using a combination of EPA's NONROAD model data, and latest demographics information, area source data, and local survey and information data, and the latest stationary sources emissions information, as required. Future year inventories will sufficiently account for projected future growth in ozone precursor emissions through 2010, particularly from stationary, area, and mobile sources. Emissions inventories were compared and analyzed for trends in emission sources over time. Inventories included in the photochemical modeling were also characterized by time of day, day of week, speciation, location, temperature, and other factors.

Modeled Attainment Demonstration

The EPA Model Attainment Test Software was used with the 2006 and 2010 base case/control case photochemical grid modeling results to project 2010 8-hour ozone attainment. A weight of evidence (WOE) analysis will be required to support the modeled attainment demonstration.

Emission Reduction Strategies

All adopted Federal and State emission reduction strategies that have been or will be implemented by the November 20, 2010 attainment date are included in all emission inventories. The strategies included in the federally-enforceable SIP will be implemented as soon as practical, but no later than May, 2010. 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.

Conformity and Motor Vehicle Emissions Budgets

Transportation conformity provisions of section 176 (c)(2)(A) of the CAA require regional transportation plans and transportation improvement programs to demonstrate 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..."

Mobile Source Vehicle Emissions Budgets for VOC and NO_x in the 2010 attainment year are established as sub-regional budgets for future conformity for the two metropolitan planning organizations (Denver Regional Council of Governments and North Front Range Transportation and Air Quality Planning Council) serving the Denver/North Front Range nonattainment area.

New Source Review & Construction Permits

The State of Colorado currently performs New Source Review in non-attainment areas applicable to VOC & NO_x major sources of 100 tpy with offsets of 1.1 to 1. The State also maintains a Construction Permits program for new and modified major stationary sources.

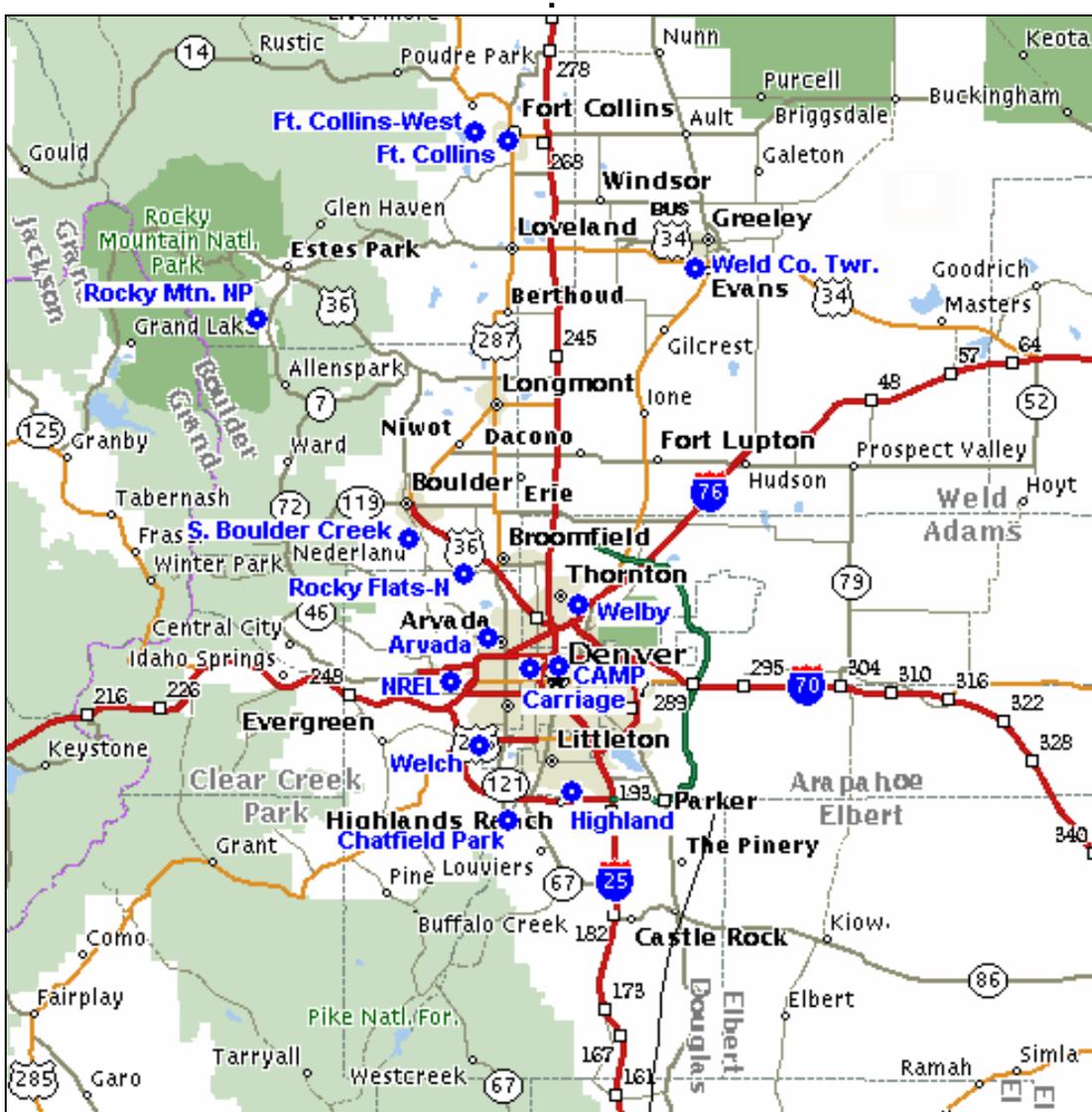
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CHAPTER II OZONE MONITORING INFORMATION

