



Image credit: Schuyler Wright



Pressure Finds A Path: *The Costly Migration of Injection Fluids Through Aging Wellbores Creates Texas-Sized Messes*

Julie Range
Orphaned Well Policy Manager
Commission Shift

September 2nd, 2026
Texas Groundwater Summit

Commission Shift Mission



Commission Shift is transforming the state oil and gas agency by working with and for the people of Texas to create pathways for shared governance.

Agenda

- Oil & Gas Activity Induced Catastrophes
- Orphaned, Inactive & Legacy Wells
- Produced Water Problem
 - Deep Injection
 - Shallow Injection
- Solutions



O&G Activity Induced Catastrophes

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Zombie Wells

Leaking Wells, Failing Wells, Purges, Blowouts

Unplugged or poorly plugged wells that leak pollutants (oil, produced water, methane, or hydrogen sulfide) into the environment (air, surface, drinking water).

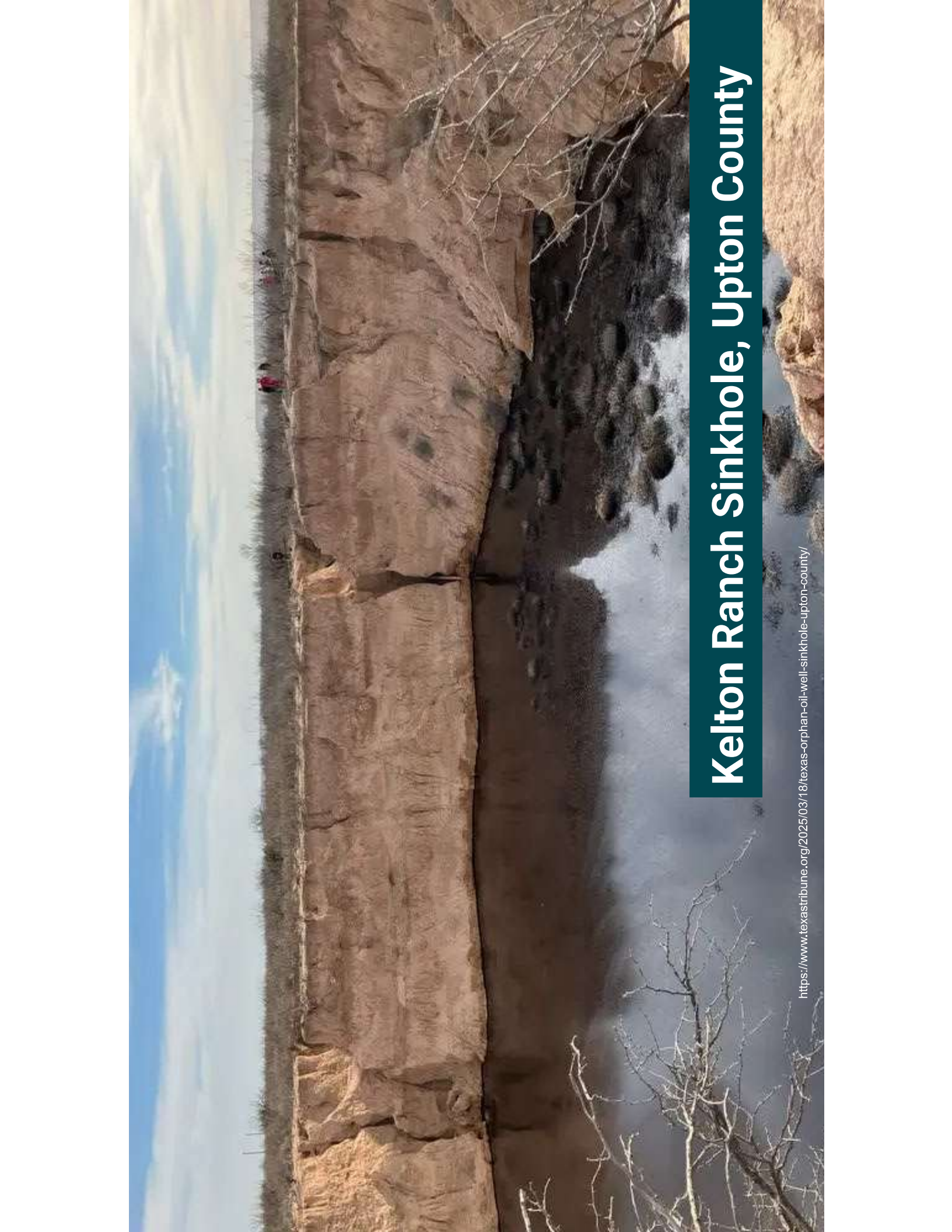


Boehmer Lake, Pecos County

Photo by ABC News, 2024

ABC News, 2024:
<https://abcnews.go.com/US/abandoned-oil-gas-wells-us-bring-fears-leak/story?id=116764814>





Kelton Ranch Sinkhole, Upton County

<https://www.texastribune.org/2025/03/18/texas-orphan-oil-well-sinkhole-upton-county/>

Crane County Geyser

Published in Texas Monthly, 01/12/2022



Reeves County (Toyah) Geyser

Justin Hammel, DeSmog October 4, 2024

<https://www.desmog.com/2024/10/04/texas-railroad-commission-kinder-morgan-oil-well-blowout-erupts-in-west-texas-permian-basin/>





Risks to Health

- Pollutants to air, groundwater, bays & estuaries
 - Chlorides, petroleum products, benzene, arsenic, Hydrogen sulfide, volatile organic compounds
- Health risks
 - Asthma, respiratory irritation, headaches, heart issues, cancer, reproductive harms

<https://e360.yale.edu/features/the-oil-well-next-door-californias-silent-health-hazard>

<https://insidedclimatenews.org/news/29082022/oil-well-health-california/>

<https://abcnews.go.com/US/abandoned-oil-gas-wells-us-bring-fears-leak/story?id=116764814>



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Orphaned, Inactive & Legacy Well Problem Overview

Types of Abandoned Wells

Inactive wells

- Have an active operator; not “orphaned.”
- No production or permitted activity for greater than 12 months

Orphaned wells

- Inactive greater than 12 months
- Operator permit to operate (P-5) delinquent greater than 12 months

Legacy Wells

- Wells drilled prior to modern regulations and environmental standards
- Limited documentation; exact location often unknown
- Higher risk of failure



**Legacy Well on Bank of Pecos River
Pecos County, TX**

Photo credit: Alyssa Wallace

A pie chart illustrating the distribution of age groups among 1000 respondents. The chart is divided into five segments, each labeled with an age group and its corresponding percentage. The segments are: 5-10 years old (28%, light blue), 10-15 years old (12%, green), 15-20 years old (7%, orange), 20+ years old (16%, dark blue), and <5 years old (37%, purple). The segments are arranged in a clockwise order starting from the top right.

Age Group	Percentage
5-10 years old	28%
10-15 years old	12%
15-20 years old	7%
20+ years old	16%
<5 years old	37%

-

Data: Railroad Commission of Texas.

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Orphaned Wells

- 12,200 as of July 2026
- 9,300 as of July 2025
 - =>31% increase
- RRC plugs 1,300 wells/yr

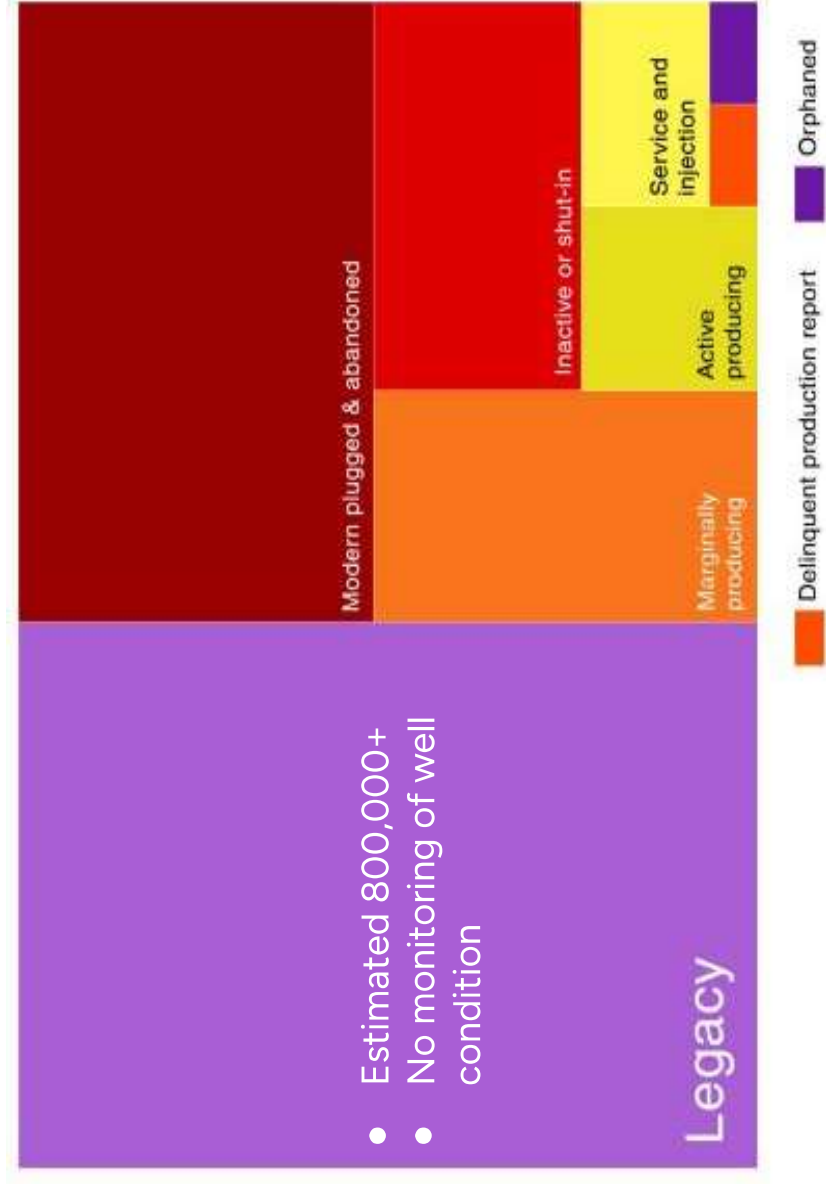
**See maps of orphaned
& inactive wells by
County**



- Orphan Wells with Delinquent P-5 Greater Than 12 Months. Jan. 2026
- Oilfield Cleanup Program Annual Reports 2018 - 2022.

