

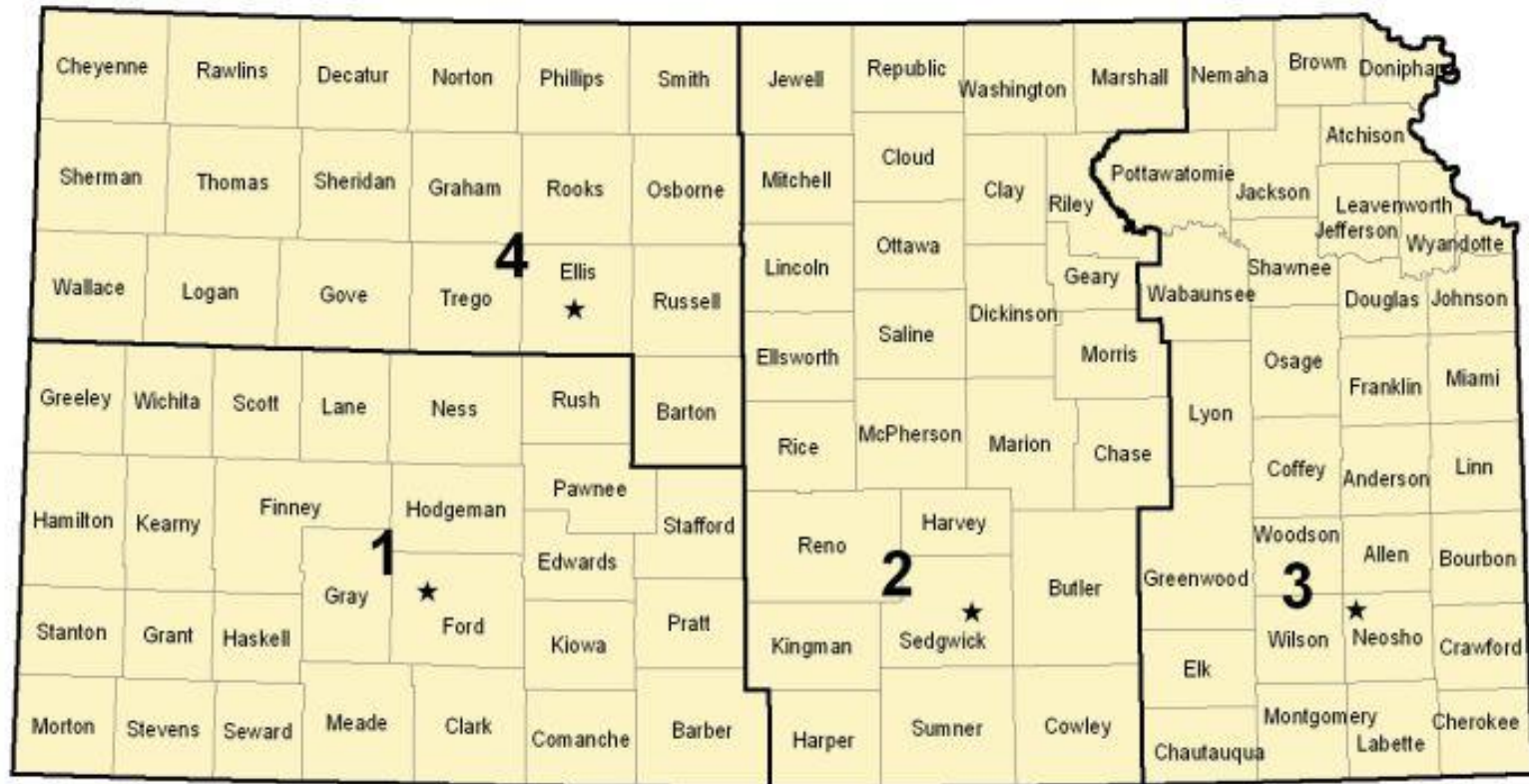
Informational Briefing on the Potential for Induced Seismicity in Kansas

House Energy and Environment Committee January 26, 2015

Ryan A. Hoffman, Director, Conservation Division



Potential for Induced Seismicity



The Conservation Division is responsible for regulating oil and gas activities statewide with its central office located in Wichita and four district offices in Dodge City, Wichita, Chanute, and Hays.