A. Ozone Monitoring Network

The 2007 ozone ambient air monitoring network in the Denver area and along the northern Front Range consisted of 13 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 Front Range 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. II - Ambient Air Quality Monitoring Program”, the APCD’s Quality Management Plan and Quality Assurance Project Plan documents, and Colorado’s Monitoring SIP which EPA approved in 1993. The data are recorded in EPA’s Air Quality System (AQS) and are available for public review at the APCD and through EPA’s AQS database. Table 1 presents the data recovery rates for each monitoring site in the Denver and north 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". For Colorado, the “ozone season” has been designated by EPA to be March 01 through September 30. 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
(Based on EPA designated ozone season of 3/1 – 9/30)**

Year	Welby 08-001-3001 Data Recovery	Highland 08-005-0002 Data Recovery	S. Boulder Creek 08-013-0011 Data Recovery	CAMP 08-031-0002 Data Recovery	Carriage 08-031-0014 Data Recovery	Chatfield Reservoir * 08-035-0002 Data Recovery
2000	99%	99%	99%	---	90%	95%
2001	96%	91%	98%	---	95%	91%
2002	95%	96%	97%	---	97%	93%
2003	95%	96%	99%	---	99%	87%
2004	94%	99%	96%	---	99%	---
2005	99%	97%	97%	98%	96%	---
2006	97%	98%	98%	99%	97%	---
2007	99%	99%	98%	98%	97%	---

Table 1 (continued)
Ozone Data Recovery Rates for Each Monitoring Site
(Based on EPA designated ozone season of 3/1 – 9/30)

Year	Chatfield Park * 08-035-0004 Data Recovery	Arvada 08-059-0002 Data Recovery	Welch 08-059-0005 Data Recovery	Rocky Flats North 08-059-0006 Data Recovery	NREL 08-059-0011 Data Recovery	Rock Mtn. NP 08-069-0007 Data Recovery
2000	---	98%	94%	98%	99%	89%
2001	---	99%	97%	98%	98%	95%
2002	---	99%	98%	96%	99%	95%
2003	---	98%	98%	99%	99%	94%
2004	92%	99%	99%	99%	98%	95%
2005	99%	95%	98%	94%	95%	90%
2006	97%	97%	99%	99%	99%	96%
2007	97%	99%	99%	96%	99%	97%

Year	Fort Collins West 08-069-0011 Data Recovery	Fort Collins CSU 08-069-1004 Data Recovery	Greeley ** 08-123-0007 Data Recovery	Weld County Tower ** 08-123-0009 Data Recovery
2000	---	99%	98%	---
2001	---	92%	99%	---
2002	---	87%	96%	99%
2003	---	97%	---	97%
2004	---	98%	---	96%
2005	---	91%	---	97%
2006	99%	98%	---	99%
2007	99%	97%	---	99%

* The Chatfield Reservoir seasonal monitor was moved from the campground registration building to the Chatfield Park office yard as a year-round monitor in 2004.

** The Greeley monitor was moved from 811 15th Street to the Weld County Tower site at 3101 35th Avenue 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 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 Part 58.10 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 North 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

Site Name	AQS #	<u>2000</u> 8-hr. 4th Max. (ppm)	<u>2001</u> 8-hr. 4th Max. (ppm)	<u>2002</u> 8-hr. 4th Max. (ppm)	<u>2003</u> 8-hr. 4th Max. (ppm)	<u>2004</u> 8-hr. 4th Max. (ppm)	<u>2005</u> 8-hr. 4th Max. (ppm)	<u>2006</u> 8-hr. 4th Max. (ppm)	<u>2007</u> 8-hr. 4th Max. (ppm)
Welby	08-001-3001	0.062	0.064	0.068	0.066	0.066	0.073	0.069	0.070
Highland	08-005-0002	0.076	0.077	0.076	0.091	0.072	0.080	0.081	0.075
S. Boulder Creek	08-013-0011	0.072	0.071	0.078	0.082	0.068	0.076	0.082	0.085
CAMP	08-031-0002	---	---	---	---	---	0.051	0.062	0.057
Carriage	08-031-0014	0.071	0.072	0.073	0.085	0.066	0.074	0.072	0.076
Chatfield Reservoir	08-035-0002	0.080	0.077	0.083	0.095	---	---	---	---
Chatfield Park	08-035-0004	---	---	---	---	0.075	0.084	0.086	0.082
Arvada	08-059-0002	0.076	0.074	0.073	0.083	0.065	0.078	0.082	0.079
Welch	08-059-0005	0.068	0.064	0.069	0.077	0.062	0.064	0.081	0.080
Rocky Flats North	08-059-0006	0.081	0.082	0.088	0.091	0.073	0.077	0.090	0.090
NREL	08-059-0011	0.083	0.081	0.081	0.095	0.074	0.079	0.083	0.085
Rocky Mountain NP	08-069-0007	0.078	0.070	0.087	0.086	0.073	0.075	0.076	0.078
Fort Collins West	08-069-0011	---	---	---	---	---	---	0.087	0.085
Fort Collins CSU	08-069-1004	0.069	0.067	0.072	0.075	0.064	0.076	0.078	0.069
Greeley	08-123-0007	0.069	0.074	---	---	---	---	---	---
Weld Co. Tower	08-123-0009	---	---	0.080	0.083	0.069	0.078	0.082	0.074

