C

Discussion of Ozone, Fire's Impact on Air Quality & Update on the Inspection and Maintenance Program Development

Presentation to the
Joint Transportation and Energy Committee

January 17, 2013

Mike Silverstein and Garry Kaufman
Colorado Department of Public Health and Environment

Colorado Department of Public Health and Environment

Attachment C

Background

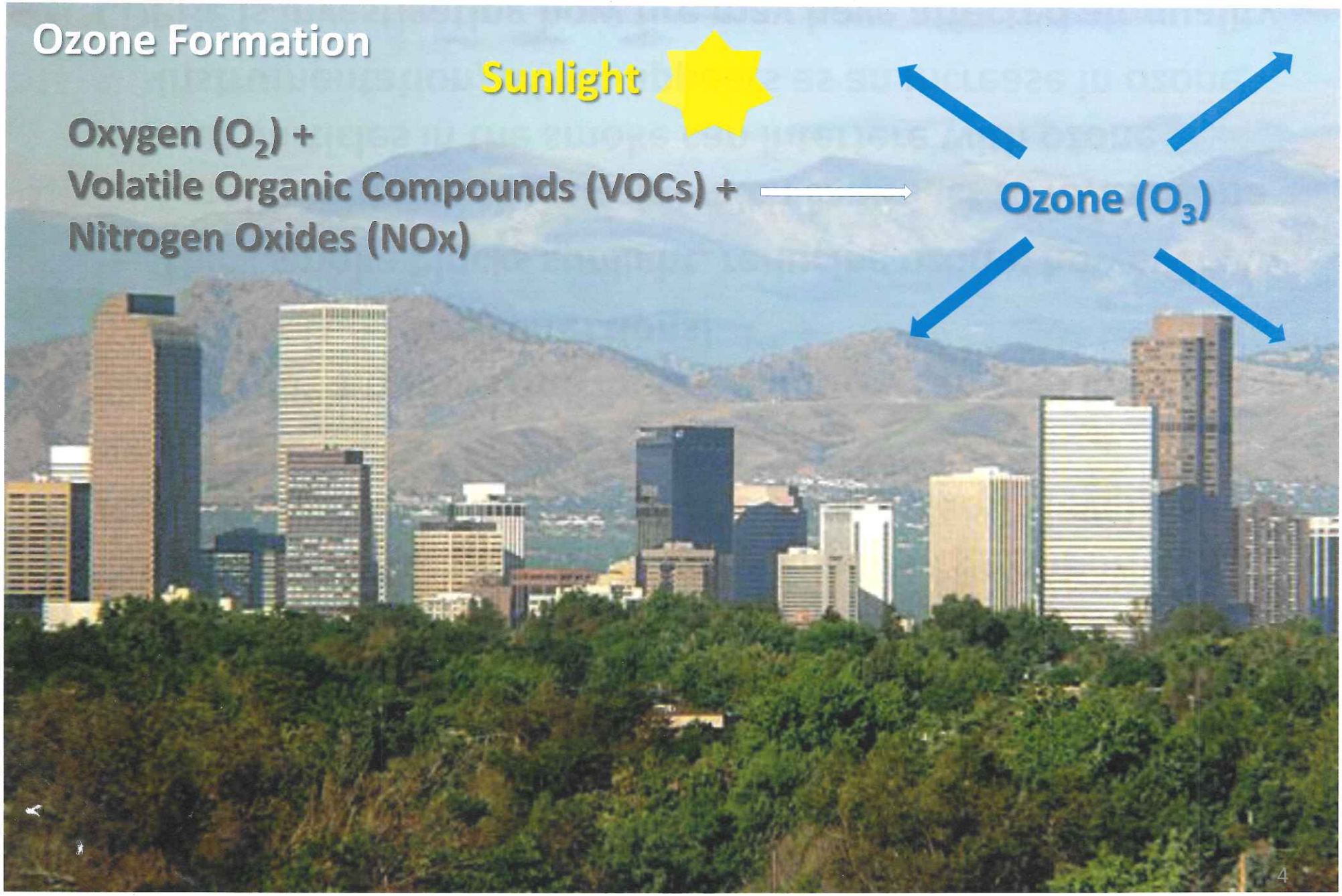
- The federal Clean Air Act establishes national health standards for six pollutants:
  - Fine particulates
  - Ozone
  - Carbon monoxide
  - Nitrogen dioxide
  - Sulfur dioxide
  - Lead
- All states must develop air quality plans and programs to comply with these standards – permitting, inspections, emission control measures
- Colorado meets all of these standards except for ozone along the Front Range urban corridor
- Colorado also experiences high particulate levels on occasion mainly due to natural events – windblown dust and smoke

