

Ozone in the Front Range



Past Achievements, Current Challenges & Future Outlook

Regional Ozone Stakeholder Meeting
Fort Collins Public Library | February 11, 2008



LET'S TAKE CARE OF OUR SUMMER AIR.

OzoneAware.org

Background



Who We Are



- **North Front Range Metropolitan Planning Organization**
- **Regional Air Quality Council**
- **Colorado Department of Public Health & Environment, Air Pollution Control Division**

Air Quality Control



- **Air quality governed by the National Ambient Air Quality Standards (NAAQS), set by U.S. EPA**
- **Standards for “criteria” pollutants intended to protect public health, mainly sensitive and/or vulnerable populations**
 - **The young, elderly, those with pre-existing lung diseases such as asthma and Chronic Obstructive Pulmonary Disease (includes emphysema and bronchitis)**

Criteria Pollutants



- RAQC's work covers the six "criteria" or common pollutants as defined by the U.S. EPA
 - Carbon Monoxide (CO)
 - Lead
 - Nitrogen Oxide (NO_x)
 - **Ozone (O₃)**
 - Particulate Matter (PM_{2.5} & PM₁₀)
 - Sulfur Dioxide (SO₂)

All About Ozone

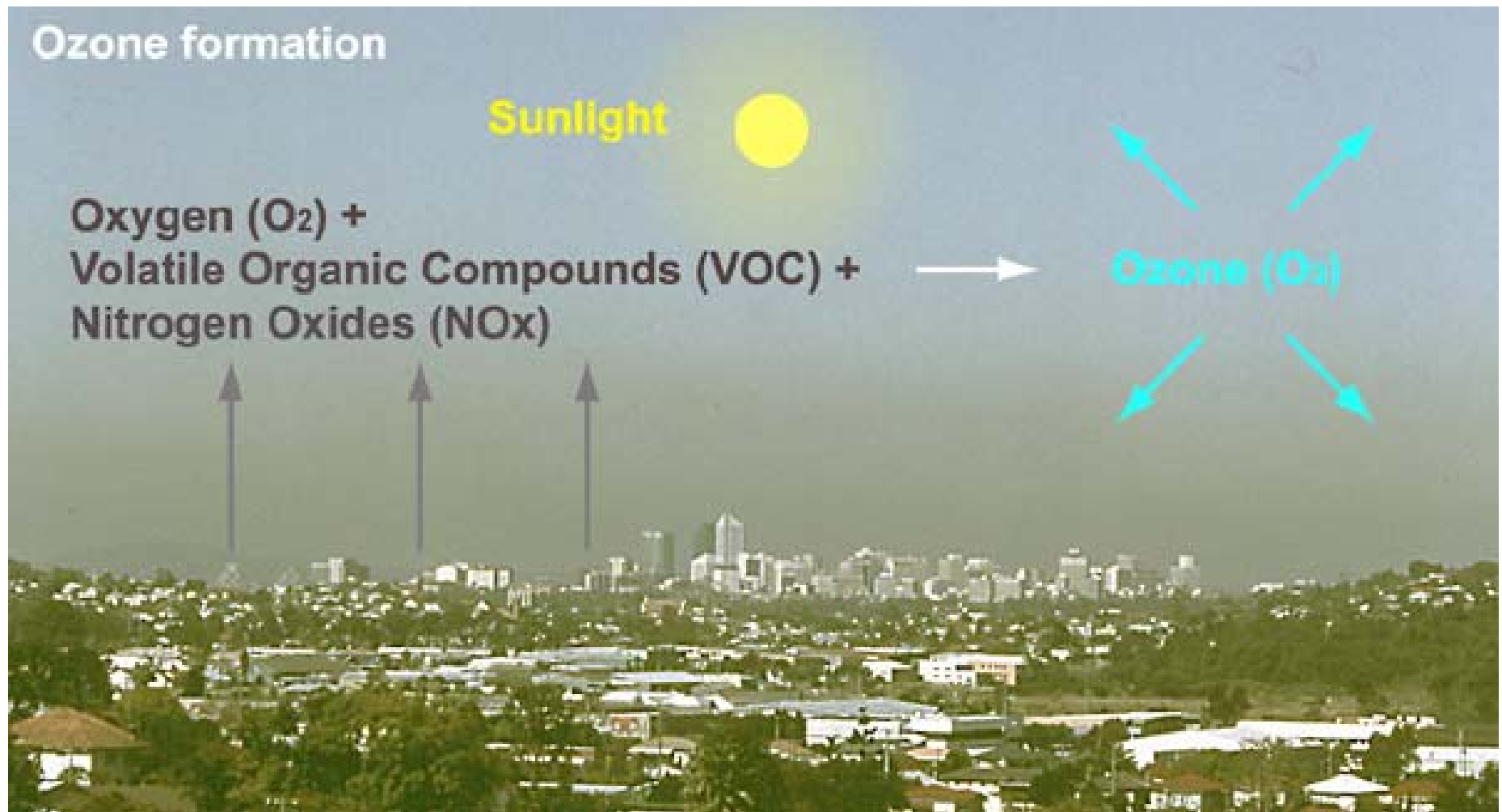


Ground-Level Ozone Pollution



- **Secondary air pollutant formed in the atmosphere through reaction of:**
 - Volatile Organic Compounds (VOC)
 - Nitrogen Oxides (NO_x)
- **Prime conditions for ozone formation**
 - Intense sunlight, high temperatures, persistent high pressure systems, light winds & little moisture
- **Ozone can trigger attacks & symptoms in individuals with pre-existing health conditions**
 - Asthma affects more than 89,000 children between the ages of 1 and 14 in Colorado

