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DEVELOPMENT OF THE MONTEREY SHALE WITH HORIZONTAL WELLS, 29R ANTICLINE, ELK HILLS, CA (2003)

The 29R Structure is a northwest trending anticline located in the southwestern part of the Elk Hills Field, in the Southern San Joaquin Valley, California. The anticline is approximately 7 miles long by 1.5 miles wide, with a 1,750 foot oil column in the Miocene Monterey Shale. The structure appears to be a blind thrust complex, with the anticline in the form of an asymmetric fold, over-steepened to the northeast, and currently collapsing at its crest. The crestal collapse feature appears to be a complex, normal fault zone, elsewhere a thrust zone, and locally a chaotic mixture. Repeat sections, some as thick as 250 feet, are present in some wells. The structure is believed to be part of a transpressional, or strike-slip regime, associated with the nearby San Andreas Fault.

Reservoir rock types include quartz phase porcelanite, opal CT phase porcelanite, chert, and sandstone. Of these rock types, chert is the most prone to fracturing, followed by quartz phase porcelanite. These rock types are commonly interbedded deeper in the Monterey Shale section. Therefore, fracturing is expected to become increasingly abundant with depth in this rock type in the 29R Structure. Fractures can provide highly permeable pathways for bottom water to break through into the oil column. For this reason it was decided to determine the most likely orientation of open, or critically stressed, fractures by conducting a detailed stress field analysis. Forty borehole imaging logs and over 200 mini frac pressures were used in this study. Results indicate that horizontal wells drilled in a northeasterly orientation, or parallel to the maximum horizontal stress, are most likely to avoid large scale, open fractures which can cause early water breakthrough.