Session III: Regulation: Finding clarity in uncertain times
The Agency was established by the Oklahoma Constitution at statehood (1907)

3 Commissioners, elected statewide, head the agency

About 450 employees, 2 main offices, 4 field offices

The Oklahoma Corporation Commission (OCC) has regulatory powers over:

- Transportation
- Oil and gas
- Petroleum storage tanks
- Public utilities
OKLAHOMA CORPORATION COMMISSION

Jurisdiction

- 8 Electric utility companies
- 8 Gas utility companies
- 367 Telephone companies
- 10 Water companies
- 25 Cotton gins
- 3,000 Oil and gas well operators
- 249 Natural gas pipeline operators and 32 hazardous liquid pipeline operators operating over 40,000 miles of pipeline
- 24 Railroads with over 4,100 public at-grade crossings
- 7,473 For-hire and private motor carriers authorized to operate in intrastate commerce
- 12,150 Petroleum storage tanks currently in use
- 1,743 Owners of 2,925 active retail fueling stations
OKLAHOMA OIL AND GAS INDUSTRY

• Active wells:
  64,000  Natural gas
  115,000  Oil
  11,663  Injection/disposal
  190,663  Total active wells

• ~350,000 plugged and abandoned wells
• ~500,000 wells drilled in Oklahoma history
• ~3,062 active operators of oil and gas wells (5/2017)
• ~41,000 miles of gathering/transmission pipelines
• ~257 pipeline operators
Approved Intent to Drill Applications
(1945 - 2016)

Calendar Year

Intents

25,000
22,500
20,000
17,500
15,000
12,500
10,000
7,500
5,000
2,500
0

09/22/2017
Intents to Drill: 2008 – 2017 Comparison

![Graph showing the comparison of intents to drill from 2008 to 2017. The graph displays monthly data with lines representing each year from 2008 to 2017. The x-axis represents the months from January to December, and the y-axis represents the number of intents. The data shows fluctuations throughout the years.](image-url)
Statewide OCC Well Completions
All OCC/IHS Wells 01/01/11-05/31/17

09/22/2017
Horizontal Well Completions
January 2011 through April 2017

Horizontal Well Formations
- CLEVELAND
- MISSISSIPIAN
- WOODFORD
- CHEROKEE, DES MOINES, GRANITE WASH
- MARMATON
- OTHER FORMATION
Brief History of Spacing and Horizontal Development

1990-2000  Coalbed methane horizontal wells – laterals typically less than 4,000’

2000-     Granite Wash, Cleveland horizontal wells – portions of western Oklahoma

2000-2001 Tests in Woodford vertical wells

2005-     Woodford Shale horizontals wells

2010 *    Set backs for Woodford Shale in 15 counties
           (≤ 330’ from East-West and ≤ 165’ from North-South)
           Mississippian horizontals in northern portions of Oklahoma

* Most significant rule changes in 20 years
Brief History of Spacing and Horizontal Development (cont.)

2011  Multi-unit horizontal wells in shale reservoirs 165:5-7-6.2 (Shale Reservoir Development Act) 52 O.S. 87.8 allows both cross-unit drilling & unitization

2013 – 2014  OCC has allowed designation of a portion of the Mississippi (Meramec) and a portion of the Springer (Goddard) interval in some limited areas as a shale reservoir

2014  Marmaton added as “targeted reservoir” for Texas and Beaver Counties (now removed)

2017  Oklahoma Energy Jobs Act allows for spacing up to 1,280 acres and development of multi-unit wells in conventional reservoirs
Oil and Gas Basic Applications

VERTICAL WELL SPACING

SET BACK DISTANCES

- 640 acre: 1,320 feet
- 320 acre (SU or LD): 660 feet
- 160 acre: 660 feet
- 80 acre (SU or LD): 330 feet
- 40 acre: 330 feet

Diagram showing set back distances for different well spacing configurations.
Oil and Gas Basic Applications

HORIZONTAL WELL SPACING

SET BACK DISTANCES
Standard (S) or Non-Standard (NS)

(Conventional)
- 1280 acre: 660 feet
- 640 acre: 660 feet
- 320 acre: 660 feet

(Un-conventional)
- 1280 acre: 330 feet
- 640 acre: 330 feet
- 320 acre: 330 feet

