

Methodology for Combining Old Log Suites with Modern Modeling Technology, Louden Oil Field, Illinois Basin, James R. Damico, Rex Knepp, and John P. Grube, Illinois State Geological Survey, 615 E. Peabody Dr., Champaign, IL 61820, damico@isgs.uiuc.edu

In mature fields lacking modern porosity logs, it is often difficult to obtain data necessary for the reservoir modeling and simulation that must precede EOR tests using CO₂. Louden Field is one such field, having been discovered in 1937 and developed in the 1930's and 1940's. Though wells form a tight, 10-acre grid, not all were logged and few have more modern logs than an SP-Resistivity suite. For 138 wells in the model area, 62 logs and 17 cores were available.

The first test of CO₂ EOR is a huff-n-puff technique applied to a Chesterian Cypress Sandstone producer, the Owens #1. Cypress reservoir bodies in the Illinois Basin are usually coalescing lenticular "pods" some 200 acres in area and 10 to 20 feet thick. According to geological mapping, Owens #1 lies near the southwestern extremity of a typical pod.

To generate a useful reservoir model it was necessary to convert SP—the log curve most nearly independent of hydrocarbon content—to a sand/shale curve through normalization. The normalized data were then used to characterize the reservoir using two different geostatistical models: plurigaussian and turning bands. These models served as the basis for geological input to simulating CO₂ injection.

The normalized SP curves were cross-plotted against the 17 core analyses to obtain regression curves relating SP to permeability and permeability to porosity. Estimated values at cored wells were overwritten by analytical values during modeling. The permeability and porosity models were submitted to reservoir simulation along with the reservoir model after upscaling.