National Ambient Air Quality Standards

Extreme Heat and Wildfires Impact Air Quality

- Heat and lots of sunshine, combined with our urban and industrial emissions, result in elevated ozone levels
- Extensive wildfires, both in Colorado and in neighboring states, generate smoke which creates haze and elevates particulate matter levels
- Though not a major contributor, wildfires can also impact ozone levels, in *both* directions!
  - Thick smoke blocks sunlight, reducing ozone; however
  - Smoke contains chemicals which can react to form ozone and particles in the smoke can interfere with ozone instrumentation, which appears as an increase in ozone
- CDPHE is investigating how fire may have affected air quality standards this summer

What is Ozone?



Health Effects of Ozone

75 ppb Ozone Standard →

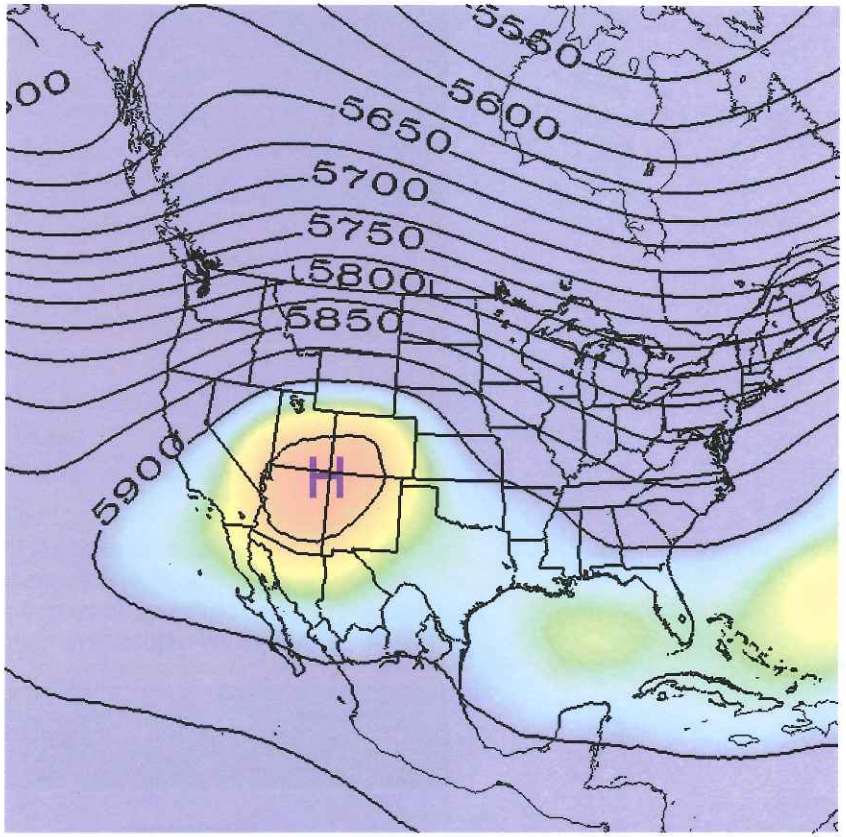
Air Quality Index Levels of Health Concern	Numerical Value	Meaning
Good	0 to 50	Air quality is considered satisfactory, and air pollution poses little or no risk
Moderate	51 to 100	Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people who are unusually sensitive to air pollution.
Unhealthy for Sensitive Groups	101 to 150	Members of sensitive groups may experience health effects. The general public is not likely to be affected.
Unhealthy	151 to 200	Everyone may begin to experience health effects; members of sensitive groups may experience more serious health effects.
Very Unhealthy	201 to 300	Health alert: everyone may experience more serious health effects
Hazardous	301 to 500	Health warnings of emergency conditions. The entire population is more likely to be affected.

