The Guadalupian shelf crest provides a unique setting for the study of changing carbonate-shelf environments. Previous works by King, Newell, Dunham, Smith, Pray, and others have provided models and interpretations to define a generalized morphology of the carbonate facies for the Guadalupian shelf, behind the Capitan Limestone. Detailed field studies of about 50 m of carbonate units within the upper Yates and lower Tansill Formations reveal significantly different facies patterns and suggest changing shelf profiles and environments through time.

Alternating carbonate and sandstone units are apparent as the product of cyclic shelf sedimentation. Major carbonate units within the stratigraphic interval studied are informally named (Hairpin dolomite, Triplet dolomite, and basal Tansill dolomite). Recognition of five major carbonate lithofacies within the three identified carbonate units at the shelf crest (the paleotopographic high of Dunham's marginal mound) indicates variance in deposition owing to highly restricted water conditions as well as more "normal" marine water circulation.

The three carbonate units differ in the following respects: the Hairpin dolomite is dominated by fenestral peloid grain-supported, pisolite-rich facies, and is associated with erosion surfaces and abundant tepee structures. Carbonate facies in the Hairpin dolomite repeatedly grew to "fill level," and the shelf crest extended at least 3 km perpendicular to the Capitan Limestone. The Triplet dolomite is composed primarily of peloidal grainstones with abundant admixed siliciclastic grains. Shelf-crest features, that is, pisolites, tepees, and fenestral strata, are uncommon, suggesting an absence of a nearly emergent paleotopographic high and a more continuous basinward sloping shelf. The basal Tansill dolomite contains abundant skeletal grains, that is, dasycladacean algae, ostracods, gastropods, and foraminifers, suggesting a deeper shelfward penetration of more open marine water than for the other two units.

Erosion surfaces common at the upper boundaries of the identified major carbonate units are most common and traceable horizontally 0.5 to 3 km behind the Capitan front, locally 50 m behind the Capitan Limestone. Simple progradation of the shelf-crest facies with the Capitan Limestone through time does not explain the change of facies within the three major carbonate units.

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Relations of Gas Occurrence to Geologic Parameters in Eastern Kentucky Gas Fields

A study of initial open-flow gas data from 4,750 wells in eastern Kentucky gas fields relates gas occurrence to geologic parameters including structural/stratigraphic sections, lithology, and geochemistry.

Approximately 300 formation density logs are used for stratigraphic correlation, reinforced by data from two cored wells and cuttings from 11 wells in this 3,000-sq-mi (7,800 sq km), 10-county study area known historically as the Big Sandy field. This field has produced for over 50 years.

Trend traces of initial open-flow data are interpreted as zones of more intense fracturing and show four preferential directional trends.

The gentle anticlinal structure in the northern part of the field, which may be an extension of the Paint Creek uplift, broadens to the south and bifurcates. Small faults are identified southwest of the main field and the Rome trough crosses the northern part of the field.

The 100-ft/mi southeast dip of the basement rocks is subdued to 30 to 50 ft/mi in the producing Devonian shale sequence which thickens by an order of magnitude into the basin to the northeast.

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Discovery and Development of Nembe Creek Oil Field, Nigeria

The discovery well for the Nembe Creek field in the coastal swamp of the Niger delta was drilled in 1973. Average recoverable reserves have risen to over 600 million bbl after the drilling of 30 wells. Nearly one-third of the wells drilled have been proposed on the basis of direct reflection seismic support, principally in the form of seismic structure mapping and cross sections. In addition, lateral predictions on the basis of true amplitude impedance data have been made for two appraisal wells.

The timely acquisition and interpretation of sufficient seismic lines in an area of complex structure, but good reflection quality, have permitted the drilling of long step-out appraisal wells, leading to early delineation of field limit and rapid growth of proved reserves.

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Application of Palynology to Age Determination, Correlation, and Paleoecology of Gas-Bearing, Nonmarine Rocks in Central Rocky Mountains

Potentially economic, low-permeability (tight), gas-bearing sandstone reservoirs in the Uinta, Piceance Creek, and greater Green River basins are found in predominantly nonmarine rocks of Late Cretaceous, Paleocene, and Eocene ages. Accurate subsurface correlations are essential to the estimation of reserves and to the understanding of the nature of reservoirs; but, in the absence of paleontologic data, the nonmarine rocks historically have proven to be difficult to correlate with geophysical logs. Pollen, spores, and other plant microfossils recovered from surface exposures and from boreholes have provided data on the age of the rocks and have facilitated accurate biostratigraphic correlation of surface and subsurface sections.

The rocks generally represent sediments deposited in lacustrine, alluvial-fan, braided- and meandering-stream, delta-plain, lagoonal, and littoral-marine environments. The nature of source, reservoir, and trapping units in these rocks is commonly, in part, a function of the depositional environment of the units. Palynologic data in combination with sedimentological, petrographic, mineralogic, geochemical, and other paleontologic data, all derived from the same samples, have been used to refine interpretations of lithofacies and to determine the paleoclimate, paleoecology, and paleoenvi-

ronment at several key reference sections in the study area.

