Frio," Vicksburg, Wilcox, Olmos, and San Miguel, and represent a vast amount of past and present production and future potential. Various petrophysical parameters such as matrix density and velocity, formation-water resistivity, porosity, and water-saturation ranges influence production. Identification of productive zones is assisted by use of the Dual Induction Laterolog, the Borehole Compensated Sonic Log, the Formation Density Log Compensated, and the Compensated Neutron Log, as well as hand- and computer-processed interpretations.

FOSS, DEANE C., Chevron U.S.A., Inc., Denver, Colo.

Depositional Environment of Woodbine Sandstones, Polk, Tyler, and San Jacinto Counties, Texas

Woodbine sandstones produce mostly natural gas in stratigraphic traps at Seven Oaks, Hortense, Leggett, and R. B. fields in Polk County, Texas. The Woodbine section can be divided into lower, middle, and nonbioturbated and bioturbated upper units of interbedded sandstones and shales. Strike-trending, pod-shaped concentrations of bioturbated upper sandstones are the principal reservoirs in these fields.

The lower and middle Woodbine sandstones are thinly to thickly bedded and isolated in black, nonbioturbated shales. Thinner sandstones average 0.25 ft (7.5 cm) in thickness and typically consist of more complete turbidite sequences (ABCDE, ABCE, BCE, and CDE). Thicker sandstones that range from 0.5 ft (15 cm) to as much as 7.35 ft (22 m) contain less complete sequences (A, AB, and BC). Thicker sandstones with less complete bedsets represent channel deposits whereas the thinner sandstones with more complete bedsets represent overbank deposits. Thinly bedded, nonbioturbated upper Woodbine sandstones are gradational upward into the thickly bedded, bioturbated sandstones. The nonbioturbated sandstones contain only turbidite bedsets reflecting overbank deposition. Ordered sequences are absent in the bioturbated upper sandstones. A few relict, ripple-laminated intervals suggest that the bioturbated sands were deposited by more persistent, low-flow-regime, possibly geostrophic currents, rather than by turbidity currents.

Woodbine clastic deposition is associated with a prograding shelf margin. Electric-log correlation and seismic sections suggest that the lower sandstones were deposited as a group of channel and overbank turbidites on the lower slope. Middle sandstones were deposited in isolated feeder channels located farther up the slope and closer to the shelf break. The thick section of slope shale containing the lower and middle turbidite sandstones is overlain by thinly to thickly bedded upper sandstones interpreted to be shelf-margin sandstones that cap the prograding slope sequence. A turbidite origin for most Woodbine sandstones in the Seven Oaks producing area suggests that channel sandstones associated with submarine fans located farther downdip, possibly over the Sligo reef break, may form extensive dip-trending reservoir bodies.

GREIMEL, THOMAS C., Bendix Field Engineering Corp., Austin, Tex., and ARTHUR W. CLEAVES, Univ. Mississippi, University, Miss.

Middle Strawn (Desmoinesian) Cratonic Delta Systems, Concho Platform of North-Central Texas

Terrigenous clastic- and carbonate-rock units forming the middle third of the Strawn Group were deposited in the Fort Worth basin and on the adjacent Concho platform of north-central Texas. Four significant transgressive-regressive cycles comprising the interval between the top of the Brannon Bridge Limestone and the top of the Brazos River Formation have been evaluated employing data gathered from 4,000 well logs and 35 measured sections. Subsurface maps indicate that four discrete, vertically persistent, deltaic depocenters, two carbonate banks, and an embayment strand-plain complex are present within the area. The average thickness for the total vertical stratigraphic interval is 1,000 ft (300 m), or approximately 250 ft (75 m) per cycle of deltaic progradation and abandonment.

When active tectonic downwarping diminished in the central part of the Fort Worth basin, middle Strawn cratonic deltas prograded across the filled foreland basin and out onto the stable, gradually subsiding Concho platform. Deltaic facies present on the platform for all four cycles involve thin, usually less than 140 ft (42 m) thick, multilateral, high-constructive elongate and lobate systems. For the lower two cycles, the Buck Creek and Dobbs Valley sandstones of outcrop, deltaic progradation extended to the western margin of the platform more than 200 mi (320 km) downdip from the source area. Carbonate-bank deposition subsequently was established on the distal ends of these oldest delta sands and westward deltaic progradation was less extensive with the upper two cycles. A strand-plain—embayment system composed of mudflats, chenier sandstone bodies, and thin bay-head deltas developed between the two principal deltaic depocenters on the platform. The Midland basin on the west was a poorly defined, gradually deepening, depression; no true Desmoinesian shelf-edge or slope systems have been discovered.

High-constructive delta systems attributed to the Dobbs Valley (cycle II) and Brazos River (cycle IV) units have sandstone accumulations in excess of 200 ft (60 m) at one depocenter along the northwestern margin of the platform and at a second one on the northwestern rim of the Fort Worth basin. These thicker deltaic complexes contain linear, multistoried sandstone bodies whose geometries resemble bar-finger sands of the modern Mississippi delta. Valley-fill fluvial deposits incise the high-conservative deltaic facies. The Arbuckle and Wichita Mountains were the major sources for the more arkosic, northern delta systems. The Ouachita foldbelt furnished the chert-rich detritus for the fluvial-deltaic facies on the Concho platform.

GUEVARA, EDGAR H., and ALICE B. GILES, Bur. Econ. Geology, Austin, Tex.

