**3D Structural Analysis of the Ventura Avenue Anticline, California: Reinterpretation of a Classic Contractional Anticline Using Modern 3D Methods**

Hauge, Thomas A.[1]; Glascock, Michael [2]; Harris, John [3]; Schwalbach, Jon [4] (1) Hauge Geoscience, Seattle, WA. (2) Aera Energy LLC, Bakersfield, CA. (3) Numeric Solutions, Ventura, CA. (4) Aera Energy LLC, Ventura, CA.

The Ventura Avenue anticline (VAA) is a tightly folded anticline with surface expression ~15x2 miles, north of the Oak Ridge trend of the western Transverse Ranges of southern California (e.g., Yeats, 1983). We are building a 3D structural model of the VAA to provide a framework for geologic models to optimize secondary and tertiary recovery projects. Data consist of logs, stratigraphic tops, fault-zone picks, and pressures from ~2000 wells, available digitally and as excellent serial 2D paper cross sections spaced at 500-1000' intervals. The cross sections, interpreted by previous workers over several decades, indicate limb dips of up to 50-60o in accord with surface geology, and folded fault zones up to 600' thick. We confirmed the stratigraphic picks of the well logs and reinterpreted the structure using 2D section construction and restoration software. We imposed uniform stratal thicknesses on 10 key intervals, reinterpreted the thick fault zones as discrete fault surfaces bounded by zones of steep dips, and linked the previously interpreted faults (all ramps) with a few stratigraphically restricted bedding-plane detachments. We restored representative sections to demonstrate kinematic admissibility. The 2D sections formed the basis for the 3D structural model. In 3D, we evaluated the cross sections for along-strike consistency, honored the 3D well tops, and created smooth fault surfaces and fault cutoffs. The resultant model is consistent with subsurface pressure data that indicate compartments bounded by stratigraphic units and faults that seal on production time scales.

Yeats (1983) interpreted the faults of the VAA as ramp-flat thrusts that formed in two separate phases, with an older (Taylor) fault family crosscut by a younger (Barnard); the Taylor predated formation of the VAA, and the Barnard was coeval with the VAA. In the eastern portion of the anticline we interpret the Barnard faults as merging upward into Taylor system detachments rather than cross-cutting the older faults as per Yeats. In the western portion of the anticline, which was the main focus of Yeats' analysis, we agree that the older faults are offset by the younger. The assumption of uniform bed thicknesses proved robust over most of the area we have analyzed, but in several areas of very steep dips the beds are structurally thinned. Our results to date indicate a structural geometry that is complex but easily understood in the context of typical processes of thrusting.