Earthquakes' causes, cures viewed

Permian Basin Water in Energy Conference ends Thursday

By **Bob Campbell** - March 1, 2023

ExxonMobil geoscience technology advisor Stefan Hussenoeder speaks about seismicity during a panel discussion in the Permian Basin during the 2023 Permian Basin Water in Energy Conference Wednesday morning at the Midland County Horseshoe Arena and Pavilion in Midland. (Courtesy Photo/ Jacob Ford, The Oilfield Photographer)

MIDLAND Salt water disposal well-induced earthquakes have become a big problem in the Permian Basin in recent years and a panel from the ExxonMobil Corp., the Texas Railroad Commission and the University of Texas Bureau of Economic Geology discussed possible solutions Wednesday during the Permian Basin Water in Energy Conference at the Horseshoe Arena.

The confab continues Thursday with a series of panels reviewing various other aspects of water use in the Odessa-Midland area and Eastern New Mexico.

Moderated by Texas Pacific Water Resources Executive Vice President Robert Crain, the 11 a.m. presentation was concluded by ExxonMobil geoscience technology advisor Stefan Hussenoeder, who said deep disposal wells are the main cause of seismicity or earthquakes.

"There are other risks associated with disposing of produced water, but seismicity is a big one," Hussenoeder told 500 people in the Horseshoe's meeting hall. "The Permian Basin has become the most active seismicity basin in the United States."

Referring to the two region's primary oil and natural gas-producing formations, he said the situation is more serious in the western Delaware Basin but also problematic in the eastern Midland Basin.

"Seismicity is difficult to assess and mitigate," Hussenoeder said. "There are a lot of different factors, geoscientific, geophysical, geomechanical and operational. All of these uncertainties play a role."

Hussenoeder cited a recent comment by an observer that the energy industry "is going through the seven stages of grief when it comes to seismicity and we haven't gotten past stage one," which is "shock."

However, Hussenoeder said he had seen "increased willingness for operators to be working with each other and working with regulators.

"There is much to be learned and there's a lot of work going on to develop new technology," he said. "Industry's key task is to effectively minimize seismicity and collectively minimize its societal impact."

Railroad Commission of Texas assistant director of technical permitting of oil and gas division Paul Dubois speaks about partnerships with oil and gas companies and its relation to permitting in the Permian Basin during the 2023 Permian Basin Water in Energy Conference Wednesday morning at the Midland County Horseshoe Arena and Pavilion in Midland. (Courtesy Photo/ Jacob Ford, The Oilfield Photographer)

Paul Dubois, assistant director of technical permitting in the Railroad Commission's oil and gas division, said the original purpose of the injection wells that dispose of produced water from fracking was "to ensure safe drinking water."

Dubois said his oil and gas-regulating agency modified its rules in 2014 to start addressing the problem, "but we still didn't have a lot of tools." Enlisting the help of industry and universities, he said, the RRC gained sophistication but still in 2017 "found ourselves swamped with disposal applications that we didn't know how to evaluate."

So it developed a scoring system that let SWD operators inject an extra 10,000 barrels per day if they submitted a daily record of their work to the RRC and the University of Texas Bureau of Economic Geology-maintained TexNet (Texas Seismology Network and Seismology Research) system.

Dubois said the RRC had recently started gathering data in a remote section of the Delaware Basin west of Odessa when a 4.9 magnitude quake shook the Reeves-Culberson county line.

"We began to understand that the deep injections were more problematic and we adopted a model to let operators know the commission was prepared to take certain actions on permits," accompanied by an option for operators to adopt a cooperative plan, he said.

Dr. Katie Smye, co-principal investigator at the Center for Injection and Seismicity Research at the Bureau of Economic Geology, reported that 27 oil and gas companies are working with her agency.

"The Midland and Delaware basins have a unique scale of production and their production of water is quite high," Smye said, adding that New Mexico sends two million barrels of produced water per day to the Texas side of Permian Basin for disposal.

She said 60 billion barrels of produced water have been pumped underground in the region.

Thursday's program in the University of Texas Permian Basin-sponsored conference will open with an analysis of "Environmental Stewardship and Staying Ahead of the Coming EPA Regulations" by Moderator Steve Beach, dean of the UTPB College of Business; Sam Sledge, CEO-director, ProPetro Services; John Durand, vice chairman, XRI; Trevor Gleisner, supervisor emissions control, Diamondback; and Lee Fuller, officer of environment and general strategy, Independent Petroleum Association of America.

Mike Hightower, director of the New Mexico Produced Water Consortium, will review "Land Application of Produced Water in the Western U.S." at 9:45 a.m. Thursday and a 10:45 a.m. program on "Development of Human Health and Environmental Risk Assessment Framework for Beneficial Reuse of Treated Produced Water" will feature Dr. Azivy Aziz, environmental associate, ExxonMobil Biomedical Sciences.

"The Use of Treated Produced Water for Agriculture Production" will be discussed at 11:30 a.m. by Dr. Katie Lewis, associate professor, Texas A&M Agrilife Research, and after lunch Texas Commission on Environmental Quality Commissioner Emily Lindley will review "TCEQ's 2023 Outlook on the EPA, the 88th Legislative Session, the Texas Energy Sector and Everything in Between."

"Looking Over the Horizon: Exploring Potential Outcomes of Non-Oilfield Beneficial Reuse and Its Role in Today's Decision Making" will be analyzed at 1:30 p.m. Thursday by Moderator Kelly Bennett, CEO, B3 Insight; Rick McCurdy, vice president of innovation and sustainability, Select Energy Services; Ben Warden, water management supervisor, Diamondback; and Alan van Reet, senior operations manager for water management, Pioneer Natural Resources.

"Water Management Research and Development at the U.S. Department of Energy Office of Fossil Energy and Carbon Management" will be reviewed at 2:15 p.m. by Hichem Hadjeres, produced water program Manager, Department of Energy Office of Fossil Energy and Carbon Management.

There will be a 3:15 p.m. presentation Thursday on federal water case law by Natasha Martin of the Graves, Dougherty, Hearon & Moody law firm and the concluding program will be on seismicity and water liability at 3:45 p.m. with Paul Tough of McElroy, Sullivan, Miller & Weber and Adam Friedman of McElroy, Sullivan, Miller & Weber.

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