

## All Shook Up?

There's a big shake up going on in the state of Kansas. The kind of thing that could have gotten Elvis all shook up. Activist groups are hyping the threat of earthquakes caused by oil and natural gas operations. Should people in the sunflower state be worried? The answer is yes, but not because of earthquakes. If the activists can get irrational fear to take hold, Kansas could take a big hit to its economy.

The controversy in Kansas is focused on injection wells. When oil and gas companies pump oil out of the earth—at a depth much deeper than groundwater—they typically produce a lot of water from the oil reservoir as well. So after they separate the hydrocarbons, the water is returned to the earth in a deeper formation than where the oil was produced through what is called a disposal well. Again, all of this happens far below ground water.

Years ago geologists discovered that in a small number of formations pushing too much produced water back into the ground too quickly can cause what they call “induced seismicity”. Nearby Oklahoma saw a significant rise in low level earthquakes corresponding to an increase in water disposal volumes and pressure, but that threat has since been greatly reduced.

Now activists are hard at work trying to convince people in Kansas that injection wells might shake up their world. It's a ridiculous claim that falls apart once you see some actual data.

The geology in Kansas is significantly different than Oklahoma's with fault lines that are shorter, making the state less vulnerable to perceptible seismic activity.

The word “earthquake” doesn't really make sense in this situation. When you say earthquake, people think of the ground shaking violently and buildings being damaged. The vast majority of seismic events we're talking about here are imperceptible movements...better defined as tremors... that are only noticed by sensitive geologic monitors.

In 2017 the U.S. Geological Survey reported 122 tremors in Kansas above 2.0 on the Richter scale. 93 were in the magnitude 2 to 2.9 range that are rarely even noticeable. The rest...29 tremors... were in the magnitude 3 to 3.9 category. Only a small percentage of people even noticed these either. Quakes have to be significantly stronger than these magnitudes before you see even minor damage to modern buildings. And remember, the Richter scale is logarithmic, meaning a 4.0 quake is ten times more powerful than a 3.0 and 100 times stronger than a 2.0

The Kansas Geological Survey reports that thousands of tiny tremors have occurred in the past several years, but the vast majority of them were below the

imperceptible 2.0 level. As a point of reference, Southern California typically has 10,000 earthquakes a year, many more of which can be felt.

There is general agreement among the industry and regulators that produced water injection in disposal wells has contributed to an increase in low-level tremors in a concentrated area in Oklahoma and near the Kansas-Oklahoma border. Just how much is a question of debate, but what is clear is that all sides are paying attention, collecting data and making adjustments so this mostly non-problem is becoming even less of a concern. The EPA and the Kansas Corporation Commission conclude Class II disposal wells are safe.

But none of that matters to professional activist groups that want to stop energy production wherever they can, and THAT is the real problem. The Kansas economy is slowing coming back since oil prices crashed in 2016. If activists are successful in creating irrational fear among enough Kansans... that could lead skittish politicians to make bad decisions that would unnecessarily damage one of the state's most important industries. That's a shake up nobody should want.

For the Clear Energy Alliance, I'm Mark Mathis. Power On.

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