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Relative size of Texas well populations as of August 31, 2021



Eliminating Orphan Wells and Sites in Texas, 2022
<https://commissionshift.org/wp-content/uploads/2023/02/Eliminating-Orphan-Wells-and-Sites-in-Texas-CommissionShift.pdf>

Why so many unplugged wells?

- Operators can delay well plugging pretty much indefinitely*.

Must plug within one year after drilling or operations cease
([SWR 14](#))

OR

Get a plugging extension ([Form W-3X](#))

- Bonds are supposed to help the RRC pay for cleanup - but they haven't been updated since 1991.

* SB 1150 limits extensions to 15 years, unless you request and qualify for new exceptions.

(Rulemaking for SB 1150 imminent!)

Asset retirement obligations insufficient



What's the cost?

Estimated costs based on Railroad Commission information:

\$492 Million to plug
~12,300 **orphaned** wells

\$16.4 Billion to plug
120,000 **inactive** wells

- Data: Railroad Commission of Texas.
- Oilfield Cleanup Program Annual Reports.
 - Annual Drilling, Completion and Plugging Summaries. 2014 - 2023.
 - Railroad Commission of Texas Legislative Appropriations Request 2026 - 2027. Avg. \$40,000 per well
 - Railroad Commission of Texas. January 10, 2025. Inactive Well Aging Report.

Source:
Railroad Commission of Texas Legislative Appropriations Request 2026 - 2027. Avg. \$40,000 per well
Railroad Commission of Texas. January 10, 2025. Inactive Well Aging Report.

<https://www.texasmonthly.com/news-politics/abandoned-oil-wells-coast-bays/>

Who's Paying to Plug? Operators or Taxpayers?

Produced Water Problem Overview

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What to do with all the produced water?

On average 3-10 barrels produced water per barrel oil

- O&G reuse
 - Fracking
 - Enhanced oil recovery
- Treat for alternate uses
 - Cooling for industrial uses, data centers, power generation
 - Agriculture / Irrigation
 - *Current SB 1145 TCEQ rulemaking will set treatment standards*
 - Discharge to stream
 - *TCEQ permit approvals imminent*
- Injection in Class II Disposal Well
 - Deep
 - Shallow

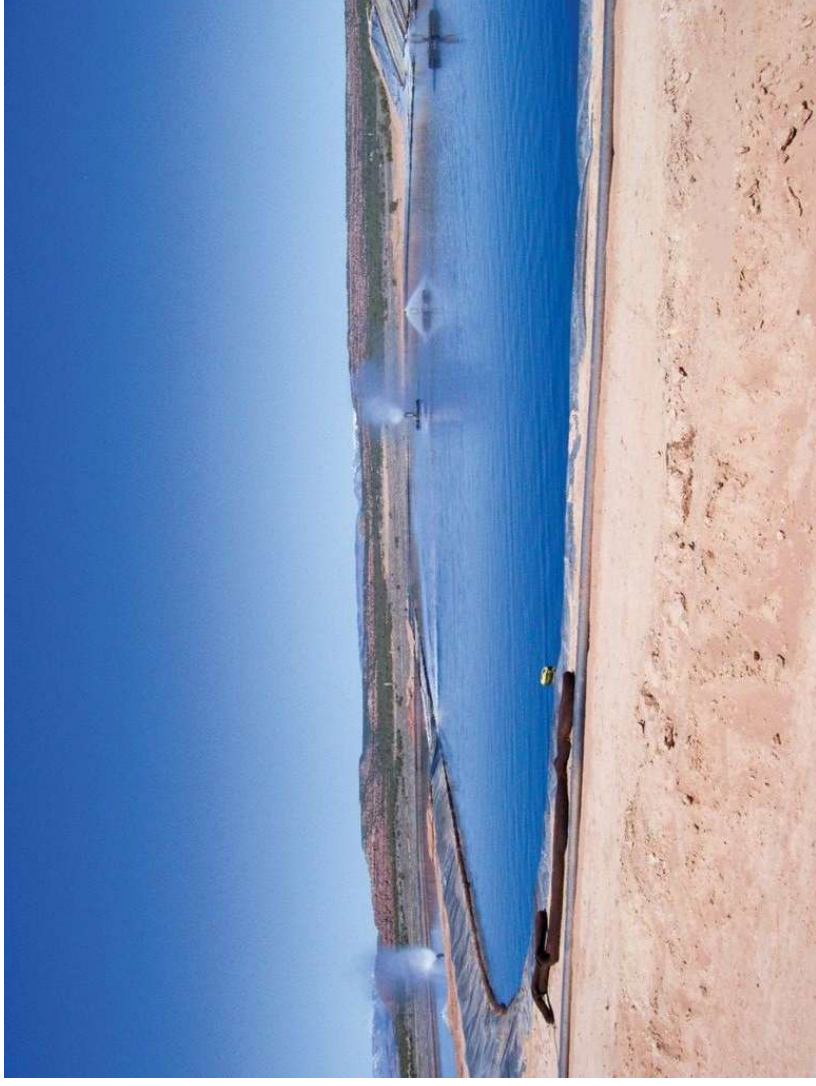
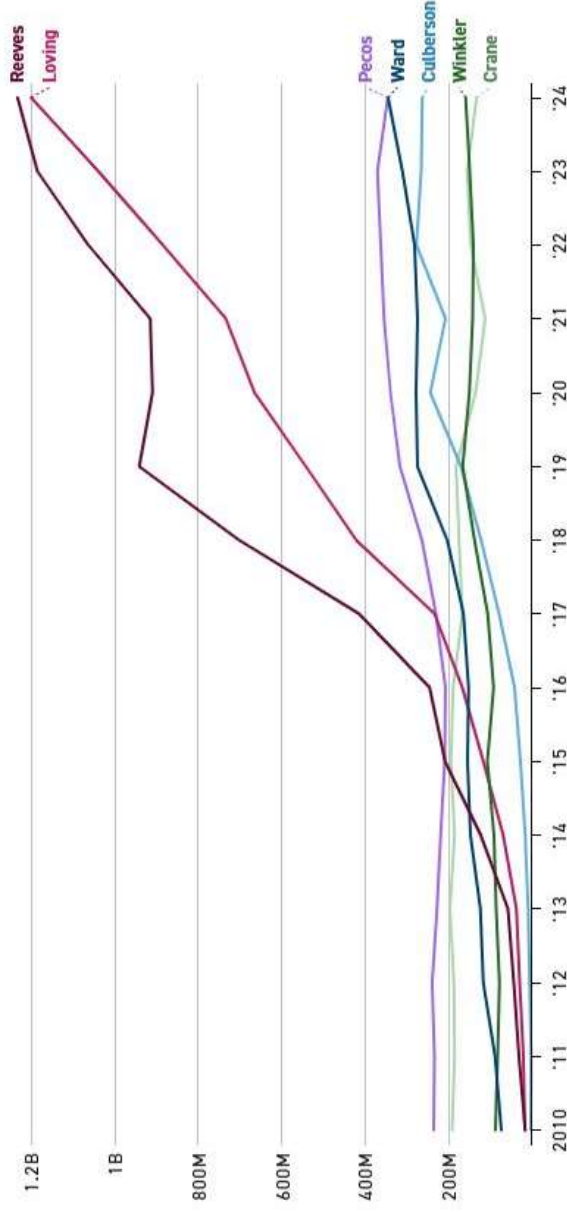


Photo by Richard Powell, Utah Division of Oil, Gas & Mining.
<https://geology.utah.gov/energy-minerals/hydrocarbons/produced-water/>

Water, water everywhere and not a drop to drink

Produced water injected in 7 Delaware Basin counties increased by nearly 500 percent from 2010 to 2024

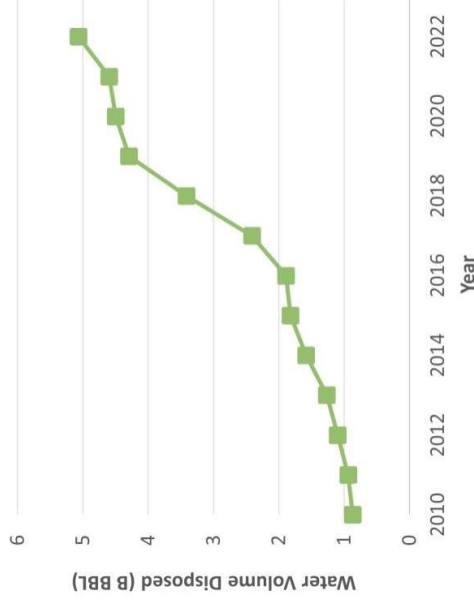
Annual barrels of produced water injected beneath part of the Permian Basin, by county



Source: The Texas Railroad Commission
Shelby Webb/POLITICO

<https://www.eenews.net/articles/fracking-waste-threatens-permian-basin-water-supplies-imperils-oil-industry-plans/>

*Enverus Drilling info / Iyabode Eytayo, Marshall
Watson & Oladoyin



Permian Basin oilfield produced water disposal volume by year.
Source: B3 Insight