Potential for Induced Seismicity

- Underground Injection Control (UIC) is a department of the Conservation Division responsible for administration of the injection wells in Kansas.
 - KCC has primacy of the Class II UIC program from the EPA under the Safe Drinking Water Act of 1974.
 - Kansas has the third largest Class II program in the nation with more than 16,000 injection wells.

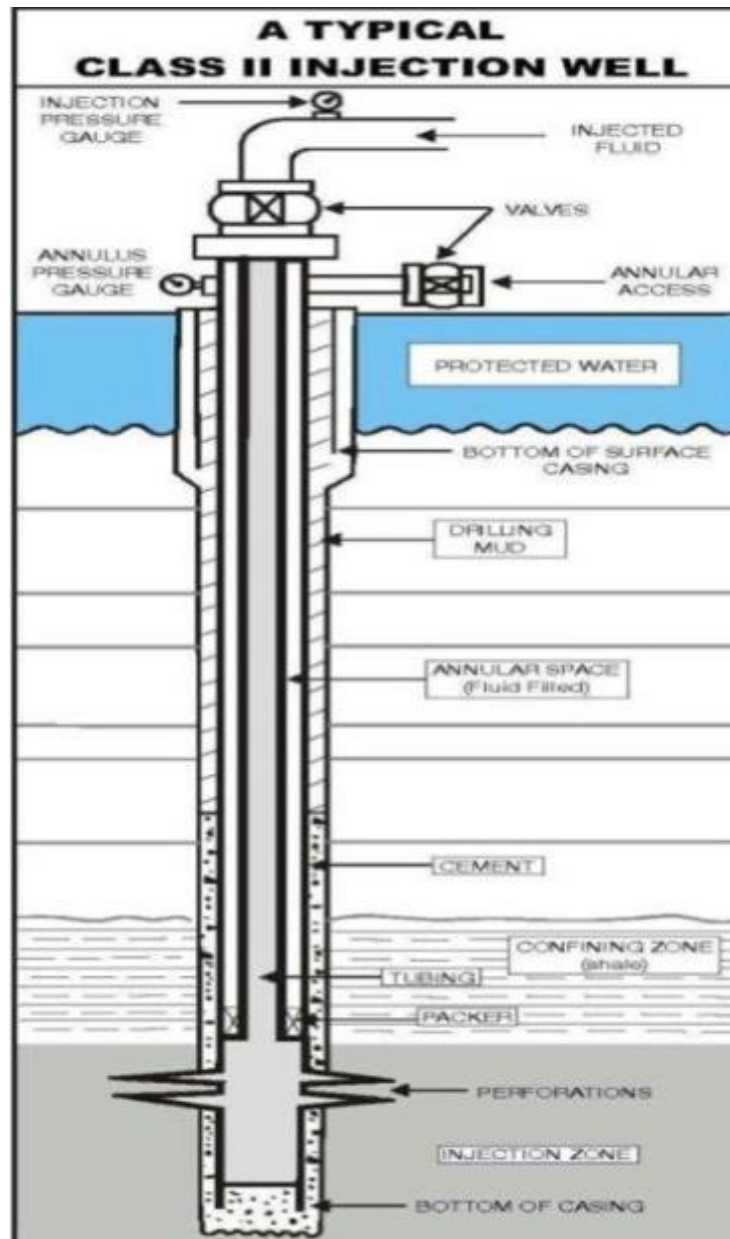


Illustration of Class II
Injection Well
(rrc.state.tx)

Potential for Induced Seismicity

- There are two types of Class II injection wells:
 - Enhanced Oil Recovery (EOR) – approximately 11,000 total
 - Produced water is separated from the oil and injected back into the productive formation to improve or maintain oil production.
 - Saltwater Disposal (SWD) – approximately 5,000 total
 - Produced water is separated from the oil and disposed of into a formation generally below the productive zone.