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

Site Name	<u>2000-02</u> 3-yr. Avg. 4th Max. Value (ppm)	<u>2001-03</u> 3-yr. Avg. 4th Max. Value (ppm)	<u>2002-04</u> 3-yr. Avg. 4th Max. Value (ppm)	<u>2003-05</u> 3-yr. Avg. 4th Max. Value (ppm)	<u>2004-06</u> 3-yr. Avg. 4th Max. Value (ppm)	<u>2005-07</u> 3-yr. Avg. 4th Max. Value (ppm)
Welby	0.064	0.066	0.066	0.068	0.069	0.070
Highland	0.076	0.081	0.079	0.081	0.077	0.078
S. Boulder Creek	0.073	0.077	0.076	0.075	0.075	0.081
CAMP	---	---	---	---	---	0.056
Carriage	0.072	0.076	0.074	0.075	0.070	0.074
Chatfield Reservoir	0.080	0.085	---	---	---	---
Chatfield Park	---	---	---	---	0.081	0.084
Arvada	0.074	0.076	0.073	0.075	0.075	0.079
Welch	0.067	0.070	0.069	0.067	0.069	0.075
Rocky Flats North	0.083	0.087	0.084	0.080	0.080	0.085
NREL	0.081	0.085	0.083	0.082	0.078	0.082
Rocky Mountain NP	0.078	0.081	0.082	0.078	0.074	0.076
Fort Collins West	---	---	---	---	---	---
Fort Collins CSU	0.069	0.071	0.070	0.071	0.072	0.074
Greeley	---	---	---	---	---	---
Weld Co. Tower	---	---	0.077	0.076	0.076	0.078

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CHAPTER III BASE CASE EMISSIONS INVENTORIES

This section presents emission inventories for this Ozone SIP for the 8-hour ozone Denver Metro Area/North Front Range attainment area, 2006 base case, and the 2010 base case used in the modeling scenarios. Inventories for the 8-hour ozone control area 2010 control case modeling will be presented later in this document and will include the additional control measures that are included in the attainment demonstration for the 8-hour ozone NAAQS. All of the base and control case inventories are for the 8-hour ozone non-attainment area (NAA), which includes the counties of Denver, Jefferson, Douglas, Broomfield, Boulder, Adams, Arapahoe, and portions of Weld and Larimer 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 vehicle miles traveled (VMT) estimates contained in 1) DRCOG's conformity analysis for the updated fiscally constrained element of the 2035 Regional Transportation Plan, 2) North Front Range Transportation and Air Quality Planning Council's (NFRTAQPC) 2035 Regional Transportation Plan, 3) the APCD estimates of VMT derived from data provided by the Colorado Department of Transportation (CDOT) and 4) Population estimates from the State Demographer. Table 4 presents this information.

Table 4: Demographic Data

	2006	2010
DRCOG VMT	69,548,803	76,551,505
NFRTAQPC VMT	10,537,341	11,753,832
NON-DRCOG/NFR VMT	1,715,579	1,865,839
NAA Population	3,118,439	3,357,009

The 2006 and 2010 base case inventories incorporate the control measures in place at that time. Control measures in place in 2006 and assumed for 2010 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 2006 to 2010 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 2006 ozone

season, which includes an enhanced Inspection/Maintenance (I/M). For 2006, a maximum of 10% fleet coverage is assumed, and for 2010, a maximum of 50% fleet coverage is assumed for the remote sensing clean screen program in the DMA based on Regulation No. 11.

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 2004, 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.

Since 1991, gasoline sold in the Larimer and Weld area during the summer ozone season (June 1 to September 15) has been subject to a national Reid Vapor Pressure (RVP) limit of 9.0 pounds per square inch (psi) in order to reduce fuel volatility. For ethanol-blended fuels, the RVP limit is 10.0 psi due to the federal 1.0 psi RVP waiver for ethanol.

For 2006, the RVP of gasoline for the Denver metropolitan portion of non-attainment area was determined by survey to be at 8.2 psi, with an ethanol market share of 60%, and for the Larimer and Weld portion of the non-attainment area the RVP was determined to be 8.4 psi with the same ethanol share of 60%. For purposes of the base case 2010 mobile source inventory, the RVP of the base gasoline is assumed to be 7.8 psi for the Denver metropolitan portion of non-attainment area, with an ethanol market share of 85%, and for the Larimer and Weld portion of the non-attainment area the RVP was assumed to be 9.0 psi with an ethanol share of 25%.

5. The EPA approved the EAC Ozone Action Plan on August 19, 2005. The OAP included an amendment to Regulation No. 7 requiring the reduction of flash emissions of volatile organic compounds from condensate collection, storage, processing and handling operations by May 1, 2005. This initial rule required the installation of air pollution control technology to achieve a system-wide 47.5% reduction from uncontrolled emissions of volatile organic compounds from new

and existing oil and gas exploration and production operations located within the 8-hour ozone non-attainment area designated by EPA for operators with total emissions greater than 30 tons per year. The 2006 Base Case estimate was developed from actual reported emissions based on the system-wide 47.5% reduction requirement.

In February 13, 2008, the EPA approved revisions to Regulation No. 7 to require the system-wide reduction of condensate tank flash VOC emissions of 75% for the 2007 ozone season by May 1, 2007 and 78% reduction for the 2012 ozone season, with technology that achieves a 95% reduction in VOC emissions. The 2010 Base Case emissions estimate assumes the 75% system-wide reduction requirement.

6. The effect of EPA final locomotive Tier 3 and Tier 4 standards were included in the 2010 area source estimates.

All of the inventories in this 8-hour Ozone Attainment SIP 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 2010 and 2012 demographic data for off-road and area sources. The technical support document contains detailed information on model assumptions and parameters for each source category.

Highway mobile source emissions are from the ENVIRON CONCEPT Model inventory, which is based on DRCOG VMT data and MOBILE6 input data provided by APCD and expanded to the entire NAA based on VMT from the North Front Range Transportation and Air Quality Planning Council and the Colorado Department of Transportation (CDOT).

Non-road source emissions are from the EPA Non-Road Model. This model includes the impact of future controls on non-road engines, which is used in equipment such as lawn and garden equipment and construction equipment.

Oil and gas source emissions are from the revised Independent Petroleum Association of Mountain States (IPAMS) inventory, and were projected to 2010 using the methodology in the IPAMS projection methodology document. The IPAMS inventory was sponsored by the IPAMS and is Phase III of a regional oil and gas emission

inventory for the inter-Mountain West jointly with the Western Regional Air Partnership (WRAP).