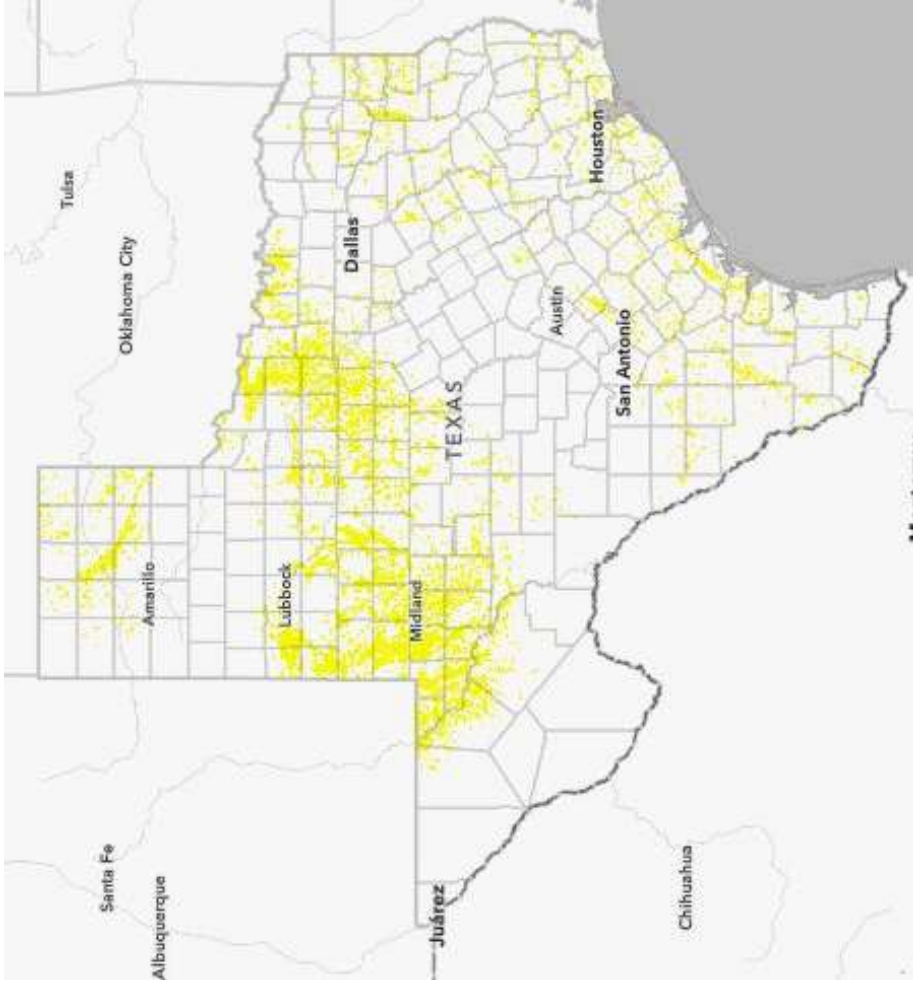
- Total 135 Billion barrels injected statewide in salt water disposal wells (1945-2021)*



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Injection wells across Texas

- 30,000 injection disposal wells (as of Jan 2026)
- Deep injection linked to earthquakes
- Shallow injection linked to leaking wells



Location of injection/disposal/service wells
(as of Feb 2026)

Deep injection



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Earthquake Trends in Texas

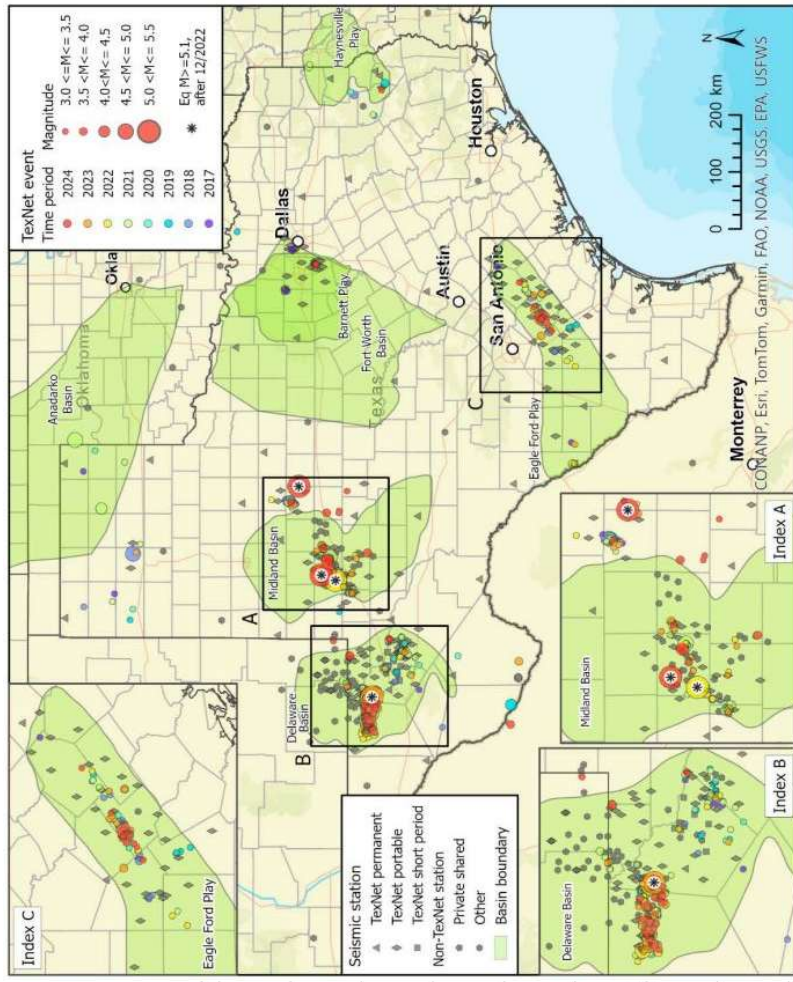
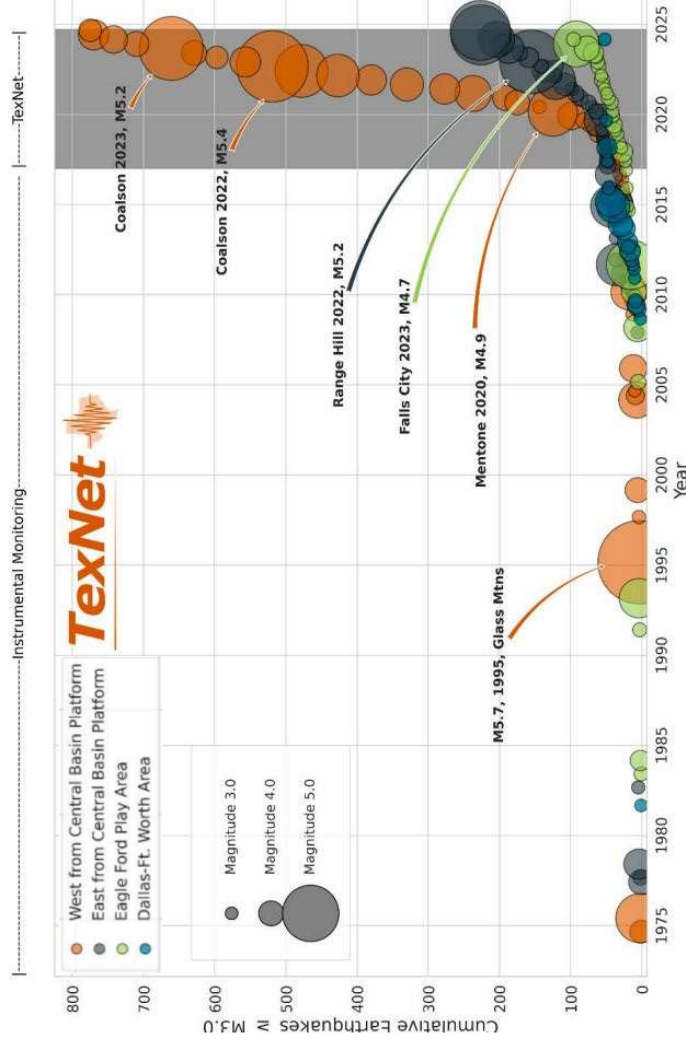


Figure 16. Earthquakes of $M \geq 3.0$ since 2017, reported by TexNet until November 2024. Highest magnitude events after December 2023 ($M \geq 5.1$) are denoted by an asterisk in a circle. Inset maps A, B and C indicate earthquake locations and sources of data from each area.

Sawaidis, Alexandros. 2024 Biennial Report on Seismic Monitoring and Research in Texas. December 2024.

<https://texnet.beg.utexas.edu/files/reports/2024%20Biennial%20Report%20on%20Seismic%20Monitoring%20and%20Research%20in%20Texas.pdf>.

Changes to pore pressure correlate with deep injection and earthquakes

- UT BEG modeled pore pressure change in deep strata relative to earthquakes in the Delaware and Midland basin
- Correlation between deep injection

