Proposed Revisions to Air Quality Requirements for Oil and Gas Facilities in Colorado

Curtis Taipale
Colorado Department of Public Health & Environment
Air Pollution Control Division

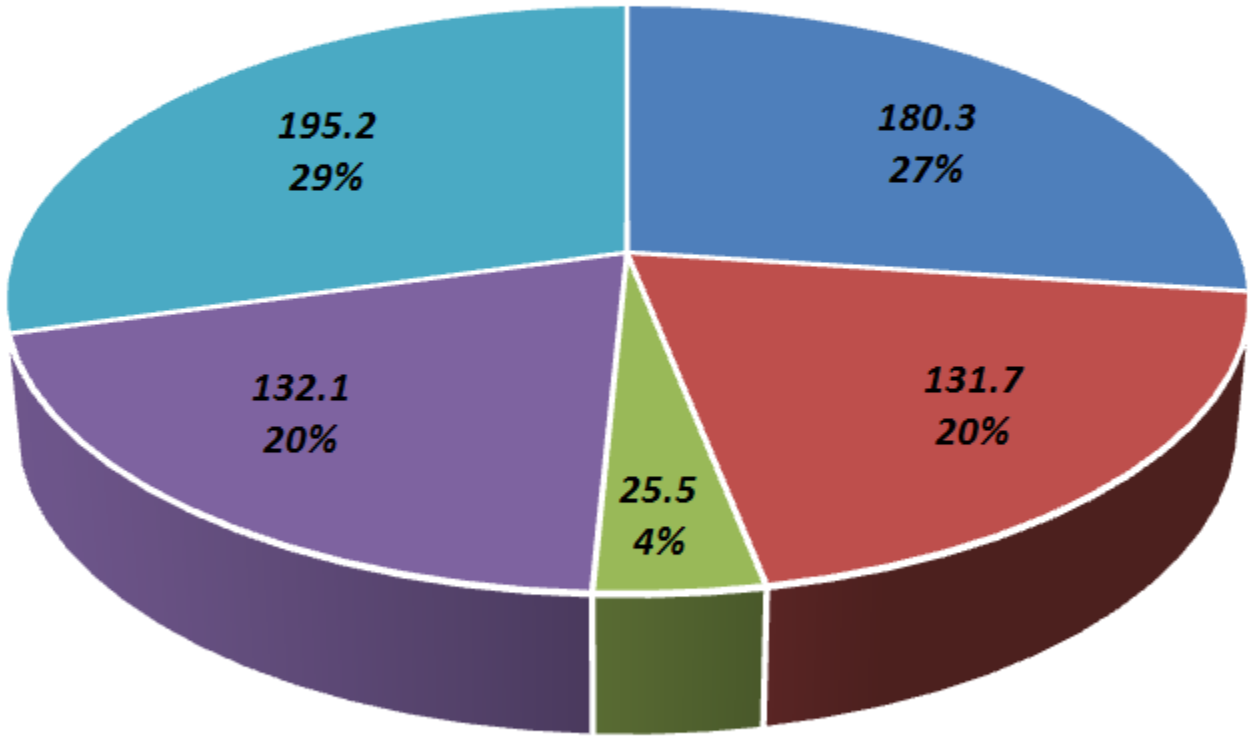
Overview

- Background
  - Air Quality
  - Emissions Data and Observations
  - Oil and Gas Sources
    - Data, Trends, and Regulatory History
- Proposed O&G Rule Revisions
- Regulatory Process
- Summary of Key Points