Potential for Induced Seismicity

- Harper County Injection Wells by year:
 - 2009: 44
 - 2010: 44
 - 2011: 50
 - 2012: 64
 - 2013: 71
 - 2014: 18 permit applications received.
- Harper County injected volumes by year (BW):
 - 2009: 11,326,728
 - 2010: 9,671,655
 - 2011: 12,022,921
 - 2012: 31,284,057
 - 2013: 51,827,349
 - 2014*:

*K.A.R. 82-3-409 requires annual injection reports be filed by March 1, 2015 for the calendar year 2014.

Potential for Induced Seismicity

- Sumner County Injection Wells by year:
 - 2009: 55
 - 2010: 53
 - 2011: 59
 - 2012: 61
 - 2013: 79
 - 2014: 17 permit applications received.
- Sumner County injected volumes by year (BW):
 - 2009: 5,707,277
 - 2010: 9,763,265
 - 2011: 6,715,897
 - 2012: 8,676,329
 - 2013: 10,722,360
 - 2014*:

*K.A.R. 82-3-409 requires annual injection reports be filed by March 1, 2015 for the calendar year 2014.

Potential for Induced Seismicity

- Harper County wells drilled by year:
 - 2010: 70
 - 2011: 41
 - 2012: 109
 - 2013: 105
 - 2014: 121
- Harper County horizontal wells by year:
 - 2010: 0
 - 2011: 9
 - 2012: 62
 - 2013: 85
 - 2014: 108

Potential for Induced Seismicity

- Sumner County wells drilled by year:
 - 2010: 18
 - 2011: 21
 - 2012: 24
 - 2013: 43
 - 2014: 50
- Sumner County horizontal wells by year:
 - 2010: 0
 - 2011: 2
 - 2012: 5
 - 2013: 18
 - 2014: 27

Potential for Induced Seismicity

- Harper County Oil Production by year (bbls):
 - 2010: 361,448
 - 2011: 506,877
 - 2012: 873,056
 - 2013: 1,733,075
 - 2014*: 1,856,317
- Harper County Gas Production by year (mcf):
 - 2010: 4,985,638
 - 2011: 5,140,093
 - 2012: 7,355,776
 - 2013: 13,499,300
 - 2014*: 16,288,199

*Production data is current through September 2014.

Potential for Induced Seismicity

- Sumner County Oil
Production by year (bbls):
 - 2010: 414,853
 - 2011: 391,203
 - 2012: 393,703
 - 2013: 494,679
 - 2014*: 530,919
- Sumner County Gas
Production by year (mcf):
 - 2010: 710,031
 - 2011: 690,351
 - 2012: 678,749
 - 2013: 727,222
 - 2014*: 834,908

*Production data is current through September 2014.

Potential for Induced Seismicity

What does the KCC do when an event triggers on the SAS?

- We determine if any disposal wells are within a six mile radius of event. If there are wells within the six mile radius, all well information such as depth, vintage, permit conditions, and the most recent injection reports are sent to KGS.
 - If the disposal well permit has a condition for daily recording of volume and pressure, that information is also requested and forwarded to KGS.
 - This condition has been added to large volume permits in 2014.
- We also look for spud calls within a three mile radius of the event within the last two months. This information can be used to determine if any well completion activities could have taken place.
 - This step is performed as an abundance of caution and to date, none of the SAS reviews have uncovered any correlation to well drilling or completion and the seismic events.

Potential for Induced Seismicity

What actions are available if evidence exists a disposal well is responsible for a seismic event?

- K.A.R. 82-3-408 allows permits to be revoked for just cause.
- 40 CFR 144.40(a) allows a state to terminate a permit for 3 causes...if the permitted activity endangers human health.
 - Right to revoke or terminate includes the right to modify.
- Any objecting party would have the right to a hearing after the revocation or modification.
- K.S.A. § 77-536 (KAPA) allows emergency proceedings and an Order to Protect Public Health and Safety. Notice to affected parties required and a hearing should be held as soon as feasible.
- K.S.A. § 55-162 also allows for emergency proceedings followed by proper KAPA procedures.

Ryan A. Hoffman

Director, Conservation Division

266 N. Main, Suite 220
Wichita, Kansas 67202-1513

