

Mitigation of Induced Seismicity that is Triggered by Hydraulic Fracturing

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Development of low-permeability hydrocarbon resources has increased during the past decade. In some areas, injection-induced seismicity has become a growing concern in application of hydraulic fracturing of low-permeability reservoirs. We examine the current state of knowledge in evaluating the seismic hazard of a geological formation or region prior to beginning a fracturing operation; a particular focus is given to the Alberta and British Columbia, Canada, where we address the feasibility of quantifying geological susceptibility to induced seismicity prior to stimulation. We compare current mitigation methods employed by the oil and gas industry with those described in the literature for related injection scenarios. Our goal is to understand motivating factors that influence mitigation strategies and the source of differences that exist in practice. We validate suggested mitigation methods through data-driven analysis and geomechanical modeling. Finally, we outline possible adaptive traffic-light systems that could help to minimize risk of induced seismicity.

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