Colorado Air Quality for NAAQS Pollutants

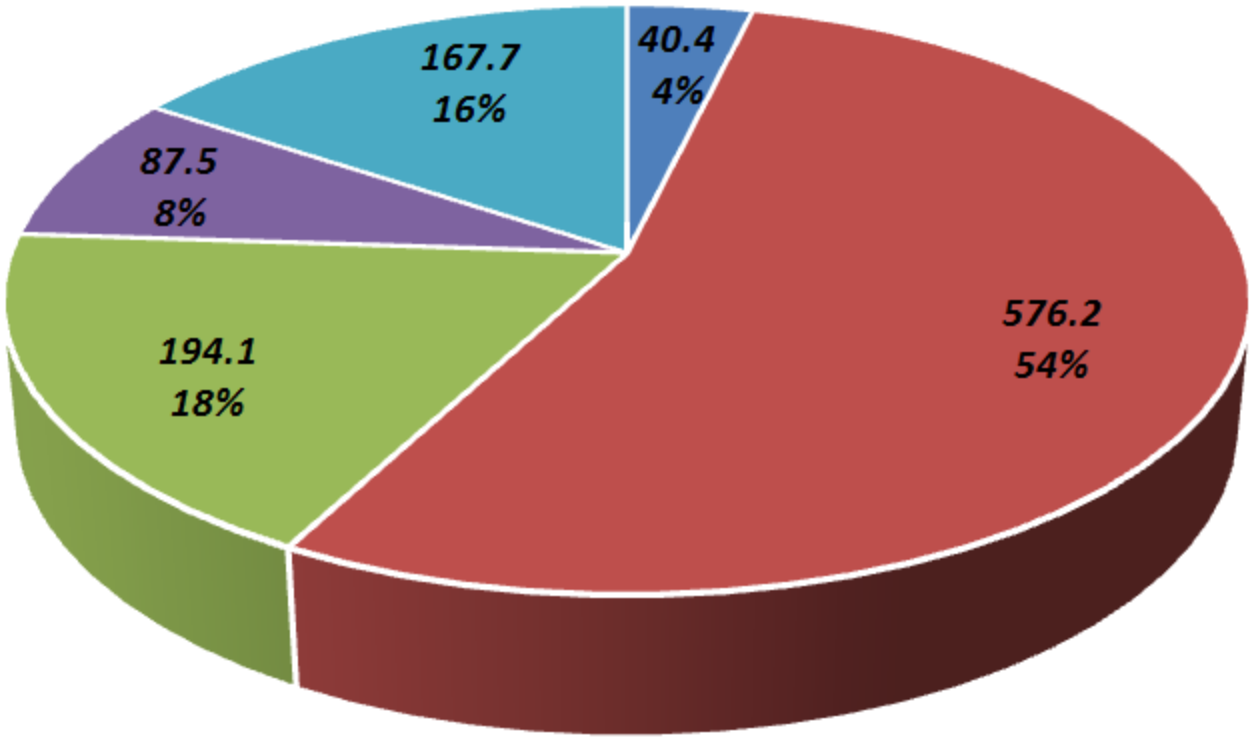
Ozone (2008: 8-hr 0.075 ppm)	• Denver Metro/North Front Range: Non Attainment • Remainder of state attainment or unclassifiable
PM2.5 (2006: Annual 15 µg/m3 & 24-hour 35 µg/m3)	• All areas in attainment or unclassifiable
PM10 (2006: 24-hour 150 µg/m3)	• All areas in attainment/maintenance or unclassifiable
NO2 (2010: 1-hour 100 ppb)	• All areas in attainment or unclassifiable
SO2 (2010: 1-hour 75 ppb)	• All areas in attainment or unclassifiable
CO (2011: 8-hour 9 ppm & 1-hour 35 ppm)	• All areas in attainment/maintenance or unclassifiable
Pb (2008: Rolling 3 month average of 0.15 µg/m3)	• All areas in attainment or unclassifiable