- **Ozone: makes it more difficult to breathe deeply and vigorously; causes shortness of breath and pain when taking a deep breath; causes coughing and sore or scratchy throat; inflames and damages the airways; aggravates lung diseases such as asthma; emphysema; and chronic bronchitis; increase the frequency of asthma attacks; makes the lungs more susceptible to infection; continues to damage the lungs even when the symptoms have disappeared; causes increased mortality**

Colorado Experiences the "Right" Meteorological Conditions for High Ozone

- Hot summers with abundant sunshine are typical for Colorado, so this summer's ozone levels are not that unusual
  - Persistent high pressure and the lack of thunderstorm activity allows ozone levels to build throughout the day
  - This has been the dominant weather pattern for the Front Range region during high ozone events

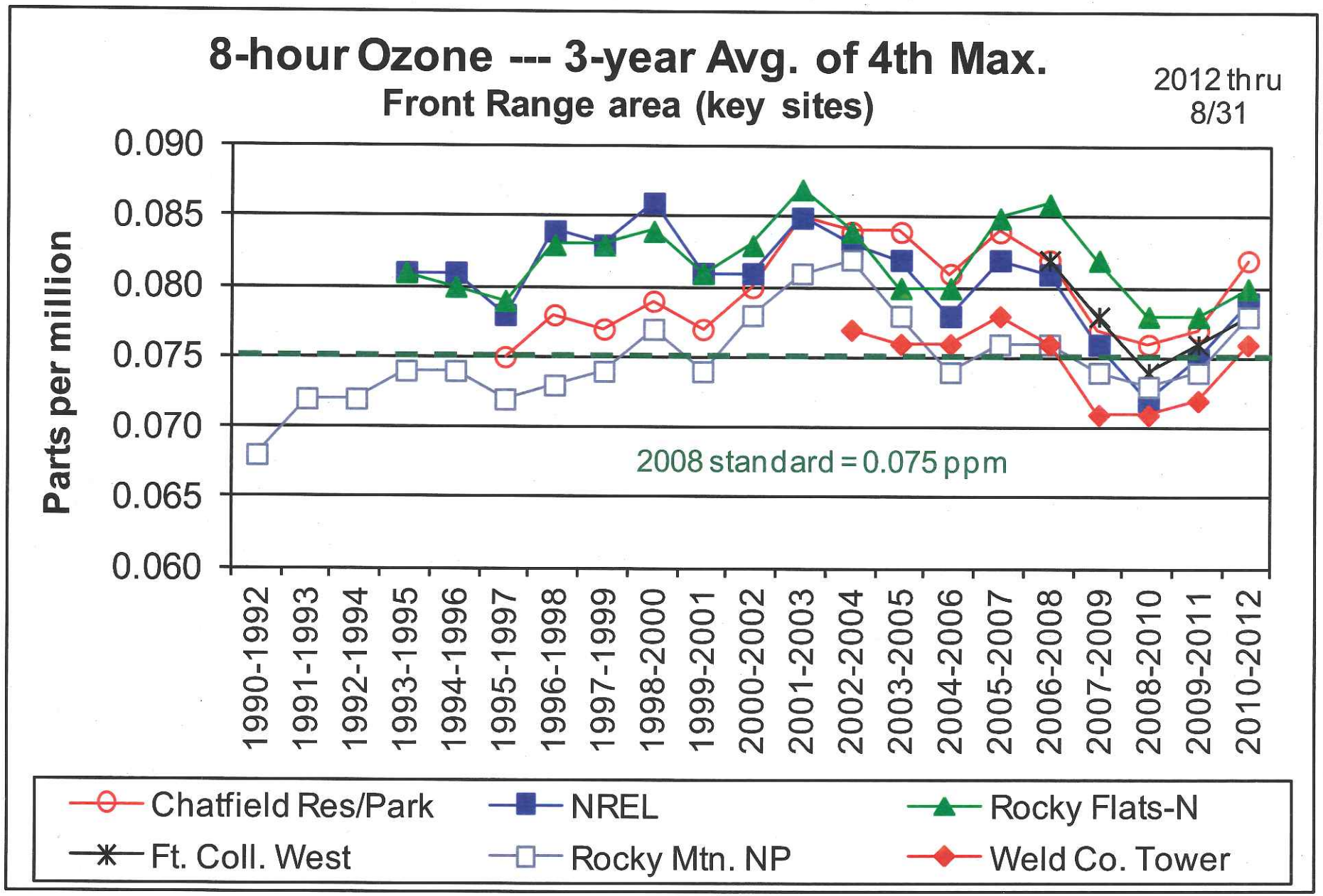
Typical "4-Corners High Pressure Dome"