Non-oil and gas area source (including heating, consumer solvent use, aircraft and railroads, etc.) are from the 2002 EPA National Emissions Inventory, grown to 2006 and 2010 by population growth from data from the State Demographer. Consumer solvent emission reductions based on 75% of the per-person reductions listed in the EPA May 30, 2007 Emission Reduction Credit Memo were applied to the projected 2010 non O&G area source inventory. An inventory done in 2005 for DIA was used for aircraft and airport non-road source emissions from DIA for both 2006 and 2010.

Non-oil and gas point source emissions were grown to 2010 by the EPA EGAS economic model, and by adding sources for which permits have been issued.

Summaries of the VOC and NO_x base case inventories for the non-attainment area for 2006 and 2010 are presented in Table 5. Emissions of NO_x 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, have been considered for the background ozone concentrations in the modeling effort. Wildfire emissions can vary significantly on a day-to-day basis depending on conditions.

Table 5: 8-Hour Ozone DMA/NFR NAA Base Case Inventories

Source Category	2006		2010	
	NOX	VOC	NOX	VOC
Point Sources				
Electric Generation Units (EGU)	55.6	0.7	58.5	1.6
External Combustion Boilers	9.5	0.4	10.0	0.5
Industrial Processes	12.5	10.2	14.0	11.0
Petroleum and Solvent Evaporation	0.3	19.0	0.3	22.0
Other	3.1	1.8	3.6	2.0
Point Sources Subtotal	81.0	32.1	86.4	37.0
Oil & Gas Point & Area Sources				
Condensate Tanks		126.5		129.6
Other O&G Point Sources	22.6	6.8	23.6	8.6
Pneumatic Devices (Area Source)		24.8		31.1
Unpermitted Fugitives (Area Source)		16.2		20.4
Other Area Sources	17.1	10.8	22.5	13.7
O&G Point & Area Sources Subtotal	39.7	185.2	46.2	203.3
Area Sources				
Personal Care Products		7.1		7.0
Household Products		21.4		17.9
Automotive Aftermarket Products		11.9		13.0
Architectural Coatings		20.1		16.8
Aircraft	7.4	1.3	8.2	1.5
Railroad	12.8	0.5	13.8	0.6
Other Coatings/Pesticides/Cooking/Misc.		3.9		4.1
Area Source Subtotal	20.2	66.3	22.1	61.0
Non-Road Mobile Sources				
Agricultural Equipment	7.0	0.9	6.3	0.7
Airport Equipment	0.7	0.1	0.6	0.1
Commercial Equipment	5.3	6.2	5.1	7.0
Construction and Mining Equipment	35.7	5.5	31.2	4.5
Industrial Equipment	10.5	2.4	6.9	1.4
Lawn and Garden Equipment (Com)	9.4	35.9	8.9	28.1
Lawn and Garden Equipment (Res)	1.2	7.5	1.2	11.8
Boats/Recreational Eq./Misc.	0.7	6.9	0.8	7.8
Non-Road Mobile Source Subtotal	70.5	65.3	61.0	61.3
On-Road Mobile Sources				
On-Road Mobile (incl. veh. refueling)	161.2	135.0	122.9	117.4
On-Road Mobile Subtotal	161.2	135.0	122.9	117.4
Anthropogenic Total	372.6	483.9	337.5	480.0
b1-megan Biogenics	53.0	694.0	53.0	694.0
Anthropogenic & Biogenic Total	425.6	1177.9	390.6	1174.0

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CHAPTER IV SIP CONTROL MEASURES

This section of the 8-Hour Ozone Attainment SIP lists the additional control measures, above and beyond those assumed in the 2010 base case inventory described in Chapter III, that are incorporated in the attainment of the 1997 0.08 ppm 8-hour ozone NAAQS by 2010. For purposes of this 8-Hour Ozone Attainment SIP, and for inclusion of such control measures in the state implementation plan, the term "8-hour ozone non-attainment area" shall mean the area designated by the EPA as a non-attainment area for the 8-hour ozone standard in 2004.

A. Revisions to Regulation No. 11 - Automobile Inspection and Readjustment (AIR) Program

The SIP includes revisions to AIR Quality Control Commission Regulation No. 11 that lowers emission cutpoints that will increase the VOC, NO_x, and CO emission reductions achieved from the existing Automobile Inspection and Readjustment (AIR) program in the Denver Metro Area. The AIR program has been in place in the Denver Metro Area since the mid 1990s. Program standards then in place were used for the 2006 base year modeling.

In March 2008, the Air Quality Control Commission approved revisions to Regulation No. 11 that tightened tailpipe emissions standards for VOCs, CO and NO_x used to pass or fail program eligible vehicles in the Denver Metro Area. The revised cutpoints went into effect in May 2008. Vehicles subject to the AIR program are inspected on a two-year cycle; therefore the emission benefits from the more stringent cut-points will be fully achieved by the summer of 2010.

This revision to Regulation No. 11 is hereby included in the state implementation plan.

B. 7.8 Reid Vapor Pressure in North Front Range

The North Front Range area is currently subject to a national Reid Vapor Pressure (RVP) limit of 9.0 pounds per square inch (10.0 psi for ethanol blends).

This revision to the state implementation plan requests that EPA change the federal regulatory Reid Vapor Pressure requirement to 7.8 psi RVP (8.8 psi for ethanol blends) gasoline for the North Front Range area by May 2009 but no later than May 2010.

C. Condensate Tank Emissions Controls

The approved EAC Ozone Action Plan included 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 initial rule required the installation of air pollution control technology to achieve a system-wide 47.5% reduction from uncontrolled emissions of volatile organic compounds from new and existing oil and gas exploration and production operations located within the 8-hour ozone non-attainment area designated by EPA. The rule includes an exemption if total emissions from an operator are less 30 tons per year.