Special Field Rules - Woodford Shale
- East/West: 330 feet
- North/South: 165 feet
OAC 165:10-3-28 (b)
“(5) **Completion interval** shall mean, for open hole completions, the interval from the point of entry to the terminus and, for cased and cemented completions, the interval from the first perforations to the last perforations.”
House Bill 1909
Shale Reservoir Development Act

HB 1909 provides two new tools for development of shale reservoirs:

1) **Tool 1** - Allows drilling of horizontal wells in shale reservoirs across existing unit boundaries, with the costs, production and proceeds allocated to each of the affected units.

2) **Tool 2** - Creates a new type of unit for horizontal shale development (a hybrid which incorporates portions of existing legal authority for drilling and spacing units and enhanced recovery units)
   - The new unit hybrid would be comprised of 2 governmental sections (i.e., 1,280 acres), but could be expanded up to 4 governmental sections under certain circumstances.
   - Creation of the new hybrid unit requires approval by 63% of working interest owners and 63% of the royalty owners in the proposed unit. (Analogous to the required approval for existing enhanced recovery units.)

3) To utilize either of these new tools, the applicant is required to submit a proposed plan of development for approval by the OCC and provide notice to all affected owners.
   - Modifies Section 87.1 of Title 52 to clarify the ability to utilize irregular shaped units (e.g., 640-acre unit that is 1/2 mile wide by 2 miles long).
   - Modifies Section 287.1 of Title 52 to clarify that enhanced recovery units are not available for primary production (confirming a recent ruling by the OCC).
   - HB 1909 passed the House on March 17, 2011, by an 87-0 vote and the Senate by a 45-0 vote on April 6, 2011. It was signed by the Governor on April 13, 2011.
Multiunit Horizontal Well

The Act treats the lateral in each section as a separate well.

Example 6-1H(7) Well

Example 6-1H(6) Well

Section 7

Section 6

Shale Reservoir

4,500 feet

4,000 feet

8,500 feet Total Completion Interval

100,000 mcf produced from Example 6-1H

52,941 mcf from Example 6-1H(7) – 100,000 mcf X 4,500/8,500 = 52,941 mcf

47,059 mcf from Example 6-1H(6) – 100,000 mcf X 4,000/8,500 = 47,059 mcf

09/22/2017
CROSS UNIT APPLICATIONS (CUA)
(Through September 6, 2017)

- SRDA (HB1909)  
  First CUA filed: May 31, 2011  
  Total CUA: 2133  
  Operators with filed CUA: 75  
  Counties with CUA:
  - Blaine: 340  
  - Grady: 312  
  - Kingfisher: 271  
  - Hughes: 230  
  - Canadian: 192  
  - Garvin: 126  
  - Stephens: 120  
  - Pittsburgh: 69  
  - Multi-county: 68  
  - McClain: 57  
  - Coal: 56  
  - Payne: 45  
  - Custer: 44  
  - Love: 27  
  - Carter: 21  
  - Dewey: 20  
  - Johnston: 19  
  - Logan: 18  
  - Major: 18  
  - Garfield: 17  
  - Atoka: 9  
  - Woodward: 8  
  - Caddo: 7  
  - Haskell: 5  
  - Grant: 4  
  - Noble: 4  
  - Beaver: 3  
  - Ellis: 3  
  - Marshall: 3  
  - Okfuskee: 2  
  - Bryan: 1

April 13, 2011
May 31, 2011
2133
75

09/22/2017
Oklahoma Energy Jobs Act of 2017 (SB 867)  
(effective August 25, 2017)

• Removes 640 acre limitation on spacing unit size. Gives Oklahoma Corporation Commission (“OCC”) authority to establish spacing units up to 1280 acres.

• **Flexible spacing size** reflective of advancements in technology, drilling economics, and geological and geophysical conditions

• Minimizes surface equipment needs, costs and **reduces surface impact**

• Anticipated to minimize legal and administrative costs, streamline regulatory process and promote efficient use of the State’s resources

• Development of more reservoir types by expanding Shale Reservoir Development Act to conventional reservoirs.
FracFocus 3.0
IT’S ALMOST HERE...