Upper Cretaceous–Lower Eocene Strata, Hainesville, Keechi, and Oakwood Salt Domes, East Texas

Salt domes in east Texas are possible sites for nuclear waste repositories. Tectonic stability is a critical factor in evaluating suitability as a repository. Subsurface studies were undertaken to determine stratigraphy and structure of strata around the domes, and to ascertain the growth history of the domes as a means to evaluate tectonic stability. Upper Cretaceous to lower Eocene strata bound the upper part of the domes. Three main types of domes have been interpreted from well-log data: (1) at Hainesville dome, Upper Cretaceous strata exhibit notable thickening in a rim syncline, and stratigraphic markers dip toward the dome except near the contact with domal material; (2) at Keechi dome, strata are uplifted and dip away from the dome; strata thin toward the dome; (3) at Oakwood dome, strata are approximately horizontal until near the dome edge, where they are upturned; minor thickening of strata occurs toward the dome. Differences in stratigraphy and structure of Cretaceous-Eocene strata in the vicinity of these domes are attributed to differences in growth history.

GUILLOTTE, J., Schlumberger Well Services, Ridgefield, Conn., and J. SCHRANK and E. R. HUNT, Schlumberger-Doll Research Center, Ridgefield, Conn.

Smackover Reservoir—Interpretation Case Study of Water Saturations Versus Production

Predicting the initial production from wells drilled in certain Smackover reservoirs is often difficult. Production history from the field, core analyses, and log data have not always proved to be helpful.

The Smackover reservoirs for which interpretation is difficult fall into two categories. The first is oolitic limestone characterized by low resistivity, moderate porosity, and reasonable permeability. High water saturation (S_w) calculated from logs does not necessarily preclude hydrocarbon production. The second is oomoldic limestone typically having high resistivity, very high porosity, and low permeability. Although log interpretation indicates low water saturation, no hydrocarbons are produced.

Cores from these reservoirs were studied to evaluate the relations now employed for understanding and predicting production. The investigation included determination of the "m" and "n" exponents (commonly known as the cementation and saturation exponents in Archie's equation), evaluation of the microporosity by scanning-electron microscopy, and laboratory determination of density, porosity, and permeability.

Results of the rock physics investigation support the empirical relations established, provide data for improved interpretation, and can be expanded to include other Smackover reservoirs within the same diagenetic facies.

HARRELSON, DANNY W., and ALVIN R. BICKER, JR., Mississippi Geol. Survey, Jackson, Miss.

Petrography of Some Subsurface Igneous Rocks of Mississippi

Cuttings and cores from test wells in 13 Mississippi counties were examined for igneous material. Samples appearing to be igneous were studied in 41 thin sections. Rocks were classified as intrusive dikes, extrusive volcanics, and basement granite. Alteration of rock types is moderate to severe.

Intrusive dike rocks and extrusive volcanic rocks are present at depths from 3,562 ft (1,085 m) to 10,010 ft (3,043 m). The basement granite observed is present at 11,010 ft (3,347 m) in Lafayette County in north Mississippi and 18,826 ft (5,738 m) in Jackson County in the coastal area.

Basement granite of Precambrian age represents the oldest stratigraphic interval recognized. Volcanic extrusive rocks and plutonic intrusive rocks have been interpreted to be present in sediments of Paleozoic through Cretaceous ages. Available age dates of the volcanic material indicate Jurassic to Late Cretaceous activity.

HENK, FLOYD H., JR., EDDIE J. LOUDON, STEPHEN N. RASCHILLA, and JACK L. WALPER, Texas Christian Univ., Fort Worth, Tex.

Sedimentation on Trailing Plate Margin—Northern Gulf Coast

The breakup of Pangea and the splitting of South America from North America in the early Mesozoic left a rifted and attenuated trailing margin on the latter plate which became the initial depositional surface for a sedimentary sequence of Late Triassic to recent age. The Late Triassic Eagle Mills Formation and its equivalents are interpreted as being the initial deposits confined to rift grabens of the attenuated plate margin. Deposition of Jurassic evaporites resulted from sedimentation by the brine-mixing process in the restricted circulation of a young and narrow seaway similar to the Red Sea. Upper Jurassic and Cretaceous strata represent the transgressive deposits formed as open-marine conditions prevailed as the plates diverged and the North American plate margin subsided. Laramide tectonism in the continental interior provided a rejuvenated hinterland source area that supplied the voluminous sediment for the regressive and prograding Cenozoic clastic wedge.

Studies of this entire sedimentary record reveal the influence of the tensional effects of continental splitting and lower crustal creep that established the initial depositional surface that slowly subsided as proposed by crustal thinning and the thermal-decay curve of cooling oceanic lithosphere. In addition, these studies also reveal the control and influence of (1) inherited structures of the rifted margin, (2) hinterland source areas, (3) the timing and amount of differential subsidence between continental and ocean crust, (4) active syndepositional faults, (5) hinge lines, and (6) postdepositional rejuvenation due to contemporary plate movement.

Not only do these studies add to our understanding of the geologic history of the area, which is most important for development of successful exploration programs, but they provide a guide for the study of sedimentary infills within ancient lithospheric plates, a neglected but important task facing all who are confronted by the complex problem of interpreting the sedimentary record of ancient basins.

HENRY, C. D., J. M. BASCIANO, and T. W. DUEX, Bur. Econ. Geology, Austin, Tex.

Hydrology and Water Quality of Eocene Wilcox Group