Legal Developments Relating to Induced Seismicity

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Locations of Induced Seismicity Linked to Oil & Gas Activity Include

- Arkansas
- Colorado
- Kansas
- New Mexico
- Ohio
- Oklahoma
- Texas
- Alberta
- British Columbia
- United Kingdom
Legal Developments

• Litigation

• Challenges based on environmental impact statements required under the National Environmental Policy Act

• Regulations
Litigation
Litigation

Where?

• Oklahoma
• Texas
• Arkansas

Results?

• No judgments on merits yet
• Some cases have settled
Causes of Action Asserted

• Negligence
• Strict liability
• Private nuisance
• Trespass
• Public nuisance
• Emotional distress (outrage)
Proving Causation

• Proving causation may be a challenge.
• Expert testimony will be needed.
• Was earthquake induced or natural?
• If induced, which injection disposal well is responsible?

➤ Perhaps multiple injection wells responsible for raising pressure within a large area.
Environmental Impact Statements
EIS Challenges & NEPA

• Project proponents should anticipate potential permit challenges.

• They and agencies should consider including seismicity risks as part of environmental impact statement analyses.

• Some enviro groups starting to raise induced seismicity in NEPA challenges.
Regulations
Relevant Laws in U.S.

• Historically, no federal or state laws whose main purpose was to control induced seismicity

• Underground injection control ("UIC") regulations exist under federal Safe Drinking Water Act

• UIC regs designed to protect underground sources of drinking water ("USDW")
Federal vs. State Role in UIC Regulation

• Safe Drinking Water Act (SDWA) includes underground injection control (UIC) regulations

• EPA will delegate “primacy” for UIC regulation to a state if state UIC regulations meet federal standards

• Most, but not all, oil and gas states have primacy

• EPA administers federal SDWA UIC regulations in states without primacy
Regulatory Activity

• At least 8 states (Ark., Cal., Col., Ill., Kan., Ohio, Okla., Tex.)

• Alberta and British Columbia

• Evaluation of seismic risk during permitting

• Restrictions or prohibitions on disposal in certain areas, depths

• “Traffic light” systems
Minimizing Seismicity Risk

• Evaluate site for past seismic activity and presence of critically stressed faults

• After beginning operations, use “traffic light” system
Traffic Light System

**Green light** – few or no restrictions if no indication of significant risk or seismic events

**Yellow light** – increased monitoring and possible reduction in injection rates if seismic events above certain magnitude occur

**Red light** – stop injections if seismic events of significant magnitude occur
Seismicity Regulations
Aimed at Hydraulic Fracturing

• California

• Oklahoma
Regulations Relating to Hydraulic Fracturing
California

• Operators of wells being hydraulically fractured must monitor California Integrated Seismic Network during fracturing and for ten days afterward. 14 Cal. Code Regs. § 1785.1

• Must halt fracturing if there is a seismic event 2.7 $M_L$ or larger within radius of 5 times “ADSA.” 14 Cal. Code Regs. § 1785.1

• ADSA = max. length of fractured area. 14 Cal. Code Regs. § 1781.
Oklahoma

Corporation Comm’ has adopted seismicity protocol that requires operators engaged in hydraulic fracturing in certain areas to

• Develop a seismicity response plan prior to fracking

• Use seismic array to monitor seismic activity in a 5 km area around wellbore

• Implement seismicity response plan if it detects earthquake greater than 2.0 $M_L$
Regulations Relating to Injection Disposal
Seismicity Regulations
Aimed at Disposal Wells

Regulations require one or more of

- Shutdown of certain wells or reduction in injection rates
- Permit applications to include info. on seismicity and/or faults
- Monitoring of seismic activity
- Increased monitoring and reporting of injection pressures/rates
Generally prohibits Class II disposal wells within

- “Moratorium Zone” defined in regulation
- 1 mile of a “Regional Fault”
- 5 miles of a known Moratorium Zone Deep Fault
- 5 miles of an existing Class II well disposing in a zone below the Fayetteville Shale
- ½ mile of an existing Class II well disposing in a zone above the Fayetteville Shale
Arkansas

• In addition, the regulation generally requires operators of Class II disposal wells to report injection volumes and pressures to the Arkansas Oil & Gas Commission on a daily basis.

Ark. Admin. Code 178.001-H-1(s)(5)(b)
Colorado

• Colorado now includes a seismicity review in its evaluation of Class II UIC permit applications for disposal wells

• In some cases, applicants for permits required to use geologic data to
  
  ➢ define seismicity potential
  ➢ show proximity to faults
Illinois

• Statute requires state agency to develop “traffic light” regulations for Class II injection disposal wells. 225 Ill. Comp. Stat. 732/1-96.
“Yellow Light Alert” issued to all UIC Class II disposal wells within 6 miles of epicenter of seismic event between 2.0 and 4.0 in magnitude.

Must reduce injection rates if receive 3 Yellow Light Alerts within 1 year.

Must halt operations if receive 5 Yellow Light Alerts within 1 year.
62 Ill. Admin. Code 240.796

• “Red Light Alert” issued to all UIC Class II disposal wells within 10 miles of epicenter of seismic event ≥ 4.0 in magnitude.

• Must halt operations if receive Red Light Alert and well is within 6 miles of epicenter.
Kansas

• In 2014, Governor Brownback creates task force to develop “State Action Plan” regarding seismicity.

• Final draft of State Action Plan issued in January 2015.

• March 2015—Kansas Corporation Comm’n issues order that appears to be based in part on State Action Plan.
Kansas—the 2015 Order

• The 2015 order reduced maximum allow injection rates into Arbuckle formation in certain areas.

• Required operators of injection disposal wells in certain area to measure daily injection volumes and pressures and to report those to the Corporation Commission each month.
Kansas—the 2016 Order

• In 2016, the Corporation Commission issued an order further reducing the maximum allowable injection rates in certain areas.
Ohio

Ohio Admin. Code 1501:9-3-06 provides that, as part of permit application for a Class II disposal well, the Div. of Oil & Gas Resources may require:

• testing and geological investigation to assist in identifying faults in area near proposed well

• submittal of plan for monitoring seismicity
Ohio

Ohio Admin. Code 1501:9-3-07 requires

- Daily monitoring of injection volumes and pressures
- Compilation of average and maximum injection volumes and pressures monthly, with annual reporting
Oklahoma

• Corporation Comm’n now considers seismicity issues when reviewing Class II disposal well permit applications.

• In some areas, more frequent recordation of injection pressure and volumes is required.

• Comm’n has focused on Class II wells that inject into or below Arbuckle formation (which lies just above basement rock).

• Comm’n has ordered numerous injection disposal wells to shutdown or reduce their injection rates.
New Class II disposal well permit applications must include seismic information from USGS database for a 100 square mile area (5.64 mile radius) around proposed well.

Texas Railroad Commission staff may require permit applicants to submit information not normally required, such as logs, geological cross sections, pressure front calculations, structure maps.
• RRC staff has authority to modify, suspend, or terminate permit if data shows well is likely inducing seismicity.

• Comm’n may require operators to report injection volumes/pressure more often than annual (the usual requirement).
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