Emission Controls have Substantially Reduced Ozone Levels in the State

- Numerous emission control measures have been implemented in Colorado to reduce ozone concentrations
  - Vehicle inspection and maintenance programs and cleaner burning gasoline
  - Industrial and commercial equipment controls
  - Oil and gas measures
  - Federal measures, including stringent vehicle emissions standards
- New measures are expected to further improve ozone conditions over the next five years
  - Federal oil and gas controls
  - Power plant emission controls and conversions from coal to natural gas

Over Time Ozone Levels Have Gone Down, though We Still Exceed the Ozone Standard

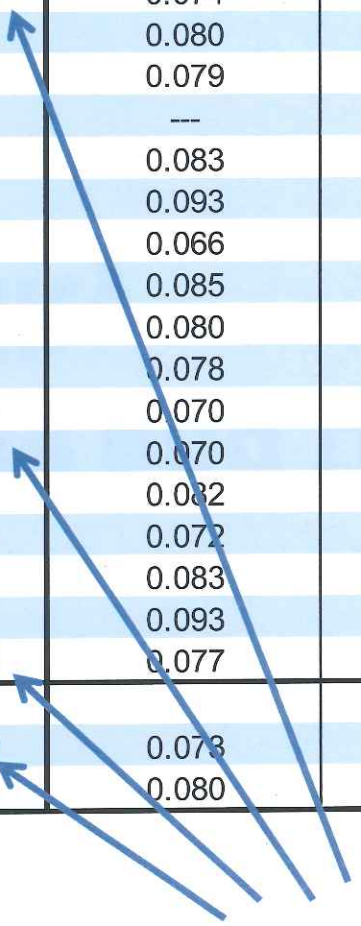


Three Year Average 4th Maximum Ozone Values

**** 2012 data through 31 August ****

East Slope Sites Site Name	AQS #	2010 8-hr. O3 4th Max. Value (ppm)	2011 8-hr. O3 4th Max. Value (ppm)	2012 8-hr. O3 4th Max. Value (ppm)	3-yr. Avg. 4th Max. Value (ppm)	2012 Highest Allowable 4th Max. (ppm)	2013 Highest Allowable 4th Max. (ppm)
Welby	08-001-3001	0.063	0.075	0.077	0.071	0.089	0.075
Highland	08-005-0002	0.075	0.078	0.080	**0.077**	0.074	0.069
Aurora East	08-005-0006	0.070	0.077	0.074	0.073	0.080	0.076
S. Boulder Creek	08-013-0011	0.072	0.076	0.076	0.074	0.079	0.075
CAMP	08-031-0002	---	---	0.067	---	---	---
Carriage	08-031-0014	0.069	0.075	0.077	0.073	0.083	0.075
Denver Animal Shelter	08-013-0025	0.064	0.070	0.073	0.069	0.093	0.084
Chatfield State Park	08-035-0004	0.079	0.082	0.086	**0.082**	0.066	0.059
USAF Academy	08-041-0013	0.068	0.074	0.075	0.072	0.085	0.078
Manitou	08-041-0016	0.072	0.075	0.075	0.074	0.080	0.077
Welch	08-059-0005	0.072	0.077	0.077	0.075	0.078	0.073
Rocky Flats North	08-059-0006	0.076	0.081	0.084	**0.080**	0.070	0.062
NREL	08-059-0011	0.074	0.083	0.081	**0.079**	0.070	0.063
Aspen Park	08-059-0013	0.073	0.072	0.077	0.074	0.082	0.078
Fort Collins - West	08-069-0011	0.075	0.080	0.080	**0.078**	0.072	0.067
Rist Canyon	08-069-0012	0.071	0.073	0.070	0.071	0.083	0.084
Fort Collins - CSU	08-069-1004	0.066	0.068	0.074	0.069	0.093	0.085
Weld County Tower	08-123-0009	0.073	0.077	0.080	**0.076**	0.077	0.070
NPS - Rocky Mtn.	08-069-0007	0.077	0.077	0.081	**0.078**	0.073	0.069
NOAA - BAO Tower	n/a	0.071	0.076	0.078	0.075	0.080	0.073

(NOAA-BAO thru 7/31)



New violating sites as 2012 ozone values replace lower 2009 values

Examples of Wildfire Smoke and the Impacts on Air Quality

Smoke from the Hewlett Fire over Old Town Fort Collins; May 16, 2012

On this day, particulate levels did not exceed the standard in Fort Collins; ozone readings were also below the standard

PM2.5 levels did exceed the standard the next day (May 17th) in Fort Collins; ozone was below the standard

High Park Wildfire near Fort Collins; June 11, 2012

On this day, particulate levels did exceed the standard in Fort Collins; ozone readings were below the standard

