

Codell Continuous Oil Accumulation in the Northern Denver Basin as Defined by Resistivity, Density, and SP Logs

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Abstract

A continuous Codell Sandstone oil accumulation is present in the northern Denver Basin downdip from water-wet Codell. The Codell oil accumulation can be defined by resistivity, spontaneous potential (SP), and density logs. Updip from the oil accumulation, average deep resistivity of the Codell decreases to below 4 ohm-m, SP response increases, and density porosity increases. Codell sandstones are continuous across the transition from downdip oil to updip water, so the updip seal does not seem to be caused by a stratigraphic trap. The transition corresponds to a change in thermal history; the area of the oil accumulation was subject to much higher heat flow than the updip wet area. This thermal maturity may have had an impact on clay diagenesis and quartz cementation resulting in reduced porosity and permeability in the more thermally mature part of the Codell. This paper presents a wireline log-based workflow that can be used to identify and map regional changes in thermal maturity that control hydrocarbon accumulations and sweet-spots in low-permeability rocks such as the argillaceous Codell Sandstone.

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