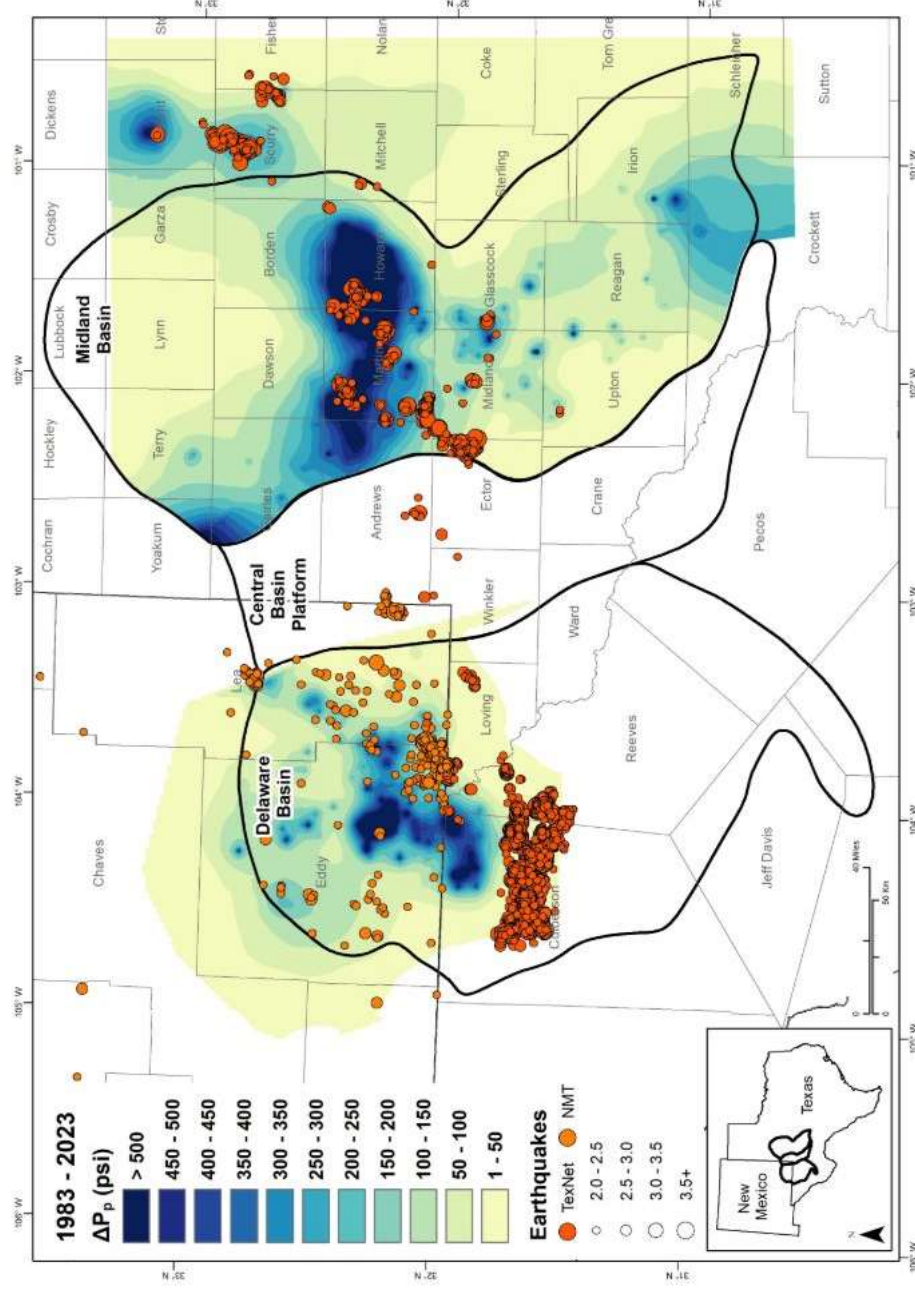


Figure: Pore pressure change in deep injection strata (Smye et al. 2024 for the Delaware Basin, Ge et al. 2024 for the Midland Basin) shown with deep earthquakes of M 2.0+ sized by magnitude. Shallow earthquakes in the sedimentary section of the southern Delaware Basin are associated with shallow disposal and hydraulic fracturing, and are not included.

Credit: Center for Integrated Seismicity Research

Shallow injection

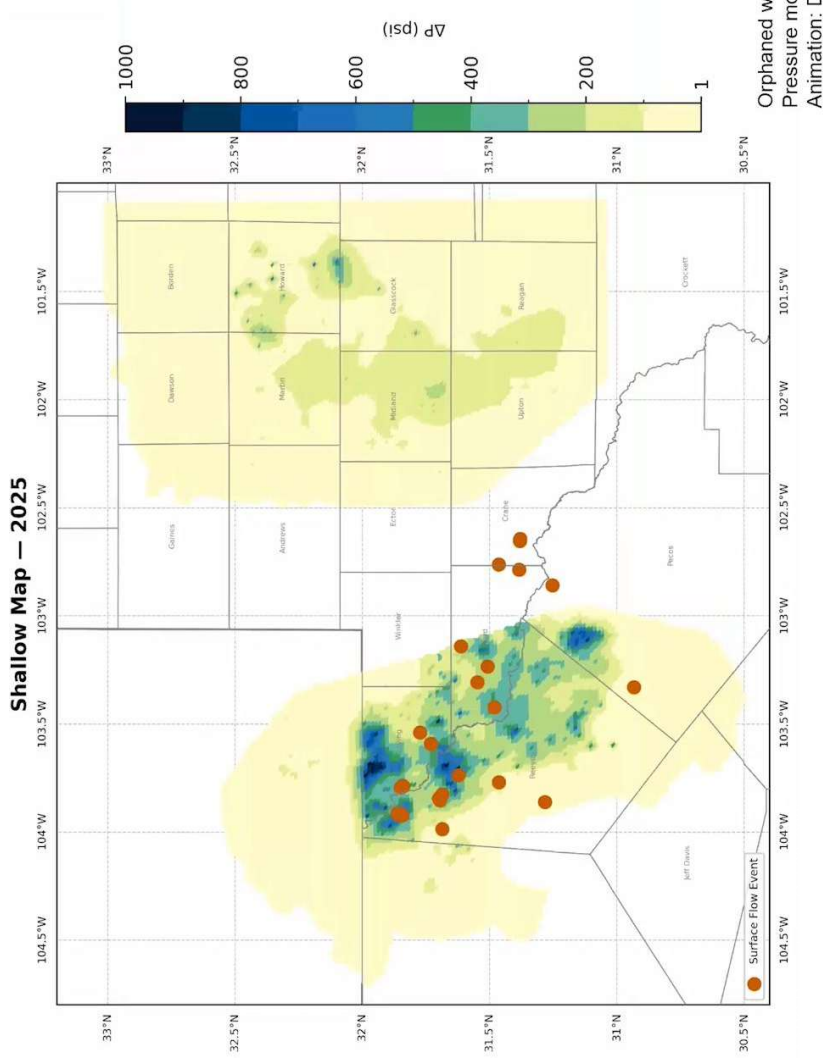


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Fluid fills the pore space and the subsurface pressurizes

...which looks for the path of least resistance.

Study indicates roughly 20% of wells in Reeves County at high risk of leaking



HOUSTON CHRONICLE

INVESTIGATIONS

By Amanda Drane, Staff Writer
Updated Oct 29, 2025 11:11 a.m.

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Gift Article

Facebook

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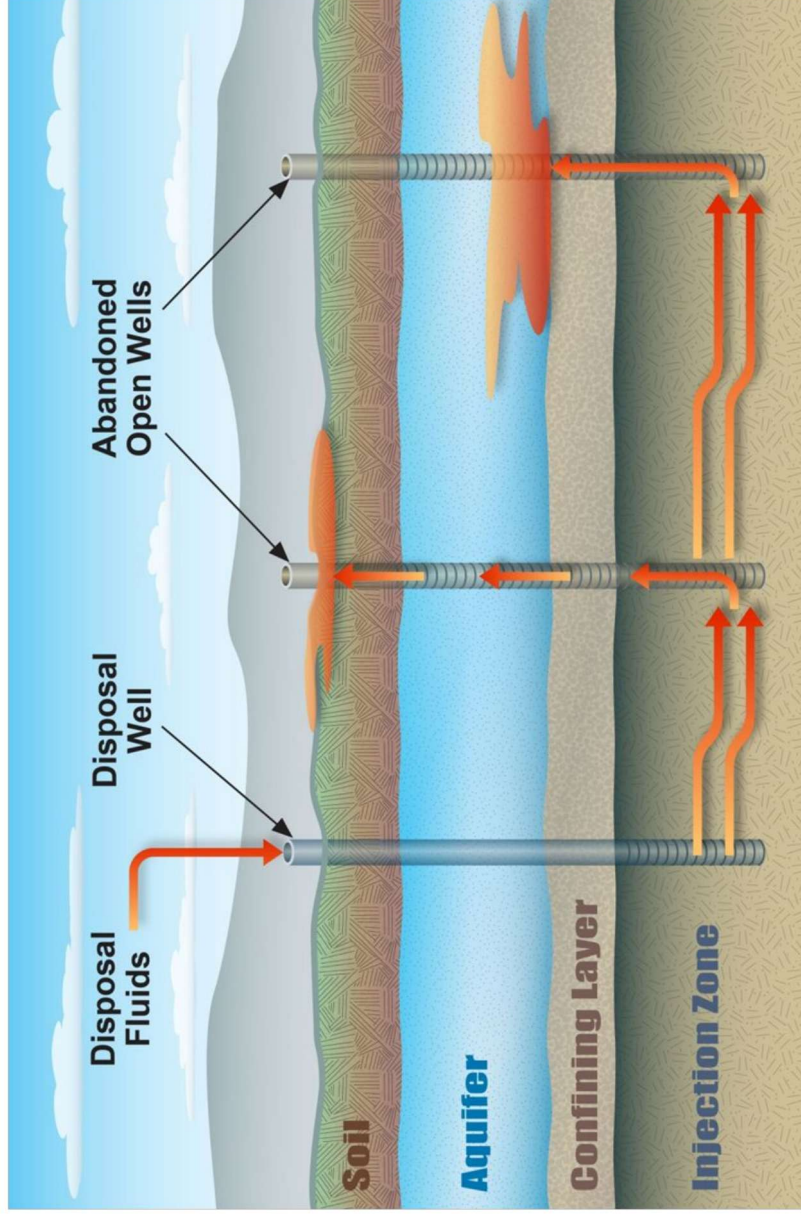
LinkedIn

Reddit

Hundreds of 'zombie' wells likely plague a single Texas county, University of Houston study finds

Risks to Water Quality

Threats from Orphan and Degraded Wells



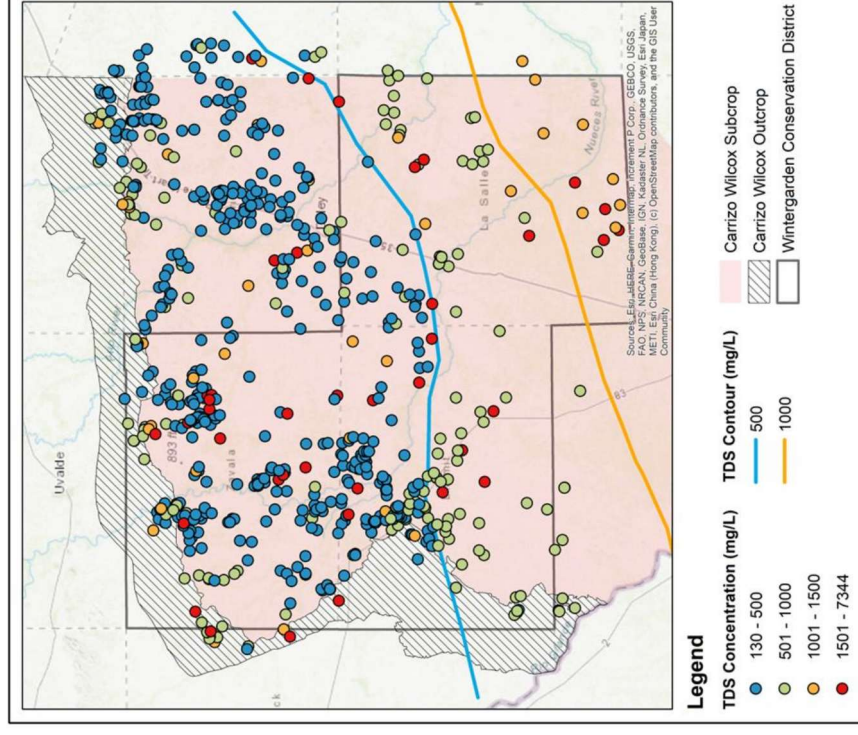
Risk is imposed by pressurized injection by a SWD Well

