

FACT✓SHEET:

EARTHQUAKES AND OKLAHOMA: GET THE FACTS

- The U.S. EPA has long recommended the use of disposal or injection wells to properly manage produced water or industrial waste.
- The EPA continues to support the use of disposal wells because of their demonstrated performance. Storage of these wastes far below ground protects surface and ground water from contamination.
- There are approximately **4,000 of these wells in Oklahoma where water is disposed** from oil and natural gas operations. Experts believe that recent earthquakes in the state are connected to a few of these wells.
- The Oklahoma Corporation Commission has identified “**Areas of Interest**” where most of the earthquakes are occurring, primarily in **central and north central Oklahoma**.
- Independent research by top institutions (Stanford University, the University of Oklahoma, and the Oklahoma Geological Survey) has not revealed any significant correlation between earthquakes and **hydraulic fracturing (fracking)**.

WHAT IS HAPPENING

“While we understand that Oklahoma has historically experienced some level of seismicity, we know that the recent rise in earthquakes cannot be entirely attributed to natural causes. Seismologists have documented the relationship between wastewater disposal and triggered seismic activity...”

- *Office of the Oklahoma Secretary of Energy and Environment (source)*

“Induced seismicity associated with fluid injection or withdrawal is caused in most cases by change in pore fluid pressure and/or change in stress in the subsurface in the presence of faults with specific properties and orientations and a critical state of stress in the rocks.”

- *National Research Council (source)*

MANAGEABLE RISK

“Earthquakes that are caused by human activities are known as induced earthquakes. **Most injection operations, though, do not appear to induce earthquakes.**”

- *Rubinstein et al., “Myths and Facts on Wastewater Injection, Hydraulic Fracturing, Enhanced Oil Recovery, and Induced Seismicity” (source)*

“Injection for disposal of wastewater derived from energy technologies into the subsurface does pose some risk for induced seismicity, but **very few events have been documented over the past several decades relative to the large number of disposal wells in operation.**”

- *National Research Council (source)*

“We think society can manage the hazard. **We don’t have to stop production of oil and gas**, but we think we can do so in a way that will minimize the earthquake hazard.”

- *Dr. Bill Ellsworth, U.S. Geological Survey (source)*

NOT DUE TO FRACKING

“It is **not caused by the hydraulic fracturing process at all.**”

- *Dr. Mark Zoback, Stanford University (source)*

“We know that researchers agree that hydraulic fracturing isn’t the cause of the major earthquakes in Oklahoma.”

- *Dana Murphy, Oklahoma Corporation Commission (source)*

“While there are large amounts of wastewater generated from hydraulic fracturing, this volume **represents a small percentage of the total volume of wastewater injected in disposal wells in Oklahoma.**”

- *Oklahoma Geological Survey (source)*