Engineering - Hydrologic Engineering; New Findings from Texas A&M University Describe Advances in Hydrologic Engineering [Coupled Fluid Flow and Geomechanical Modeling of Seismicity In the Azle Area (North Texas)]

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2020 NOV 6 (VerticalNews) -- By a News Reporter-Staff News Editor at Energy Weekly News -- Investigators publish new report on Engineering - Hydrologic Engineering. According to news reporting originating from College Station, Texas, by VerticalNews correspondents, research stated, "A series of earthquakes was recorded along a mapped fault system near Azle, Texas, in 2013. To identify the mechanism of seismicity, geologic, production/injection, and seismicity data are gathered to build a detailed simulation model with coupled fluid flow and geomechanics tomodel fluid injection/production and the potential onset of seismicity."

Financial supporters for this research include Texas A&M University Joint Industry Project, Model Calibration and Efficient Reservoir Imaging (MCERI), **Bureau of Economic Geology** Project, TexNet Seismic Monitoring Program.

Our news editors obtained a quote from the research from Texas A&M University, "Sensitivity studies for a broad range of reservoir and geomechanical parameters are performed to identify the influential parameters for injection wellhead pressure and earthquake data. A Pareto-based multi-objective history matching is performed using these influential parameters. The calibrated results are used to identify the controlling mechanisms for seismicity in the Azle area, North Texas, and their relationship to hydrocarbon production and fluid injection in the vicinity. Geomechanical interaction has a significant impact on seismicity in the Azle area. Unbalanced loading created by the difference in the net fluid injection and production on different sides of the fault seems to generate accumulation of plastic strain change, likely resulting in the onset of seismicity. Previous studies ignore fluid withdrawal from gas production. Thus, they seem to have significantly underestimated the fluid withdrawal rates, almost by an order of magnitude. The equivalent bottomhole-voidage fluid rate used in this study suggests a drop in history-matched reservoir pore pressure that is consistent with the observed tubinghead pressure trends. Pore pressure increases may not fully explain the seismicity near the Azle area. Instead, geomechanical effects and strain propagation to the basement appear to be the dominant mechanisms. The low fault cohesion and minimum effective horizontal stress obtained from history matching confirm that the faults must be near or at the critically stressed state before the initiation of fluid production/injection. A sensitivity analysis indicates that the minimum effective horizontal stress and fracture gradient play a critical role in the potential risk for seismicity related to fluid injection/production."

According to the news editors, the research concluded: "A streamline flow pattern further shows that there is no fluid movement in the basement formation and the unbalanced loading from different sides of the fault is more likely the controlling mechanism for seismicity."

This research has been peer-reviewed.

For more information on this research see: Coupled Fluid Flow and Geomechanical Modeling of Seismicity In the Azle Area (North Texas). SPE Reservoir Evaluation & Engineering, 2020;23(3):1006-1018. SPE Reservoir Evaluation & Engineering can be contacted at: Soc Petroleum Eng, 222 Palisades Creek Dr, Richardson, TX 75080, USA.

The news editors report that additional information may be obtained by contacting Rongqiang Chen, Texas A&M University, College Stn, TX 77843, United States. Additional authors for this research include Xu Xue, Jaeyoung Park, Changqing Yao, Hongquan Chen, Akhil Datta-Gupta, Michael J. King, Peter Hennings and Robin Dommisse.

Keywords for this news article include: College Station, Texas, United States, North and Central America, Hydrologic Engineering, Engineering, Texas A&M University.

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