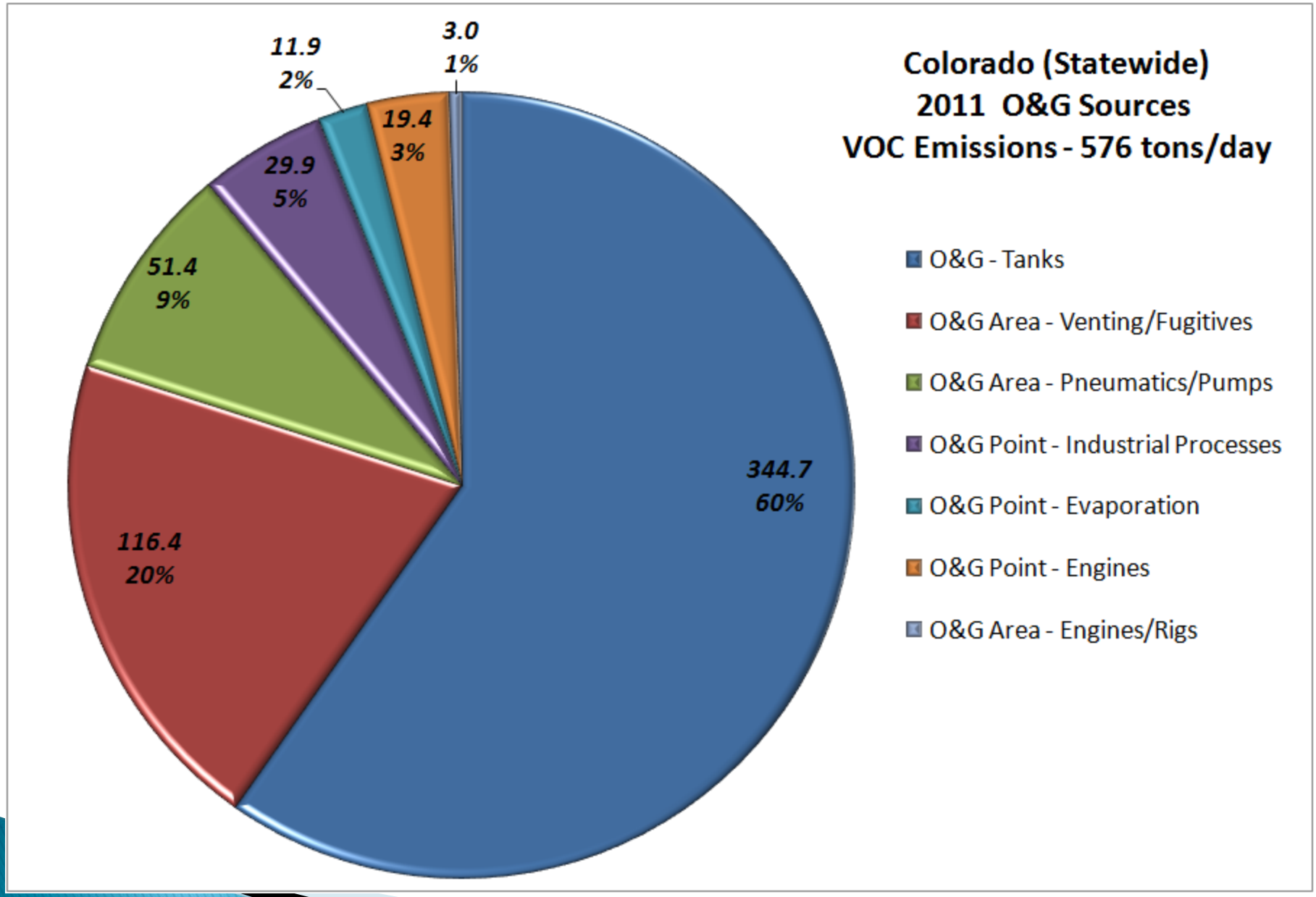
Colorado (Statewide)
2011 - Anthropogenic NOx Emissions
665 tons/day



- Point
- O&G (permitted & unpermitted)
- Area
- Non-Road Mobile
- On-Road Mobile

