Since 2003, Dr. Scott M. Frailey has been a senior reservoir engineer for the Illinois State Geologic Survey, where he is involved with the technical aspects of the CO2 storage and CO2 EOR programs and provides technical expertise in the areas of reservoir characterization and engineering including pressure transient analyses, core analyses, well log analyses, and reservoir modeling. He is the director of the Center for Geologic Storage of CO_2, an Energy Frontier Research Center sponsored by the US Department of Energy.

Previously, Scott was an associate professor of petroleum engineering at Texas Tech University (TTU) where he taught and conducted research in the areas of formation evaluation, reservoir engineering and CO2 EOR. Prior to joining TTU in 1992, Scott held full time employment and internships with BP Exploration (Alaska), Arco Oil and Gas, and Marathon Oil.

Dr. Frailey graduated from the University of Missouri-Rolla with B.S., M.S., and Ph.D. in petroleum engineering in 1985, 1986, and 1989, respectively. He is a registered professional engineer in Texas, New Mexico, and Illinois.

Assessing the Significance of an Injection Pilot: Implications on a Commercial Storage Project

Abstract

Although expensive, conducting a CCS injection pilot prior to developing a large-scale CCS project can provide information to management that will reduce commercial and environmental uncertainties. A pilot project confirms the presence of a geologic formation that is suitable for storage by evaluating petrophysical properties, the likelihood of occurrence of injection-induced seismicity, and the integrity of a seal (caprock) to ensure containment. The pilot project is the only direct method of determining achievable injection rate and the resulting pressure for a specific perforated interval within the geologic formation tested. The challenge is to scale the injection rate and pressure and storage capacity (cumulative injected CO2) from the pilot project specifications to those required for a commercial project. The issues are differences between injection fluids (e.g. brine or CO2), duration of injection, the height of the perforated interval (permeability-thickness required), and location of the perforated interval within the geologic formation (uncertainties regarding microseismicity, plume size, and distribution). If the commercial project's risk is primarily injectivity and capacity, then a test well with water injection at various rates into a geologic formation, for which core permeability data and a reliable permeability-porosity correlation exist, may be successfully used to scale to CO2 injection rate. If CO2 can be used for the pilot study, more confidence can be given to the pilot project's results. The continued use of the pilot project's injection well, availability of CO2, and ability to extend height of perforated interval and effectively plug previous perforations are important considerations for the decision to conduct a pilot project.