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Field Relations of Some Pre-Tertiary Dolomites in Great Basin

In marine, pre-Tertiary, carbonate-platform deposits, primary and secondary dolomites are commonly associated. "Primary" dolomite is used here in the sense of penecontemporaneous replacement of calcareous sediments essentially at the time of their deposition; primary dolomite preserves microcrystalline textures and fabrics indicative of inner-platform sedimentation. "Secondary" dolomite is used here in the sense of postdepositional replacement of limestone or calcareous sediment by the progressive, slow growth and coalescence of discrete dolomite crystals. Secondary dolomite is generally characterized by saccharoidal texture, which may be formed at different diagenetic stages, as well as by hydrothermal processes. The boundaries of secondary dolomites may cross-cut stratification surfaces, thereby making depositional and paleogeographic interpretation difficult.

Primary and secondary dolomites in the Great Basin commonly show a distinctive and recurrent pattern of spatial relations. In ascending order, marine limestone, which may be of any facies, is supplanted by sucrosic secondary dolomite, which in turn is overlain by primary dolomite. The boundary between the unaltered limestone and secondary dolomite is commonly a zone of mottled limestone and dolomite in which nodules or beds of secondary chert are present. The boundary between primary and secondary dolomite is abrupt and, in places, is an unconformity of regional extent. The regionally coextensive occurrence of primary and secondary dolomite indicates that secondary dolomitization is related to the formation of the overlying primary dolomite or to the surface on which it was formed, and is thus eogenetic. With the wide range of possible scenarios affecting the water chemistry of carbonate platforms, either the reflux or mixed-water hypothesis could be adapted to explain this pattern of coextensive occurrence of primary and secondary dolomites. For example, primary-dolomite areas could be associated with the concentration of magnesium or, through exposure, could be the avenue through which meteoric water is introduced into the system.

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Future of Uranium

The future of nuclear power has been uncertain for a number of years. However, despite somewhat lower forecasts than some years ago, nuclear is emerging again as a major future power source both in this country and throughout the world. Uranium is the mainstay of nuclear power whether alone or in combination with plutonium. If nonproliferation concerns dictate the former, much larger quantities of uranium will be needed than otherwise but, in either case, a many-fold increase in production will be required. Additional uranium resources are being developed in the United States and the world at an adequate rate for the time being, but this rate will have to be increased substantially toward the latter part of the century. United States reserves calculated at a forward production cost of $50/lb of U_3O_8 increased in 1978 by about the same amount as in 1977. Total estimated resources did not change significantly, however, and exploration activity has apparently begun to level off at least for the present. The development of uranium deposits in Texas and successful exploration to expand Texas uranium resources can play a significant, although probably not major, role in meeting United States uranium demand.

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Calcareous Nannoplankton in Upper Aptian and Albian Black Shales from South Atlantic (DSDP Legs 36, 40)—Sedimentologic Implications

Nannofacies analyses of 65 samples of Upper Aptian and Albian black shales from the Falkland Plateau, the Cape Basin, and the continental margin off Angola (South Atlantic, DSDP Leg 36, sites 327 to 330; DSDP Leg 40, sites 361 to 364) provide data on depositional environment. The presence of nannoplankton shows undeniable marine conditions, productivity of surface waters, and oceanic connections. The mode of fossilization (coccolith aggregates interpreted as coccospheres dislocated on the spot) indicates stagnant and confined depositional conditions, which are confirmed by the presence of pyrite framboids. Coccoliths that are present only as casts show that dissolution processes took place in the sediment and not in the water column.

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Coal Resources of Part of Southern Illinois Basin

Pennsylvanian rocks in the southern Illinois basin are sandstone, shale, coal, and thin discontinuous beds of limestone. Stratigraphically these rocks and their associated coal seams have been designated: Caseyville Group, Mt. Rorah and Wise Ridge coals; Tradewater Group, Davis and Dekoven coals; Carbondale Group, #2, #2A, #3, #4, #5, #5A, and #6 coals. The Wise Ridge, Davis, Dekoven, #5, and #6 coals have been strip mined, and the #5 and #6 coals have been deep mined. Extensive subsurface reserves have been proven for the Davis, Dekoven, and #5 coal and strippable reserves for the #5.

The Pennsylvanian sediments dip to the north and northwest at 80 to 100 ft/mi. Rocks of the Tradewater Group have been faulted against Upper Mississippian sediments along the Shawneetown–Rough Creek fault, whose displacement is about 1,400 ft (420 m). The upthrown block forms a broad curving ridge with a steep fault-line scarp on the north and this ridge is the dominant topographic feature of the area. The Cottage Grove fault trends slightly north of west across the northern boundary of the area and has a displacement up to 150 ft (45 m). No structural features have been discovered on the east and west sides of the area.

The sediments between the coals generally consist of,