Colorado (Statewide)
2011 - Anthropogenic VOC Emissions
1066 tons/day



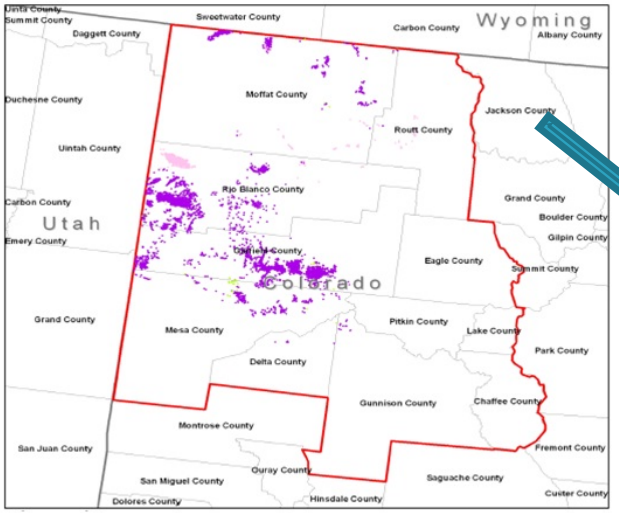

Colorado (Statewide)
2011 O&G Sources
VOC Emissions - 576 tons/day
344.7
60%
116.4
20%
51.4
9%
29.9
5%
11.9
2%
19.4
3%
3.0
1%
O&G - Tanks
O&G Area - Venting/Fugitives
O&G Area - Pneumatics/Pumps
O&G Point - Industrial Processes
O&G Point - Evaporation
O&G Point - Engines
O&G Area - Engines/Rigs

Emission Observations

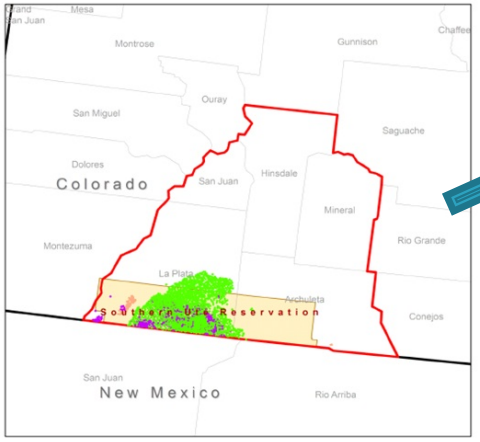
- Oil and Gas operations are a significant contributor to NOx and VOC emissions in Colorado
- Oil and Gas emissions impact multiple areas across the state
- Future development opportunities will likely increase oil and gas air emissions
- Oil and Gas sector is the predominant source of VOC emissions
- Absent additional requirements, oil and gas emissions are expected to increase while VOC emissions from other sectors are expected to decrease
- Oil and Gas sector is one of several contributors to NO_x emissions
  - Significant NO_x emission reductions will occur over the next 5 years due to Regional Haze rules and vehicle fleet turnover