In 2006 the AQCC approved to Regulation No. 7 to require the system-wide reduction of condensate tank flash VOC emissions of 75% for the 2007 ozone season, and 78% reduction for the 2012 ozone season, with technology that achieves a 95% reduction in VOC emissions.

This revision to the state implementation plan further amends Regulation No. 7 to phase out the system-wide approach and replace it with a threshold approach to achieve additional reduction of condensate tank flash VOC emissions as follows:

- Control new and modified condensate tanks ≥ 2 tpy in the non-attainment area by 95% and install and operate auto igniters and electronic surveillance, effective February 1, 2009;
- Retrofit existing condensate tanks ≥ 10 tpy in the non-attainment area to 95% control and install and operate auto igniters and electronic surveillance by May 1, 2010

D. Pneumatic Control Devices

Pneumatic devices powered by pressurized natural gas are used widely in the natural gas industry as liquid level controllers, pressure regulators and valve controllers. As a part of normal operation pneumatic devices release or bleed natural gas to the atmosphere.

A revision to Regulation No. 7 requires that natural gas actuated pneumatic control devices in the non-attainment area shall be low bleed devices unless granted an exception for safety purposes from the Division as follows:

- New pneumatic control devices shall be low-bleed devices effective February 1, 2009
- Existing high-bleed pneumatic control devices shall be retrofitted to low bleed devices effective May 1, 2009
- Existing and new high bleed devices may receive an exemption for safety reasons, but must receive enhanced maintenance on a monthly basis

E. Additional Revisions to Regulation Nos. 3 & 7

- **Regulation No. 7 Expansion to all NAA in Colorado**

The current Regulation No. 7 is specific to the former Denver one-hour ozone attainment-maintenance area. This revision to Regulation No. 7 expands the source-category VOC emission control requirements to include all ozone non-attainment areas in the state, which will now include the entire Denver/North Front Range nonattainment area.

All ozone non-attainment areas in the state (existing and future designations) shall be subject to Regulation 7 Reasonably Available Control Technology (RACT) requirements.

- **Regulation No. 3 Exemptions**

Regulation No. 3 currently defines a wide variety of sources that are exempt from providing Air Pollutant Emission Notices (APEN) and/or permitting because by themselves or cumulatively as a category they are deemed to have a negligible air quality impact.

APEN and permitting exemptions will be removed or revised to develop an inventory of emissions from source categories where actual emissions are anticipated to exceed reporting thresholds or there are equity issues, and in the case of condensate tanks, to exclude categorical exemptions over the new 1 ton per year APEN threshold in the non-attainment area. Proposed exemptions for removal/revision are as follows:

- Removal of APEN and permit exemptions for O &G condensate storage tanks, but may make use of the generic APEN exemption when actual emissions fall below defined de minimis levels.
- Remove APEN exemptions but retain permit exemptions for the following:
 - Petroleum industry flares
 - Crude oil truck loading
 - Oil production wastewater
 - Crude oil storage tanks

- Revise APEN/permitting exemptions for surface water impoundments and chemical storage tanks to exclude the exemption for the following:
 - Oil and gas production wastewater
 - Commercial facilities' operations
 - Revise APEN/permitting exemptions for fuel storage dispensing to expand the applicability all non-attainment areas for equity purposes.
-
- **Regulation Nos. 3 & 7 RACT Clarification**

Clarifies how both Regulation No. 3 minor source RACT requirements and Regulation No. 7 RACT requirements apply in an ozone non-attainment area as follows:

 - All new and modified sources having VOC \geq 2 tpy or NO_x \geq 5 tpy emissions are required to complete a RACT analysis unless subject to a general RACT (based on adopted control technique guidelines (CTGs)) in Regulation No. 7, and implement RACT.
 - All existing sources having VOC emissions greater than 100 tons per year in a non-attainment area are required to complete a RACT analysis and implement RACT.

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

A. Photochemical Modeling for the 2006 and 2010 Base Case Scenarios

As a former EAC area, EPA regulation requires a photochemical grid modeling attainment demonstration as part of the revised 8-Hour Ozone Attainment SIP. The goal of the attainment plan's 8-hour ozone modeling analysis is to conduct a comprehensive photochemical modeling study for the Denver Metro Area/North Front Range non-attainment area 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) (as applied by 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 2006 and 2010 base case were processed through the emissions processing systems, CONCEPT for the DMA on-road mobile, MEGAN for biogenic emissions and SMOKE for the other emissions categories. The photochemical modeling study was conducted in accordance with EPA modeling guidance for ozone ("Guidance on the Use of Models and Other Analyses for Demonstrating Attainment of Air Quality Goals for Ozone, PM_{2.5} and Regional Haze" (EPA-454/B-07-002, April 15, 2007) 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
- Evaluation of MM5 Simulations of the June-July 2006 Denver Ozone Season
- Development of the 2002 Base Case Modeling Inventory
- Model Performance Evaluation June-July 2006 Denver Ozone Season, Diagnostic Testing and Analysis
- Development of the 2010 Base Case Modeling Inventory
- Air Quality Modeling for the 2006 & 2010 Base Case, 2010 Base Case Ozone Projections, and Sensitivity Analysis

- Additional Air Quality Modeling Analysis to address 8-Hour ozone Attainment for the DMA/NFR non-attainment area.

B. Base Case Relative Response Factors (RRF)

The modeling produces base case relative response 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 2006 base case modeled 8-hour ozone concentration divided by the mean 2010 base case modeled 8-hour concentration. The RRF is essentially the percentage change in modeled ozone concentrations between 2006 and 2010. Specifically, each RRF is the mean of at least 10 daily 8-hour predicted maximum concentrations in 2006 greater than 0.075 ppm "nearby" (within 15 kilometers) a monitor during a given episode divided by the mean of similar 2010 daily 8-hour predicted maximum concentrations during a given episode as shown below. (Based on EPA's "Guidance on the Use of Models and Other Analyses for Demonstrating Attainment of Air Quality Goals for Ozone, PM_{2.5} and Regional Haze" (EPA-454/B-07-002, April 15, 2007).

