# $CO_2$ recycling accounting and EOR operation scheduling to assist in storage capacity assessment at a U.S. gulf coast depleted reservoir

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## Abstract

From the start of $CO_2$ injection on July 2008, through August 31, 2011, ~3 million metric tons of $CO_2$ have been stored in the lower Tuscaloosa Formation at Cranfield, Mississippi. We used the field to illustrate the importance of two operational choices on $CO_2$ storage capacity: (1) reinjection of $CH_4$ with the recycled $CO_2$; and (2) injection rate in the presence of a spill point in the storage structure. The overall amount stored in the reservoir is approximately the amount purchased, corrected for the presence of impurities. We present a procedure to estimate how much $CO_2$ is stored in an arbitrary volume smaller than that of the reservoir. The mass stored is corrected for $CH_4$ and accounts for produced and recycled $CO_2$. The procedure was applied to estimate the amount of $CO_2$ stored in two Cranfield compartments, which are separated by a non-transmissive fault. We also investigated factors impacting storage capacity in EOR-then-storage and pure-storage contexts, with both being constrained by non-desirable migration of $CO_2$ out of the reservoir through a spill-point. As expected, the longer the EOR operations continue, the larger the amount stored relative to the pure storage case. Although never large, the 14% gain in a hypothetical simplified model of the Cranfield reservoir, is strongly dependent on the injection/production strategy used.