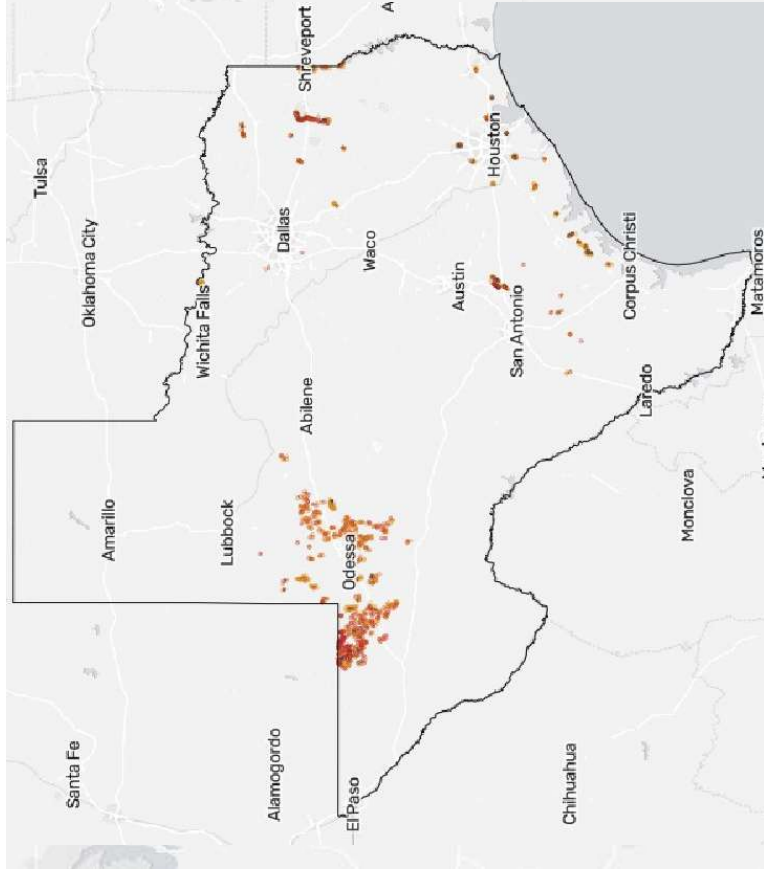
Example: Eagleford Play

Risks to Water Quality

**This groundwater
should be fresh**

**O/G activities
are the only feasible
source for the
“hotspots”**





The more injection occurring at disposal wells near at-risk wells, the higher the risk.

Disposal Well Injection Amount:



☒ Inactive 15+ years ☒ Orphan ☒ Plugged pre-1970 ☒ Multiple risks

Q Enter an address

Spandrop

Houston Chronicle Map shows where wells are most likely to pollute

Lockhart

Maxwell

Martindale

Staples

Fentress

Prairie Lea

Luling

Harwood

Kingsbury

Seguin

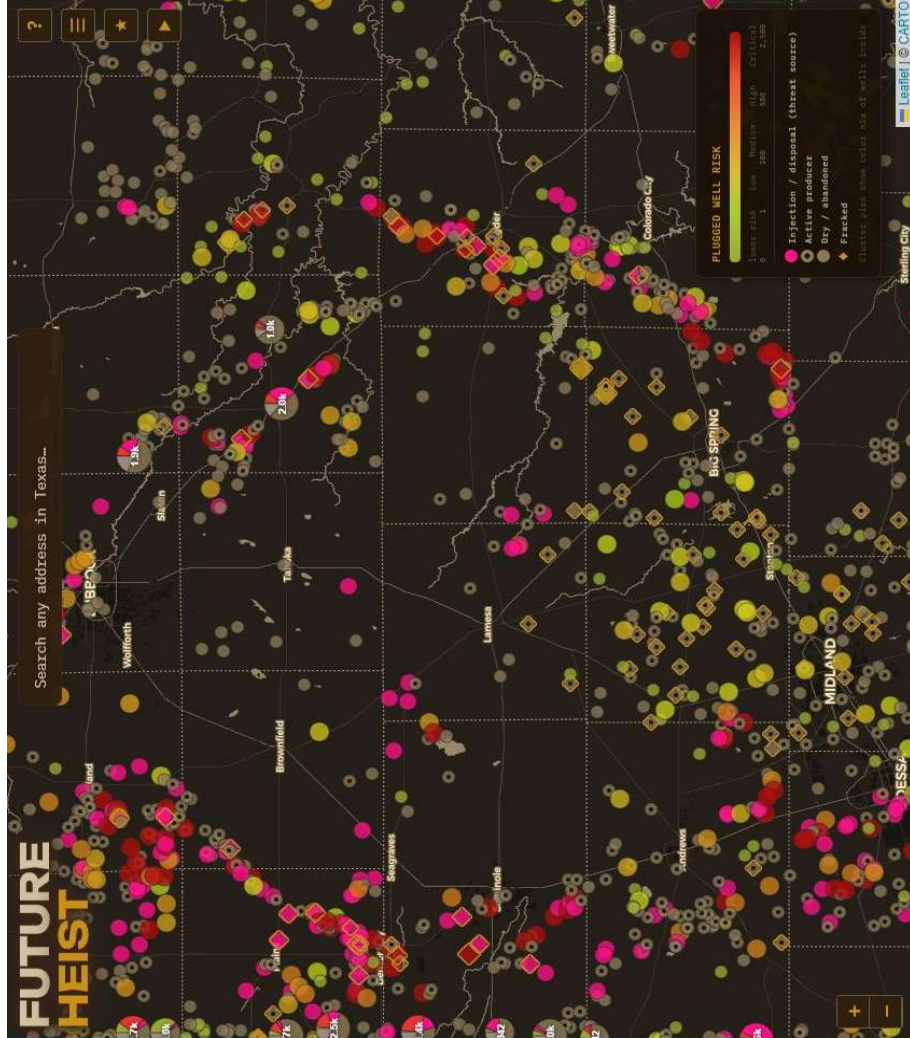
The Texas Railroad Commission says vulnerable wells within 2 miles of disposal wells are at the highest risk.

A well can be at-risk if it is an orphan well, meaning it was left unplugged by operators who went bankrupt or dissolved. Wells inactive longer than 15 years and wells plugged pre-1970 are also at increased risk.

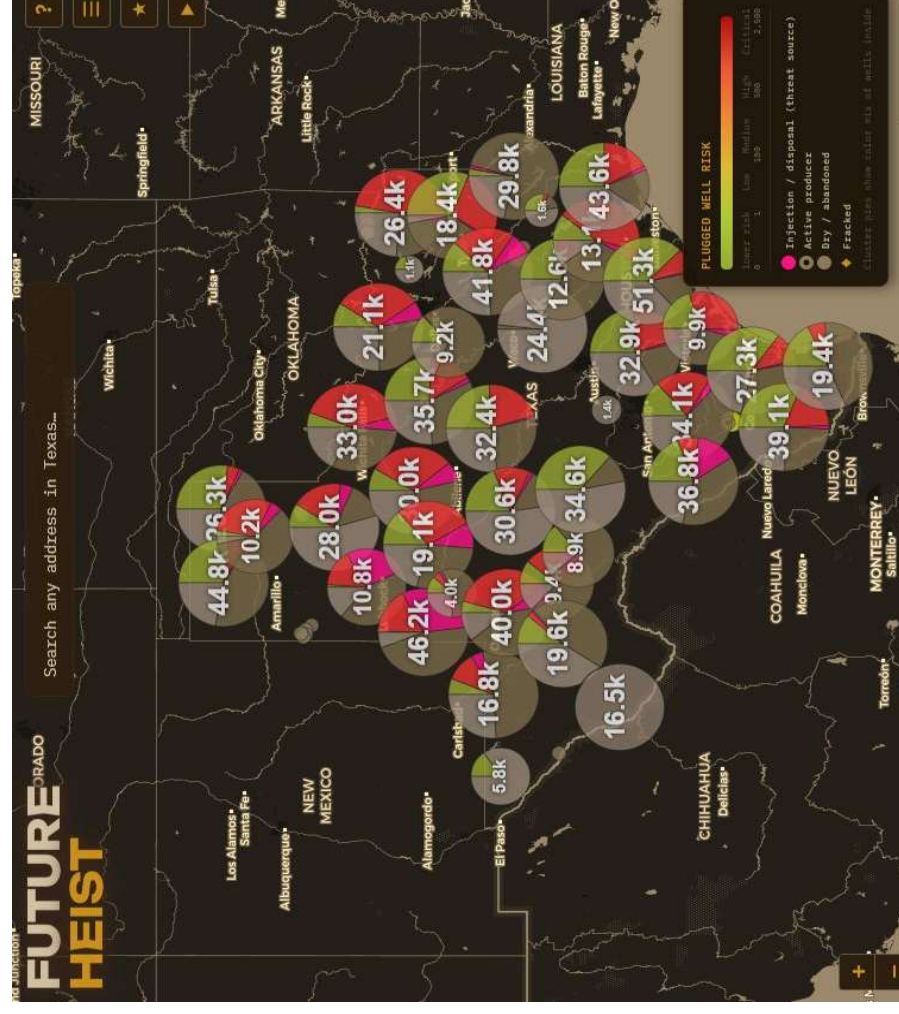
<https://www.houstonchronicle.com/projects/zombie-oil-wells-map-search/>

