**AAPG Annual Convention**
**Salt Lake City, Utah**
**May 11-14, 2003**

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**Facies Architecture of a Diatomite-Sandstone Reservoir from Integrated Core and Log Analysis, Lost Hills Field, California**

Integrated core and log analysis enable interpretation of parasequence stacking patterns and facies architecture of the Upper Miocene Belridge diatomite, a diatomite-sandstone reservoir at Lost Hills field in the San Joaquin Basin, California. Core analysis indicates a 670- to 1060-ft thick reservoir (0.5-0.8 my duration) of <100 feet thick, coarsening- and shallowing-upward cycles (parasequences) with diatomite bases, sandstone tops, and flooding surfaces between cycles. Helminthopsis burrows in diatomite half-cycles indicate slow pelagic sedimentation (possible deepening), whereas Teichichnus burrows in the sandstone tops indicate rapid, land-derived sedimentation (possible shallowing).

Core to well log calibration enabled derivation of log algorithms to calculate reservoir properties that populate a 1,000-well 3-D geologic model. Integrated core, log and model analysis reveals progradational parasequence stacking patterns within the Belridge that delineate three seismic-scale (150-500 ft thick) depositional sequences with hiatal and/or erosional surfaces between sequences. Basinward thickening of diatomite half-cycles contrasts basinward thinning of sandstones. Pliocene onlap, stratigraphic thinning, and model-derived lithologies indicate deposition on a faulted anticlinal high analogous to the modern Lost Hills structure. Also, stratal thickening on the downthrown sides of faults, and thinning over flexures evidences deformation concurrent with diatomite deposition. Interestingly, concentration of diatomite on the crest of the Lost Hills paleo-high, with clastics on the flanks, indicates a paleotopographic depositional control. Because core constrains an extensive log database, the Lost Hills model provides a valuable tool for predicting reservoir behavior, demonstrating the potential of a core-based approach to reservoir management.