What Others are Saying

"In Kansas, there's no evidence that the earthquakes are being caused by fracking." *Rex Buchanan, former Kansas Geological Survey Interim Director*

"It is important for the public to recognize that the risks posed by injection of wastewater are extremely low. In addition, the risks can be minimized further through proper study and planning prior to injection, careful monitoring in areas where there is a possibility that seismicity might be triggered, and operators and regulators taking a proactive response if triggered seismicity was to occur." *Mark D. Zoback, Professor of Geophysics Stanford University*

"Most injection wells are not associated with felt earthquakes." *United States Geological Survey List of Myths and Misconceptions Regarding Induced Seismicity*

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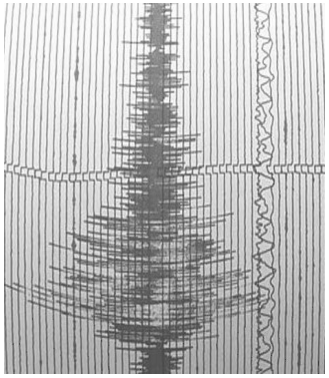
Seismic Activity in Kansas



Kansas Seismicity Overview and Context

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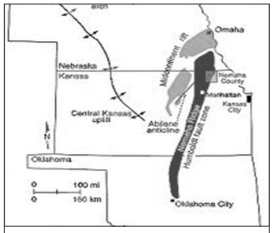
The Kansas Independent Oil & Gas Association (KIOGA) and its member companies continue to follow seismic events in Kansas and Oklahoma. Like many Kansas citizens, we too are concerned by these events and are proactively enhancing our knowledge to gain a better understanding of why the events are occurring.

Kansas is an area that has been seismically active over millennia. The majority of these events are located on or near a prominent geologic feature known as the Nemaha Ridge, which extends north/south across much of Kansas and Oklahoma. This feature is responsible for many of Kansas' and Oklahoma's oil fields. Numerous ancestral faults are associated with the Nemaha Ridge uplift over geological time. Seismic activity varies over time in an unpredictable manner. Sudden increases/decreases in activity with no obvious external causes have been documented around the world. Because oil and gas are produced in 90 of Kansas' 105 counties, any seismic activity within the state is likely to occur near oil and gas production.



Nemaha Ridge

What is causing seismic activity in Kansas?

More often than not, activists and media continue to get it wrong when it comes to the issue of induced seismicity. Contrary to what you might have read or heard, hydraulic fracturing is not the cause of earthquakes, or induced seismicity in general. Expert after expert agree with this fact.

While hydraulic fracturing is an unlikely source of discernible seismic activity, considerable attention is being focused on Class I and Class II Injection wells. Given the long history of successful underground injection operations across the nation, the likelihood that induced seismic events will occur in properly permitted and operated injection well is very small. Too often, the mere presence of nearby oil, gas, or injection wells results in allegations that they are the source.

While hydraulic fracturing treatments do produce wastewater (flowback water) that is disposed of in injection wells, the vast majority of wastewater disposal is produced water from day-to-day production. Less than 5% of wastewater is from hydraulic fracturing operations.

In early 2015, the Kansas Corporation Commission (KCC) ordered oil companies in 5 areas of Harper and Sumner counties to reduce the amount of brine fluid they injected. In 2016, the KCC expanded the area subject to injection restrictions to include parts of Kingman, Sedgwick, and Barber counties. Data from the Kansas Geological Survey (KGS) indicates felt earthquakes in Kansas have decreased significantly in the last several years. This is good news and shows that Kansas regulatory policies are working.

Industry Response

Kansas oil and gas companies have taken the issue of induced seismicity very seriously. Industry has actively worked with state regulators since 2014 helping to secure funds for additional seismic monitoring stations and sharing proprietary data with scientists and regulators in efforts to reduce induced seismicity. Efforts have also been made to ensure the assumptions and results of numerous studies are correct, scientifically-based, and limited in scope to the site-specific features of the areas in question. The efforts are producing results. The latest data shows seismic activity in Kansas has declined **81%** since 2015 with an average annual decline of **26.7%** from 2015-2020. Felt seismic activity (M>2.7) in Kansas has declined **82%** 2017 with an average annual decline in felt seismic activity of **36.3%** from 2017-2020.

Although scientists agree wastewater injection from day-to-day oil & gas production can under very specific circumstances cause induced seismicity, it is important to understand that the risk is very low. A comprehensive study based on data from the USGS and peer-reviewed studies, found that less than one-half of one percent (0.48%) of injection wells in Kansas have been linked to induced seismicity. The USGS states in its list of Myths and Misconceptions About Induced Earthquakes (usgs.gov) that **"Most injection wells are not associated with felt earthquakes."**