Major O&G Basins in Colorado

Piceance Basin

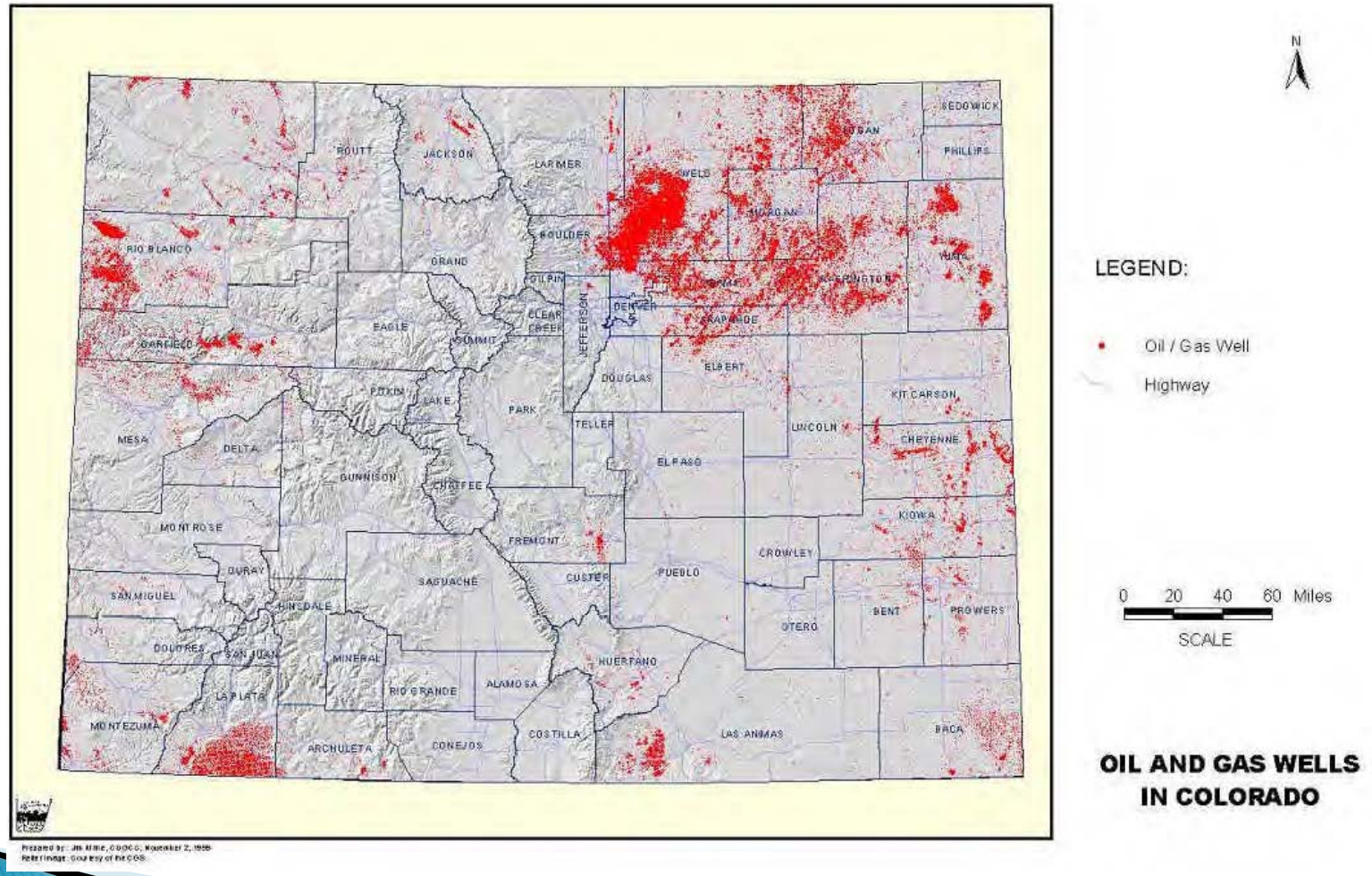


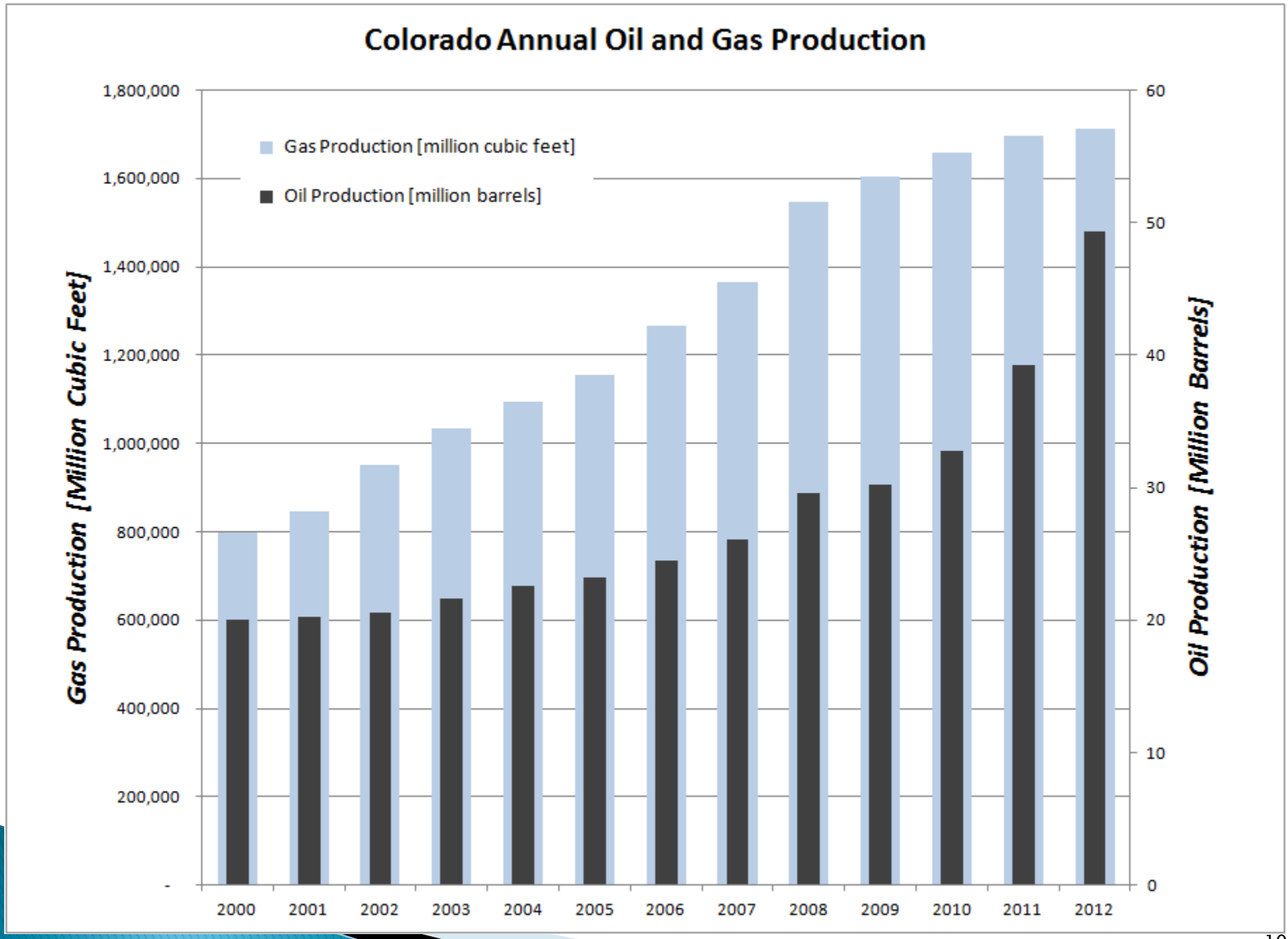
Northern San Juan Basin



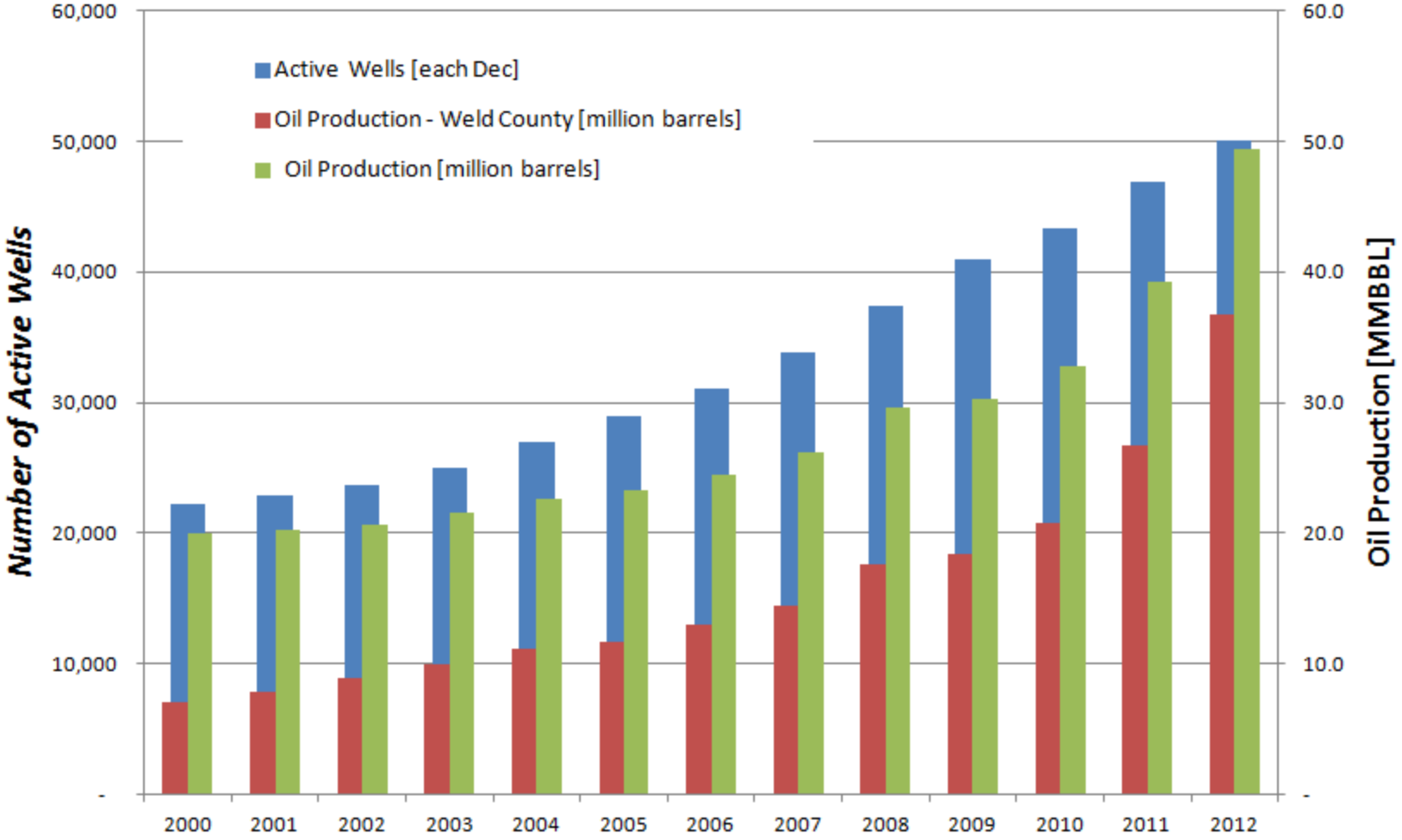
D-J Basin

Colorado has over 51,000 active O&G wells




Colorado Annual Oil and Gas Production
Gas Production [million cubic feet]
Oil Production [million barrels]
Gas Production [Million Cubic Feet]
Oil Production [Million Barrels]
1,800,000
1,600,000
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
-
60
50
40
30
20
10
0
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012

Colorado Annual Oil Production and Number of Active Wells



O&G Regulatory Background

- 2004 Early Action Compact (EAC) Rulemaking
  - Reduced VOC and NOx emissions from Oil and Gas Sector in the Denver Metro/North Front Range (DMA/NFR)
- 2006 EAC Rulemaking
  - Update to 2004 rules and adoption of new rules with statewide applicability
- 2008 OAP Rulemaking
  - Ozone Action Plan to address non-compliance with Ozone NAAQS in DMA/NFR
  - Increase system-wide controls on condensate tanks in DMA/NFR NAA