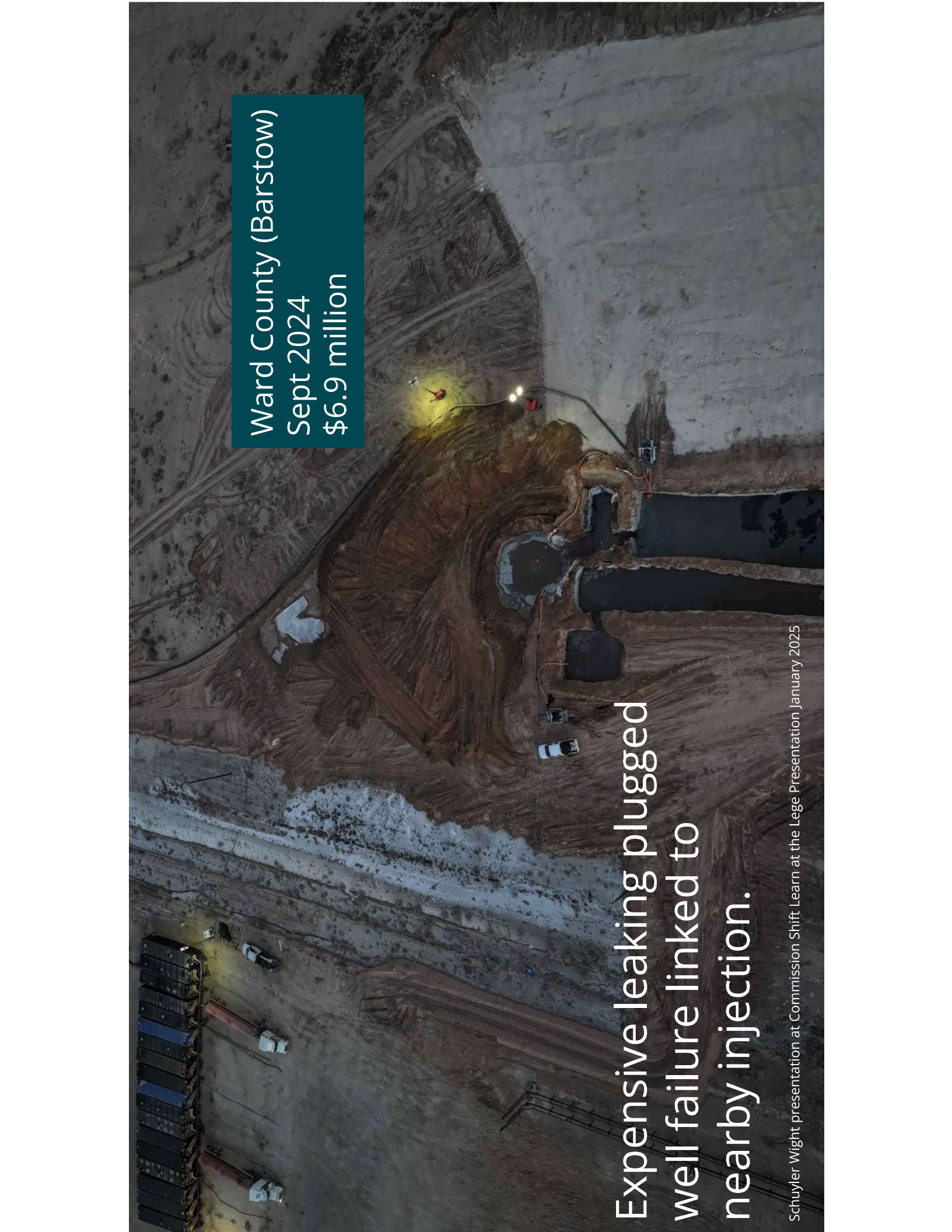
Future Heist Zombie Well Map

- Plugged well zombie risk:
 - 25,700 wells at critical risk
 - 53,000 wells at high risk
- 900+ injection wells with documented casing failure



Credit: Futureheist.org

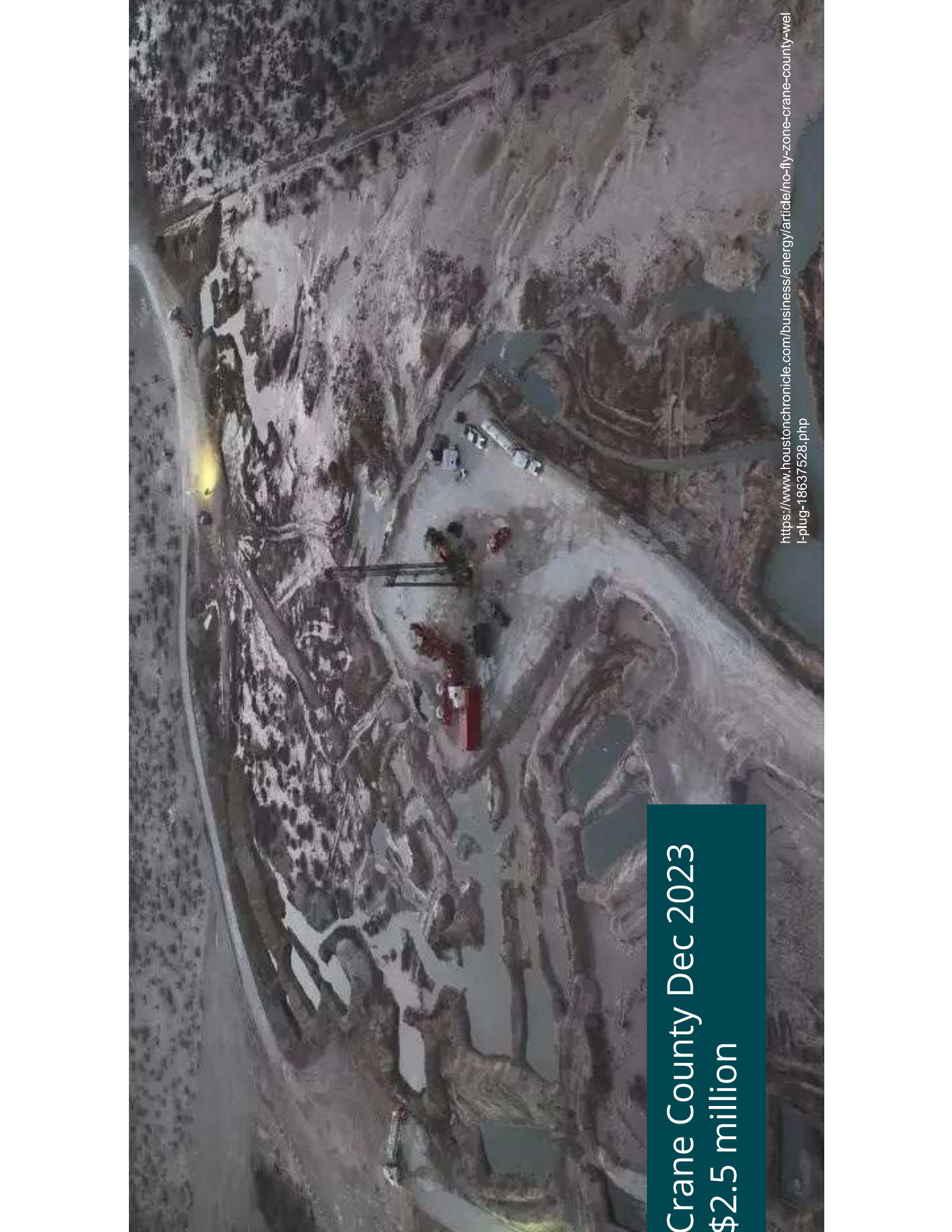


An aerial night photograph of an industrial site. In the center, a large, dark, cylindrical storage tank is visible. To its right is a massive, conical pile of reddish-brown earth or sand, illuminated by bright work lights. Several vehicles, including a white pickup truck and a dark SUV, are parked near the base of the pile. In the lower-left corner, a long row of blue and black shipping containers is stacked. The ground is uneven and shows signs of heavy machinery activity.

Ward County (Barstow)
Sept 2024
\$6.9 million

Expensive leaking plugged
well failure linked to
nearby injection.

Schuyler Wight presentation at Commission Shift Learn at the Lege Presentation January 2025



Crane County Dec 2023
\$2.5 million

<https://www.houstonchronicle.com/business/energy/article/no-fly-zone-crane-county-wel-l-plug-18637528.php>

RRC Response



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RRC Orders Blackbuck's Disposal Well to Close Over Earthquake Fears

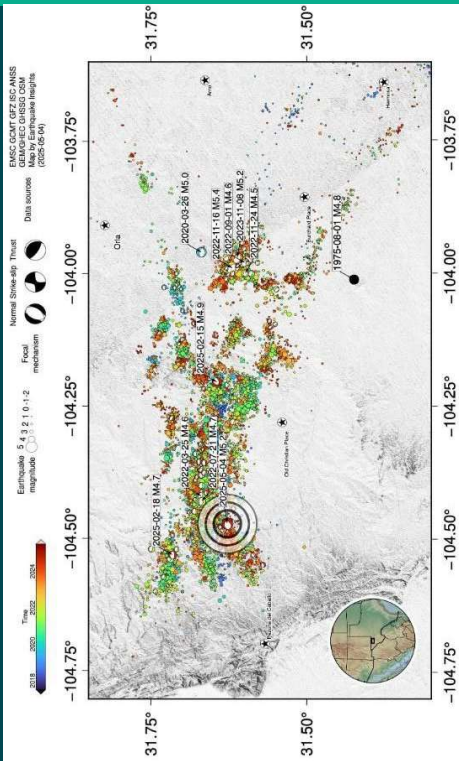
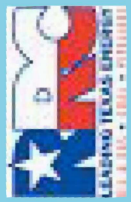
The Texas Railroad Commission had called for an emergency suspension of Blackbuck Resources' water disposal well operations on May 13, after an earthquake with a record 5.4 magnitude struck West Texas 10 days earlier.

