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APPLICATION OF SCAT (STATISTICAL CURVATURE ANALYSIS TECHNIQUE) TO DEFINE A COMPLEX FAULTED RESERVOIR MODEL - 24Z STEVENS SANDS, ELK HILLS FIELD, CALIFORNIA

The 24Z reservoir is a 1000' thick Miocene Stevens turbidite sand accumulation deposited perpendicular to the NW trending 29R structure. 24Z was previously mapped as a simple NW trending anticline with sand channel edge trapping to the East and West. Downdip water injection supported oil production and prevented gas cap expansion resulting in ultimate recovery estimates of about 45% of OOIP. Additional EOR efforts appeared uneconomic. 24Z is now interpreted as being complexly faulted with additional opportunities.

Drilled in early 2000, well 74N-24Z displayed anomalous thickness and confusing correlation. The EMI/dipmeter log, interpreted using the SCAT technique, revealed several thrust faults. Since thrust faulting had not previously been considered at 24Z, dipmeters from adjacent wells were reinterpreted using the SCAT technique, revealing additional thrusting. A complete SCAT review of all dipmeters in 24Z resulted in a new structural interpretation. Now interpreted as a partial "flower structure", more than 10 thrust faults and at least one significant cross fault divide 24Z into numerous blocks. Seismic control in the area is poor but consistent with this interpretation as are production anomalies and limited RFT pressure gradient analysis.

The structural review led to drilling several wells to test downdip fault blocks which proved uneconomic due to additional faulting although minor oil production was established. Mainbody infill drilling for bypassed oil has shown mixed results. Current efforts focus on 3D geological model building and simulation to evaluate waterflood potential of interior blocks not adequately affected by the earlier flank injection.

SCAT analysis has proved useful in unlocking the structural picture of 24Z and led to additional infill and step-out drilling as well as suggesting additional EOR potential. SCAT is being applied elsewhere at Elk Hills to reveal faulting which may lead to explanations for known production anomalies as well as additional drilling opportunities.