America's Biggest Oil Field Is Turning Into a Pressure Cooker

Drillers' injection of wastewater is creating mayhem across the Permian Basin, raising concern about the future of fossil-fuel production there

By Benoît Morenne and Andrew Mollica

Dec. 25, 2025 11:00 pm ET

Listen to this article

Length 10 minutes

Shale drillers have turned the biggest oil field in the U.S. into a pressure cooker that is literally bursting at the seams.

Producers in the Permian Basin of West Texas and New Mexico extract roughly half of the U.S.'s crude. They also produce copious amounts of toxic, salty water, which they pump back into the ground. Now, some of the reservoirs that collect the fluids are overflowing—and the producers keep injecting more.

It is creating a huge mess.

A buildup in pressure across the region is propelling wastewater up ancient wellbores, birthing geysers that can cost millions of dollars to clean up. Companies are wrestling with drilling hazards that make it more costly to operate and complaining that the marinade is creeping into their oil-and-gas reservoirs. Communities friendly to oil and gas are growing worried about injection.

"It's one of the many things that keep me up at night," said Greg Perrin, general manager of the groundwater-conservation district in Reeves County, Texas, where companies are injecting some of the largest volumes of wastewater.

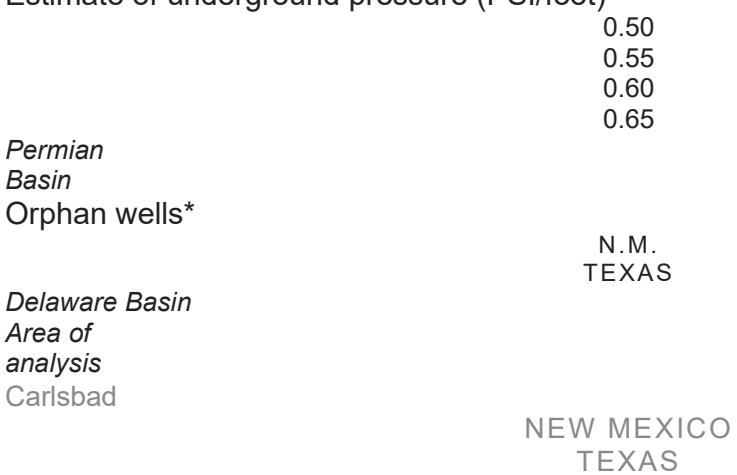
Swaths of the Permian appear to be on the verge of geological malfunction. Pressure in the injection reservoirs in a prime portion of the basin runs as high as 0.7 pound per square inch per foot, according to a Wall Street Journal analysis of data from researchers at the University of Texas at Austin's Bureau of Economic Geology.

When pressure exceeds 0.5 pound per square inch per foot, the liquid—if it finds a pathway—can flow to the surface and pose a risk to underground sources of drinking water, Texas regulators have said in industry presentations.

The fracas above ground is raising questions about how the Permian can sustain red-hot production without causing widespread environmental damage that could leave taxpayers on the hook—and complicate the region's economic plans. The basin is trying to lure data centers with cheap land and energy and has plans to become a hub for burying carbon dioxide captured at industrial plants and sucked out of the air.

“You need to have a stable, locked-down geology that’s going to behave as it’s supposed to,” said Adam Peltz, a director at the Environmental Defense Fund, a nonprofit advocacy group. “Otherwise, you’re going to cause a huge, expensive mess that Texans will pay for for generations.”

The industry is working to clean up its act, but solutions to treat and ditch meaningful volumes of water far from the oil fields remain years away.

<permianwater-pressure-_355px.jpg>


*Inactive, noncompliant wells that have been inactive for a minimum of 12 months and where the responsible operator has been delinquent in reporting for more than 12 months, as of November 2025.
Sources: Jun Ge and Katie Smye, University of Texas at Austin's Bureau of Economic Geology (pressure); Railroad Commission of Texas (orphan wells)

Oil-and-gas executives said solving the wastewater issue is an industry priority.

“The size of the Permian is such that this can’t be a limiting factor for the success of the whole basin,” said Scott Neal, director of growth and portfolio for Chevron’s shale and tight business.

Unintended consequences

In the Delaware portion of the Permian, its most prolific region, drillers crank out between 5 and 6 barrels of water, on average, for every barrel of oil.

For years, they pumped the putrid fluids deep into the ground—and triggered hundreds of earthquakes, some with a magnitude of over 5. They caused little damage in the sparsely populated Permian, but they were felt as far as Dallas, El Paso and San Antonio, where a historic building was damaged.

In 2021, the Railroad Commission of Texas, the agency that oversees the oil-and-gas industry in the state, began cracking down on deep disposal. Companies pivoted to shallow reservoirs, which now

absorb roughly three-quarters of the billions of barrels of water that they inject in the Permian every year. The shift largely cured the tremors but has created unintended consequences.

Saltwater erupted in 2022 from an abandoned well near the unincorporated community of Tubbs Corner, Texas. SARAH STOGNER

Pressure is mounting, and saltwater is being kicked out over vast distances. It is migrating up some of the decaying wells that litter the Permian, forcing companies and regulators to play a protracted—and expensive—game of whack-a-mole.

In 2022, a 100-foot column of saltwater erupted from an abandoned well in Texas' Crane County near the unincorporated community of Tubbs Corner. Chevron, which owned the well, plugged it. But nearly two years later, water started to ooze from a different well in the same area, a sign that bottling up the geyser likely repressurized the subsurface and triggered the new outburst, scientists said.

It took the Railroad Commission about 53 days and roughly $2.5 million to plug that leak. Eventually, the agency quietly shut in the injection wells that it said were likely causing the increase in pressure.