Ozone Formation

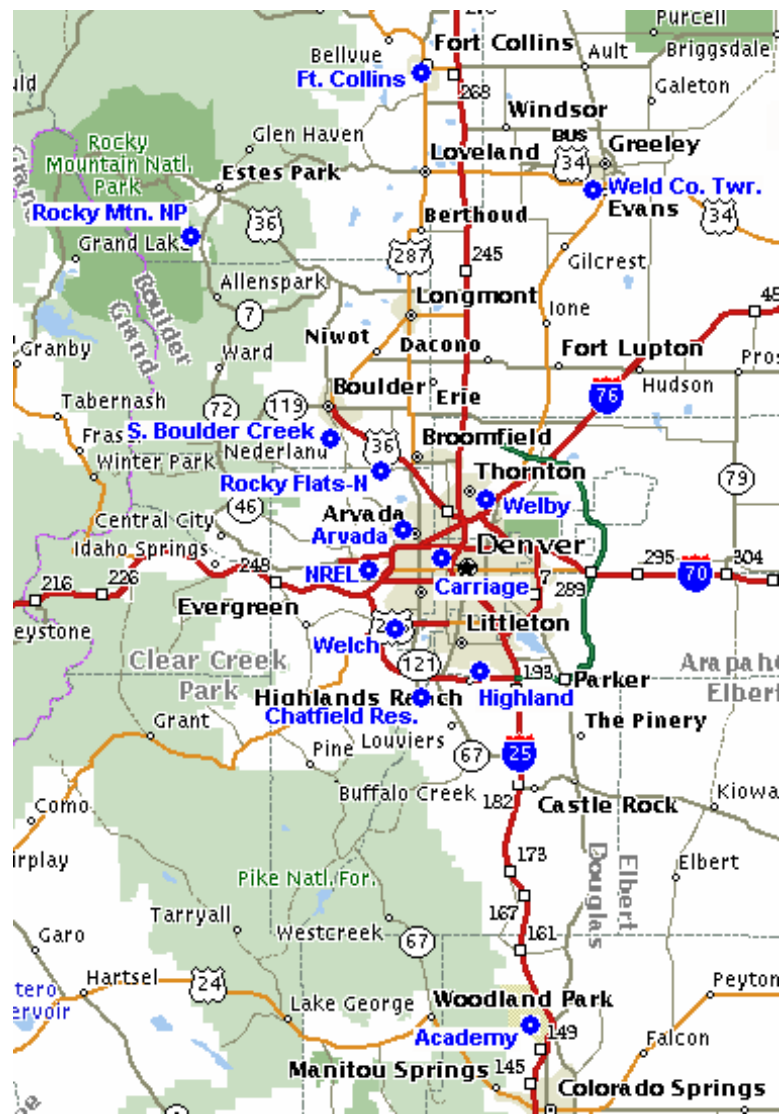


8-Hour Ozone Standard



- **Form of standard takes into account extreme and fluctuating meteorological events**
 - .08 parts per million (80 parts per billion)
 - 8-hour averaging period
 - 4th maximum at each monitor
 - Averaged over a 3-year period
 - Calculated to two decimal places (.084 ppm rounded to .08 ppm)
- **14 monitors in the Denver/North Front Range area**

