

# **CO<sub>2</sub>-rock-brine interactions in Lower Tuscaloosa Formation at Cranfield CO<sub>2</sub> sequestration site, Mississippi, U.S.A.**

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### **Abstract:**

A highly integrated geochemical program was conducted at the Cranfield CO<sub>2</sub>-enhanced oil recovery (EOR) and sequestration site, Mississippi, U.S.A. The program included extensive field geochemical monitoring, a detailed petrographic study, and an autoclave experiment under in situ reservoir conditions. Results show that mineral reactions in the Lower Tuscaloosa reservoir were minor during CO<sub>2</sub> injection. Brine chemistry remained largely unchanged, which contrasts with significant changes observed in other field tests. Field fluid sampling and laboratory experiments show consistently slow reactions. Carbon isotopic composition and CO<sub>2</sub> content in the gas phase reveal simple two-end-member mixing between injected and original formation gas. We conclude that the reservoir rock, which is composed mainly of minerals with low reactivity (average quartz 79.4%, chlorite 11.8%, kaolinite 3.1%, illite 1.3%, concretionary calcite and dolomite 1.5%, and feldspar 0.2%), is relatively unreactive to CO<sub>2</sub>. The significance of low reactivity is both positive, in that the reservoir is not impacted, and negative, in that mineral trapping is insignificant.

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