Second White Specks Formation: New Concepts for Understanding Fractured Reservoirs

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Abstract

The Upper Cretaceous Second White Specks Formation is a fractured, marine, interbedded shale, siltstone, and fine-grained sandstone. This unit is part of the Colorado Group (Alberta Group), which also includes the Cardium and Viking formations and was deposited in the Cretaceous Seaway during a relatively quiet tectonic period of the building of the western Canadian Cordillera. The Second White Specks has been characterized as a zone with numerous hydrocarbon shows, but to date it has not shown the repeatable success needed to establish a resource play.

Despite the lack of repeatability, there have been a few notable individual wells within the zone that have produced over one million barrels of liquid petroleum from vertical drill holes. In these cases the well appears to have intersected a regional natural fracture system that has delivered significant volumes of hydrocarbons. In resource plays there is an ongoing debate over the merits of matrix permeability versus the permeability of the natural fracture system. In the case of the Second White Specks Formation, the natural fracture system dominates the permeability system.

A paradox in the exploration/production endeavor is that wells are positioned and drilled to find hydrocarbon storage but are completed to maximize rate and deliverability. In this procedure the natural delivery system is ignored (natural fractures) in the belief that well stimulation and induced hydraulic fractures can replicate or improve upon the natural system. Flow from the rock is a complex interplay of varying fracture apertures, access to the hydrocarbon-generating system, development of elevated fluid pressures, fluid compatibility, and resistance to flow within the rock. Successful wells appear to access large natural fluid pathway systems such that the mega-fracture network connects effectively with the micro-fracture system.