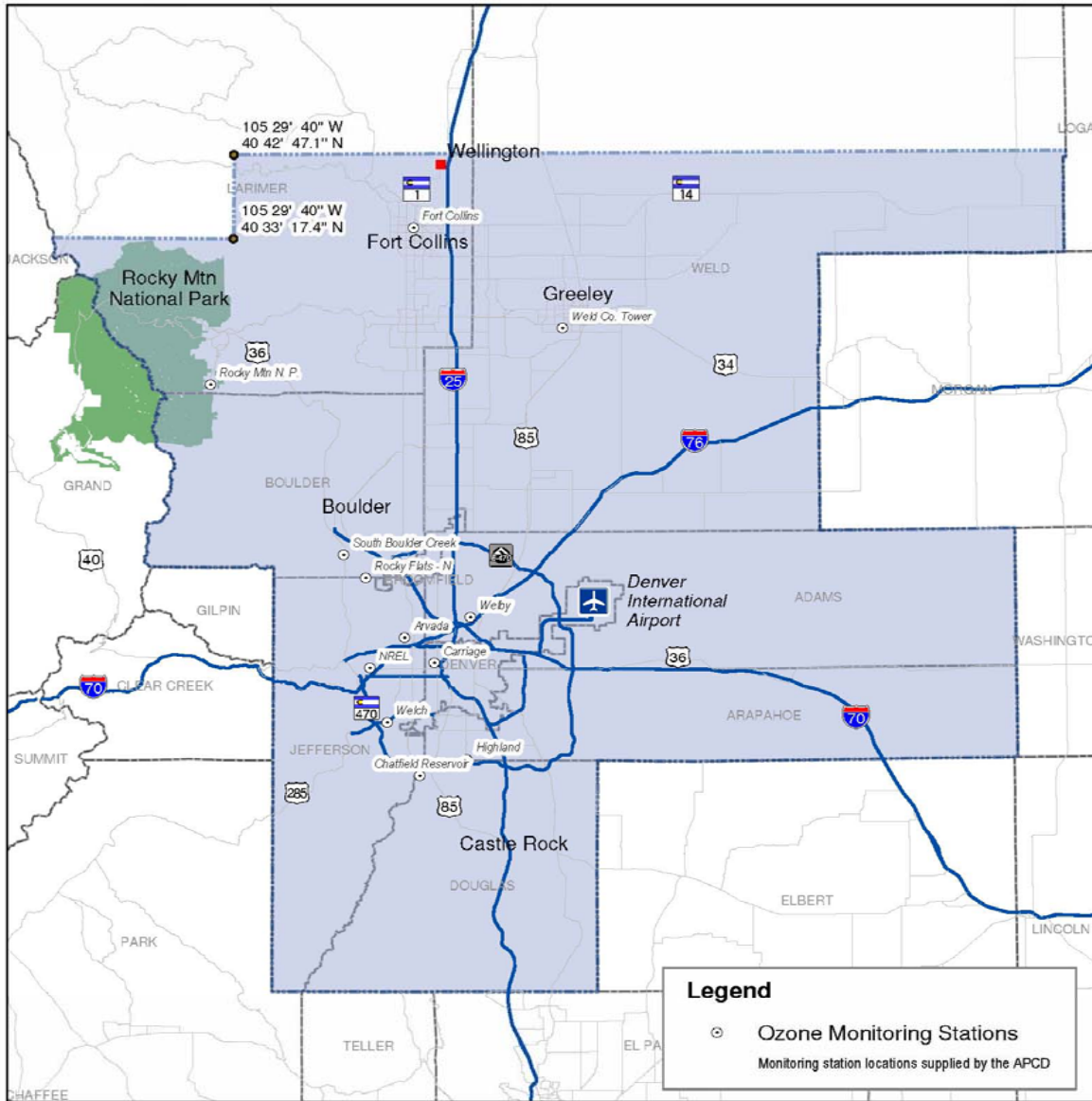
Ozone Monitoring Sites



Front Range Air Quality Status



- **Denver reached an historic achievement in 2002 when it met all NAAQS after previously violating 5 of the 6 standards**
 - **However, region violated ozone standard in 2007, based on 2005-07 rolling average**
 - o **“Nonattainment” designation effective as of late November**



Denver-Boulder-Greeley-Fort Collins, Colorado
Eight-Hour Ozone Control Area

Ozone Attainment Status



Monitor	2007			2007	2006	2005	2005-07	2004-06
	1st Max	2nd Max	3rd Max	4 th Max			Ave.	Ave.
Highland Reservoir	9-Jul	2-Jul	30-Jun	31-Jul				
	83	79	75	75	81	80	79	77
Chatfield S.P.	31-Jul	25-Aug	9-Jul	21-Jul				
	86	85	83	82	86	84	84	81
NREL	9-Jul	30-Jun	2-Jul	25-Aug				
	90	85	85	85	83	79	82	78
Rocky Flats	9-Jul	31-Jul	30-Jun	25-Aug				
	98	94	90	90	90	77	86	80
S. Boulder Creek	9-Jul	2-Jul	1-Jul	20-Jul				
	88	86	85	85	82	76	81	75
Fort Collins West	9-Jul	30-Jun	2-Jul	30-Jul				
	88	87	85	85	87	--	--	--

High Ozone Days



	<u>> 85 ppb</u>	<u>>80 ppb</u>	<u>4th Max</u>
• 2003	16	--	95 ppb
• 2006	9	19	90 ppb
• 2007	8	13	90 ppb

EPA Proposed Standard Comparison



	<u>>80 ppb</u>	<u>>75 ppb</u>	<u>>70 ppb</u>
• 2004	1	7	24
• 2005	9	20	40
• 2006	19	34	63
• 2007	13	23	48

Ozone's Priority Status



- **Governor Ritter's Directive to RAQC**
 - Propose measures to reduce ozone further in the 2008 summer ozone season
 - Submit a proposed plan to the AQCC by September 2008 to assure compliance with the federal standard
 - Set a goal of reducing or eliminating ozone levels above 0.08 ppm
 - Consider the addition of elements that would further reduce ozone levels in anticipation of a lower federal standard

Ozone Stakeholder Involvement Process



Purpose:

Ozone Stakeholder Committee



- Represent your interests
- Provide input and review
 - Potential strategies
 - State Implementation Plan
- Assist with logistical/programmatic items
 - Identify potential funding sources
 - Help with implementation of identified strategies

Process:

Stakeholder Involvement



- Collaborative and open process
- All stakeholders invited to participate
 - Government, nonprofit and other interest groups, business and industry and citizens
- Structured agendas, flexible format
 - Staff works to provide historical, technical and programmatic information to stakeholders
 - o Provides basis of understanding from which valuable discussion can occur
- Outcome-based process
 - Stakeholders work together to set goals and ensure they are met

Format:

Ozone Stakeholder Committee



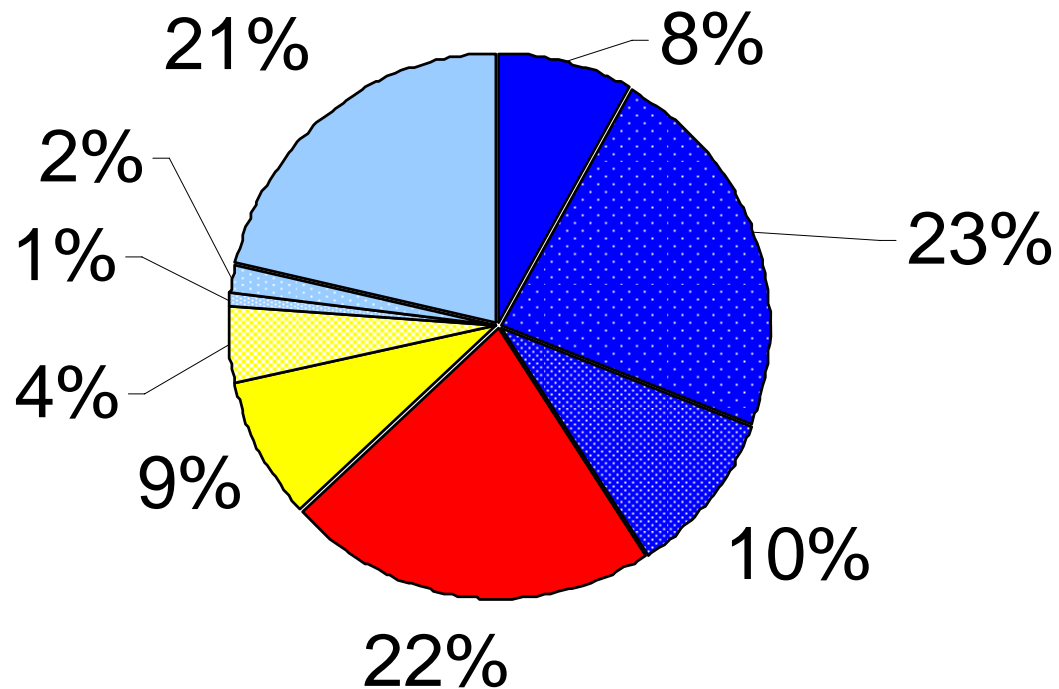
- **Started meetings in October**
 - Nine meetings to date
- **Chaired by a RAQC Board member, with a lead staff member coordinating agendas, communication and other logistical items**
 - Joan Ringel, Chair
 - Sara O’Keefe, Staff Lead
- **Agendas developed in coordination with the State’s Air Pollution Control Division, North Front Range representatives and input from stakeholders**

