

**AAPG Annual Convention
Salt Lake City, Utah
May 11-14, 2003**

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CO₂ Pilot Results, Belridge Diatomite, Lost Hills, California

This paper describes the results to date of a jointly funded DOE/ChevronTexaco CO₂ pilot project in the Lost Hills Field, Kern County, California. Based on the results of CO₂ injectivity tests performed in the field in 1999, a pilot project was initiated in 2000. The pilot consists of four inverted (injector-centered) 5-spot patterns covering approximately 10 acres, and is located in a portion of the field that has been under waterflood since 1992. The target reservoir is the Belridge Diatomite of the Monterey Formation. The pilot location was selected based on geology, reservoir quality and reservoir performance of the waterflood. The goal of the CO₂ pilot has been to resolve issues associated with CO₂ utilization rate, premature CO₂ breakthrough, and overall uncertainty in the unproven CO₂ flood process in diatomites and siliceous shales.

A comprehensive monitoring and surveillance program has been implemented for the pilot. This paper summarizes the injection and production performance and the monitoring results to date, including CO₂ injection tracers, crosswell electromagnetics, crosswell seismic, CO₂ injection profiling, cased-hole resistivity, and tiltmeter data. While initial results were promising with good injectivity and oil response, later monitoring efforts showed early CO₂ breakthrough and sanding of producers. Also monitoring efforts showed that while some of the CO₂ was entering the diatomite, the early breakthrough of CO₂ was due to the existence of fractures and faults. The results presented in this paper may be applicable to evaluate and design other potential San Joaquin Valley CO₂ projects.