FracFocus is continuing to evolve and expand its performance and versatility by providing more than a dozen enhancements including:

- Expand the public’s ability to search records
- Improve data accuracy
- Provide extraction of data in a “machine readable” format
- Update educational information on chemical use, oil & gas production and potential environmental impacts

These upgrades will be designed to dramatically enhance the site’s functionality for the public, state regulatory agencies and industry users.

Adding more participating companies and reported wells from across the country, FracFocus’ continued success is the result of state and federal government agencies and the oil and natural gas industry to provide public transparency.

FracFocus machine-readable data now available

FracFocus is pleased to announce the release of disclosure data to the public in

Looking for information about a well site near you?

Search for nearby well sites that have been hydraulically fractured to see what chemicals were used in the process.

TOTAL WELL SITES REGISTERED 127781

FAQs

Q. FracFocus is telling me the well I entered is outside the county boundaries?
OKLAHOMA

- Regulated by Oklahoma Corporation Commission
- Approximately 500,000 wells drilled
- **More than 25 years ago,** the Commission established ability to request/require reports and records on hydraulic fracturing/chemical treatment on any well
- Cross references to rules regarding hydraulic fracturing (2010)
- 48 hours advance notice of hydraulic fracturing required to the Conservation Division District Office or field inspector (2013)
- Horizontal wells hydraulically fractured on or after January 1, 2013 and other wells hydraulically fractured **on or after January, 2014** required to be filed with FracFocus Registry (2012)
Approximately 5 acres in surface area

Water treatment of flow back water prior to input into pit

Devon Cana Project
Canadian County, OK
500,000 bbls
5 years/ $1M surety
24/7 security

60 Mil liner
Collapsible, steel reinforced pipe to pump water in and out of pit
Pipe can be easily moved to well site locations.
• **Notice of hydraulic fracturing operations** given at least 5 business days prior to the commencement of hydraulic fracturing operations to operators of producing wells within 1/2 mile of completion interval of subject well which are completed in the same common source of supply. 165:10-3-10(b)(1)

• **Notice of initial commencement of injection** and disposal operations in the Arbuckle formation. 165:10-5-7(b) (Daily volume/pressures – 2014)

• **Concurrent development** - clarifying each unit shall be independently operated and developed, and that the future participation or non-participation of owners in one of the units shall not impact the owner’s rights in the other unit being concurrently developed. 165:5-7-6(j)

• **Well location exception** – Well location and exception to the 300/600 foot distance between wells can be in one application. 165:5-7-9.
2016 OIL & GAS RULE CHANGES
(Effective August 25, 2016)

• **Fee proposals**: OAC 165:5-3-1(b)(1)
  – Transfer of well operatorship (N) – $25 single well
  – Transfer of well operatorship (O) – $250 multiple wells
  – Notification of intent to plug (P) – $100

• **Permit to Drill**: OAC 165:10-3-1(a)(4)
  For a horizontal well, a plat showing location and total depth of each abandoned, plugged, producing or drilling well and dryhole within ¼ mile of the completion interval of the proposed horizontal well
2016 OIL & GAS RULE CHANGES (cont.)
(Effective August 25, 2016)

• **Monitoring and reporting requirements** (Underground Injection Control): OAC 165:10-5-7(4)(c)
  – Daily monitoring of volumes and pressures for wells in designated areas
  – Shutdown or other action (g)
    Process for objection to shutdown or other action includes request for technical conference and resolution of disputes

• **Duration of underground injection well orders or permits** OAC 165:10-5-9(c)
  Suspension or temporary modification based on statute or rule
CHAPTER 10 RULE PROPOSALS
(Effective September 11, 2017)

- **Hydraulic fracturing-diesel**: OAC 165:10-3-10(a) – diesel fuel prohibited as base fluid in hydraulic fracturing operations without approval. Upon approval, operator is required to send written authorization to owner of surface location and to each operator of a producing spacing unit or well within 1/2 mile.

- **Hydraulic Fracturing-impact**: OAC 165:10-3-10(b)(4) – If operator believes there is evidence hydraulic fracturing operations have impacted its well(s), operator can report occurrence in writing to appropriate District Office within 24 hours of discovery.

