

KEYES, PAUL L., Humble Oil & Refining Co., New Orleans, LA 70160

JURASSIC GEOLOGY OF FLOMATON FIELD AREA OF SOUTHERN ALABAMA

Flomaton field, in Escambia County, Alabama, is the first major gas condensate discovery from the Jurassic Norphlet Formation in Alabama. Structurally the field is a NW-SE trending, low-relief salt feature bounded on the north and east by a major down-to-the-basin fault which is part of the Pickens-Gilbertown-Pollard regional fault system. The Norphlet sandstone reservoir is about 60 ft thick and produces CO₂ and sour gas with a high condensate yield.

The paleostructural history of the area indicates that movement of Louann salt and faulting occurred, probably as a result of gravity slide and basinward salt creep, forming structures capable of trapping hydrocarbons. Jurassic deposition was affected by these early structural features and by presalt topography that existed updip from the Flomaton area.

Norphlet clastics were derived from the northeast and deposited by braided stream systems. As the Jurassic Smackover seas transgressed the area, the upper part of the Norphlet was partly reworked. In the Flomaton area, the overlying Smackover Formation is a dark-brown, dense, micritic limestone. Above the Smackover, the Haynesville Formation can be subdivided into upper and lower members with the upper Haynesville consisting of predominately red, coarse clastics and the lower member being fine, red clastics and evaporites. At Flomaton, over 300 ft of bedded salt has been drilled in the lower Haynesville causing many drilling and completion problems. The Cotton Valley Group marks the top of the Jurassic and consists primarily of coarse, gravelly clastics.

KING, ROBERT E., Comoro Exploration Ltd., New York, N.Y. 10017

STRATIGRAPHIC EXPLORATION SYMPOSIUM—SUMMARY

Despite the existence of some truly giant oil and gas fields as well as numerous smaller ones in stratigraphic traps, purposeful search for such traps has been less rewarding than exploration for structural ones. Seismic exploration has been successful in mapping reefs, but definition of wedgeouts of porous clastic reservoirs is generally beyond the limits of resolution of seismic methods.

Basins with a record of tectonic instability, with important unconformities and overlaps, and with alternations of marine, paralic, and fluvial facies are likely to contain numerous clastic stratigraphic traps. Stable but continually subsiding evaporite basins or stable shelves bordering evaporite basins or troughs where fine clastics were deposited are the chief sites for reef development. In the parts of basins where structural relief is low, most of the hydrocarbons are likely to have been trapped stratigraphically.

Systematic search for stratigraphic fields, coordinating the results of seismic surveys with detailed stratigraphic studies, followed by drilling of wells by operators who are willing to assume higher than normal dry hole risk, will continue to be the principal exploration method for finding stratigraphic oil and gas fields unless a direct method of oil finding is discovered. Contributors to this symposium have shown how improvement of the techniques of stratigraphic analysis are enabling explorationists to identify their objectives with greater precision.

KLEIN, GEORGE DEVRIS, Dept. Geol., Univ. Illinois, Urbana, IL 61801

ENVIRONMENTAL MODEL FOR SOME SEDIMENTARY QUARTZITES

Precambrian, Cambrian, and Ordovician orthoquartzites in Scotland, California, and Nevada are characterized by primary features that are indicative of sediment transport by tidal currents. Sedimentary structures in these quartzites are grouped as follows. *Association 1.* cross-stratification organized into heringbone sets with bipolar-bimodal orientation; parallel laminae; *Association 2.* reactivation surfaces; multimodal frequency distributions of cross-strata set thicknesses; bimodal frequency distributions of cross-strata dip angles; *Association 3.* interference ripples; ripples superimposed at 90 and 180° on underlying cross-strata and slip faces of dunes and sand waves; *Association 4.* tidal bedding; flaser bedding; lenticular bedding; and *Association 5.* burrows, including escape structures.

Suggested tidal transport mechanisms are: *Association 1.* reversing tidal current bedload transport; *Association 2.* time-velocity asymmetry of tidal current bedload transport; *Association 3.* ebb-emergent sheet-runoff; *Association 4.* alternation of tidal bedload and mud suspension deposition; and *Association 5.* organic reworking.

These observations indicate that some orthoquartzites are analogs to modern tidal sand bodies. Association of orthoquartzites with (1) mudstones containing flaser, tidal, and lenticular bedding, and (2) shallow subtidal, intertidal, and supratidal carbonates, indicates that perhaps many orthoquartzites are tidalites (sediments deposited by tidal bedload transport, tidal fluctuations, alternation of bedload and suspension deposition, and suspension slack water deposition). A tidal sediment transport model for sedimentary quartzites is consistent with their extensive areal distribution patterns (averaging 23,000 sq km) on Paleozoic and Mesozoic platforms.

KOCH, W. JERRY, Shell Development Co., Houston, TX 77001

LOWER TRIASSIC LITHOFACIES OF CORDILLERAN MIOGEOSYNCLINE, WESTERN UNITED STATES

The Lower Triassic marine formations of the Cordilleran miogeosyncline (Dinwoody, Thaynes, and Moenkopi) make up a wedge-shaped body that intertongues on the east with redbed shelf deposits (Chugwater and Moenkopi). The miogeosynclinal strata are limestones with minor amounts of shale, siltstone, and sandstone. The shelf deposits are redbeds with tongues of nonred siltstone, sandstone, dolomite, limestone, and evaporites.

Carbonate tongues in the redbeds in eastern Utah consist of oolites and poorly sorted echinoderm-rich limestones. There are no obvious lateral facies changes and the deposits appear to have formed in a shallow, laterally extensive sea.

In most areas, however, lacustrine or shallow-marine redbed environments passed westward into a sand channel—oolite bar complex or into tidal flats with intraformational conglomerate channels. Seaward, lagoons (burrowed muds) and offshore banks (echinoderm-rich wackestones and oolites) were present. Farther seaward open marine (gray bioclastic limestones and tan calcareous siltstones) and euxinic basin (black limestones and shales) conditions existed.