

Influence of Hydrothermal Dolomitizing Fluids on Basinal Sediments: Devonian of Western Canada

Ron Spencer and Tom Weedmark

XRF Solutions

A large body of information is available from studies of dolomite from the Devonian of western Canada performed over about 20 years beginning in the mid 1980's. Many of these studies rely on fluid inclusion and stable isotopic data to interpret the origin of the dolomite. These data include information on the temperature and composition of the dolomitizing fluids and the timing of the dolomitization. High temperature fluids ascended faults and contacted carbonates resulting in dolomitization. Much of the dolomitization occurred along platform margins.

The same structures that controlled the upward rise of the high temperature dolomitizing fluids can be traced into the adjacent basins. The potential influence of these fluids on sediments in the basin is examined here. Temperatures of dolomitization are highest in the Slave Point system of northeast British Columbia (near 200 C) and systematically decrease into south-central Alberta (near 100 C). There are significant changes in the Horn River – Muskwa – Duvernay basinal sediments that can also be explained in terms of decreasing temperatures. These include the amount and nature of quartz cementation and the presence of minerals associated with high temperature fluids.

The interaction of the high temperature fluids in the basin appears to be responsible for the preservation of high amounts of organic carbon. These fluids are also responsible for the cementation of the shale, which controls the mechanical properties. Understanding the influence of these hydrothermal fluids on the sediments in the basin improves the ability to characterize and exploit these unconventional reservoirs.