# Developing Colorado's Oil and Gas Emissions Controls– Overview of the Process and Requirements

## Presentation for the Interstate Oil & Gas Compact Commission's Annual Business Meeting

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COLORADO
Department of Public Health & Environment

# High Level Observations

- **Colorado ranks 6th in the U.S. for natural gas production and 7th for crude oil production**
  **(data from the U.S. Energy Information Administration website - 5/12/2015)**

- **Emissions from oil and gas production impact multiple areas across the state**

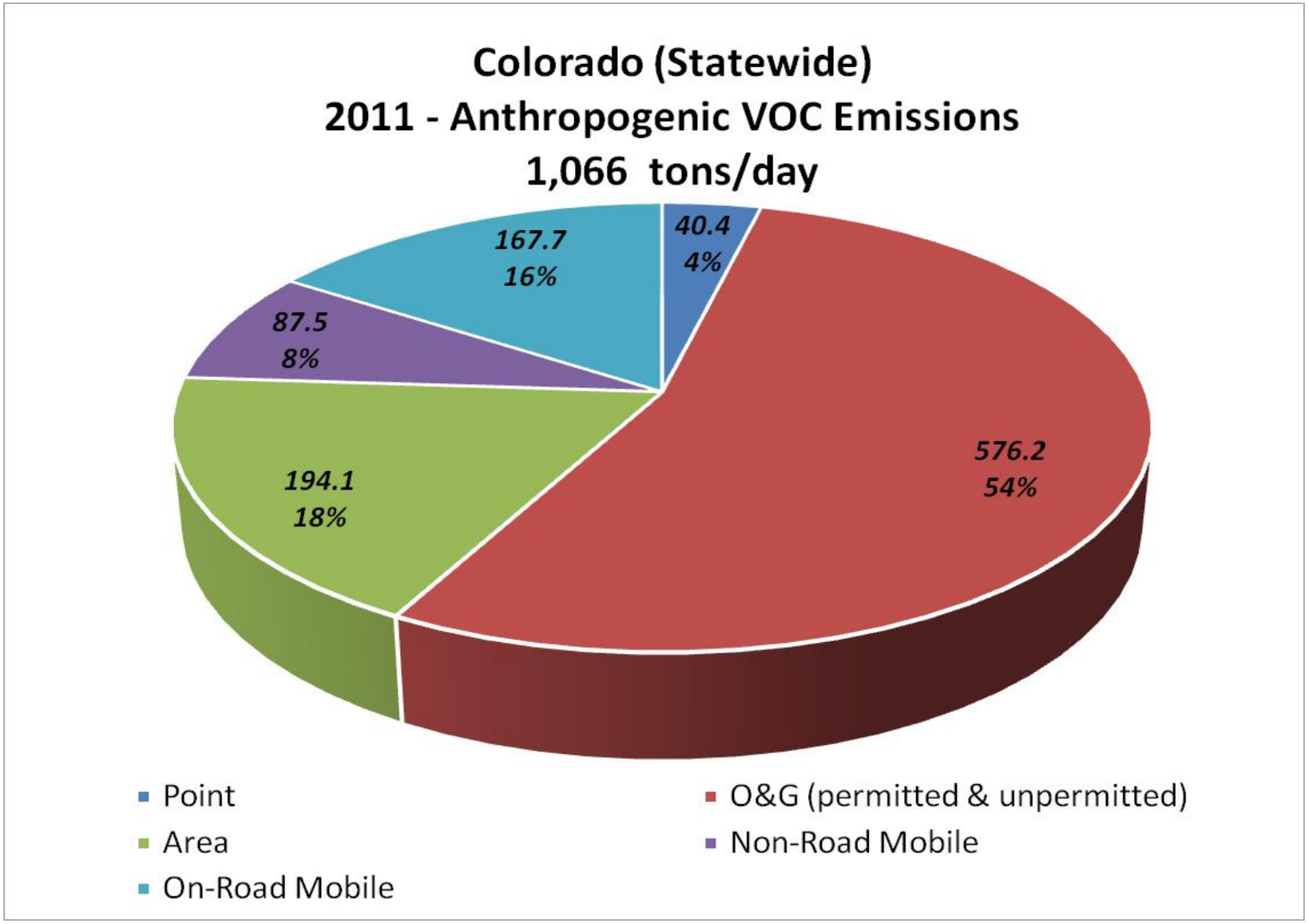
- **The oil and gas sector is the predominant source of volatile organic compounds (VOC) emissions in Colorado**