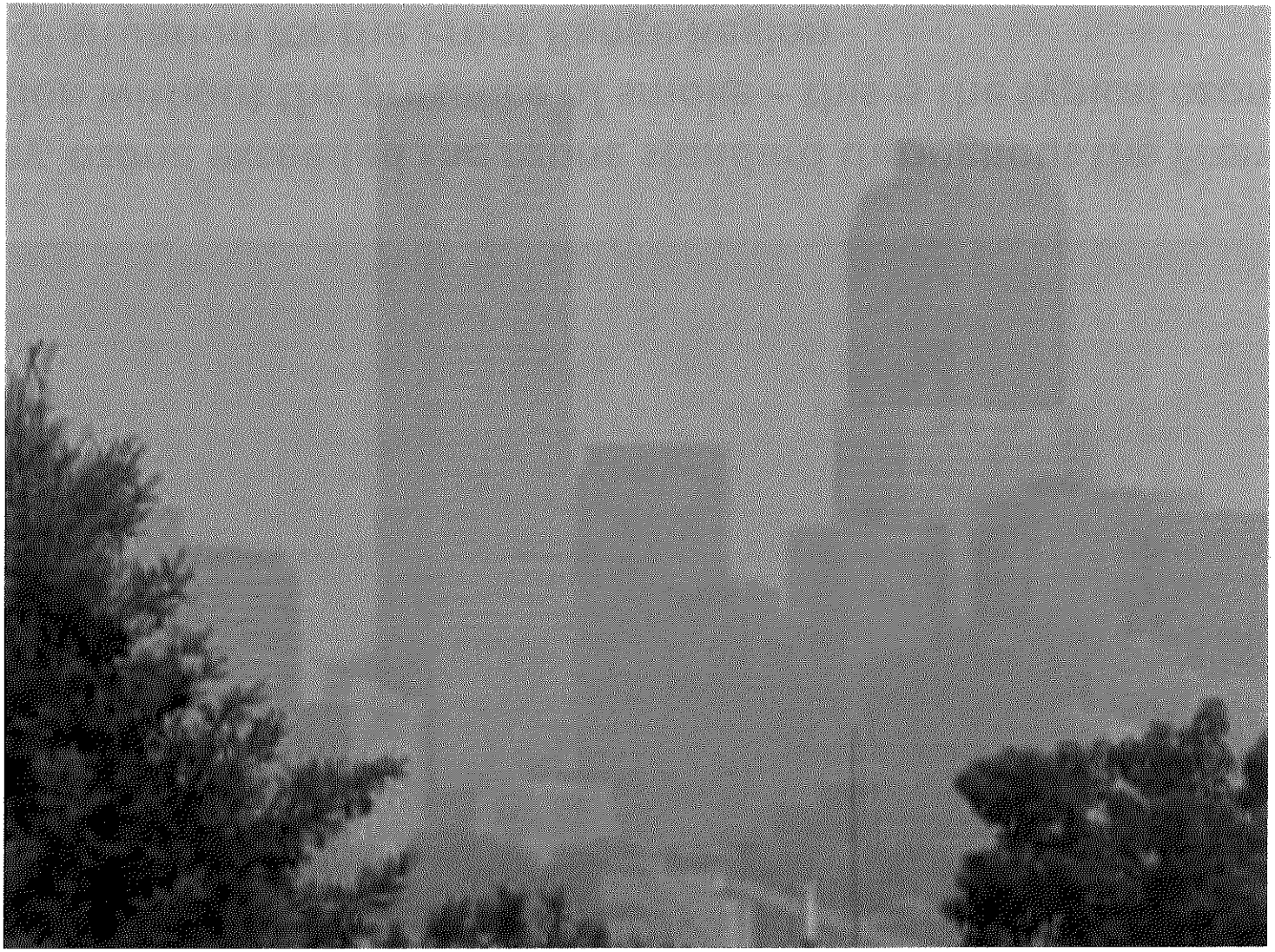
Heavy smoke from the Waldo Canyon Wildfire; June 26, 2012

On this day, particulates did not exceed the standard in Colorado Springs; ozone readings were also below the standard

PM2.5 levels did exceed the standard the next day (June 27th) in Colorado Springs; ozone was below the standard

Smoke from the High Park Wildfire near Fort Collins impacting the Denver-metro area; June 12, 2012

On this day, particulates exceeded the standard in Longmont; ozone readings were below the standard throughout the region



