

Analysis of Low-Permeability Intervals in a Heavy Oil, Braided Stream Deposit Using a Combination of Core and Log Analysis, Kern River Field, California

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The Kern River field is located in Kern County, California, immediately adjacent to the city of Bakersfield. This giant oil field has produced over a billion barrels of 12°API-gravity crude during the last 105 years from a Mio-Pleistocene braided stream deposit. Estimated reserves are still substantial. Daily production of nearly 100,000 BOPD places this field in the top five producing fields in the country. Reductions in reservoir quality due to lower-permeability siltstones and minor amounts of clay are leaving pockets of reservoir rock with residual oil saturations that are 10-30 saturation units higher than the adjacent rock with higher permeability. An attempt to produce the oil has been marginally successful. Much of the lower-quality reservoir rock is already heated to 220°F or greater and gives little indication of draining in a timely manner. A study is underway to determine whether the lower-permeability rocks could be accessed with short horizontal wells drilled to introduce steam and pressure directly into these intervals, thereby inducing the hydrocarbon to migrate into the better reservoir rock where it may be produced; or to use the laterals as producing wells and attempt to drain the low-permeability reservoir rock from a horizontal well which will contact more of the reservoir. Seventy cores taken over the last 20 years are being reviewed, along with core photographs, wireline logs, and 3-D models, to determine how extensive the targets are for a pilot project. Two wells are reviewed here to present the general scope of the project.