- **O&G is also a significant source of nitrogen oxide (NOx) and methane ($CH_4$) emissions**

# High Level Observations

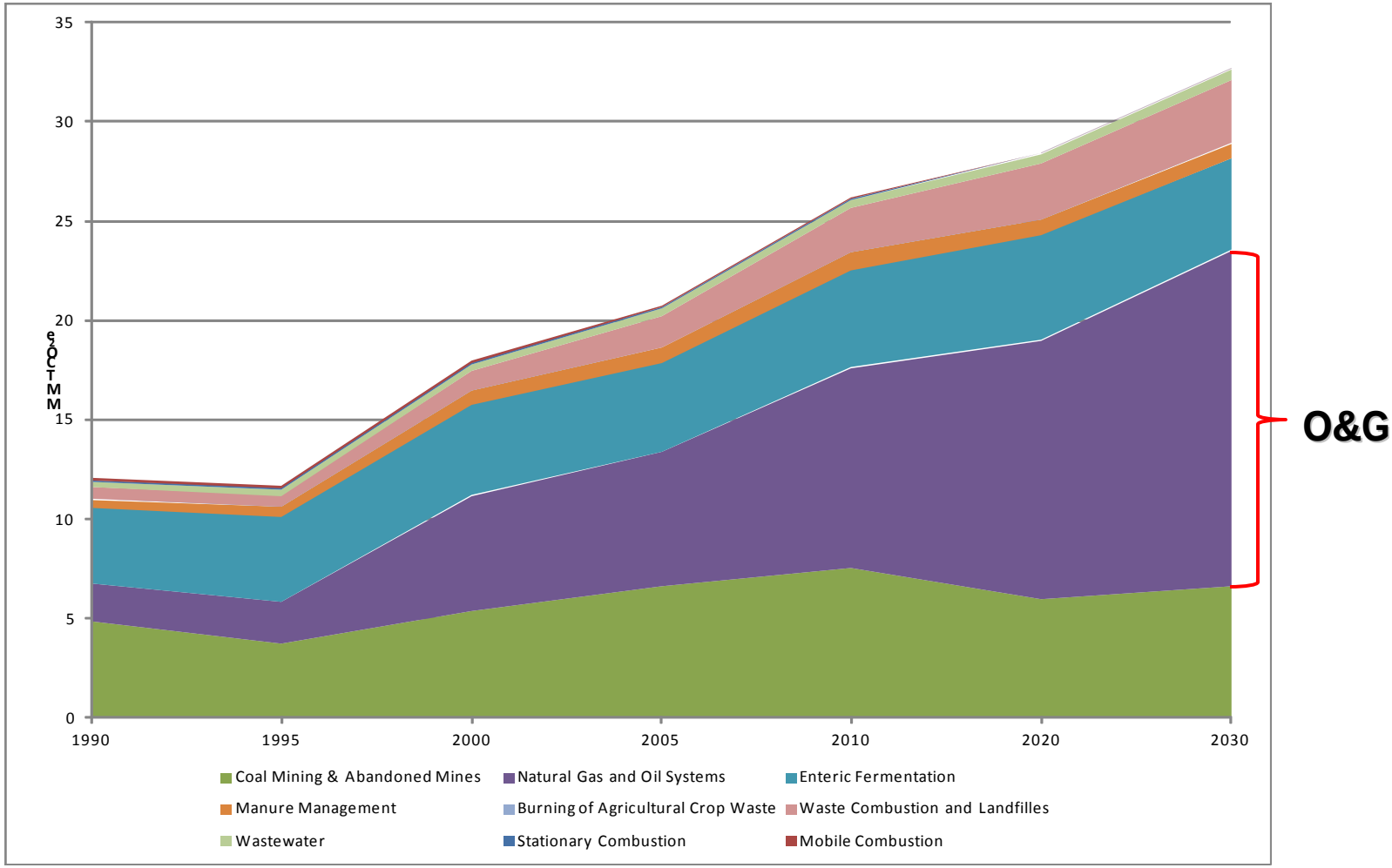
- Colorado has implemented strategies that foster increased use of natural gas
- Maximizing the capture and beneficial use of natural gas and liquid hydrocarbons have economic and environmental benefits
- Absent additional requirements, oil and gas emissions are expected to increase while emissions from other sectors are expected to decrease