Smoke from Wyoming and Montana wildfires impacting the Denver-metro and North Front Range areas; July 4, 2012

On this day, particulate levels approached the standard but did not exceed it in Denver; ozone readings exceeded the standard up and down the Front Range

On this day, ozone exceeded the ozone standard throughout the Front Range region without the presence of smoke – this is the typical ozone exceedance situation for the Front Range Region

"Exceptional Events"

Exceptional Events are unusual or naturally occurring events that can affect air quality but are not reasonably controllable (such as uncontrolled fire or blowing dust)

- **EPA recognizes that exceptional events should not penalize an area**
  - **Monitored values determined to be exceptional are not considered when determining compliance with National Ambient Air Quality Standards**

- **CDPHE intends to identify events that the science indicates are caused or heavily influenced by natural events**
  - **Like blowing dust and wildfire episodes**

CDPHE is in the Process of Determining if Any of the 2012 High Ozone and Particulate Concentrations are *Exceptional*

- The State is in the process of "flagging" some of this year's high values as exceptional - this process is ongoing and can take at least a year for a final determination by CDPHE
  - CDPHE will consult with local health departments during this process
- CDPHE will prepare science-based justification for each exceptional event
- EPA has issued very stringent guidance for determining exceptional events, and their approval is necessary
- EPA approval of all possible exceptional events will not result in area achieving attainment in 2012

Questions so far?

Air Quality Control Commission's Review of the Vehicle Inspection and Maintenance Program

Air Quality Control Commission's I/M Review Process

- Various vehicle inspection and maintenance programs have been in place in Colorado since the 1980's, including in the northern Front Range Region
- The present "centralized enhanced" program utilizes I/M-240 and remote sensing technologies, and is operated by a contractor
- In 2012, the AQCC embarked on a process to assess the current program with the goal of increasing convenience and reducing costs while maintaining air quality benefits of the program
- From February through June 2012, the AQCC reviewed all the technical and economic aspects of various vehicle inspection and maintenance programs

Basic Tenets of a Future Program from the AQCC Quality Control Commission

- ❑ Other testing technologies and approaches are to be considered
- ❑ Any program should achieve the same or more emission reduction benefit compared to the current program
- ❑ Customer convenience should be improved
- ❑ Inspection costs to vehicle owners should not increase
- ❑ Administrative fees should not increase
- ❑ The boundaries of the program area will not altered
- ❑ Increased model year exemptions should be considered

Proposed Regulatory Changes

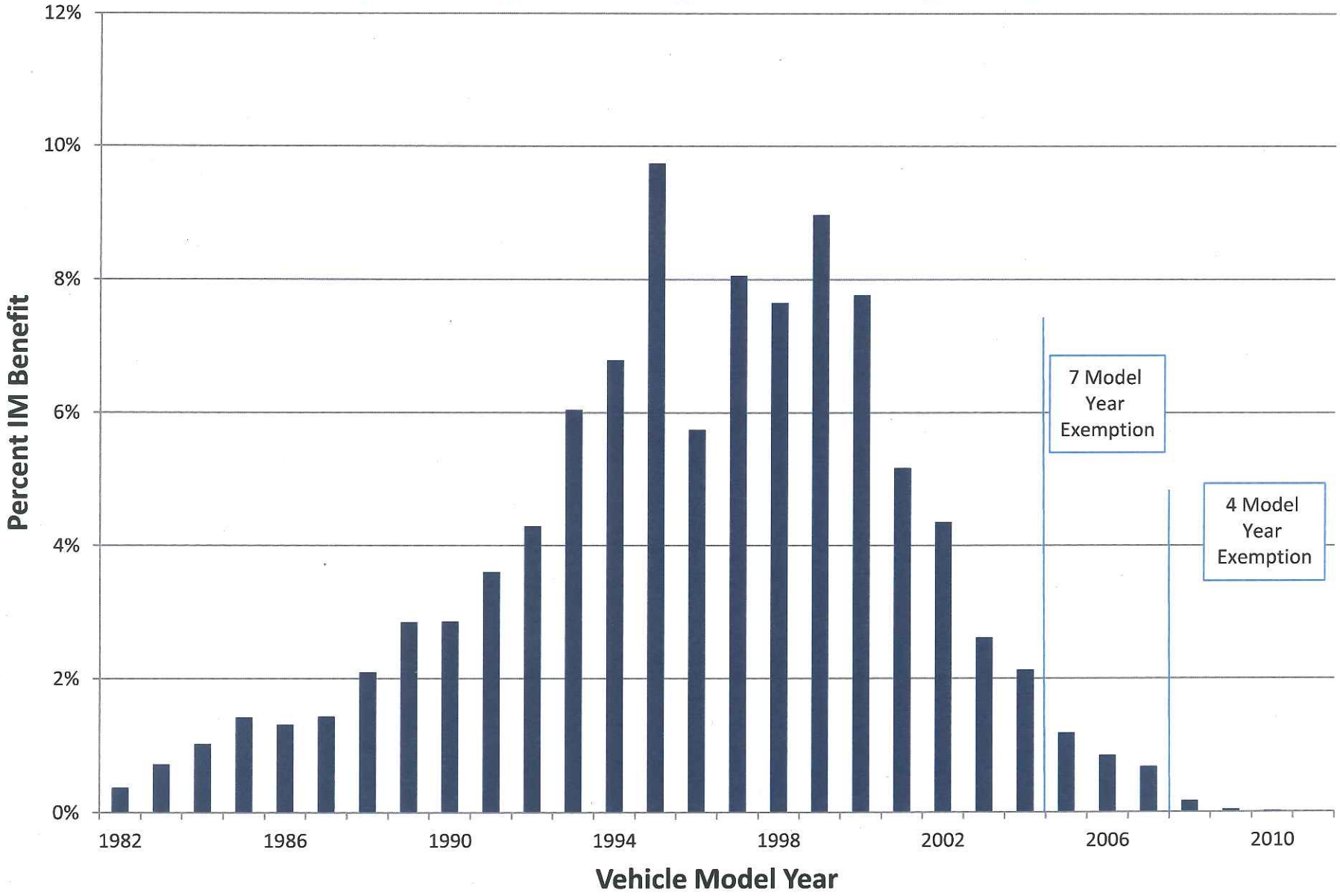
Based on the Guiding Principles from the AQCC, CDPHE Proposed Regulatory Revisions in September 2012

