One of the seismometer stations installed by TexNet in the Fort Worth Basin area. Texas Bureau of Economic Geology

BARNETT SHALE

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Earthquake monitoring system being rolled out in North Texas

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FORT WORTH — Nearly two years after a rash of earthquakes rattled the sensibilities of North Texas residents and state lawmakers, a meticulously designed network of seismographs is being rolled out to determine if the tremors are occurring naturally or can be linked to oil and gas industry production.

Researchers at the Texas Bureau of Economic Geology have installed 14 of 22 permanent seismographs and another 15 portable stations as part of the $4.5 million TexNet system approved by state lawmakers two years ago. The number of permanent seismograph stations has doubled in the last two months, officials said.

“It has taken some time, but to our thinking it is better to do this slower and more methodically and the state will greatly benefit, rather than us rushing in and picking sites that are not very good,” said Michael Young, associate director of the bureau. “We want to get the sensors in the ground, but in the right way.”

There are two permanent and 13 portable TexNet seismograph stations in the Fort Worth/Dallas area. That brings to 31 the number of stations in North Texas, including the equipment being monitored by geologists at Southern Methodist University, Young said.

The bureau’s work comes as the U. S. Geological Survey is forecasting fewer damaging earthquakes this year in the central and eastern United States, areas where in recent years there have been numerous tremors linked to wastewater disposal wells used in oil and gas production.

> “WE’RE GOING AS FAST AND AS METHODICALLY AS WE CAN.
> Michael Young, associate director of the Texas Bureau of Economic Geology

In 2015, state lawmakers approved $4.5 million for a comprehensive earthquake study after a string of temblors plagued North Texas, the largest one a 4.0 magnitude event near Venus and Mansfield that May.

Lawmakers were also reacting to a peer-reviewed article by researchers from SMU, the University of Texas at Austin and the U.S. Geological Survey stating that 27 earthquakes near Reno and Azle from November 2013 to January 2014 were likely caused by drilling-related operations.

Of the $4.5 million, $2.47 million was set aside to buy equipment and $2 million to study the results.

While the geology bureau had hoped to have the TexNet system up earlier, Young said they also wanted to make sure that “the data is the highest quality possible.” First, researchers analyzed data from 2010 and 2012 to find the best “quiet” sites, or places away from roads, railways and other industrial activity.

Then they looked at the site geology. Seismometers work best when measuring seismic activity reverberating through solid rock. Each site also had to have a solid cellphone connection for data streaming 24 hours a day, seven days a week, he said.

Once a site was selected, for a permanent or temporary seismometer, the state had to negotiate with the landowner for the right to be on their property, Young said. The portable seismometers go down a few feet, while the permanent sites involve 20-foot-deep holes with steel and cement casings.

“I would say it was more time-intensive than we anticipated ... We’re going as fast and as methodically as we can,” Young said.

Besides the 14 permanent seismometer sites already installed, the bureau has two other locations under contract and four others scouted, he said.

Crucial information

Mark Petersen, chief of the USGS National Seismic Hazard Mapping Project, said the kind of information provided by the TexNet seismometers is crucial when predicting possible earthquakes. Petersen was one of the authors of the recent report predicting less seismic activity in the coming year.

“I do think that it’s wonderful that the state of Texas has formed TexNet so we can see where (earthquakes) are occurring and how the ground is shaking,” Petersen said. “We depend on earthquake location and magnitude in making these predictions.”

In the USGS report, about 3.5 million people live and work in areas with significant potential for damaging quakes from induced seismicity in 2017, with the majority in Oklahoma and southern Kansas. Include the possibility of natural earthquakes, the number at high risk rises to about 4 million.

The forecast is lower than last year, when it was estimated that 7 million people were at risk. This report is the second time the agency has forecast the likelihood of earthquakes.

THE STUDY ALSO SUGGESTS THAT, BY USING THE BEST AVAILABLE SCIENCE, POLICY MAKERS AND THE ENERGY INDUSTRY CAN MAKE “RATIONAL AND PRUDENT DECISIONS” TO REDUCE THE HAZARD OF EARTHQUAKES.

In North Texas and North Arkansas, no earthquakes larger than 2.7 magnitude occurred in 2016. USGS considers a magnitude 2.7 earthquake to be the level at which ground shaking can be felt, according to the agency. An earthquake of 4.0 or more can cause minor or more significant damage.

Petersen said he was a little taken aback by their findings.

“I was very surprised. We didn’t have any indication that rates would decline like that,” Petersen said. “The rates do go up and down, and we don’t often see them go to zero like that. It made me think that there are other things going on.”

The agency said the decrease in earthquakes may be due to a drop in wastewater injection resulting from regulatory actions or a slowdown in oil and gas production due to lower prices. The one-year study was published Wednesday in Seismological Research Letters.

Petersen stressed that there is still more seismic activity than there was10 years ago, when rates climbed rapidly, probably because of the increased use of wastewater injection wells used in the drilling process. There also were three 5.0 magnitude earthquakes in Oklahoma, one the largest ever recorded, he said.

The hydraulic fracturing process, or fracking — which injects water, sand and chemicals deep into rock formations to free oil and gas — can cause small quakes along natural faults that are rarely strong enough to register on monitoring equipment. But fracking also generates vast amounts of brackish, or salty, water which is then pumped into injection wells that send the fluid thousands of feet underground.

“We have a large amount of research that links the injection of wastewater and seismic activity and we can see, in places like Oklahoma, when the pumping goes up the earthquakes increase and when the pumping goes down the earthquakes decrease,” Petersen said.

But the study also suggests that, by using the best available science, policy makers and the energy industry can make “rational and prudent decisions” to reduce the hazard of earthquakes, he said.

A manageable issue

The Texas Railroad Commission, which regulates the oil and gas industry, has shied away from linking wastewater injection and earthquakes. But it has been more proactive as research suggested a connection.

Since its new seismicity-related disposal well rules went into effect in 2014, the agency has received 75 disposal well applications in areas of historic seismicity. Of those, 39 permits were issued with special conditions such as reducing maximum daily injection volumes, and 11 were approved without limitations. Twelve of the requests were withdrawn while the other applications are pending or under protest.

“The Commission’s highest priority is protection of public safety and the environment,” spokeswoman Ramona Nye said in a prepared statement. “The data and research developed through the TexNet program will be critical in the Commission’s science-based decision-making on issues related to seismicity.”

Industry spokesman Steve Everley said the report shows, more than anything, that there “is a clear sign that the ongoing and collaborative work between scientists, the industry, and state regulators is reducing risks.”

“The scientific community has always emphasized that this is a manageable issue, and that the risk of induced seismicity is low. States have also been updating their regulations on wastewater injection in recent years, including here in Texas,” said Everley, a spokesman for Texans for Natural Gas.

This story contains material from the Star-Telegram archives.

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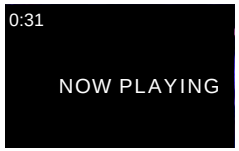

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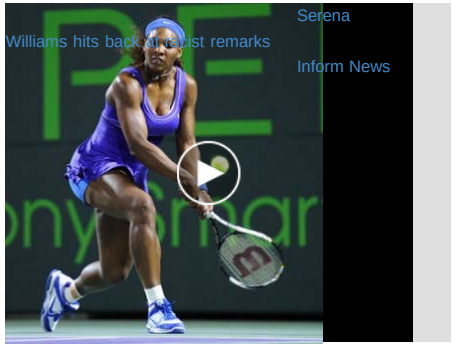

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