

HARDING, T. P., and R. C. VIERBUCHEN*, Exxon Production Research Co., Houston, TX, and NICHOLAS CHRISTIE-BLICK, Lamont-Doherty Geol. Observatory, Palisades, NY

Structural Styles and Plate-Tectonic Settings of Divergent (Transtensional) Wrench Faults

A divergent (transtensional) wrench fault is one along which strike-slip deformation is accompanied by a component of extension. Faulting dominates the style and can initiate significant basin subsidence and sedimentation. The divergent wrench fault is distinguished from other wrench faults by predominantly normal separation on successive profiles, negative flower structures, and a different suite of associated structures. En echelon faults, most with normal separation, commonly flank the zone and exhibit evidence of external rotation. Associated folds are predominantly vertical drag and forced flexures parallel and adjacent to the wrench. Hydrocarbon traps can occur in fault slices within the principal strike-slip zone, at culminations of forced folds, in adjacent tilted fault blocks, and within less common en echelon folds.

The divergent wrench style may develop within transform systems where major strands splay or bend toward the orientation of associated normal faults (e.g., San Andreas fault zone in Mecca Hills). The style also occurs where wrench faults overstep in a divergent sense, or where regional plate motion is obliquely divergent to a linear fault (e.g., southern Dead Sea fault). Within extensional settings, divergent wrench faults may develop at graben doglegs or oversteps (e.g., between the Rhine and Bresse grabens) and may separate regions that experienced different magnitudes of extension (e.g., Andaman Sea area; Furnace Creek fault zone, California). The style has also been recognized in magmatic arcs and backarc settings (e.g., Lake Basin fault) near convergent plate boundaries and in intraplate basins (e.g., Cottage Grove fault system).

HARRIS, JOE W., Consulting Geologist, Kihei, Maui, HI

A Microcomputer Geologic Well Data Management System

A well data management system, geoGRAM, is used to store historical well data and current data from geologic studies of the Rocky Mountain area. The program is a state-of-the-art data-base management system with the ease of use required by the geologist with limited computer experience. It allows the geologist to design map data files to suit the geology of the local or regional study area. Well record formats can handle information on 48 zones and, depending on disk capacity, store from 1 to more than 30,000 wells in each file. User-defined defaults for formation names and other data allow data to be entered mostly from the numeric keypad. Data stored is that normally gleaned from scout tickets, test reports, and well log analysis. The program automatically calculates elevations and potentiometric surfaces and any user-selected thicknesses and ratios. It allows data input in both metric and traditional units, and output in units the user selects.

Access to stored data and report writing are as simple as data entry. The file access method allows rapid on-screen viewing of records either by random access to individual well records or by "thumbing through" the file using a single keystroke. Well records may be shown on the screen singly or displayed side by side for data comparison on a 132-column screen. Printouts are provided with single-well cards holding up to 48 lines of data with graphics showing well location, API well symbol, and user-selected symbols to indicate producing zones. Multiwell listing on either printer or CRT screen is also provided. Report design including data selection, column layout and headings is accomplished entirely by menu selection.

In addition to the file data output to the CRT screen and the 2 hard-copy printout methods, file data may also be transferred to mainframe computers for graphics or other special processing by modem, disk, or tape using IMB 3740 protocol.

HARWOOD, GILL M., The University, Newcastle upon Tyne, England, and KATHY A. MCGILLIS, Louisiana State Univ., Baton Rouge, LA

Location of Gilmer Shelf Margin, Upper Jurassic, East Texas Basin

Regional stratigraphic correlations, based on wireline logs, have defined a distinctive sequence of shales within the Bossier Formation.

This lower Bossier shale member, of near constant thickness, extends across the East Texas basin into Louisiana. The overlying upper Bossier shale member thickens markedly to the south and east but northward and westward intertongues with Schuler Formation siliciclastics. Below the lower Bossier shale member a shale-dominated sequence with carbonates exists in some parts of the East Texas basin. This Gilmer shale member thickens to over 500 ft (150 m) in Panola and Harrison Counties and Louisiana, but is thin or absent over the Gilmer shelf margin, where lower Bossier shales rest on Gilmer limestone buildups. Across the center of the East Texas basin the Gilmer shales average 100-150 ft (30-45 m). The continuation of the conformable, uniform lower Bossier shale member across the basin implies some time equivalence of, at the least, the thicker Gilmer shales with the massive undifferentiated Gilmer/Smackover carbonates within the East Texas basin.

The Gilmer shelf margin is situated where this carbonate succession passes laterally into eastward-derived shales; the margin is east-facing and east of the basin depocenter, trending through Upshur, Smith, and Rusk Counties. A subsidiary trend in the Gilmer limestone on the northwestern and western flanks of the basin is controlled by the presence of an underlying Buckner carbonate barrier. Only in the northeast of the basin is the Gilmer shelf margin coincident with earlier shelf edges. This reevaluation of the Gilmer shelf margin presents a major target for future hydrocarbon exploration.

HATTIN, DONALD E., Indiana Univ., Bloomington, IN

Rudists as Historians—Smoky Hill Chalk Member (Upper Cretaceous), Kansas

Remains of Smoky Hill rudists yield a wide spectrum of data relating to growth attitude, nature of substrate, death, and postmortem events. Well-preserved skeletal remains of these organisms occur mainly in the lower half of the Smoky Hill Chalk Member, and are most common in a highly fossiliferous interval that lies approximately 23 m (75 ft) above the base of a recently established reference section. Early records of Great Plains explorations suggest that extensive collecting accounts in part for low apparent specimen density. Among the many *Durania* specimens examined during this study, including numerous nearly intact lower valves, few have closely similar morphology. Specimens are solitary or compound, thin walled to thick walled, tall-conical to short-discoidal, symmetrical to highly asymmetrical in lateral aspect, and have little to extreme lateral expansion of last-formed parts of the valve wall. Wide morphological variability manifests adaptation to unstable substrate conditions, and compensation for gradual tilting or abrupt toppling as specimens approached adult size. Distribution of epizoans, particularly oysters, permits assessment of specimen orientation during life and after death, especially by defining sediment-water interfaces. Epizoan distribution also furnishes evidence of pre-burial fragmentation of Smoky Hill rudists. Texture and structure of enclosing chalky sediments are consistent with a low-energy depositional environment, so wave or current damage is unlikely. Pre-burial fragmentation of some specimens, fragments oriented contrary to normal gravitational settling, overturned specimens, and possible tooth marks combine to suggest that large vertebrates left in their wake the wreckage of extensive predation.

HAWORTH, J., M. SELLENS, and A. WHITTAKER, Exploration Logging, Inc., Sacramento, CA

Interpretation of Hydrocarbon Shows Using Light (C_1 - C_5) Hydrocarbons

Mathematical treatment of light hydrocarbons (C_1 - C_5) in the interpretation of hydrocarbon shows has been attempted by many authors. The methods so far developed have been used on specialized grids and can only be used for a few readings per grid.

A study of a large number of mud logs from many different geologic environments was conducted to compare hydrocarbon shows to various ratios of C_1 - C_5 hydrocarbons. The aim of the study was to produce a method of interpretation of reservoir hydrocarbon character using C_1 - C_5 gas shows that would be relatively simple to calculate, plot, and interpret. The method also had to be easily integrated with other reservoir character plots and logs such as mud logs and wireline data; hence it had to be plotted on a depth log while not losing any interpretational value.

From this study, a new method of mathematical treatment was evolved