significant place in both the exploration and production aspects of the petroleum industry.

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A Shorthand Notation for Carbonate Facies—Dunham Revisited

Carbonate facies can be described in a concise format that reads like an algebraic equation:

CARBONATE FACIES = (LITHIC DESCRIPTOR) (COMPOSITION) (TEXTURE) ± REMARK.

Lithic descriptors are portrayed by symbols for sedimentary structures, admixtures of argillaceous or arenaceous material, diagenetic features, and/or porosity. The second term, composition, generally used for describing the sand-size fraction of the rock, is represented by symbols designed to look like the grains themselves. Compositional symbols that appear in the equation should include only common rock-forming particle types, listed in order of decreasing abundance. The third term of the equation, texture, consists of a one-letter or two-letter abbreviation for the textural terms of Dunham or of Embray and Klovan. The fourth term of the descriptive equation is optional and allows a qualifying remark, using a minimum of appropriate symbols. Thus, a limestone that is cross-stratified and consists of 75% ooids and 25% carbonate cement is written as X○G.

Advantages of this shorthand system are (1) it is graphic and can be used to expedite routine sample logging and digital data recording; (2) it is useful in maps and cross sections to illustrate facies patterns in carbonate rocks, (3) it provides an international shorthand that transcends language barriers, and (4) it is both descriptive and genetic and has important implications for porosity prediction, and is thus an aid in the search for stratigraphic traps.

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Depth-Gradient Analysis and Biotic Succession in Colony Creek Cycle (Late Pennsylvanian) of North Texas

The Colony Creek Shale (Canyon Group) in north Texas contains a vertical succession of lithologies and biotas deposited during regression from deep water to shallow water and strandline deposition. Stratigraphic successions in the Colorado River valley and the Brazos River valley of the outcrop belt are similar, showing that regression was of regional extent. A thin layer of platy, phosphatic black shale containing an ammonoid fauna occurs at the base of the Colony Creek and is diagnostic of deep-water deposition. This unit is similar to deposits of maximum transgression (stillstand) of many Pennsylvanian cycles. The overlying shoaling-upward portions of the Colony Creek are characterized by upward increase in sand content, increasing numbers and thicknesses of sand beds, and culmination in a horizon of subaerial exposure.

Statistical analysis reveals a continuum of communities in the shales of the Colony Creek. These communities represent the continuing response of organisms to shoaling but are partly the result of an increase in sand content within the shales. The basal phosphatic black shale contains a community distinguished by its ammonoids. The overlying gray shales contain a diverse pleurotomariid community, which grades upward into a *Neospirifer*-productid community. In shoal-water deposits a distinct *Neospirifer*-myalinid community appears. The top of the sequence contains a molluscan community in sand substrates, which is characterized by *Permophorus*. The brachiopod *Crurithyris* is dominant in most shales in the succession and is not depth controlled. This succession of lithologies and biotas is typical of cyclothem deposits in other regions of North America and in Europe.

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Subsurface Strawn and Atokan Series, Southwest Jack County, Texas

Lower Pennsylvanian sediments in the Fort Worth basin are prolific hydrocarbon producers. These sediments are deltaic in nature and are characterized by complex stratigraphy. The problem of locating new reserves and exploiting producing zones depends largely on subsurface mapping and a detailed knowledge of the stratigraphy.

The Atokan and Strawn progradational sediments in the study area consist of 13 separate depositional cycles, each of which isolated several reservoirs. Each of these groups of reservoirs has potential for structural and/or stratigraphic hydrocarbon traps. Mapping located prospects in the Strawn on noses in the Dog Bend Limestone, in Atokan conglomerates in structural lows associated with faulting in the Marble Falls, and in deeper horizons, such as Mississippian reefs and Ellenburger highs, and on structural highs in the Marble Falls.

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Oolite Shoal Reservoirs in Pettet Formation (Lower Cretaceous), Southeast Shelby County, Texas

The Pettet Formation is a southward-thickening carbonate wedge, deposited during Aptian (Early Cretaceous) time in the region that is now the Gulf coastal plain of east Texas, Arkansas, and Louisiana. Within the Pettet are characteristic oolite sequences which formed in a northwest-southeast-striking belt paralleling the shelf edge.

In southeast Shelby County, Texas, the Pettet oolite shoals were studied, using available well cores and induction-electric logs. The oolite shoals appear to have formed on top of remnant topographic highs in the underlying Travis Peak Formation, in series of vertically stacked cycles of grainstone development.

The oolite shoals display five constituent lithofacies: (1) mudstone, (2) oolitic packstone, (3) skeletal-oolitic packstone, (4) skeletal-oolitic grainstone, and (5) oolitic grainstone. The oolitic grainstone lithofacies is the most volumetrically significant constituent of the Pettet oolite shoal reservoirs, comprising approximately 95% of each sequence.

Three diagenetic environments are seen in the oolite shoals: marine phreatic zone, vadose zone, and freshwater phreatic zone. Porosity is mainly primary interparticle, with some secondary intraparticle and vuggy porosity also being important. The freshwater phreatic diagenesis appears to have had the most effect on the Pettet reservoirs, creating minor recrystallization-induced porosity occlusion and excellent porosity-enhanced dissolution zones.

Hydrocarbon reserves in the Pettet Formation are related to certain structurally modified oolite shoals. Salt swelling and diapirism in the underlying Jurassic Louann Salt appear to be the mechanism responsible for the formation of locally developed anticlinal noses and domes. These small anticlinal features, when occurring beneath or adjacent to an oolite shoal, result in the upward tilting of the strata with subsequent migration and stratigraphic trapping of oil and gas.

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Significance of Framework Dissolution in Interpreting Sandstone Provenance

Dissolution of unstable framework grains such as feldspar and rock fragments (including chert) is common in sandstones worldwide. Such framework dissolution usually results in a depletion of unstable framework grains and a corresponding enrichment of quartz. Failure to recognize this diagenetic modification of composition of a sandstone will result in misinterpretation of its provenance. A proper evaluation of sandstone composition may be achieved by including the dissolved portion of a framework grain as a grain, rather than as porosity, while point counting. This should be useful in interpreting original composition of sandstones and their provenance.

STAPLES, MARCUS E., Bass Enterprises Production Co., Fort Worth, TX

Exploration of Basal Bend Bar System, Southeast Foard County, Texas

The Bend conglomerates of north Texas are lithologically diverse Lower Pennsylvanian sandstones and conglomerates deposited by a variety of depositional systems. In southeast Foard County, the basal Bend conglomerates form oil-productive sandstone bodies morphologically identical to both ancient and modern coastal marine bars.

A basal Bend shale isopach map of southeast Foard County delineates the paleotopography of the eroded Mississippian surface over which the