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

An RRF for each monitoring site for modeled (predicted) days greater than 0.075 ppm is presented in Table 6.

C. Estimated Future (2010) 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.

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

Table 6 presents the current (2005-2007) base case design values (DVC) for each monitoring site, the base case RRFs for modeled days greater than 0.075 ppm, and the future base case design values (DVF) for each site. If the future (2010) base case design values are less than 0.085 ppm (85 ppb), then attainment is demonstrated.

However, when there are DVFs in the range of 82-87 ppb EPA guidance requires a Weight of Evidence (WOE) analysis to support the attainment demonstration.

EPA guidance indicates that base design values, which are the three year average of the 4th maximum values at each monitor and which is the case here, are to be presented to 3 places in ppm, truncating the 4th place right of the decimal point. When projecting future design values in ppm, similarly rounding to the 4th place and ultimately truncating the 4th place for comparison with the NAAQS is required. In Table 6 below, the future Design Values have been calculated to the 4th place in ppm and presented with the 4th place truncated for comparison with the 1997 8-hour standard of 0.084 ppm.

Table 6: 2010 Base Case Design Values for Each Monitoring Site for Modeled Days greater than 0.075 ppm

Site Name	8-Hour Ozone Current (2005-2007) Base Case Design Values (ppm)	Base Case Relative Response Factors	Calculated 8-Hour Ozone Future (2010) Base Case Design Values (ppm)	Truncated 8-Hour Ozone Future (2010) Base Case Design Values (ppm)
Welby	0.070	1.0042	0.0702	0.070
Arvada	0.079	1.0026	0.0792	0.079
NREL	0.082	1.0039	0.0823	0.082
Rocky Flats North	0.085	0.9994	0.0849	0.084
S. Boulder Creek	0.081	0.9976	0.0808	0.080
Fort Collins	0.074	0.9878	0.0730	0.073
Fort Collins West	(0.086)*	0.9874	0.0849	(0.084)*
Carriage	0.074	1.0022	0.0741	0.074
Welch	0.075	1.0004	0.0750	0.075
CAMP	0.056	1.0017	0.0560	0.056
Weld County Tower	0.078	0.9964	0.0777	0.077
Highland	0.078	0.9916	0.0773	0.077
Chatfield Res.	0.084	0.9934	0.0834	0.083
Rocky Mtn. N.P.	0.076	0.9903	0.0752	0.075

* only two years of data available, 2006 & 2007, therefore this is not an official design value

As can be noted attainment at all of the monitors is achieved (design values less than 85 ppb) in 2010 for the 8-hour ozone non-attainment as a result of the reductions expected from existing programs and regulations. However, since there are monitors with Design values between 82-87 ppb a Weight of Evidence analysis is required.

D. 2010 Control Case Emission Inventories

Reductions from the SIP control measures described in Chapter III have been applied to the 2010 base case emissions inventories to provide an additional safety margin as follows:

- Reid Vapor Pressure of base gasoline requested to be 7.8 psi (maintains 1.0 psi waiver for ethanol-blended gasoline at 85% market share) in North Front Range – estimated 3 tpd VOC reduction to direct on-road mobile source emissions and in refueling (gas station) emissions.
- Controls on new condensate tanks ≥ 2 tpy and existing tanks ≥ 10 tpy – estimated 24 tpd reduction in VOC based on an assumed Rule Effectiveness adjustment of 0.83 applied to the calculated actual emissions reduction.
- New and existing pneumatic control devices required to be low-bleed devices – approximately 19 tpd VOC reduction based on an assumed Rule Effectiveness adjustment of 0.83.
- Tighten Regulation No. 11 I/M cut points - 1 tpd VOC, 3 tpd NO_x and 13 tpd CO.
- Additional Regulation No. 3 & 7 changes – no additional credit assumed

Rule Effectiveness (RE) reflects the actual ability of a regulatory program for controlled point sources or source categories to achieve the emissions reductions required by regulation. During the AQCC 2006 rule making on Regulation No. 7 revisions related to controls on condensate tank emissions, new EPA guidance on RE was reviewed, and, in consultation with EPA Region 8 staff, an RE of 0.83 was established for the Oil and Gas industry facilities. This essentially discounts the calculated reduction estimates by 83%.

The total emission reduction, compared to the 2006 base case, for these control strategies (together with the federal and existing state controls assumed for the 2010 base case) is approximately 47 tons per day VOC and 3 tons per day NO_x in the 8-non-attainment area (however the total VOC reduction could be as great as 70 tons per day without the rule effectiveness reduction) The resulting 2010 control inventory based on the total control package noted above is presented below in Tables 7 (VOC) & 8 (NO_x) for the 8-hour non-attainment area. All inventories presented in this chapter represent a typical average episode day. In the photochemical modeling, all anthropogenic source categories are varied by day of the week, time of day, temperature, location, speciation and other factors. Biogenic sources are varied by differing meteorological conditions and diurnally varied by temperature.