Understanding Where Ozone Comes From



- **Background concentrations**
 - Includes biogenic (plants, trees) sources and transport (emissions from other areas)
 - On an 85 ppb or higher day, background ozone can account for 40-65 ppb
 - This means we are controlling 20-45 ppb
- **Anthropogenic sources (man-made)**
 - Approximately 500 tons per day VOCs
 - Approximately 400 tons per day NOx

VOC Source Categories

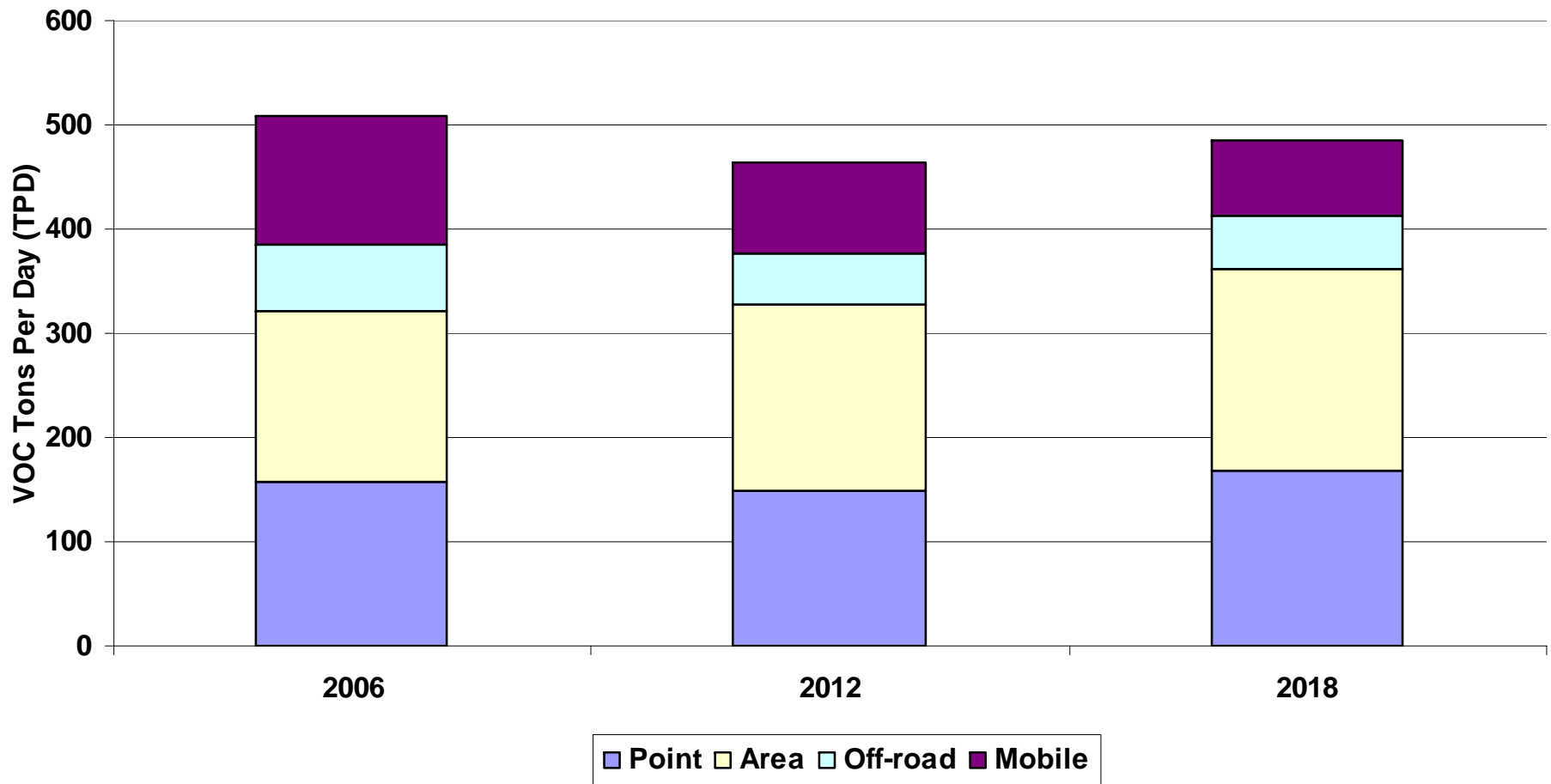