- **1002A Reports**: OAC 165:10-1-7(b)(6) and 165:10-3-25(a) and (b) – 1002A Completion Reports filed within 60 days

- **Fluid level monitoring**: OAC 165:10-5-6(g) – Procedures established for monitoring required by orders or permits.

- **Land application**: OAC 165:10-7-19, 165:10-7-26 and 165:10-9-2 – equipment used to land apply deleterious substances standardized and prohibition of certain equipment.

- **Pits and commercial wells**: OAC 165:10-9-3 – Notice requirements and procedures established for applications to approve pits in excess of 50,000 barrels at commercial disposal well sites.
EMERGENCY RULES FOR SB 867
(CHAPTERS 5 AND 10)

• SB 867 Effective August 25, 2017
• OAC 165:5-7-6(k) – Affidavit required to confirm lateral length
  • Replaced term “shale” with “targeted” reservoir
• OAC 165:5-7-6(e) – Initial unit well must exceed 10,560 feet for unit > 640 acres
• OAC 165:5-7-7(d) – AFE shall include total footage for proposed well and for multi-unit well must also be shown as allocated
EMERGENCY RULES FOR SB 867
(CHAPTERS 5 AND 10) (cont.)

• **OAC165:10-3-28(b)** – Removes “Associated” CSS, adds “Adjacent” CSS
  • Removes Marmaton CSS, Shale Reservoir
  • Revises “Targeted” reservoir, Terminus

• **OAC 165:10-3-28(e)** – Changes 640 to 1,280 acres and (f) and adds set backs for conventional and unconventional reservoirs
2015, 2016 and 2017 LEGISLATION

2015
HB 2234  Gas seep response fund
SB 808   Wind power generation facilities
SB 809   Political subdivisions cannot regulate oil and gas production in a manner inconsistent with OCC regulations
HB 2177  Extended lateral horizontal well development act (dormant)

2016
HB 2303  Extends well plugging fund to July 1, 2021
HB 2444  Pipeline Safety violations to match PHMSA ($100,000 per day/$1M per series)
HB 3158  Clarifies the emergency authority of the OCC to respond to potentially critical environmental or public safety situations

2017
SB 867   Oklahoma Energy Jobs Act of 2017
OGS Uses about 100 Stations to Locate Oklahoma Earthquakes
Human Activity Can Induce Earthquakes

Fluid Pressure increase from injection

Alteration of regional subsurface stresses

Figure modified from: http://www.earthmagazine.org/article/ground-shaking-research-how-humans-trigger-earthquakes
# Earthquake magnitude & frequency

<table>
<thead>
<tr>
<th>Magnitude</th>
<th>Earthquakes</th>
<th>Energy Equivalents</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Largest recorded earthquakes</td>
<td>&lt;1 Krakatoa eruption</td>
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<tr>
<td></td>
<td>Vast destruction</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Massive loss of life</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Great earthquake</td>
<td>1 World’s largest nuclear test (USSR)</td>
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<tr>
<td></td>
<td>Severe impact</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Large loss of life</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Strong earthquake</td>
<td>18 Mount St Helens eruption</td>
</tr>
<tr>
<td></td>
<td>Damage in $Billions</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Some loss of life</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Moderate earthquake</td>
<td>150 Hiroshima atomic bomb</td>
</tr>
<tr>
<td></td>
<td>Property damage</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Light earthquake</td>
<td>1,500 Average Tornado</td>
</tr>
<tr>
<td></td>
<td>Some property damage</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Minor earthquake</td>
<td>10,000 Average M 3.5 Tornado</td>
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<tr>
<td></td>
<td>Felt by humans</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Injection induced earthquakes</td>
<td>100,000 Typical M 5.6</td>
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<tr>
<td></td>
<td>Typical &lt;3.5 (Highest recorded = 5.6)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Frequency of Occurrence</td>
<td></td>
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<tr>
<td></td>
<td>Avg. per year (est.)</td>
<td></td>
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<tr>
<td>2</td>
<td>Magnitude 2.0 and below = typical micro-seismic events</td>
<td></td>
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</tbody>
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Enhance Recovery
Low Risk
Disposal
Low Risk

