Hydrocarbon Generating Potential of the Spraberry Formation in the Midland Basin

Jackie Reed[1], John Zumberge[2], and Stephen Brown[2]
[1]Reed Geochemical Consulting, Houston, Texas [2]GeoMark Research, Inc., Houston, Texas,

The combined Permian Wolfcamp/ Spraberry production in the Midland Basin (Wolfberry play) has typically involved only vertical Spraberry completions. However, success of relatively recent, unconventional, horizontal Spraberry wells as measured by some notable IPs in excess of 975 BOEPD, has led to its closer examination as a source. Like the Wolfcamp, the Spraberry is a heterogeneous formation composed of primarily low permeability siltstones, sandstones and some organic silts and calcareous mudstones.

New regional geochemical analyses of the Spraberry sediments (Upper Spraberry, Middle Spraberry, Jo Mill and Lower Spraberry formations) show they contain zones of moderate to good organic richness, generally 2-4% TOC. However, sediment maturity across some of the productive area, indicates the Spraberry is immature to early mature and cannot be generating all the hydrocarbons it is producing.

Depth profiles of quantitative sediment solvent extraction, extract characterization and pre and post extracted sediment data for a well in Dawson County clearly show the presence of migrated, mature hydrocarbons within a productive zone in the Spraberry. The maturity of this zone is in distinct contrast to that of the in situ generated Spraberry hydrocarbons both above and below the productive zone.

Comparison of the geochemistry (isotopes and biomarkers) of the migrated Spraberry hydrocarbons to oils from GeoMark's Permian Basin oils database of over 600 samples, indicates the migrated hydrocarbons are generated from the Permian Wolfcamp formation. Therefore, an element of successful exploration for

Spraberry hydrocarbons requires charge access to mature Wolfcamp sediments.