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Permian Basin was hit by a record number of earthquakes last year. What does that mean for drilling?



Paul Takahashi, Staff writer

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Latshaw drilling rig #19 operates near a wind farm in Stanton, Texas, on Monday, Dec. 27, 2021. According to the United States Geological Survey, at approximately 7:55 p.m. on Monday, the Texas Seismological Network detected a 4.5 magnitude earthquake 11 miles north of Stanton. (Eli Hartman/Odessa American via AP)
Eli Hartman, MBI / Associated Press

Oil companies operating in West Texas – a thousand miles from the nation’s most active fault lines – are becoming more concerned about earthquakes, which reached a record number last year and are growing ever stronger.

The Permian Basin, the 86,000-square-mile oil-rich land stretching from Lubbock to Marfa and San Angelo to Carlsbad, N.M., has no major geographic faults like those that slice the West Coast. But the nation’s most prolific oil field and the cities and towns within it were shaken by almost 2,000 earthquakes last year, a record number for the area.

Earthquakes measuring stronger than 2 on the Richter scale – enough to crack walls and foundations – have become an almost daily nuisance. The number of temblors has risen 74 percent from 2020 and are eight times more than in 2017, according to data from the University of Texas at Austin’s TexNet Seismic Monitoring and analyzed by Norwegian energy research firm Rystad.

The rising number of quakes is putting pressure on shale oil companies, which face the prospect of more restrictions on saltwater waste that could force them to move larger amounts of it to more distant disposal wells or recycling facilities, or to even halt drilling operations in some areas.

“Over the last two years, there’s just been an explosion in the frequency of these earthquakes,” said Ryan Hassler, Rystad’s senior shale analyst. “In recent weeks and months, the concern has been not only the frequency of seismic events rising at incredible rates, but it’s the size of these earthquakes. We’re starting to see more and more 3.5 to 4.0 earthquakes. People in Midland and Odessa are starting to feel these earthquakes almost on a daily basis.”

Seismologists attribute the increasing frequency and intensity of the region’s earthquakes to the oil industry’s routine practice of injecting saltwater – a byproduct of oil production – into deep disposal wells. A decade of the injections

earthquake-prone areas.

“It’s a little early to tell what (the impact of saltwater disposal restrictions) might be,” said Todd Staples, president of the Texas Oil and Gas Association, the state’s largest oil trade group. “I haven’t heard from operators of any specific impacts yet, but I think those are the types of operational questions that companies are looking at how to manage during this time.”



(Spencer Platt/Getty Images/TNS)
Spencer Platt, Staff / TNS

Bigger, stronger

Scientists fear the size and strength of these earthquakes will continue to rise in the coming years as Permian crude production increases after the pandemic-driven oil bust slashed operations amid a historic drop in demand for petroleum products.

For each of the roughly 4 million barrels of crude pumped daily from the ground in West Texas, at least three barrels of extremely salty water are produced.

The vast majority of this water is injected into 2,300 active disposal wells across Texas. Last year, 11.5 billion barrels of saltwater were pumped into these wells across the country, and that figure is expected to rise to 13.4 billion barrels by 2026, according to Rystad.

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The Texas Railroad Commission, the state's oil and gas regulator that has been



closely monitor seismic activity in the area,” spokesman Andrew Keese said. “The agency will take any actions, as necessary.”

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Oil trade groups and companies said they support the Railroad Commission’s restrictions on disposal capacity in the most seismically active areas of the West Texas oil patch.

Ben Shepperd, president of the Permian Basin Petroleum Association, said he appreciates that the Railroad Commission isn’t “painting the whole area with a

The rise in Permian earthquakes also is spurring significant interest and investment in water recycling facilities, which could help divert saltwater from disposal wells and mitigate seismic activity.

The recycled water can be reused to in oil production to fracture shale to produce crude and natural gas, instead of freshwater from local aquifers in a drought-prone state like Texas. There are some proposals to use recycled water to irrigate crops fed to livestock.

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percent more than the 1.5 billion barrels in 2020. Still, only about 5 percent of the saltwater produced in U.S. shale fields was recycled last year, Rystad found.

A cottage industry of water treatment providers is cropping up in the Permian Basin in response to this growing demand for recycling facilities.

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