<permianwater-tubbs-maps-_355px.jpg>

Wastewater Whack-a-Mole

Detail

How produced water has wreaked havoc in Tubbs Corner

TEXAS

1053

329

N

1 km
1 mile
Surface deformation velocity
SUBSIDED
EXPANDED
+4 inches a year
–1
+3
–2
+2
–3
+1
–4
Wastewater from oil production was injected into the ground. This water flowed underground to the south through the path of least resistance.

As pressure under the surface increased, the ground started to heave.
Jan. 5, 2021, to Dec. 16, 2021
In January 2022, an old well started to spray wastewater. Its surroundings were blanketed white by the salty fluids.

This blowout relieved the underground pressure, causing the ground to subside.
Dec. 16, 2021, to Jan. 15, 2022
The geyser was capped about two weeks later. The area started to repressurize. A dome-shaped uplift expanded for more than a year.
Jan. 15, 2022, to Nov. 6, 2023
On Dec. 7, 2023, the Railroad Commission was notified that water was leaking through a well about a mile away from the first geyser. It plugged the well on January 29, 2024.
Nov. 6, 2023, to
Jan. 20, 2024
This leak stabilized the pressure build-up, but it appears the area has seen a slight but steady ground uplift in recent months.
Jan. 20, 2024, to Oct. 11, 2025
Sources: SkyGeo (surface deformation velocity); Railroad Commission of Texas (boreholes)
Surface displacement in area around Tubbs Corner blowouts
<permianwater-tubbs-time-series-_355px.jpg>
In area near...
20
inches
1st blowout
2nd blowout
15
2nd blowout*
Plugged in
about 8 weeks
10
5
1st blowout
Plugged in about
2 weeks

0

2021
2022
2023
2024
2025

*Blowout was reported to the Railroad Commission on Dec. 7, 2023.
Source: SkyGeo

The ordeal might not be over. The ground in the area has seen a slight uplift in recent months, a sign that pressure is building up again, scientists said.

Tackling the crisis

Regulators in Texas face a tough balancing act. Oil-and-gas production contributes too much to the state's economy to be curtailed, but letting the situation fester risks turning supportive communities against the industry. Their task is complicated because New Mexico restricts disposal, so most of the Permian's wastewater is injected in Texas.

Researchers at the Bureau of Economic Geology painted a critical picture of the frenzied injection in a preliminary, informal project proposal shared with the Railroad Commission last year, an open-records request filed by The Wall Street Journal revealed. Operators were injecting wastewater with little concern over how it might travel underground or its impact on reservoir pressure, they said.

"This behavior inexorably causes waste, regulatory action that impairs operation and investment, and reduction of the intrinsic value" of the injection resource, they said.

The commission has adopted a more-proactive approach to tackle the issue, industry experts said. Staffers routinely rely on satellite data to track down pressure buildups. Earlier this year, it said it would impose limits on injected volumes.

The Railroad Commission at times has appeared concerned about how the mounting crisis might reflect on it and the industry it regulates. It told the Texas Legislature last year that assembling a team to investigate the issue would help increase public confidence, the Journal's open-records requests revealed. It received $1.3 million to hire the team. It also obtained an additional $100 million to plug leaky oil-and-gas wells.

Increasingly, Permian landowners find themselves dealing with abandoned well bores that come back to life. In May, a well on the Pecos County property of Laura Briggs started spraying saltwater like a fire hydrant. She said it took the Railroad Commission about four months to get it plugged at a cost of about $350,000.

"You're working with broken, rotten pieces of stuff," she said.

Some ranchers worry that wastewater might contaminate sources of groundwater and imperil their operations.

“If it breaks loose in a zone where we’re drawing, say, stock water from, it could put you out of business overnight,” said Brad Gholson, a rancher and the owner of Reeves County Feed & Supply, a livestock feed dealer in Pecos.

Perrin of the groundwater-conservation district said he thinks the Railroad Commission doesn’t have enough boots on the ground to handle the situation. His district is starting a campaign to collect samples at water wells and assess whether quality has changed as a result of injection—an effort he expects to cost up to $200,000.

A commission spokesman said its injection program is designed to protect freshwater.

Uncertain future

The glitchy Permian plumbing is forcing producers to drill through zones of high pressure, fortify their wells with additional strings of casing, and use protective coating against corrosive saltwater. All this means that companies are having to spend more to extract oil and gas.

“Bit by bit, it adds cost, it adds complexity, it adds mechanical challenges,” said Chevron’s Neal. He said the pressure buildup hasn’t caused any material disruption to its operations.

In addition to these headaches, some drillers report that water is migrating into their oil-and-gas reservoirs. Pecos Valley, a Permian operator, earlier this year filed a lawsuit against the water-handling company NGL, saying water it had injected escaped and flooded four oil-and-gas wells. NGL has denied the allegations.

Oil-and-gas fields in South Texas, North Dakota and Appalachia also produce briny water but in much smaller volumes than in the Permian. As this basin matures, wells keep getting wetter.

The industry is testing technologies to evaporate the liquid faster and strip it of salt so it can be reused outside the oil patch. Companies are crafting plans to release scrubbed water into rivers. Texas lawmakers have passed legislation to help advance these solutions.

But researchers said these alternatives won’t alleviate the near-term need for injection. Katie Smye, a researcher at the Bureau of Economic Geology, said there are areas of the Permian where injecting wastewater can be done safely and the industry must put more work into delineating these zones.

“If we say no to deep injection due to earthquakes, and we say no to shallow injection due to surface flows, and we’re not taking into account the science of areas where injection is proceeding safely,” she said, “then what?”

Write to Benoît Morenne at benoit.morenne@wsj.com and Andrew Mollica at andrew.mollica@wsj.com