Table 7: VOC Base Case & Control Case Emission Inventory (tpsd)

	2006	2010	2010 Control
Source Category	VOC	VOC	VOC
Point Sources			
Electric Generation Units (EGU)	0.7	1.6	1.6
External Combustion Boilers	0.4	0.5	0.5
Industrial Processes	10.2	11.0	11.0
Petroleum and Solvent Evaporation	19.0	22.0	22.0
Other	1.8	2.0	2.0
Point Sources Subtotal	32.1	37.0	37.0
Oil & Gas Point & Area Sources			
Condensate Tanks	126.5	129.6	105.6
Other O&G Point Sources	6.8	8.6	8.6
Pneumatic Devices (Area Source)	24.8	31.1	12.0
Unpermitted Fugitives (Area Source)	16.2	20.4	20.4
Other Area Sources	10.8	13.7	13.7
O&G Point & Area Sources Subtotal	185.2	203.3	160.1
Area Sources			
Personal Care Products	7.1	7.0	7.0
Household Products	21.4	17.9	17.9
Automotive Aftermarket Products	11.9	13.0	13.0
Architectural Coatings	20.1	16.8	16.8
Aircraft	1.3	1.5	1.5
Railroad	0.5	0.6	0.6
Other Coatings/Pesticides/Cooking/Misc.	3.9	4.1	4.1
Area Source Subtotal	66.3	61.0	61.0
Non-Road Mobile Sources			
Agricultural Equipment	0.9	0.7	0.7
Airport Equipment	0.1	0.1	0.1
Commercial Equipment	6.2	7.0	7.0
Construction and Mining Equipment	5.5	4.5	4.5
Industrial Equipment	2.4	1.4	1.4
Lawn and Garden Equipment (Com)	35.9	28.1	28.1
Lawn and Garden Equipment (Res)	7.5	11.8	11.8
Boats/Recreational Eq./Misc.	6.9	7.8	7.8
Non-Road Mobile Source Subtotal	65.3	61.3	61.3
On-Road Mobile Sources			
On-Road Mobile (incl. veh. refueling)	135.0	117.4	113.1
On-Road Mobile Subtotal	135.0	117.4	113.1
Anthropogenic Total	483.9	480.0	432.5
b1-megan Biogenics	694.0	694.0	694.0
Anthropogenic & Biogenic Total	1177.9	1174.0	1126.5

Table 8: NOx Base Case & Control Case Emission Inventory (tpsd)

	2006	2010	2010 Control
Source Category	NOX	NOX	NOX
Point Sources			
Electric Generation Units (EGU)	55.6	58.5	58.5
External Combustion Boilers	9.5	10.0	10.0
Industrial Processes	12.5	14.0	14.0
Petroleum and Solvent Evaporation	0.3	0.3	0.3
Other	3.1	3.6	3.6
Point Sources Subtotal	81.0	86.4	86.4
Oil & Gas Point & Area Sources			
Condensate Tanks			
Other O&G Point Sources	22.6	23.6	23.6
Pneumatic Devices (Area Source)			
Unpermitted Fugitives (Area Source)			
Other Area Sources	17.1	22.5	22.5
O&G Point & Area Sources Subtotal	39.7	46.2	46.2
Area Sources			
Personal Care Products			
Household Products			
Automotive Aftermarket Products			
Architectural Coatings			
Aircraft	7.4	8.2	8.2
Railroad	12.8	13.8	13.8
Other Coatings/Pesticides/Cooking/Misc.			
Area Source Subtotal	20.2	22.1	22.1
Non-Road Mobile Sources			
Agricultural Equipment	7.0	6.3	6.3
Airport Equipment	0.7	0.6	0.6
Commercial Equipment	5.3	5.1	5.1
Construction and Mining Equipment	35.7	31.2	31.2
Industrial Equipment	10.5	6.9	6.9
Lawn and Garden Equipment (Com)	9.4	8.9	8.9
Lawn and Garden Equipment (Res)	1.2	1.2	1.2
Boats/Recreational Eq./Misc.	0.7	0.8	0.8
Non-Road Mobile Source Subtotal	70.5	61.0	61.0
On-Road Mobile Sources			
On-Road Mobile (incl. veh. refueling)	161.2	122.9	119.4
On-Road Mobile Subtotal	161.2	122.9	119.4
Anthropogenic Total	372.6	337.5	335.0
b1-megan Biogenics	53.0	53.0	53.0
Anthropogenic & Biogenic Total	425.6	390.6	388.1

E. Estimated Future (2010) Control Case Design Value

Table 9 presents the current (2005-2007) base case design values (DVC) for each monitoring site, the 2010 control case RRFs for modeled days greater than 0.075 ppm, and the 2010 control case design values (DVF) for each site.

Table 9: 2010 Control Case Design Values for Each Monitoring Site for Modeled Days greater than 0.075 ppm

Site Name	8-Hour Ozone Current (2005-2007) Base Case Design Values (ppm)	Control Case Relative Reduction Factors	Calculated 8-Hour Ozone Future (2010) Control Case Design Values (ppm)	Truncated 8-Hour Ozone Future (2010) Control Case Design Values (ppm)
Welby	0.070			
Arvada	0.079			
NREL	0.082			
Rocky Flats North	0.085			
S. Boulder Creek	0.081			
Fort Collins	0.074			
Fort Collins West	(0.086)*			
Carriage	0.074			
Welch	0.075			
CAMP	0.056			
Weld County Tower	0.078			
Highland	0.078			
Chatfield Res.	0.084			
Rocky Mtn. N.P.	0.076			

* only two year of data available, 2006 & 2007, therefore not an official site

Attainment at all of the monitors continues to be achieved (design values less than 85 ppb) in 2010 for the 8-hour ozone non-attainment with an additional margin of safety as a result of the reductions expected from existing programs and regulations and the additional control measures discussed in Section D. of this Chapter and in Chapter III. However, since there are still 3-4 monitor sites with Design values between 82-87 ppb a Weight of Evidence analysis is required.

F. Weight of Evidence (WOE) Analysis

EPA's 8-hour ozone modeling guidance suggests a weight of evidence analysis (a set of supplemental analyses) to support the attainment determination if the maximum modeled 8-hour ozone Design Value is between 0.082 ppm and 0.087 ppm at more than one monitor. Although all monitoring locations in this SIP attainment demonstration indicate modeled attainment of the 8-hour ozone standard, four monitors (Rocky Flats

North, Fort Collins West, Chatfield and NREL) have modeled concentrations that fall into the 0.082-0.087 ppm range. Therefore, a set of supplemental analyses are required to determine if these monitors are expected to demonstrate compliance with the ozone standard.