  - Statewide VOC controls on condensate tanks over 20 tpy and NOx controls on natural gas fired engines

O&G Regulatory Background (cont)

- 2012 partial adoption of NSPS OOOO
  - Partial adoption reflected concerns about permitting burdens that would occur with full adoption
  - In connection with partial adoption the Air Quality Control Commission (AQCC) directed the Division to consider full adoption of NSPS OOOO, as well as other improvements to Colorado's oil and gas emission regulations.

Proposed Revisions

- Revisions to reporting and permitting
  - Colorado Regulation Number 3
- NSPS OOOO full adoption
  - Colorado Regulation Number 6, Part A
- Oil and gas emission reduction strategies
  - Colorado Regulation Number 7

Proposed Revisions: Regulation Number 3

- Remove NSPS, NESHAP, MACT "catchall" provisions
  - Reduce minor source permit workload
  - Percent of statewide emissions from eliminated permits
    - VOC=0.005%, NOx=0.07%, SO2=0.0002%, CO=0.05%, PM=0.0004%
- Revise and simplify non-criteria reportable pollutant (NCRP) threshold
- Remove the crude oil storage tank permitting exemptions

Proposed Revisions: Regulation Number 6 – NSPS OOOO

- Partial adoption October 18, 2012
- Proposed full adoption
  - Remove current emission threshold exclusion to include all affected facilities regardless of size
  - Well completion requirements

Proposed Revisions: Regulation Number 7 (part I)

- Expand control requirements for storage tanks
  - Lower statewide control threshold from 20 tons per year to 6 tons per year
  - Include crude oil and produced water storage tanks
  - Require controls during the first 90 days of well production statewide
- Expand auto-igniter requirements on flare control devices statewide

Proposed Revisions: Regulation Number 7 (part II)

- Expand control requirements for glycol dehydrators
  - Lower control threshold from 15 tons per year to 6 tons per year
  - More stringent threshold for facilities near populated areas
- Establish requirements to minimize emissions during well maintenance
  - Require best management practices