■ Other Point
■ Other Area
■ MS Diesel Vehicles

■ Oil & Gas Flash
■ Lawn & Garden
■ MS Refueling

■ Oil & Gas Area Sources (2)
■ Other Off-road
■ MS Gas Vehicles

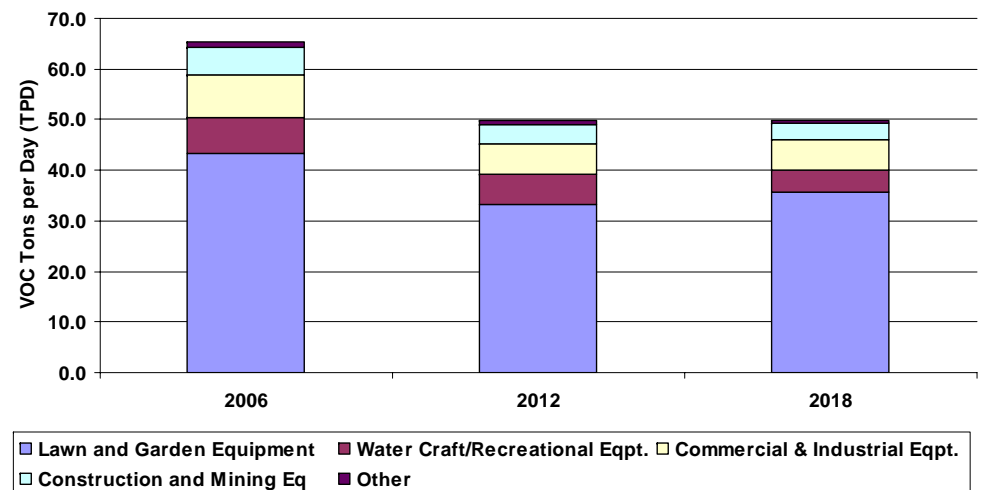
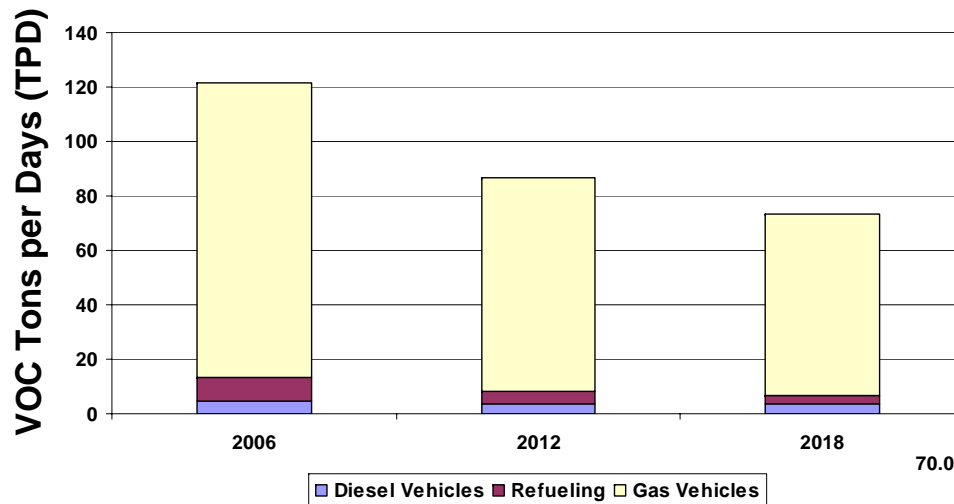
VOC Emissions Inventory



VOC Emissions Trends



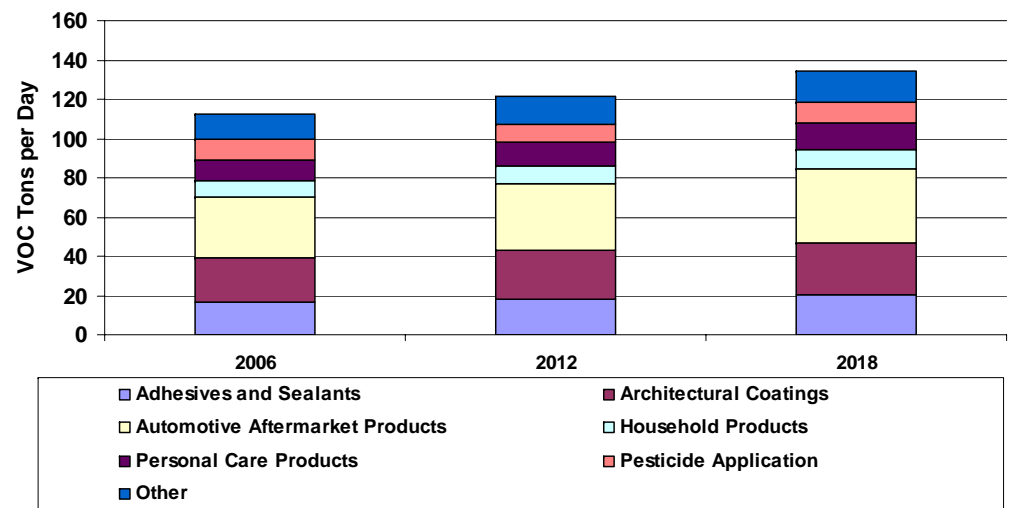
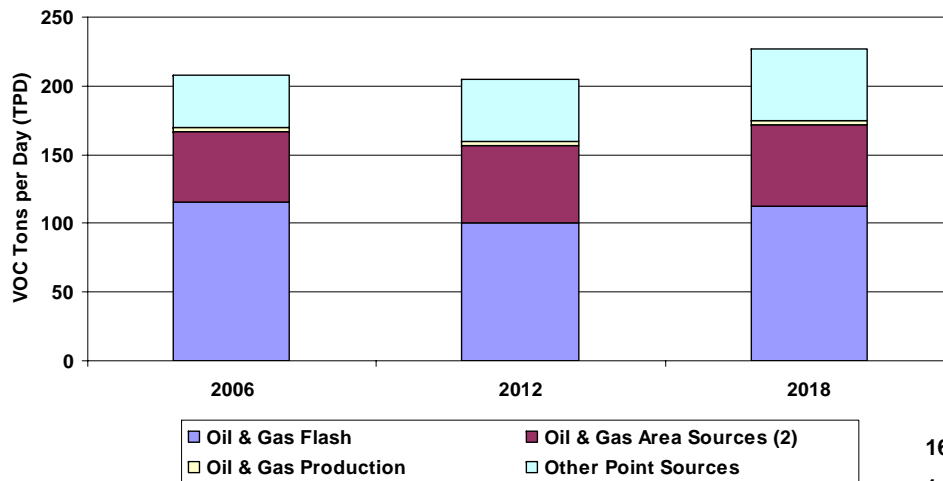
- Significant reduction in mobile and area source emissions due to federal standards



