Colorado’s Hydrocarbon Control Rules for the Oil and Gas Sector: Rule Implementation and Lessons Learned

Presentation to the Committee on Gas
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High Level Observations

• Colorado ranks 6\textsuperscript{th} in the U.S. for natural gas production and 7\textsuperscript{th} for crude oil production
  (U.S. Energy Information Administration website - November 2015
  \url{http://www.eia.gov/state/?sid=CO})

• O&G is also a significant source of volatile organic compounds, nitrogen oxides and methane

• These emissions impact multiple areas across the state
Trend in Colorado Methane Emissions by Source Category (MMTCO2e)

(Colorado Greenhouse Gas Inventory - 2014 Update)

Highlights of Colorado’s Oil and Gas Emission Reduction Rules
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 annual 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
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
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
## 2014 Inspection Results (1803 New Facilities Inspected; 4869 Total Inspections)

<table>
<thead>
<tr>
<th>Component type</th>
<th>Number of leaks identified</th>
<th>Number of leaks repaired</th>
<th>Number of leaks on delay of repair list as of Dec. 31</th>
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</thead>
<tbody>
<tr>
<td>Valves</td>
<td>745</td>
<td>680</td>
<td>29</td>
</tr>
<tr>
<td>Connectors</td>
<td>688</td>
<td>602</td>
<td>48</td>
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<tr>
<td>Flanges</td>
<td>86</td>
<td>77</td>
<td>2</td>
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<tr>
<td>Pump seals</td>
<td>16</td>
<td>16</td>
<td>0</td>
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<tr>
<td>Pressure relief devices</td>
<td>171</td>
<td>169</td>
<td>1</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>1,706</strong></td>
<td><strong>1,544</strong></td>
<td><strong>80</strong></td>
</tr>
</tbody>
</table>

### Leaks identified (1706)

- Valves (745)
- Connectors (688)
- Flanges (86)
- Pump seals (16)
- Pressure relief devices (171)

### Leaks repaired (1544)

- Valves (680)
- Connectors (602)
- Flanges (77)
- Pump seals (16)
- Pressure relief devices (169)

### Repairs delayed (80)

- Valves (29)
- Connectors (48)
- Flanges (2)
- Pump seals (0)
- Pressure relief devices (1)
## Comparing EPA’s Proposed Rules to Colorado Regulations

<table>
<thead>
<tr>
<th>Equipment/process</th>
<th>NSPS OOOO</th>
<th>NSPS OOOOa</th>
<th>CTG</th>
<th>Colorado</th>
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<tbody>
<tr>
<td></td>
<td>VOC</td>
<td>VOC and methane</td>
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<td>HC</td>
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<td>Gas well completions</td>
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<tr>
<td>Oil well completions</td>
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<td>Centrifugal compressors</td>
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<td>♦</td>
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<tr>
<td>Reciprocating compressors</td>
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<td>Pneumatic controllers</td>
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<td>Pneumatic pumps</td>
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<td>LDAR – natural gas processing plants</td>
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<td>LDAR – well sites</td>
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<tr>
<td>LDAR – compressor stations</td>
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<td></td>
<td>♦</td>
<td>♦</td>
</tr>
</tbody>
</table>
Where Can Colorado’s Materials be Found?

- Website links to the rules and supporting materials
  

  https://www.colorado.gov/pacific/cdphe/emissions-requirements-oil-and-gas-industry
Lessons Learned So Far

- Older facilities have more problems

- Payback for eliminating high-bleed pneumatics is a few months - $$$ for the companies and royalty owners coupled with fewer emissions

- Companies are consolidating their equipment to single pads and in some cases are going tankless

- Centralized processing of liquids is growing - reduces opportunities for emissions

- Pressures are being stepped down at production facilities; lower pressure = fewer emissions

- Companies have preventative maintenance on the mind - a greater awareness means more attention to facilities and equipment

- Merging federal and state regulations is mandatory for company compliance and agency oversight