

IADC Briefing Book

Hydraulic Fracturing: Earthquakes



With respect to hydraulic fracturing, increased seismic activity is mostly associated with water injection wells. An injection well is one that is used to place fluid underground into porous geologic formations. Spent hydraulic fracturing fluids, including water, wastewater, brine (salt water) are injected into these wells that are drilled specifically for this purpose. [2]

Key Messages

- Many scientists believe that the increase in seismic activity in areas with established well developments is attributable to the 152,000 Class II wells used for oil field produced water injection and disposal. Most of these have been characterized as minor and not felt on the surface. [1]
- The great majority of disposal wells are not associated with any tremor generation.
- In response to seismic activity in the Fort Worth, Texas area, the Texas Railroad Commission set out rules that aim to control the design, location and depth of the wells, plus the volume and rate at which fluids can be injected. [3]
- The earthquake risk is very low in most areas, but if the well is loaded with more water volume than it can safely accept, tremors can be likely. Paying special attention to water volume limits and staying within those can effectively reduce the risk of seismic events. [1]
- Water injection limits in the US are set by state regulators, which pay special attention to local conditions and rock formation behaviors specific to their states.
- Site selection and rate limits are critical to safe injection behavior.

Other Resources

1. Science study: “High Rate Injection is Associated with the Increase in U.S. Mid-Continent Seismicity” <http://www.sciencemag.org/news/2015/06/huge-study-links-wastewater-injection-wells-earthquakes>
2. Energy in Depth: <https://energyindepth.org/wp-content/uploads/2015/11/Energy-In-Depth-Report-Injection-Wells-and-Earthquakes-Quantifying-the-Risk1.pdf>
3. General Information about Injection Wells (US Environmental Protection Agency): <http://www.epa.gov/uic/general-information-about-injection-wells>
4. Injection and disposal wells (Texas Railroad Commission): <http://www.epa.gov/uic/general-information-about-injection-wells>