# Statewide VOC Emissions

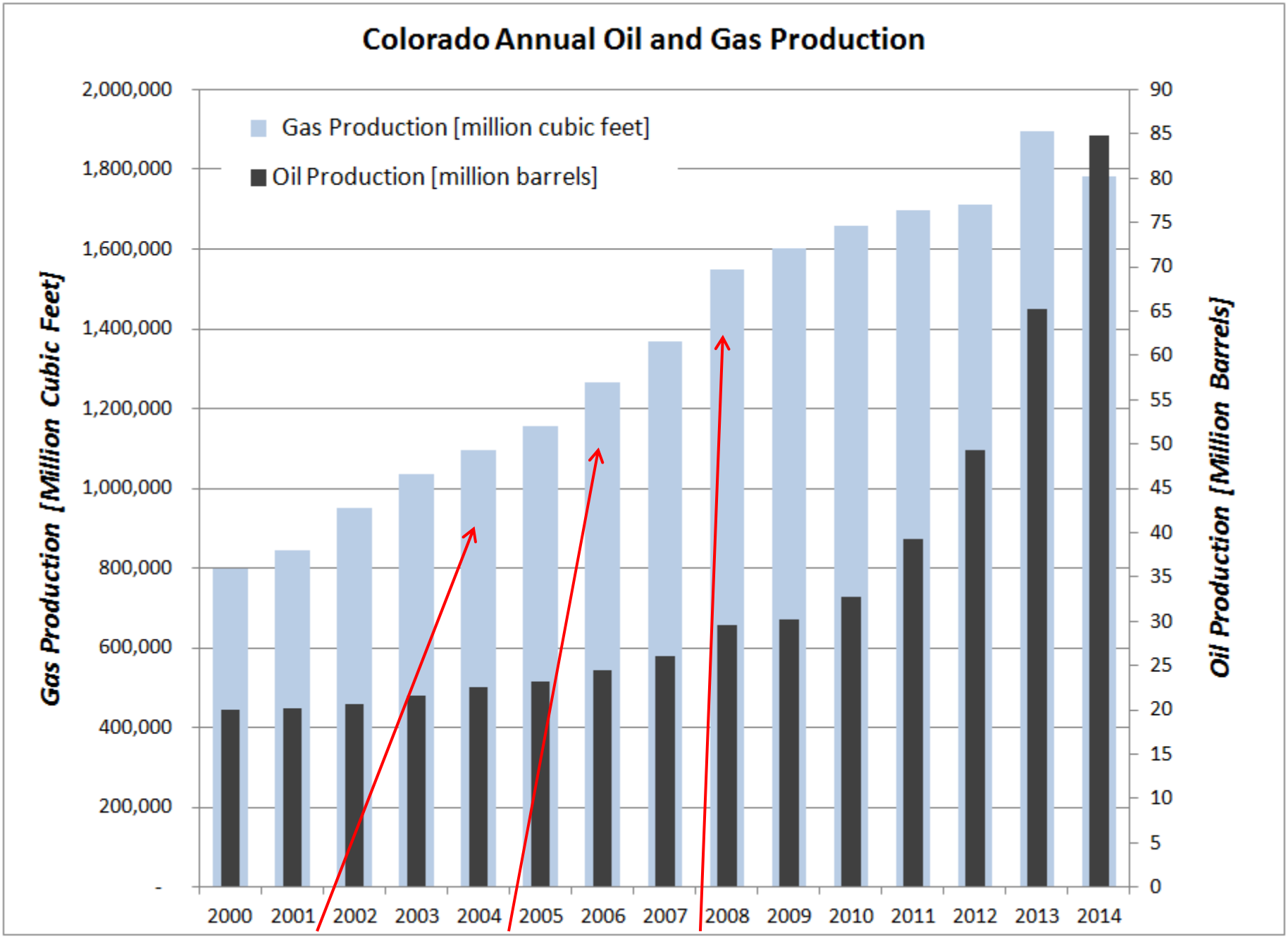


# Trend in Colorado Methane Emissions by Source Category (MMTCO2e)

**(Source: Colorado Greenhouse Gas Inventory – 2014 Update)**



- **Colorado has been a national leader in implementing cost-effective air regulations for the oil and gas production sector**
  - **2004 rulemaking to reduce VOC an NOx emissions from O&G sources in the Denver Metro/North Front Range region**
  - **2006 adoption of O&G emission controls with statewide applicability**
  - **2008 action to further reduce O&G emissions in the Denver Metro/North Front Range region**
- **Even with all of these rules in place, Colorado needs to further improve air quality and keep pace with the industry**


Colorado Annual Oil and Gas Production
Gas Production [million cubic feet]
Oil Production [million barrels]
Gas Production [Million Cubic Feet]
Oil Production [Million Barrels]
2,000,000
1,800,000
1,600,000
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
-
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2004 Controls
2006 Controls
2008 Controls

# Directive from the Top

- **In 2012, Colorado's Governor Hickenlooper directed staff and stakeholders to find ways to reduce leakage from natural gas production**

- **Colorado's Department of Health and Environment also proposed a goal:**

  **Any naturally occurring unrefined petroleum liquid collection, storage, processing and handling operation shall be designed, operated and maintained so as to minimize leakage of VOCs and other hydrocarbons to the atmosphere to the extent reasonably practicable**

# Developing a Framework for the New Rules

- **Proactively address non-compliance with the ozone National Ambient Air Quality Standard** *while also reducing methane emissions which contributes to global climate change*
  - **Require responsible development**
  - **Reduce leakage from O&G production**
  - **Ensure benefits from existing rules for petroleum storage tanks**
  - **Maximize the climate change benefits of natural gas usage by reducing production waste**

# Getting to the Issues

- The Department of Health and Environment proceeded to convene the stakeholders