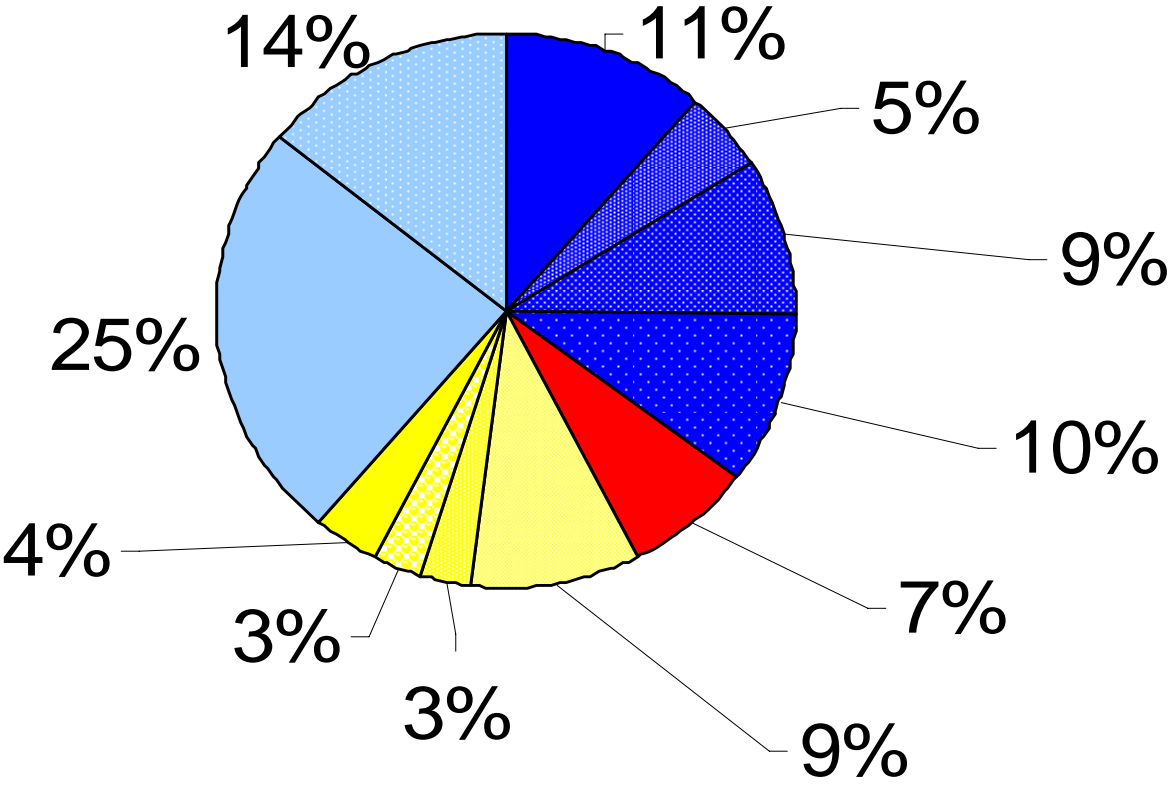
VOC Emissions Trends



- Point and other area sources are expected to grow as a result of population and economic growth

