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Hydrothermal Dolomite Reservoirs—A Play Whose Time Has Come

Fracturing, dolomitization, and solution can create permeability and porosity in tight limestones forming attractive exploration targets. The reservoirs result from migration of hot, saline fluids from the basin center to the margins via regional aquifers, unconformities, and faults. The brines also cause maturation of source rocks. Compressional deformation is necessary to form uplifts, which provide the hydraulic head driving the brines, and to reactivate basement faults that act as fluid conduits.

These reservoirs develop in platform carbonates and are associated with Mississippi Valley type mineralization. Initial lithologies affect the style of the resultant reservoirs. In strata with some effective permeability and porosity such as Ladyfern field, British Columbia/Alberta, and Dover field, Ontario, dolomitization enhanced matrix permeability and porosity over a broad area. At Albion-Scipio field, Michigan (tight grainstones and wackestones), or Glodes Corners field, New York (argillaceous limestones and lime mudstones, the reservoir is restricted to a narrow zone of dolomitization and solution-enhanced fractures along a fault zone.

These traps are attractive because they are under-explored, can produce at high rates and have high recovery factors. Prospective areas can be delineated by integration of standard geologic techniques to identify potential reservoir units in a favorable setting with regard to brine migration and focusing, and hydrocarbon generation and migration. Potential fields and remote sensing data are effective tools to identify faults that may be zones of focused hydrothermal fluid flow. Seismic can identify collapse synclines and dimout zones indicative of reservoirs; 3-D seismic surveys may be necessary to delineate heterogeneous reservoirs.