- Numerous public and one-on-one meetings were held with companies, trade associations, environmental groups, government agencies, elected officials, and citizen advocates in late 2012 and throughout 2013
  - White papers were developed
  - Proposals were floated
  - Rule language was batted around
  - Costs of controls and environmental benefits were estimated

# Crafting a Proposal

- **In mid 2013, a breakthrough occurred:**
  - **The Governor's Office, the state's three largest producers, the Environmental Defense Fund and the Department took the work from the stakeholder process and together developed a comprehensive approach to reduce hydrocarbon emissions from O&G production activities**
  - **The traditionally VOC-oriented rules were broadened to include all hydrocarbons -** *including methane*
  - **The rules would apply statewide, not just in ozone nonattainment areas**
  - **The rules would be cost effective and achievable**
  - **The larger emitting sites would be subject to more rigor**
  - **The regulatory burden would be less for smaller emitting sites**

# Advancing the Proposal

- The coalition together proposed a regulatory package to the Colorado Air Quality Control Commission in November 2013 containing a wide range of requirements aimed at reducing all hydrocarbon emissions from O&G production sector
  - Streamline permitting for many small sources
  - Adopt federal oil and gas air rules into state regulations
  - Expand most ozone NAA O&G measures statewide
  - Eliminate high bleed pneumatics
  - Enhance capture at controlled storage tanks
  - Initiate inspection, leak detection and repair requirements for most wells sites and compressor stations - "LDAR"

# Refining the Proposal

- More than 30 parties became involved in an intensive "pre-hearing" process
  - Parties included O&G producers and trade associations, local governments, environmental/citizen groups
  - Parties submitted alternative proposals ranging from ultra stringent measures to voluntary BMPs
  - Thousands of pro/con public comments were received
  - Numerous meetings and negotiation sessions were held
  - Amendments to the proposed rule were made