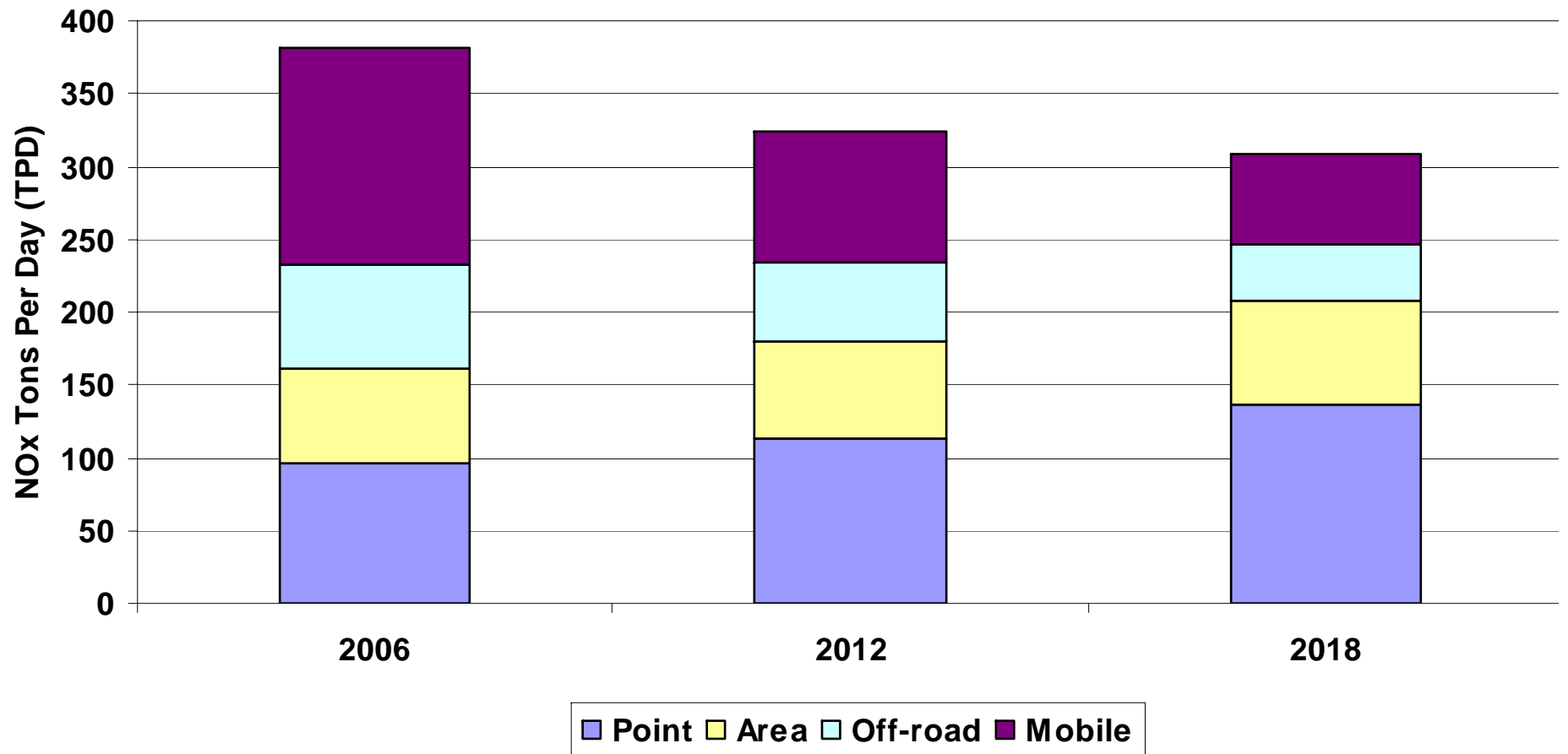


NOx Source Categories



- PS Electric Generation
- Other Point Sources
- Other Area Sources
- Industrial Equipment
- Other Non-road
- MS Diesel Vehicles
- PS Commercial/Institutional/Industrial
- Oil & Gas Area Sources (2)
- Construction and Mining Eq
- Lawn and Garden Equipment
- MS Gasoline Vehicles

NOx Emissions Inventory



Controlling & Reducing Ozone



VOC vs. NOx Controls



- Ozone formation through the interaction of VOC and NOx is very complex and dependent on many variables
- While both VOC and NOx contribute to ozone formation, areas are generally either:
 - **VOC-limited:** Reducing VOC emissions is more effective at reducing ozone
 - **NOx-limited:** Reducing NOx emissions is more effective at reducing ozone
 - Based on local conditions like atmospheric chemistry, meteorology, mix of sources, types of emissions, etc.
- Denver area is considered VOC-limited, so focus of past control efforts has been on VOC sources
- In some situations and locations, reducing NOx can be counterproductive to reducing ozone
 - Dispersion modeling and scientific observations can help determine impact of NOx reductions

Ozone Strategies Since 2004



- 7.8 RVP lower volatility gasoline implemented in 2004
- Controls on oil and gas industry
 - 47.5% system-wide reduction in 2005
 - 75% system-wide reduction in 2007
 - 78% system-wide reduction in 2012
 - NOx controls on reciprocating engines
- Vehicle fleet turnover
- Repair Your Air high-emitter pilot program
- “Let’s Take Care of Our Summer Air” outreach and awareness program

Strategy Time Horizons



- **2008**
 - Strategies that can be implemented and effective for the 2008 ozone season; identify by early 2008
- **By 2010**
 - Strategies that can be implemented and effective before 2010 ozone season
 - Strategies included in attainment SIP adopted by AQCC in December 2008
- **Longer-term**
 - Strategies that can be implemented now or in the future that will have an effect in the next 5-10 years
 - Strategies that may be necessary to comply with a more stringent ozone standard

2008 Current Plans



- **HB1302 High-Emitter Pilot Program**
- **“Cash for Clunkers” vehicle salvage program**
- **Lawn mower exchange programs**
- **Local government/CDOT/school district diesel retrofit project**
- **Continue education and outreach program**

Current Federal Programs



- **Federal programs in place that will provide emission reductions this year and beyond**
 - **Gasoline vehicles**
 - Engine standards and low-sulfur fuel requirements
 - **Diesel vehicles**
 - On-road engine standards and low-sulfur fuel
 - **Off-road and small engine standards**
 - **Off-road low-sulfur diesel fuel**
 - **Locomotive engines**
 - Engine standards and low-sulfur fuel

Control Strategy Options: Fuels



- **Lower RVP (volatility) gasoline (VOC)**
- **Reduce impact of ethanol blending during ozone season (VOC/NO_x)**
- **Federal Reformulated Gasoline (VOC/NO_x)**
- **Stage II Vapor Recovery**
 - **Hoses/nozzles at stations capture refueling vapors**
 - **On-board vapor recovery canisters required on all vehicles since 1998, making Stage II less effective and redundant over time; this still may be a viable strategy for the next 5 to 10 years, so it is being investigated**

Control Strategy Options: Gasoline Vehicles



- **Federal Tier II emission standards (VOC/NOx)**
 - Phased in between 2004 and 2009
- **Improvements to current I/M program (VOC)**
 - HC & NOx cut points, disappearing vehicles, test frequency, Clean Screen coverage
- **NFR I/M Program**
 - Options under development
- **High-emitter program (VOC)**
 - HB 1302 mandates development of program
- **“Cash for Clunkers” scrappage program (VOC/NOx)**
- **California tailpipe standards (VOC/NOx)**
 - States can adopt CA standards with EPA approval

Control Strategy Options: Diesel Vehicles



- **Federal Phase III standards (NO_x/PM/VOC)**
 - Phased in 2007-2010
- **Promote/require biodiesel (NO_x/PM/VOC)**
- **Diesel retrofits (NO_x/PM/VOC)**
- **Diesel anti-idling programs (NO_x/PM/VOC)**
 - Technology requirements, education and idling restrictions
- **Diesel scrappage programs (NO_x/PM/VOC)**
 - On- and off-road vehicles

Control Strategy Options: Area Sources



- **EPA small and non-road engine standards (VOC/NOx)**
 - Tier II/III standards phased in between 2001-08
 - Tier IV standards phased in between 2008-15
- **Lawn equipment exchange programs (VOC)**
 - RAQC has sponsored “Mow Down Pollution”
- **CA commercial products regulations (VOC)**
 - Paints, solvents, degreasers, auto refinishing, adhesives, paving, printing, etc.
- **CA consumer products regulations (VOC)**
 - 12 product categories
- **NOx strategies for significant sources to be evaluated through the State’s visibility improvement efforts for national parks and wilderness areas**

Control Strategy Options: Stationary Sources



- **Review RACT (reasonably available control technology) requirements for existing sources (VOC/NOx)**
 - Currently apply in Denver area, would be new for NFR
- **New Source Review for new/modified major sources (NOx/VOC)**
 - Stringent control technology and emission offsets required
- **Additional controls on O&G flash emissions (VOC)**
 - 75% system-wide reduction currently required
 - 78% reduction in 2012
 - Control technology is > 95% effective
- **Assessment of other O&G sources and control options (VOC/NOx)**

Control Strategy Options: Stationary Sources Cont.