- ❑ **Expand model year exemptions from 4 to 7 Years**
- ❑ **Require on-board diagnostics "OBD" testing for 1st two inspection cycles**
- ❑ **Require I/M-240 testing commencing with 3rd inspection cycle**
- ❑ **When needed, allow flexibility between I/M-240 testing and OBD testing to improve customer convenience**

Prior to the AQCC Public Hearing, the Legislative Audit Committee Received the 2012 I/M Performance Audit Report

- Audit Recommendations:
  - Consider adopting additional model year exemptions
  - Consider implementing additional on-board diagnostics (OBD II) testing
- While not a formal recommendation, Audit Report also indicated that the ongoing need for the program should ***continue*** to be evaluated

Ozone Precursor I/M-240 Benefit by Model Year
Based on 2011 I/M Inspection Results
(One Inspection Cycle VMT Weighted)



Consideration of Additional Years of OBD Testing

- CDPHE evaluated expanding OBD testing beyond 1st two testing cycles
- Consistent with audit findings, CDPHE found that additional OBD testing would increase the cost of the program
- In response to audit recommendations, CDPHE committed to further evaluate OBD testing to determine potential expanded use

Ongoing Need for the I/M Program

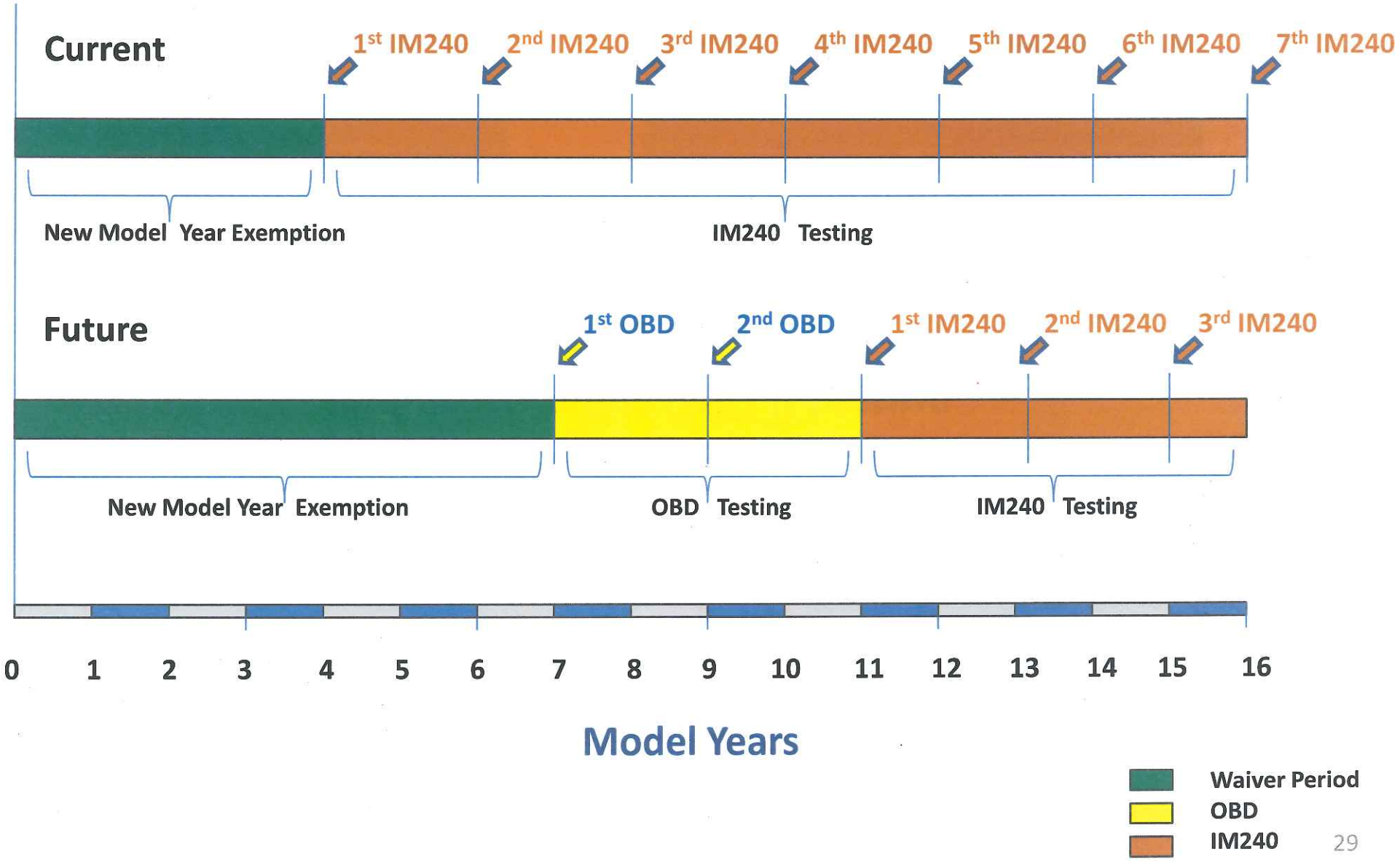
- Mobile sources are currently the largest contributor to ozone formation within the non-attainment area
  - Vehicles typically contributes approximately ½ of the ozone formed within the area
- The I/M Program is the most effective strategy available to reduce emissions from mobile sources
  - Audit found that program reduced ozone precursor emissions by 25 tons per day
- EPA will re-evaluate the area's attainment status based on 2013-15 air quality data
