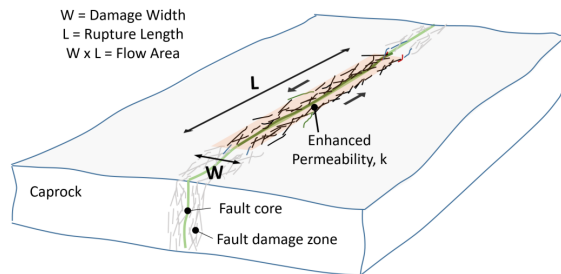
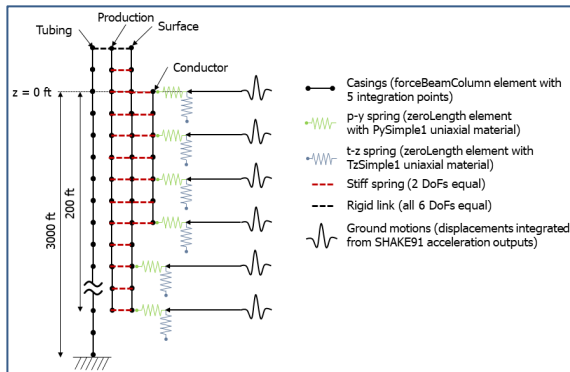


## OpenSRA – Seismic Response of Wells and Caprocks

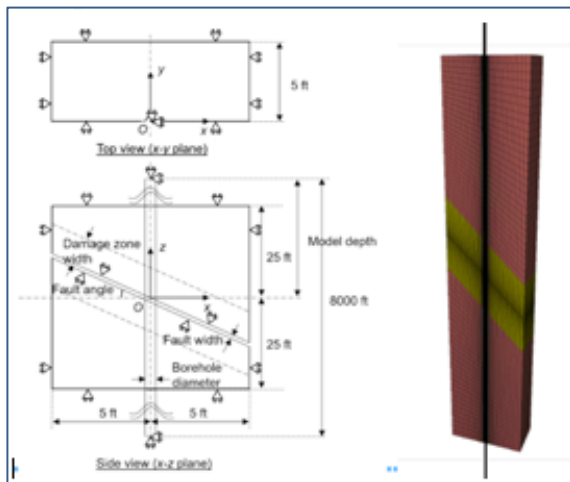
OpenSRA is a new open-source seismic risk assessment software tool for gas utility regulators and owners that will enable them to strategically assess challenges posed by the risk from earthquakes and other geological hazards. OpenSRA includes recent research that assesses the fragility of gas storage wells and caprocks.



Caprock model



Dynamic shaking model



Fault shear model

### Results

- Advanced full-physics numerical modeling developed to assess the seismic performance of underground wells and caprocks.
- Computational modeling includes relevant characteristics of California underground storage facilities and wells.
- Impacts from ground shaking and direct fault shear displacement included in computational modeling of wells and caprocks.
- Uncertainties quantified and reduced for the earthquake assessment of underground storage facilities.

### Benefits & advantages

- Results compiled into OpenSRA to aid in studying earthquake scenarios, prioritizing mitigation efforts, and planning post-earthquake assessments for natural gas systems.
- Fragility curves developed for underground wells and caprocks.
- Reduced uncertainties in the assessment of the response of underground storage facilities to earthquakes.
- System-wide fragilities and prioritization of mitigation will provide *greater reliability* of the overall system. A methodical and rational approach to implementing mitigation *increases safety*.

Rutqvist J., Sasaki, T., Luu K., Jordan P., Zhang Y., Foxall W., Watson-Lamprey J., Largent M., Zheng B. 2022. [Performance-Based Earthquake Engineering Assessment Tool for Natural Gas Storage and Pipeline Systems, Task C Final Report - Seismic Response of Wells and Caprocks](#). California Energy Commission. July 2022 [PEER research report in progress.]