

## Clay Mineralogy and Formation Water Salinities of Upper Wilcox Sediments, Righthand Creek Field, Allen Parish, Louisiana

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### Abstract

Formation waters in the Wilcox Formation of the Louisiana and Texas Gulf Coast typically show a freshening downdip as overpressured conditions are encountered. In some instances salinities drop significantly below normal seawater values, even in sediments that were deposited in a marine environment. The origin of these low salinity waters is still conjectural, although meteoric flushing, membrane filtration, and release of water during the smectite to illite transition have been proposed as mechanisms. Understanding the origin of these waters is thus important in understanding the regional paleohydrogeology and diagenetic history of the Wilcox.

Produced waters from upper Wilcox sediments in the Righthand Creek Field in southwestern Louisiana have salinities as low as 9,000 to 10,000 mg/L or approximately 1/3 the salinity of seawater. A study was conducted of the clay mineralogy of sidewall cores over a depth interval from approximately 11,000 to 11,550 feet to determine whether or not there was evidence for the smectite to illite transition having occurred in these sediments. The clay minerals in the sands within this interval are typically dominated by kaolinite and chlorite. The mudstones, in contrast, are dominated by smectite, kaolinite, and illite, and the smectite-illite transition has not yet occurred in these sediments. If the low-salinity waters at Righthand Creek are the products of dehydration, it is unlikely that they have been produced by in situ reactions and are instead waters that have been expelled from underlying and/or downdip, overpressured sediments where the transition is known to have occurred.