southwest and is 940 ft (287 m) below the surface within the northwest part of the study area and 1,330 ft (405 m) below the surface in the southwest part of the study area.

The areas containing high concentrations of sandstone form two elongated trends within the study area. The sandstone trends strike N55°E, and trend axes lie approximately 1 mi (1.6 km) apart. The sandstone bodies are approximately ¾ mi (1.2 km) across and 5 mi (8 km) long, and range in thickness from 3 to 40 ft (~1 to 12 m).

The sandstone bodies may represent shallow marine offshore bar or strandline deposits.

BRANT, RUSSELL A., and NORMAN C. HESTER, Kentucky Geol. Survey, Lexington, Ky.

Coal Geology and Resources of Eastern Kentucky

In 1979, 107 million tons of coal were mined in the Eastern Kentucky coal field; of this total, 50 million tons came from surface-mining operations. Original resources are estimated at about 33.5 billion tons, with remaining coal estimated at approximately 29 billion tons. Recoverable-coal estimates cannot be reported because of lack of reliable data particularly in the area below principal drainage.

Major production comes from Big Sandy, Hazard, and Cumberland River Coal Reserve Districts. These areas are an important source of low-sulfur (1 to 2%), high-volatile A and B coal, often used for blending in coke production; however, the larger part of production supplies the compliance coal market.

Physical and chemical characteristics of the coal and associated rocks vary geographically and stratigraphically, reflecting the controls of sedimentary environments. In general, the following relations have been recognized: high-sulfur conditions in coal and related overburden are associated with rocks having marine or brackish-water affinities; splits are commonly associated with crevasse splays; and bad roof conditions are frequently associated with paleochannels and related slumps.

The eastern Kentucky coal resources program, operated jointly by the Kentucky Geological Survey and the Institute for Mining and Mineral Research, is in its third year, due for completion in 1982. Detailed geologic maps resulting from the recently completed Kentucky cooperative geologic mapping program provide the stratigraphic framework for this project. A more accurate assessment of coal tonnage, a better understanding of coal stratigraphy, and the development of models for determining mineability are the major goals of this project.

The deep mining potential looks promising for the northeast-southwest trending "Appalachian Trough" in southeastern Kentucky. Experiments with longwall mining are presently being conducted in this area.

BROOKFIELD, MICHAEL E., Guelph Univ., Guelph, Ontario, and CARLTON E. BRETT, Univ. Rochester, Rochester, N.Y.

Middle Ordovician Shelf Carbonate Sedimentation Around Bathymetric Highs in Southwestern Ontario: A Persian Gulf Analogy

Sedimentation patterns around three classes of bathymetric high in the Persian Gulf vary according to regional setting and diameter of the high. Around basin-center highs, the sedimentation patterns are concentric but become progressively asymmetric toward the coast (coastal highs) due to accretion of bioclastic sand on windward sides. Where the diameter of the high exceeds 5 km, downwind tails of bioclastic sand enclose muddy lagoonal-type sediments. Highs submerged below 10 m favor active submarine lithification on their crests, while emergent highs favor beach-rock lithification without dolomitization.

The Persian Gulf bathymetric high model can be directly applied to the Middle Ordovician carbonate rocks of southwestern Ontario and can be used to explain the complex biofacies and lithofacies relations, as well as the location of Ordovician hardgrounds. Both Persian Gulf and Ontario Ordovician hardgrounds occur predominantly on bioclastic and intraclastic sands, deposited in shoaling areas around the islands or highs where rates of deposition are low, especially on accretion tails. Both hardground occurrences exhibit certain faunal similarities, for example, encrusting bryozoans, sponges (stromatoporoids), abundant browsing gastropods (associated with algal mats); similar large branching burrow tunnels are present at omission surfaces in both examples. However, the abundance of pelmatozoan echinoderms and the absence of encrusting corals and bivalves in the Ordovician of southwestern Ontario contrast with recent hardground faunas.

A preliminary justification of the Ordovician-Persian Gulf comparison is presented in terms of general lithofacies and biofacies comparisons and location of hardgrounds. Unfortunately the study is handicapped by poor exposure and lack of precise stratigraphic control; a program of shallow drilling is needed to test some of the inferred sediment distributions around Ordovician submarine highs.

CASEROTTI, PHILLIP M., C. E. Brehm Drilling & Producing Co., Mt. Vernon, Ill.

Geology and Geophysics of Middle Mississippian (Valmeyeran), Ewing Area, Jefferson and Franklin Counties, Illinois

Since 1976, significant new oil reserves have been discovered in the Ewing area of Jefferson and Franklin Counties, Illinois. One new field and three deeper pool discoveries contain oil reserves in excess of 1.2 million bbl. These oil reserves are in Middle Mississippian limestone at depths of less than 4,000 ft (1,219 m).

Spring Garden field, discovered in November 1977, was drilled on a seismic prospect and has 600 acres (240 ha.) under production from the McClosky Limestone Member of the Ste. Genevieve formation. A study of a core from the field indicates the reservoir was deposited in an oolite bar or beach environment similar to present-day deposition at the Lily Bank oolitic shoal in the Bahamas. The trap at Spring Garden field is formed by the updip pinch-out of porous oolitic limestone into a tight micritic lime mud on a structural nose. The field has primary recoverable reserves of 600,000 bbl of oil.

Based on seismic work and well control, deep tests were drilled in three old fields: Bessie, Ewing East, and