# The Rulemaking Hearing- Mid-February 2014

- Day 1: public comments via webcast and in-person
- Days 2-4: presentation, cross-examination, and rebuttal testimony presented by the coalition and the parties
  - Some supporting, some opposing, and some altering the coalition's proposal one direction or another
- Day 5: Commission deliberation and decision to adopt the coalition proposal, with minor revisions and clarifying policy statements

# Overview of New Emission Reduction Strategies

- LDAR for compressor stations and well production facilities
- Expanded control requirements for storage tanks
- Improved capture of emissions at controlled tanks
- Expanded control requirements for glycol dehydrators
- Capture or control of the gas stream at well production facilities
- Requirements to minimize emissions during well maintenance
- Expanded pneumatic controller requirements statewide
- Auto-igniters on all combustion devices

# Costs and Benefits of New Rules

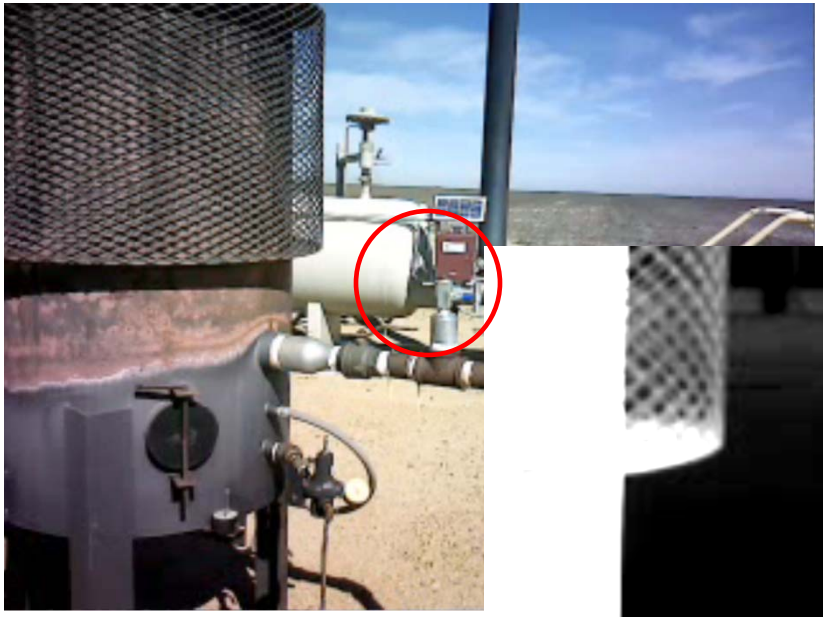
- Estimated <u>annual</u> cost of new rules for industry is approximately $42 million