- **Urban Forest Development Program**
 - Evaluate types of trees that increase urban shade, cut energy demand and reduce natural emissions of VOCs
- **Assessment of other stationary source controls for NO_x to be evaluated through the State's visibility improvement efforts for national parks and wilderness areas**
 - Could include power plant controls, such as emissions caps or additional energy efficiency programs
 - Could include controls on boilers, such as NO_x caps, fuel requirements, etc.

Control Strategy Options: Public Education



- **Aggressive public awareness program to reinforce messages on consumer behavior**
 - Assorted advertising, media coverage, local government communication
- **Business outreach**
 - Employer programs
 - Pollution prevention and business best practices
- **Cooperation between RAQC, DRCOG, NFRMPO, CDOT, RTD and other transit providers to promote alternative transportation options**
 - DRCOG's RideSmart Thursdays program
 - Transit incentives

Short-Term Strategies



- **Additional short-term strategies endorsed by the RAQC Board**
 - Voluntary RVP reduction
 - Voluntary 7.8 RVP in NFR
 - Voluntary reductions in oil & gas emissions
 - High-emitter vehicle scrappage program
 - Landscaping pilot program – change out lawn equipment for a municipal government
 - Voluntary high-emitter in NFR
 - Evaluate collector vehicle requirements
 - Consider expansion of vehicle inspection / maintenance program to NFR
 - o Discussion with NFRMPO Board on March 6

Small Business Information



Changes for Minor & Major Sources



- **Minor sources in nonattainment areas**
 - Lower reporting thresholds
 - Significant changes
 - RACT requirements
 - Lower public comment thresholds
 - Other potential changes as stakeholder process develops and defines ozone reduction goals
- **Major sources in nonattainment areas**
 - Lower reporting thresholds
 - Significant changes
 - Sources could be subject to New Source Review (NSR) if significant changes > 40 tons per year
 - Other potential changes as stakeholder process develops and defines ozone reduction goals

Small Business Assistance Program



- **Internet resources**
 - **CDPHE Guidance Document Library**
 - www.cdphe.state.co.us/ap/stationarylibrary.html
 - **CDPHE Air Pollution Control Division**
 - www.cdphe.state.co.us/ap/ozone.html
 - **Small Business Assistance Program (SBAP)**
 - www.cdphe.state.co.us/ap/sbap/index.html

What's Next?



Next Steps



- **Discuss strategies at stakeholder meetings**
- **Analyze strategies**
 - Air quality benefit
 - Cost and economic impact
 - Implementation considerations
- **Work on implementing/evaluating strategies that have been identified for 2008 season**
 - Work with affected parties
- **Identify strategies for consideration in attainment SIP**
 - Identify regulatory/statutory needs & implementation timeline
- **Identify longer-term strategies**

Information/Questions: Ozone Stakeholder Involvement Process



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Ozone Stakeholder Involvement Process

[Meetings](#) | [Contact Info](#) | [Participants](#) | [Milestones](#)

[Feedback](#) | [Reports](#) | [Presentations](#)

Elevated concentrations of ground-level ozone during this past summer appear to have put the nine-county Denver region in violation of the federal health-based, eight-hour standard. To ensure future compliance with the standard, the Regional Air Quality Council (RAQC) invites you to participate in the ozone stakeholder involvement process.

Strengthening existing and developing additional programs to reduce ozone in both the short- and long-term is a priority for Gov. Bill Ritter, the Regional Air Quality Council (RAQC), Colorado Department of Public Health and Environment (CDPHE) and the Air Quality Control Commission (AQCC).

In a [letter](#) to new RAQC Chairman Andrew Spielman, Gov. Ritter directed the RAQC to move quickly in developing plans to reduce ozone. Gov. Ritter asked that the RAQC implement measures to reduce ozone in the 2008 summer ozone season, setting a goal of eliminating ozone levels above .080 ppm. In addition, he asked that the RAQC propose a plan to the AQCC by September 2008 to assure compliance with the federal standard in future years. Finally, the RAQC should consider the addition of elements that would reduce ozone levels in anticipation of a stricter federal standard, which currently is under consideration by the U.S. Environmental Protection Agency.

Due to the tight timeline under which these directives will be completed, staffs from both the RAQC and APCD have started working toward the outlined goals and objectives. Stakeholders play a key role in the development of both voluntary and regulatory strategies and will begin work immediately to ensure that there is enough time to host a collaborative process that will result in the development of effective and efficient control measures.



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Front Range Air Quality

11 AM 10/02/07

— GOOD —
Max AQI: 38
No Alert in Effect
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Contact RAQC
Regional Air Quality Council
1445 Market Street, #260
Denver, Colorado 80202
Phone 303-629-5450
Fax 303-629-5822
www.raqc.org

Feedback: Web-based system



Ozone Stakeholder Feedback

We hope that you will be able to participate in upcoming [Ozone Stakeholder Committee Meetings](#) to provide review and input on potential strategies to reduce ozone pollution and ensure future attainment with the federal health-based standard.

However, we have provided a simple way for you to provide input if your schedule does not allow for you to attend any meetings. All feedback will be routed through the Regional Air Quality Council's office and considered as part of the formal stakeholder input process. Please note that due to the potential for a high volume of feedback, staff may not be able to respond to each individual comment.

Thank you for taking the time to provide input on this important process.

- Nature of Inquiry:
- New Strategy Idea
 - Feedback on Proposed and/or Existing Strategy
 - Questions/Feedback on Stakeholder Process
 - Other Ozone Stakeholder-Related Inquiry

First Name:*

Last Name:*

- Affiliation:
- Government Organization
 - Non-Profit
 - Business/Industry
 - Interested Citizen
 - Other

Email Address:*

Comment:



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Front Range Air Quality
2 PM 09/18/07

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Questions & Discussion