- The need for program should be assessed based on attainment status and emission reduction benefits achieved in future years

The Air Quality Control Commission Adopted Revisions to the Program in December

The Commission considered all information brought to it and voted to approve an updated program:

- Increase the model year exemption from 4 to 7 model years
  - Will be the longest exemption period in the country
- Require OBD II testing for the next 4 years (2 inspection cycles)
- Require I/M-240 testing commencing with the 3rd inspection cycle
- Require long-term OBD II testing for vehicles that cannot be tested with I/M-240 (hybrids, over-sized tires, traction control vehicles, others)
- Provides for I/M-240 testing for vehicles "not ready" for OBD II testing
  - Sometimes vehicles cannot be OBD tested if the on-board computer is not ready - these vehicles will have to be tested at a later date
  - Being able to take an I/M-240 test on-the-spot will eliminate this inconvenience
- Continue the use of remote sensing (drive-by vans)

Comparison of Current Program versus Future Program



Anticipated Impacts of a New Program

- No increase in inspection costs to vehicle owners
  - Estimated annual program costs will be reduced by between at least $1 million to $8 million beginning in 2015
- Improved motorist convenience with additional model year exemptions and more rapid OBD II testing
- Emission reductions are maintained
- New program to begin January 1, 2015

A technician uses an onboard information system workstation to connect the vehicle's datalink connector and OBD II system.
Photo courtesy of Snap-on.

Final questions?