Hart Energy Staff Thu, 06/19/2025 - 05:09 PM Comments

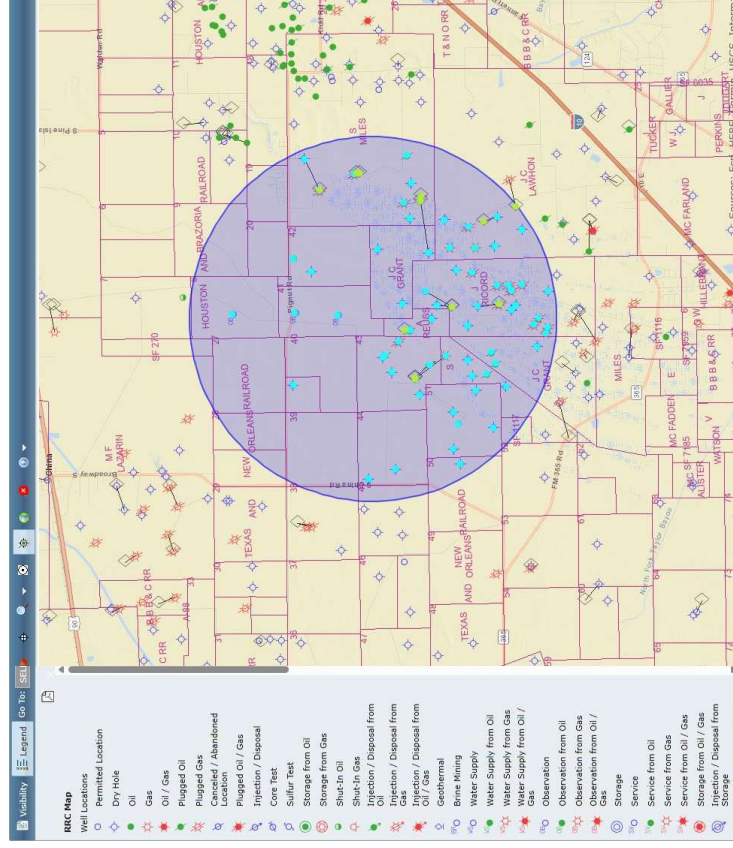
RRC Issues Enhanced Guidelines for Permian Basin Disposal Wells

May 16, 2025

AUSTIN – Utilizing scientific and engineering analysis, the Railroad Commission of Texas has issued new guidelines that further strengthen permitting of disposal wells in the Permian Basin.



Summary of enhanced guidelines for Permian Basin disposal wells



- Limit maximum surface injection pressure (MSIP) by confinement zone
- Limit maximum daily injection volume by average reservoir pressure
- Maximum Injection Rate limits
- 2-mile radial Area of Review:
 - Strict requirements within ½ mile for well conditions
 - Reduce MSIP within 2-mile if questionable well conditions within radius

State Managed Priority 1 Wells

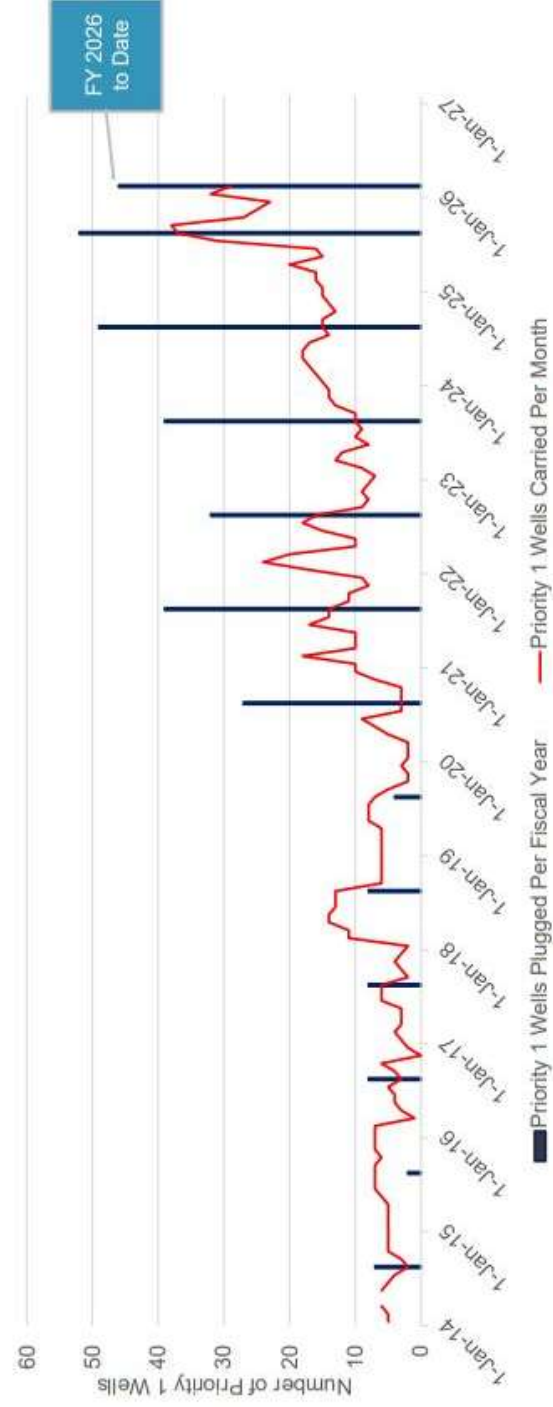
Leaking and Plugged "Priority 1" Wells



Fiscal Year	Average Annual Priority 1 Wells
2025	19
2026	29*

Fiscal Year	Total Annual Plugged Priority 1 Wells
2025	46
2026	52*

* first half of fiscal year



Railroad Commission presentation, "Response to Oil and Gas Emergencies" March 24, 2026



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First Baptist Church
Grandfalls, Ward County, TX
April 21, 2026

RRC emergency response updates

- RRC proposes changing emergency response when reservoir fluid confinement fails.
- Due to challenges managing produced water:
 - Unconventional produced water can't go back into fracked formations
 - High injection rates into shallow disposal wells
 - Old wellboards and "confinement" layers not confining

RRC: "We can no longer simply solve the surface flow and ignore the subsurface situation"

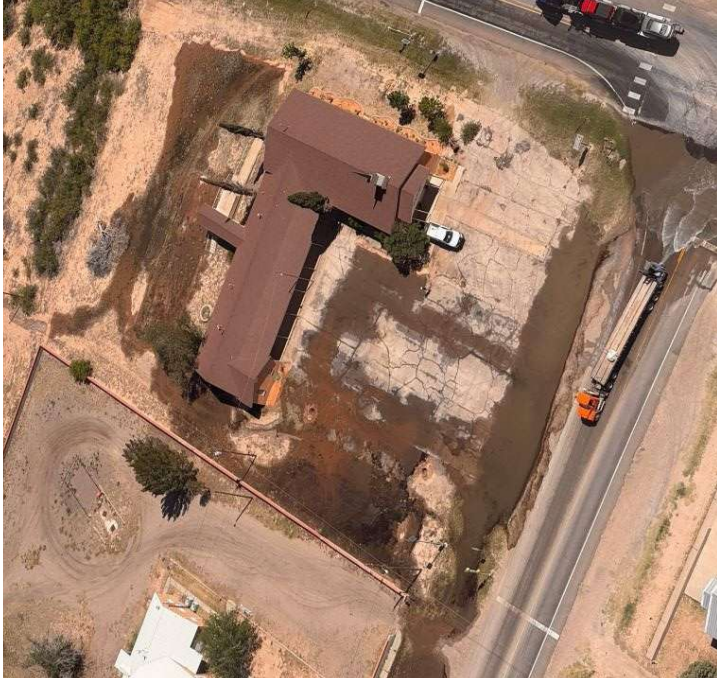
Image credit: Laura Briggs

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Proposed RRC emergency response

- Proposed Response (RRC led):
 - Secure & assess site
 - Compel contributing operators to control the flow
 - Declare “Oil or gas emergency”
 - Shut in injection wells in minimum 2 mile radius
 - Stop the leak
 - Look for cause
 - Require injection operators to demonstrate confinement before injection resumes
- Alternative Response (Operator-Led Emergency Response Action (OLERA))
 - Designate up to three member lead operators
 - Maximizes operator control over response
 - More flexible response terms

No public input but industry input requested to the proposed response plan.



First Baptist Church
Grandfalls, Ward County, Texas
April 21, 2026



Solutions

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Need strong updates to Inactive Well Rules



Photo credit: Elizabeth Conley/Houston Chronicle

Comment period opens soon!

Chart: Onoja, M.U. and Shariatipour, S.M. (2019)
<https://doi.org/10.1002/qhgw.1932>

Working Group Recommendations

- Limit extensions & shut down loopholes
 - Limit extra extensions to 2 years (unless part of compliance plan)
 - Create clear definitions for “hardship” & what qualifies as “return to operation”
- Make sure wells are safe
 - No extensions in high-risk zones
 - Risked-based prioritization for plugging inactive wells
- Strengthen rules to stop bad transfers
 - Certified analysis well still has economic value and operators are financially able to plug wells
 - Require full-cost bonding
- Accountability and transparency
 - Make data accessible
 - Build compliance rating system
 - Tough penalties

How to Comment on RRC Rulemaking

When rulemaking opens

- Fill out comment form on proposed rulemakings on RRC website
 - www.rrc.texas.gov/general-counsel/rules/proposed-rules/
- Email rulescoordinator@rrc.texas.gov your comments

Stay up to date on the rulemaking

Sign up for the RRC Rules Email Services OR Sign up for Commission Shift news updates

**Comment period
opening soon!**



Orphaned Well Policy Solutions

- Collect the right amount of financial assurance
 - Full cost bonding
- Address well transfer liability
 - Full cost financial assurance for individual wells before transfer
 - Joint and several liability
- Limit inactive well plugging extensions - 15 years still too long
- Stop assuming a plugged well is plugged
 - Locate, improve tracking and assess the condition of old plugged wells and legacy wells