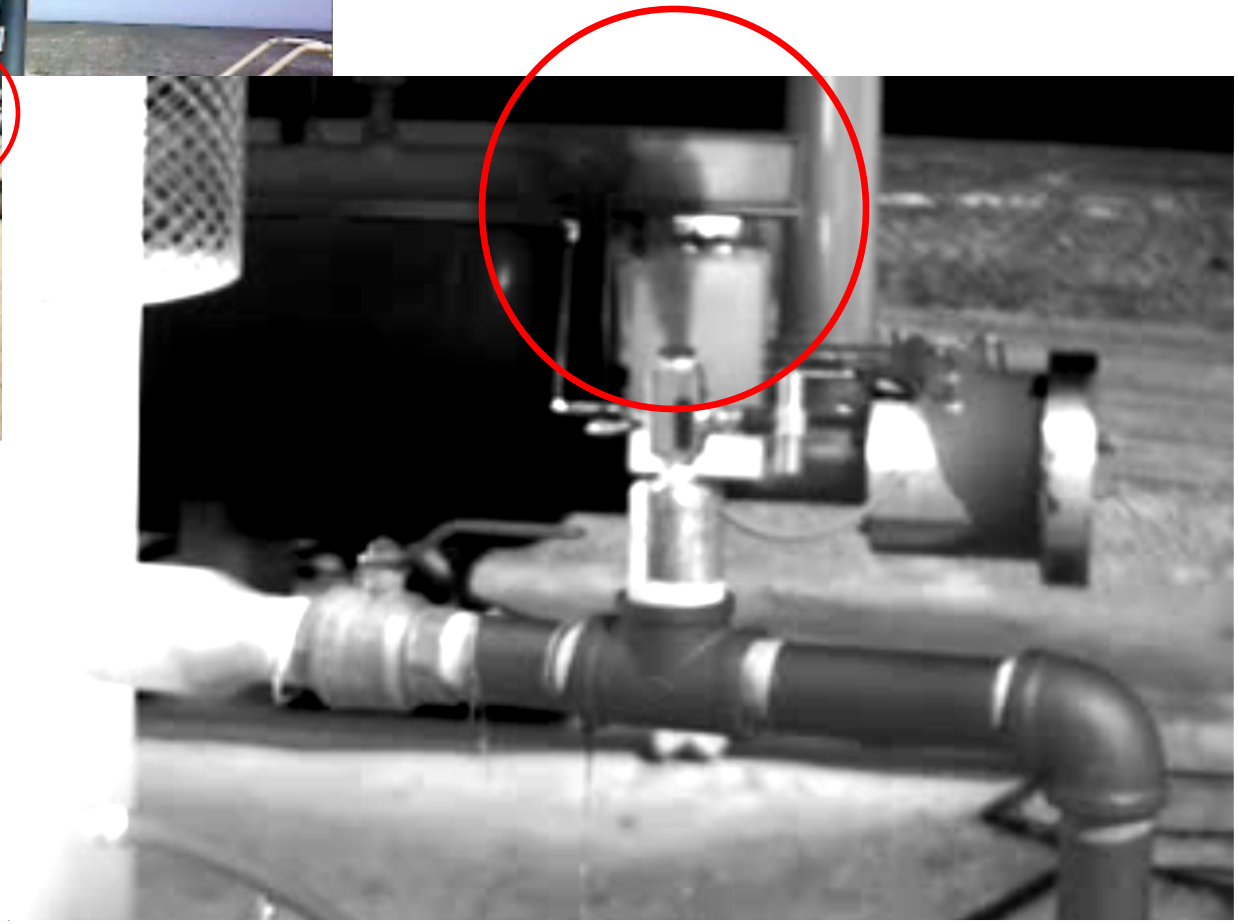
- Significant reduction of volatile organic compounds and methane
  - Approximately 94,000 tpy of VOC
  - Approximately 64,000 tpy of methane
  - Overall cost effectiveness for the entire package is approximately $450 per ton of VOC reduced

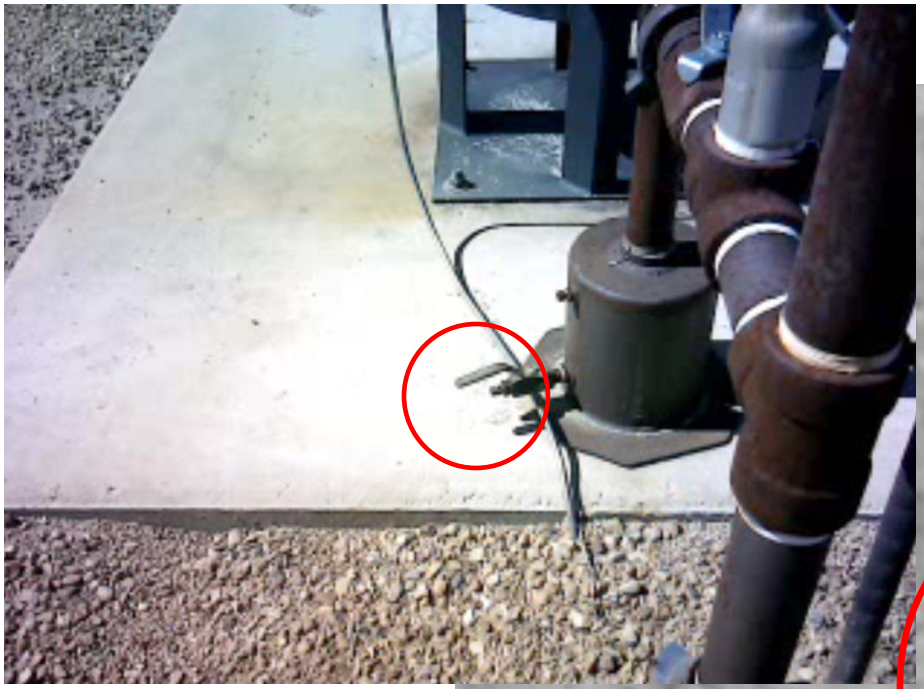
# LDAR for Compressor Stations and Well Production Facilities