Supplemental analyses used in a weight of evidence will help determine whether attainment is likely where modeled attainment test results indicate future air quality levels are near the NAAQS. Supplemental analyses under consideration include the following:

- Review of ozone conceptual models for the 8-hour NAA – Review the current understanding of meteorology, geography, emissions inventory and chemistry related to ozone production and compare the ozone modeling results to conceptual models about ozone formation. A conceptual understanding has been developed over many years via forecasting tools, analysis, and daily ozone forecasting to support the Ozone Action Day Alert program. Aspects of this review include:
 - Back trajectory analysis
 - Emissions trends versus monitored VOC levels
 - Comparison of monitored versus modeled VOC/NO_x ratios
 - Meteorological analysis, including 500 mb trends analysis, temperature trends, and dispersion effects
 - Statistically-based ozone trend analyses that eliminate the effects of meteorology
 - Weekend-weekday effect
 - Further review of the base-year model performance evaluation
- Review other modeled metrics to assess the changes in ozone levels in the NAA from 2006 base case to 2010 base case to 2010 control case – Metrics to review include:
 - Relative change in grid cells ≥ 85 ppb or ≥ 84 ppb or ≥ 83 ppb
 - Relative change in grid cells-hours ≥ 85 ppb
 - Relative change in maximum modeled 8 hour ozone
- Review alternative attainment test methodologies - Alternative test methodologies include:
 - Use EPA's recommended average of the three Design Values over the 2004-2008 timeframe instead of the single 2005-2007 Design Value
 - Use different thresholds for selecting days for the RRF calculation

- Review air quality related trends such as:
 - Recent emissions trends
 - Recent trends in monitored 1st maximum and 4th maximum ozone values
 - Recent trends in three year design values

- Assess the efficacy of SIP, state-only and voluntary control strategies – Review and analyze :
 - The suite of sensitivity tests performed to address the potential change in ozone due to a variety of emissions reduction scenarios
 - The ozone source apportionment technology analysis which assesses the impact of various emissions source categories on the Rocky Flats and Fort Collins West monitors.

G. Commitment to Conduct Periodic Assessment of Growth Assumptions

The State of Colorado will periodically evaluate the growth assumptions used to develop this plan and will evaluate the need for additional control measures if needed to remedy unanticipated emission increases. Specifically, the Division will periodically evaluate the data and growth assumptions used in the SIP's attainment demonstration for new point source growth and future transportation patterns and their impact on air quality. If the review of growth demonstrates that adopted control measures are inadequate to address growth in emissions, additional measures will be considered and added to the plan.

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Chapter VI

VOC and NOx Motor Vehicle Emissions Budgets

A. Transportation Conformity

Transportation conformity provisions of section 176 (c)(2)(A) of the CAA require regional transportation plans and transportation improvement programs to demonstrate 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...”

The EPA’s Transportation Conformity Regulation (40 CFR 93.118) also requires that motor vehicle emission budget(s) be established for the last year of the implementation plan, and may be established for any other years deemed appropriate if the plan does not specify emissions budgets for years other than the last year of the plan, the regulation requires that a demonstration of consistency with the emission budgets be accompanied by a qualitative finding that there are no factors that would cause or contribute to a new violation or exacerbate an existing violation in the years before the last year of the implementation plan.

The 8-Hour ozone non-attainment Area encompasses multiple metropolitan planning organizations and transportation planning regions. The Denver Regional Council of Governments (DRCOG) is responsible for transportation planning in the 7-county Denver metropolitan area and as a portion of southwest Weld County. Likewise, the North Front Range Transportation and Air Quality Planning Council is responsible for transportation planning in the urbanized portions of Larimer and Weld counties. Finally, the Upper Front Range Transportation Planning Region (TPR) is responsible for transportation planning in the rural portions of Larimer, Weld, and Morgan counties.

Because of the different institutional arrangements and different schedules and timelines for transportation plans and programs development, regional, state and federal transportation and air quality agencies recommend two sub-regional motor vehicle emission budgets for purposes of transportation conformity in the Denver/North Front Range ozone nonattainment area.

B. Mobile Vehicle Emission Budgets

Mobile Source Vehicle Emissions Budgets for VOC and NOx are proposed for the 2010 attainment year, the last year of the plan, and beyond. Budgets are proposed for two sub-regional areas defined as follows and shown in Figure 2:

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

The two sub-regional budgets add to the sum of the total 2010 motor vehicle emissions for the entire nonattainment area (see Tables 7 and 8 in Chapter V).

Sub-regional motor vehicle emission budgets, once approved by the AQCC and determined adequate by the EPA, will be used to measure the conformity of plans and programs for the respective areas. Through an agreement between the affected agencies, DRCOG has agreed to perform transportation forecasts and conformity determinations for the entire Southern Sub-regional Area and the North Front Range Transportation and Air Quality Planning Council has agreed to perform transportation forecasts and conformity determinations for the entire Northern Sub-regional Area. This will allow for independent conformity determinations based on the applicable sub-regional emissions budgets by the two MPOs, whose frequency and timing needs for conformity determinations differ substantially.

- **Proposed 2010 Emissions Budgets for the Denver Metro and North Front Range 8-Hour Ozone Nonattainment Area and Sub-Regional Areas**

The following table indicates the separate motor vehicle emission budgets for the ozone precursors VOC and NOx for the two sub-regional areas discussed above as shown in the following Table 10:

Table 10: Total 8-Hour 2010 and Sub-Regional Area Emissions Budgets

Emissions Budget Areas	2010	
	VOC	NOx
Southern Sub-regional Budget (DRCOG & UFR TPR Sub-Regional Area)	89	96
Northern Sub-regional Budget (NFRMQPC & UFR TPR Sub-regional Area)	23	23

Figure 2: 8-Hour Ozone Emission Budget Sub-Regional Areas