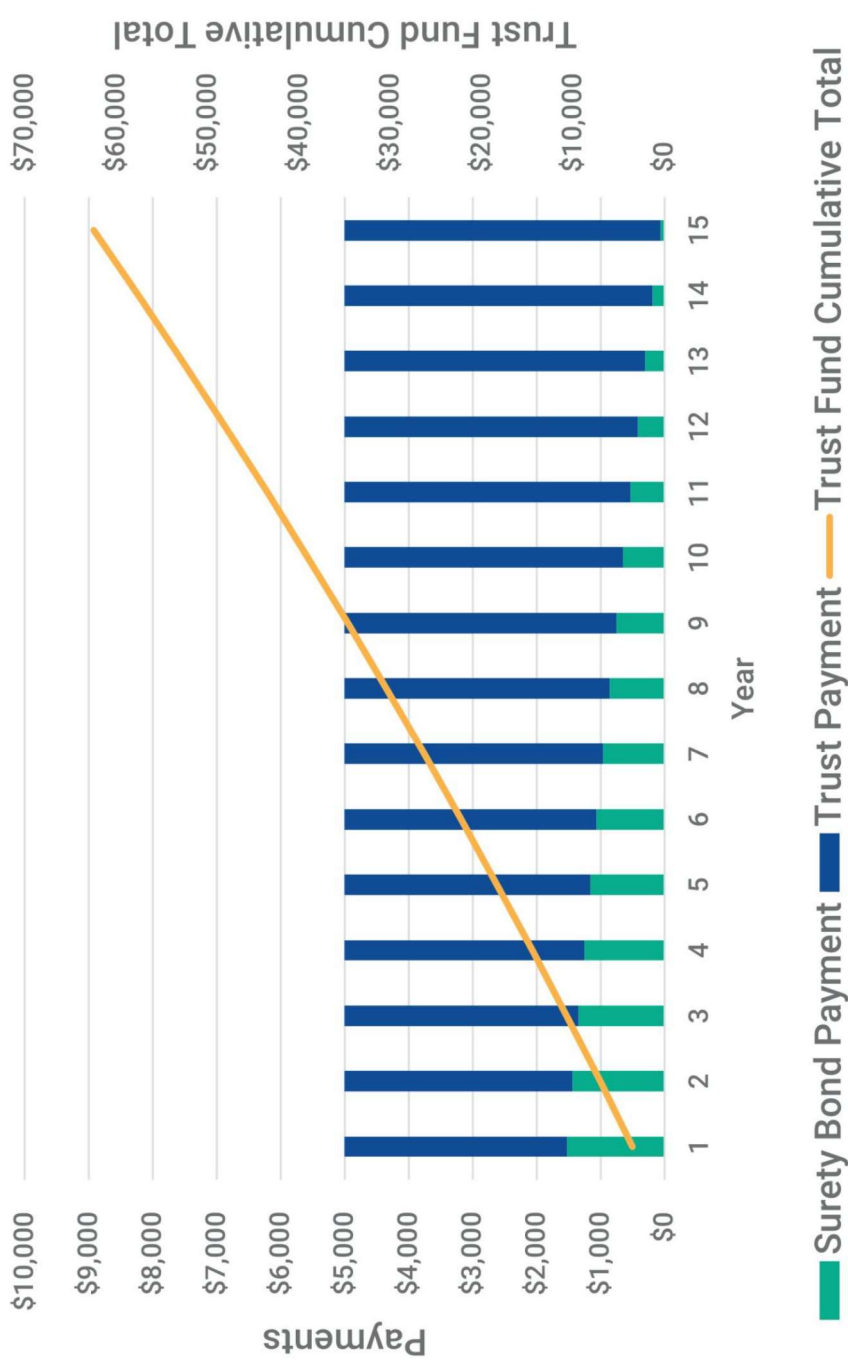


Learn about solutions on YouTube:
@CommissionShift

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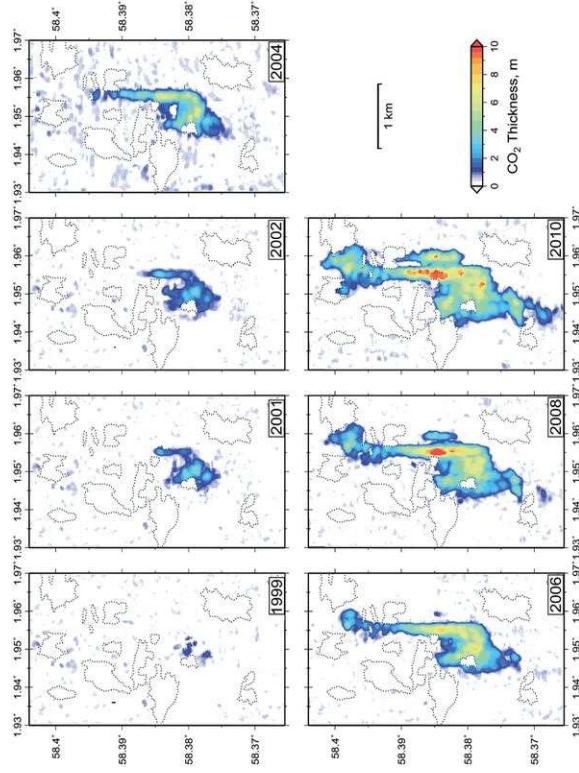
Solution: Save for retirement

Hypothetical example of a sinking trust fund with full cost bonding



Suggested injection well permitting reforms - Update Class II Injection Rules

- Area of Review based where the fluid will go
- Not a generic assumption



Mapped distribution model of CO2 in the uppermost layer beneath the caprock with time

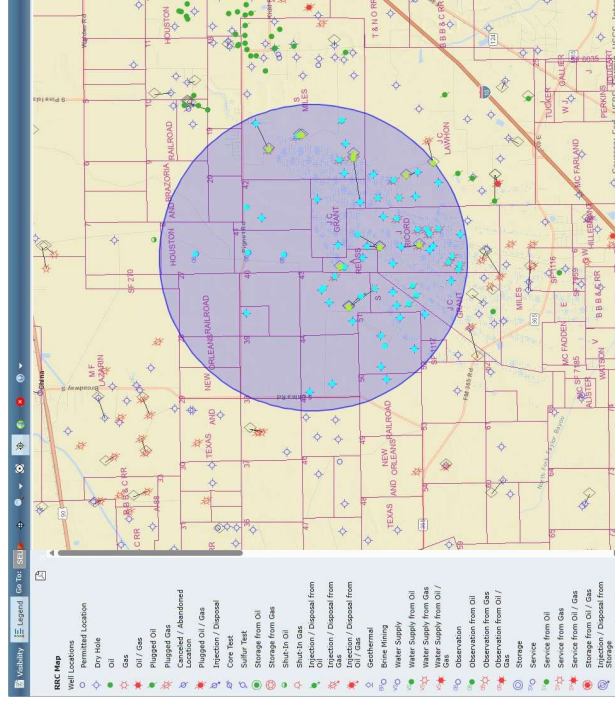
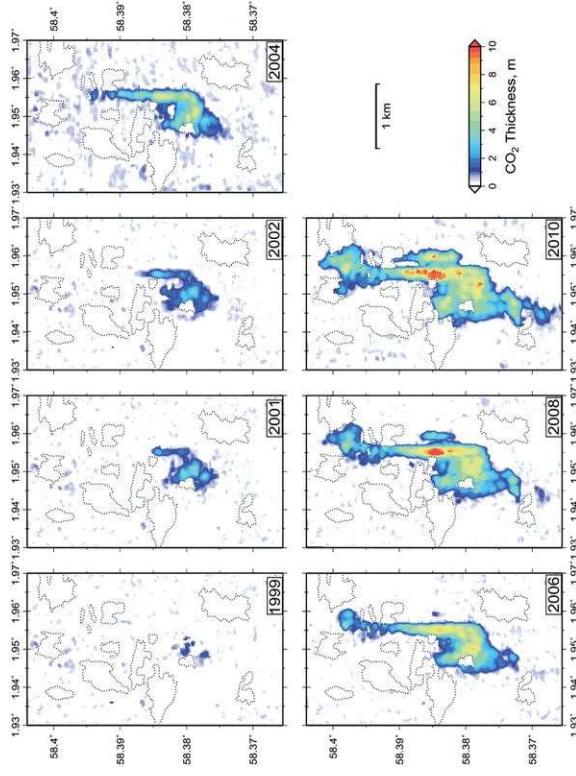


Chart: Onoja, M.U. and Shariatipour, S.M. (2019)
<https://doi.org/10.1002/ghg.1932>

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Suggested injection well permitting reforms - Update Class II Injection Rules

- Area of Review based where the fluid will go
 - May span multiple miles
- Stronger scrutiny of injection locations.
 - End or reduce injection into overpressurized places
- Greater scrutiny of penetrations in area of review.
 - Wells in path of plume must be properly plugged
 - No well plugging extensions
- Monitor injected fluid plume
- Injection pressure & volume limits



Mapped distribution model of CO2 in the uppermost layer beneath the caprock with time

Concerns with Produced Water Treatment for Beneficial Reuse

- Unproven at scale
 - More technology vetting needed
- Fill knowledge gaps
 - Water testing insufficient for unknown chemicals
 - Require disclosure for proprietary chemicals
- Ensure beneficial reuse rules protect humans and environment
 - Effective rules need to be based on solid science, complete risk assessments, and fully vetted treatment technologies

- Consortiums need more transparency

Rulemaking in progress now for SB 1145 that transfers land application authority to TCEQ from RRC

- Proposed rule lacks water quality standards for known hazardous components
- Lack of transparency on rulemaking assumptions and process



Images: Tony and Karen Coleman

Well Failures, Spills & Leaks Reporting Reforms



- Improve reporting requirements for spills & leaks
- Strengthen well failure reporting requirements
- Strengthen clean up and monitoring requirements for failures
- Require reporting of:
 - Location, well, operator & lease information
 - Information about failures
 - Type & location of failure
 - In freshwater stratus? Signs of subsurface crossflow? Flow at surface?
 - Volumes leaked, constituents leaked
 - Clean up requirements & clean up status
 - Compiled failure report for all wells
- Make data publicly available

Compensation requirements for those harmed

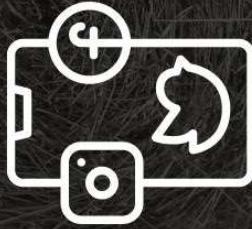
Images: Schuyler Wight

Talk to Us

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