Colorado as Oil and Gas Producer

• 150-year history of production
• 50,254 active wells as of February 2013
• ~80% of wells are drilled with surface use agreements in place with landowners

Colorado as Outdoor Destination

• 55 mountains over 14,000 feet
• 42 State Parks, 4 National Parks, 41 Wilderness areas
• 12,000,000 skier visits
• Over 1 million fishing licenses and 650,000 hunting licenses sold annually
INCREASES IN DRILLING PERMITS

Between 1996 and 2008, Colorado saw 750% increase in drilling permit applications.

<table>
<thead>
<tr>
<th>Year</th>
<th>Drilling Permit Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>1,002</td>
</tr>
<tr>
<td>2004</td>
<td>2,915</td>
</tr>
<tr>
<td>2007</td>
<td>6,368</td>
</tr>
<tr>
<td>2008</td>
<td>8,027</td>
</tr>
</tbody>
</table>
COGCC MISSION

PROMOTE RESPONSIBLE AND BALANCED DEVELOPMENT OF COLORADO’S OIL & GAS RESOURCES

• Ensure that:

  – Exploration and production of oil and gas resources are conducted efficiently.
  
  – Mineral owners’ rights are protected.
  
  – Oil and gas production is conducted in a manner consistent with protection of public health, safety, and welfare, including the environment & wildlife resources.
COLORADO OIL AND GAS DRILLING PERMITS BY COUNTY - 2012

- **Weld County (1826)**: 48%
- **Garfield County (1046)**: 28%
- **Rio Blanco County (117)**: 3%
- **Mesa County (150)**: 4%
- **La Plata County (71)**: 2%
- **All Others (565)**: 15%
Well Construction & Hydraulic Fracturing
LIFESPAN OF A WELL

#1 SITE LEASING
Leases for oil and gas drilling usually run 3-10 years. It can be several years after land is leased before any drilling starts.

Can be several years

#2 WELL IS DRILLED
Depending on depth and type of well, drilling can take from 2 to 30 days.

Can take from 2 to 30 days

#3 HYDRAULIC FRACTURING/COMPLETION
Usually immediately follows drilling and casing of a well. Fracturing takes most of a day for each stage, so time will depend on stages. A 20-stage frac could take a few days to three weeks.

#4 INTERIM RECLAMATION
This reduces the size of the well pad. It is to occur within six months after well completion, or within three months if the land is used for crops.

3 to 6 months

#5 FINAL RECLAMATION
When a well is plugged, which may occur immediately after drilling or decades later, final reclamation must be completed within one year; three months if the land is used for crops.

#6 RELEASE FROM BOND
The COGCC will release the financial assurance liability from a well when the vegetation has recovered to eighty percent (80%) of the predisturbance coverage. This revegetation may take several years depending on the areas soil type, and the annual precipitation.

May take several years
Wellbore Construction:  
**Horizontal Well**

- COGCC Rule 317 – protecting aquifers
  - Concrete and steel casing are cemented in place & to the surface

- Natural gas bearing formation – separated by more than a mile of solid rock, with concrete isolation across zones.

- Drill with clear water to set Surface Casing
  - Add bentonite clay and pH control agent to help thicken bentonite (improve yield)

- More time & $$$ to drill, equip, and stimulate

- Hydraulic fracturing is similar to vertical well....just larger volumes because more formation is exposed to wellbore.
HYDRAULIC FRACTURING: BASICS

• Hydraulic fracturing dates to the 1940s. Used in Weld County, Colorado since 1980s.

• It is not only used for oil and gas, it can also be used to enhance groundwater production.

• Fracturing enhances resource recovery, and unlocks oil and gas from formations once considered off-limits for significant development.

• Today, > 90% of oil and gas wells in Colorado are hydraulically fractured.
HYDRAULIC FRACTURING: OVERSIGHT

• COGCC requires cement bond logs and pressure monitoring to ensure integrity of well and cement work during hydraulic fracturing.

• As of April 1, 2012, operators must disclose all fracturing ingredients and concentrations to FracFocus.org and file paperwork to certify proprietary claims.

• As of May 1, 2013, operators must take groundwater samples in vicinity of well.
Groundwater Protection During Drilling and Hydraulic Fracturing
PROTECTING WATER

• Ensure surface casing is set at least 50 feet below the deepest water well or aquifers.

• Ensure production casing and cementing isolate all production zones and create a seal to protect aquifers.

• Rules require setbacks and additional steps when drilling near streams used for public drinking water sources.
GROUNDWATER SAMPLING

• Beginning May 1, 2013 operators have been required to take one pre-drilling and two post-drilling samples at up to 4 water well or spring locations within ½ mile of pad.

• Only four other states require any sampling, and only CO and WY require post-drilling water sampling.

• Samples will be collected and analyzed by a third-party and results will be provided to the COGCC.

• Data will be public through COGCC website.
WATER DEMAND AND SOURCES

• Hydraulic fracturing accounts for less than 1/10 of 1% of Colorado’s annual water use.

• The amount of water used for hydraulic fracturing in Colorado is comparable to that used in snowmaking.

• Operators can get water from various sources but must adhere to state water law when obtaining and using it.

• 60% of water for HF jobs is typically recycled.
INSPECTIONS AND COMPLAINTS

• COGCC conducted 12,239 field inspections in 2011.

• Inspections can address pre-drilling site review, cementing, fracturing, production, or reclamation.

• COGCC inspects all complaints within 48 hours.

• Where complaint concerns water, COGCC collects water/gas samples, compares to regional water quality.

• If complaint verified, operator must mitigate impacts and remediate soil and water to meet standards.
Wildlife and Habitat Protection
COLORADO HABITAT STEWARDSHIP ACT

• HB 07-1298 passed unanimously during Governor Bill Ritter’s first legislative session, signed on May 29, 2007.

• Directed COGCC to balance oil and gas development with wildlife conservation.

• Required to minimize adverse impacts, by:
  • Avoiding adverse impacts
  • Minimize extent and severity of unavoidable impacts
  • Mitigate effects of remaining impacts
ELEMENTS OF HB 07-1298

- Consultation with wildlife officials where:
  - Operator seeks variance of wildlife rules
  - Pad proposed in “Sensitive Wildlife Habitat”
  - Mitigate effects of remaining impacts

- Avoidance of “Restricted Surface Occupancy” areas

- Best Management Practices
  - Statewide BMPs
  - BMPs in Sensitive Wildlife Habitat
  - BMPs in SWH where Surface Owner consents
Landscape-Level Planning for Wildlife

• Comprehensive Drilling Plans
  • Pre-permit a number of wells and pad-sites in broad geographic area, for activities up to 6 yrs
  • Voluntary, operator-initiated

• Wildlife Mitigation Plans
  • Operator seeks variance of wildlife rules
  • Pad proposed in “Sensitive Wildlife Habitat”
  • Mitigate effects of remaining impacts

• Geographic Area Plans
Questions?

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