FRESH WATER ZONE
PRODUCING ZONE
INJECTION FORMATION
CONFINING LAYER

SALTWATER

OIL AND SALT WATER

GRANITE
Disposal into basement

High Risk
UIC Program

• In Oklahoma there are:
  4,626 Disposal Wells
  7,037 EOR Wells

• Of the 4,626 disposal wells there are 1045 wells that are authorized for disposal into the Arbuckle formation.
SEISMICITY ISSUES – ACTIONS

- Oil and Gas Division continues to address “basement” issues
  - Broad agreement among researchers that injecting into the basement carries high potential risk of seismicity
- March/July of 2015 plans apply to about 560 Arbuckle disposal wells (plug backs)
- August 2015 – 38% volume reduction within the “Logan County Trend Area”
- October 2015 plan for Cushing Area (shut-in and volume reductions)
- November 2015 plan for Medford Area (volume reductions)
- November 2015 and January 2016 plans for Fairview Area (shut-in and volume reductions)
SEISMICITY ISSUES – ACTIONS (cont.)

- **December 2015** plan for **Bryon/Cherokee and Medford Areas** (shut-in and volume reductions)
- **January 2016** plan for **Edmond Area** (volume reductions)
- **February 2016** plan for **Western Oklahoma** (volume reductions)
- **March 2016** plan for **Central Oklahoma** (volume reductions)
- **August 2016** plan for **Luther/Wellston Area** (shut-in and volume reductions)
- **September 2016** plan for **Pawnee Area** (shut-in)
- **September 2016** (updated) plan for **Pawnee Area** (shut-in and volume reductions)
- **November 2016** plan for **Pawnee Area** (shut-in and volume reductions)
SEISMICITY ISSUES – ACTIONS (cont.)

- **November 2016** plan for Cushing Area (shut-in and volume reductions)
- **December 20, 2016** Statewide: Directive regarding seismicity that may be linked to hydraulic fracturing operations
- **February 24, 2017** Area of Interest (AOI) – Directive restricting future volume disposal rates**

**Permitted volume within the AOI prior to any directives was 26 million bpd.

Permitted (i.e., potential) volume is now 3 million bpd.

Actual volume is about 1.6 million bpd.
SEISMICITY ISSUES – LOGAN COUNTY TREND AREA

Hypod (EQ) 2014 to 2015
Logan Trend Line Buffer (10K)
Arbuckle Wells in Buffer

- Hypod: Logan Trend Line
- Arbuckle Wells in Buffer
- Logan Trend Line Buffer_8_3_2015

09/22/2017
FAIRVIEW TREND AREA

Fairview - Cherokee 8 mile
All EQ Last 30 Days 1/11/2016

prefmag

- -0.20000 - 1.00000

- 1.00001 - 2.00000

- 2.00001 - 3.00000

- 3.00001 - 3.50000

- 3.50001 - 3.99999

- 4.00000 - 4.50000

- 4.50001 - 5.61000

ArbuckleWells_FairviewCherokeeTrend
Fairview_Cherokee_8MileA
Pawnee EQ HypoDD
2016 to 9-20-2016
Subject Wells
PAWNEE_5.8_AILOCC
<all other values>
OCC Pawnee 5.8
Reduction
51
<all other values>
EPA Osage County
Reduction
51
2016_HypoDD
magnitude
-0.200000 - 1.000000
1.000000 - 2.000000
2.000000 - 3.000000
3.000000 - 3.500000
3.500000 - 3.999999
4.000000 - 4.500000
4.500000 - 9.000000
Pawnee_Fault_Sub
Pawnee_Main_Fault
Pawnee_1024x1024_09072016
Osage_Pawnee_
Reduction_Buff
Original_Pawnee

Date: 10/3/2016
Area Of Interest
Central and Western
Area of Volume Reduction
EQ 1882 to 2017
Effective as of 2/22/2017

AOI
WESTERN
CENTRAL
COMPLETE 1882 to 2017

Map Date: 2/22/2017

Miles
Oklahoma M3.0+ earthquakes and Arbuckle injection
Session III: Regulation: Finding clarity in uncertain times