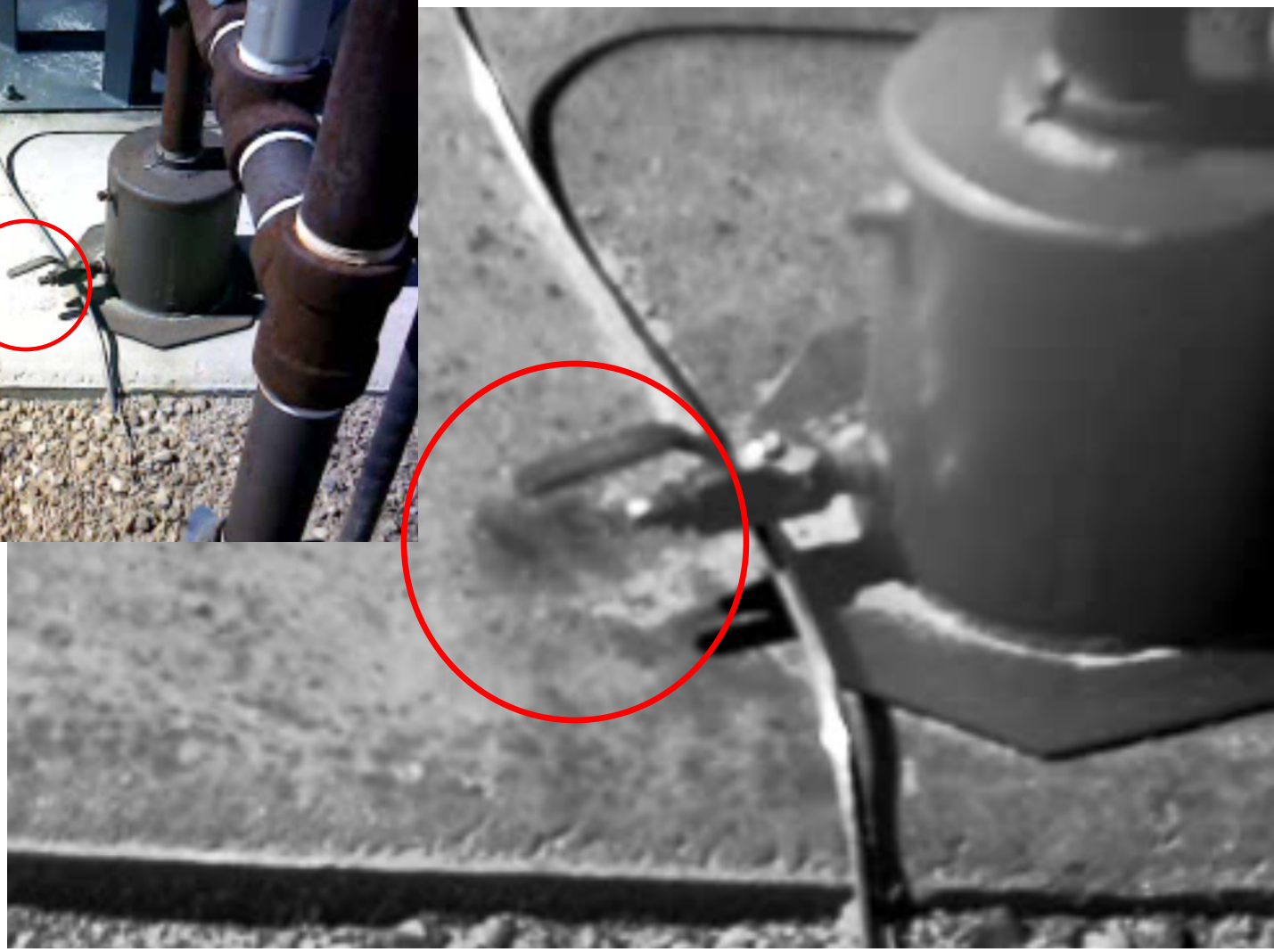
- Frequent visitation and monitoring using Method 21, infra-red (IR) cameras, audio/visual/olfactory observations
  - Wells: plumbing, separators, ancillary piping
  - Compressor stations: compressors, engines, dehys, processing skids, tanks, piping, etc.
- Tiered monitoring schedule to focus on the highest emitting facilities and reduce the burden on smaller facilities
- Repair schedule for identified leaks
- Recordkeeping and reporting requirements

