

USGS drafting new hazard maps as oil and gas boom causes quakes

Bruce Finley, Denver Post, 4-23-15

Earthquakes of magnitude 3 or greater are 100 times more likely now than in 2008 in regions of Colorado and seven states that are hotbeds for oil and gas drilling, federal geologists said Wednesday.

This has prompted the government to prepare new seismic-risk maps for construction, insurance and public safety.

The question of who bears the costs of possible damage and quake-resistant construction has yet to be decided. But a U.S. Geological Survey team, based in Colorado, also has started a series of meetings with engineers and designers.

"These quakes are occurring at a higher rate than ever before and pose a higher risk and threat to people living nearby," USGS scientist Mark Petersen, chief of the agency's National Seismic Hazard Modeling Project, said at a conference where he and others are unveiling a federal report.

"If you live in one of these areas of induced seismicity, you should educate yourself and those around you for protective actions you can take," Petersen said.

The federal push to create forecast maps showing where ground-shaking could be most severe follows recent government research focused on industry injection of wastewater into super-deep wells. The report at a Seismological Society of America conference in Pasadena, Calif., marks the government's first comprehensive assessment of hazard levels from industry-induced earthquakes.

While most industry-induced quakes result from disposal of wastewater, the scientists said they've documented quakes caused by hydraulic fracturing, or fracking, the process used to stimulate release of oil and gas from deep shale rock formations.

USGS scientist Bill Ellsworth said quakes linked to fracking are short-lived.

"It is during the hours the fracturing is occurring that there is potential for an induced earthquake," he said, noting regulators in some states have tried to modify industry practices.

Colorado natural resources officials are "in close communication with relevant state, federal, interstate and academic experts," state spokesman Todd Hartman said. Colorado reviews industry sites for seismic potential before issuing permits, Hartman said.

Last June, the Colorado Oil and Gas Conservation Commission ordered NGL Water Solutions to stop injecting wastewater into a 10,770-foot well near the Greeley-Weld County airport after a 3.2-magnitude earthquake. Shaking stopped. NGL modified the well before resuming wastewater disposal.

It will be up to states to use the hazard maps.

The USGS found that the frequency of quakes of at least magnitude 3 at industry hotbeds increased by more than 100 times since 2008, Petersen said. For example, Oklahoma's rate of one or two industry-linked quakes a year increased to two to three per day, he said.

Recent quakes in Colorado include a 5.3-magnitude temblor near Trinidad in 2011. That same year, a 5.6-magnitude quake in Oklahoma caused damage that led to condemnation of 14 buildings.

USGS researchers are investigating whether industry-triggered quakes could spur bigger earthquakes along natural geological fault lines.

There's no evidence that industry could cause quakes up to magnitude 7, the level associated with catastrophic natural quakes. "But we cannot rule that out," USGS scientist Justin Rubinstein said.

States experiencing oil and gas-related earthquakes — including Oklahoma, Colorado and Texas — historically had few quakes. But rather than severity, Ellsworth said, "it is the rate of the earthquakes that really matters." Frequent moderate quakes around magnitude 5 could cause the most harm.

Preliminary hazard maps showing elevated risk in five parts of Colorado are to be updated annually. Unlike quakes from natural tectonic plate friction, quakes caused by oil and gas activity depend on the level of activity, which fluctuates, complicating efforts to assign long-term risk as done in existing natural hazard projections.

Insurance companies see quakes in Colorado as an emerging risk. There's no claims history, said Carole Walker, director of the Rocky Mountain Insurance Industry Association.

"We hope people will purchase insurance if there's an increased risk. If insurance isn't purchased, you don't have the coverage for it and it can become a litigation issue," Walker said. "A business or homeowner could sue for damages, and they would have to prove the causation of the risk."

USGS meetings with engineers and other experts are addressing potential costs in Oklahoma, where bridge inspection and repair is a focus. They're looking at whether industry causation is clear.

"It's up to the courts to decide who will actually pay these costs," Petersen said. "Our reports are designed to help people understand the threats they face."