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Combining New and Old Approaches to Discover New Value in Mature Fields, Permian Basin, West Texas

Mature fields discovered in the mid-20th century contained vast original in-place reserves that have been produced for decades. Distribution of original in-place and remaining reserves must be derived from various vintages and qualities of geoscience and engineering data, combined with incomplete and occasionally murky histories of production and injection practices. Discovering new value within these fields requires integrating new and old data, technologies, approaches, and subsurface models to identify and cost-effectively develop additional reserves.

Cherty limestones comprising the 250 m-thick Devonian ThirtyOne Formation are prolifically productive in faulted anticline fields of the Midland Basin, West Texas. New logs have identified unrecognized pay, which has been developed through horizontal drilling or multi-stage fracture stimulations in vertical wells. A combination of post-stack processing and seismic attribute mapping has identified numerous small-offset faults within the field. Production characteristics indicate fracture plus matrix reservoir behavior (type 2 of Nelson, 1985), leading to an updated description of reservoir property distribution, and revised criteria for choosing and ranking prospects.

The best results come from new data and technologies fused with proven approaches such as data mining and rigorous reservoir description. Superficial examination of the Silurian zone in one Delaware Basin field indicated potential for 10 bcf or more offsetting uneconomic recoveries. Detailed reservoir description shows the high-reserve Silurian wells are juxtaposed across faults against thicker Devonian reservoir zones, suggesting a complicated pattern of fluid connectivity through matrix and fault/fracture trends. Hence discovering new value in mature areas requires fusion of new and old approaches.