Proposed Revisions: Regulation Number 7 (part III)

- Require capture or control of the gas stream at well production facilities
  - New or modified wells need to connect to transmission pipeline or route gas to flare
- Expand pneumatic controller requirements statewide
  - Require replacement of high-bleed devices with low/no bleed devices statewide

Proposed Revisions: Regulation Number 7 (part IV)

- Improve capture of emissions at controlled storage tanks
  - Clarify that controlled tanks must be operated without venting to the atmosphere
  - Establish requirements for Storage Tank Emission Management systems (STEM)
    - Capture performance evaluation
    - Certified design to minimize emissions
    - Extensive instrument-based monitoring
    - Continual improvement expected

Proposed Revisions: Regulation Number 7 (part V)

- Establish LDAR requirements for compressor stations and well production facilities
  - Periodic monitoring using Method 21 or infra-red (IR) cameras
    - Tiered monitoring schedule to focus on the highest emitting facilities and reduce the burdens on smaller facilities
    - Would establish the most comprehensive leak detection program for oil and gas facilities in the nation
  - Repair schedule for identified leaks
  - Recordkeeping and reporting requirements

Proposed Revisions: Regulation Number 7 (part VI)

Proposed Tiers for Leak Inspections		
Facility Type	Uncontrolled Actual VOC Emissions	Inspection Frequency
Compressor Station (based on component fugitive leaks)	≤ 12 tpy	Annually
	>12 tpy to ≤ 50 tpy	Quarterly
	> 50 tpy	Monthly
Well Production Facilities (based on tank battery emissions)	< 6 tpy	One Time + Monthly AVO
	≥ 6 tpy to ≤ 12 tpy	Annually
	>12 tpy to ≤ 50 tpy	Quarterly
	> 50 tpy	Monthly

Regulatory Process

- 2013 Stakeholder Process
  - Division conducted 5 stakeholder meetings from January through May
  - Numerous technical workgroup meetings held over summer and fall
- Collaboration effort between one environmental group and the oil and gas industry with the support of the Governor
  - Environmental Defense Fund, Noble Energy, Encana and Anadarko
- Proposed rulemaking request filed with Air Quality Control Commission on November 21, 2013
  - Rulemaking process with the Commission underway

Regulatory Process (cont)

- Air Quality Control Commission Hearing Scheduled for February 19-22, 23rd?, 2014
- Individuals or groups can provide written comments prior to the Public Hearing
- Hearing will take place at the Aurora Municipal Center, 15151 East Alameda Parkway

Summary of Key Points (part I)

- Expands Colorado's existing program and establishes innovative new strategies that address each of the most significant sources of hydrocarbon emissions from the oil and gas production sector
- Maintains Colorado's leadership role in regulating air emissions from oil and gas production
- Establishes a rigorous set of requirements to ensure responsible development of Colorado's oil and gas resources

Summary of Key Points (part II)

- Wide range of regulatory requirements aimed at reducing volatile organic compound (VOC) and methane emissions from the oil and gas production sector

- Collaborative effort involving the Division, industry, environmental groups and local government stakeholders

Summary of Key Points (part III)

- Significant emission reductions from the Oil and Gas sector
  - Over 93,000 tons per year of VOC reduced
  - About 64,000 tons per year of methane and ethane reduced

- Cost-effective requirements
  - Calculated cost per ton of VOC reduced ranges from $176 to $1,259 per ton
  - Overall cost effectiveness for the entire package is approximately $450 per ton of VOC reduced

Questions

- curtis.taipale@state.co.us

- Stakeholder Process:
- http://www.colorado.gov/cs/Satellite/CDPHE-AP/CBON/1251635574914

- Rulemaking Process:
- http://www.colorado.gov/cs/Satellite/CDPHE-AQCC/CBON/1251647985820

Extra Slides

Regulation Number 3 APEN and Permit Reporting Thresholds

	APEN		Air Permit	
Pollutant	Attainment [tpy]	Non-Attainment [tpy]	Attainment [tpy]	NAA Non-Attainment [tpy]
VOC	2	1	5	2
NOx	2	1	10	5
PM10/PM2.5	2	1	5	1
CO	2	1	10	5
SO2	2	1	10	5