# Leak on open-ended valve on piping connected to flare combustor







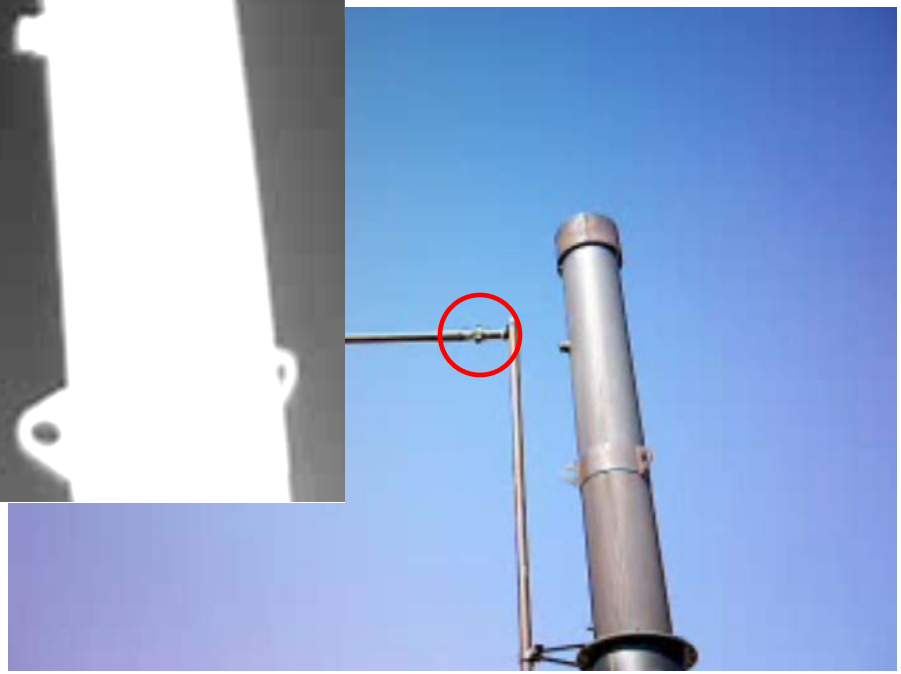


**Leak - open valve on drip pot**

# Storage Tank Inspections

- Controlled tanks must be operated without venting to the atmosphere
- Establishes requirements for Storage Tank Emission Management systems (STEM)
- Emissions associated with the top of the storage tank (pressure relief valves, thief hatches, control devices/piping) are addressed through STEM
- Certified design to minimize emissions
- Extensive instrument based and AVO monitoring
- A tiered monitoring schedule focuses on the highest emitting facilities and reduces the burden on smaller facilities

**Leak on loose hammer union on pipe leading to flare combustor**



# Repairing Leaks & Recordkeeping

- First attempt at repair required within 5 working days with provisions for good cause (parts availability or full shut-down)
- Instrument monitoring following the repair(s) are required within 15 working days to determine effectiveness
- Operators must maintain records
  - Initial approved instrument monitoring method
  - List of leaking components and monitoring method used to determine the leak
  - Date of first repair attempt and if necessary additional attempts

# In Closing:

- The new rules bring O&G production controls in-line with most other sources in Colorado
- There are cost-effective strategies that can reduce methane and other emissions from the oil and gas sector
- Broad collaboration is important
- Colorado's rules ensure responsible development of oil and gas resources and can serve as a model or reference point for others

# Where Can the Materials be Found?

- **Website link to the rules and supporting materials**

  **https://www.colorado.gov/pacific/cdphe/aqcc-meeting-materials-february-19-23-2014**