molds of several gastropod genera of Eocene and Oligocene ages. Several specimens of a Paleocene pelecypod genus have been collected. Some small (10-25 mm in length), elliptical objects of uncertain paleontologic classification were found in Eocene, Oligocene, and lower Miocene.

PARKER, C. A., Shell Oil Co., New Orleans, La.

Geopressures and Secondary Porosity in Deep Jurassic of Mississippi

Deep drilling in the interior salt basin of Mississippi has revealed geopressured oil, gas, and water with high-pressure gradients. These geopressures are mainly in the Jurassic Smackover and Norphlet Formations, but also may be in overlying formations. The geopressures rise stratigraphically in a basinward direction and increase their gradients with depth. The highest documented Smackover pressure gradient in Mississippi is 1.06 psi/ft recorded in saltwater flows from a 23,455-ft wildcat. The highest Smackover gas gradient is 0.99 psi/ft at 22,250 ft. Pressure-gradient reversals are recorded in some parts of the basin.

Deep Smackover geopressures differ from relatively "leaky" geopressures in the Gulf Coast Tertiary in that they underlie nonshale crystalline seals with no transition zone. Deep Smackover geopressures cannot be predicted from compaction trends because cores reveal that geopressured Smackover sandstones are compacted severely, whereas their vuggy porosity is secondary in origin and is not a result of "undercompaction" related to geopressures as in the Gulf Coast Tertiary.

Geopressured gas mixes range up to 100 percent carbon dioxide and 78 percent hydrogen sulfide. The nature and distribution of these gases suggest they are late thermal migrants and late thermal metamorphic alterations of former oil reservoirs. The geopressures they have generated are young pressures in this "old" basin and are termed inflated and phase pressures, respectively. Associated geopressured acidic fluids appear to have dissolved available soluble minerals, thereby creating late secondary porosity in compacted sandstones which are now the deep gas reservoirs.

PFLUM, C. E., Esso Production Research Co., Houston, Tex.

Upper Depth Limits and Morphologic Variations of Foraminifera from Continental Slope and Abyss of Gulf of Mexico

Modern Foraminifera collected along three traverses across the Gulf of Mexico show that morphologic variations within species (clines) may serve as excellent indicators of bathymetry. Many species of Foraminifera are known to have restricted upper depth limits that can be used in making paleobathymetric interpretations. Penetration of Neogene offshore sediments of the Gulf of Mexico allows paleontologists to interpret paleobathymetry of sediment samples with a higher degree of accuracy through comparison of the ancient faunas with these modern counterparts.

Some depth-related morphologic variations of species, such as size, form, and ornamentation, are known to have importance in paleobathymetric interpretations and are useful in evaluation of an assemblage. The more obvious and important depth-related morphologic variations have been recorded for the genera *Uvigerina, Laticarinina, Gyroidina,* and *Hoglundina.* Genera which include especially significant depth-indicator species include *Gyroidina, Cibicides, Eponides, Oridorsalis, Cyclammina, Bulimina, Osangularia,* and *Alabamina.*

ROBERTSON, J. M., Welex, Houston, Tex.

Framework for Stratigraphic Interpretation of Dip Logs

Stratigraphic interpretations of dip logs have been attempted since the middle 1960s, with limited success. In many cases the dip-log information is not suitable for a stratigraphic interpretation. Deficient computation procedures for stratigraphic information and failure to remove postdepositional structural tilting are two common shortcomings.

Determination of the depositional environment of a sandstone requires consideration of (1) the paleocurrent dips within the sandstone, (2) dips in the units surrounding the sandstone, (3) and the depositional environment of the formation. Bar-type sandstones normally have internal paleocurrent dips in the same direction as the overlying shale dips. The paleocurrent dips in channel-type sandstones are perpendicular to the dips in the adjacent shales.

The sandstone interpretation generally should agree with a regional depositional model for sandstones. Marine-bar sands usually subparallel the regional depositional slope, whereas channel sands are perpendicular to the slope.

SEGLUND, J. A., New Orleans, La.

Collapse-Fault Systems of Louisiana Gulf Coast

Collapse faulting is found circumscribing salt-withdrawal basins in the south Louisiana salt-dome province. The salt-withdrawal basins are the result of unusually large volumes of salt vacating a restricted area of the source salt bed to form peripheral salt intrusions. Such localized salt-withdrawal basins are not known in the upper Gulf Coast or interior salt basin because the salt intrusions in those areas are of smaller volume and more widely dispersed. In the lower Gulf Coast, areas are found where large intrusions of salt have occurred, salt domes are found clustered, or a salt ridge of extraordinarily large mass has risen. An abnormally steep-sided basin is associated with the unusually large intrusions of salt.

The sedimentary rocks overlying the salt-withdrawal area have collapsed periodically as salt was withdrawn and moved toward the surface at the periphery of the withdrawal area. The sedimentary collapse caused normal faulting parallel with, and on, the flanks of the newly initiated basin structure. The faulting, when viewed in cross section, tends to assume a conical configuration nearly conforming to the cross-sectional outline of the basin. These faults are referred to as collapse faults.

STARK, P. H., Petroleum Information Corp., Denver, Colo.

Analysis of Energy Crunch

The peaking of domestic oil production in 1970 coincided with the first increase in the GNP unit cost of energy. Thus began the energy crunch that was well documented but unrecognized until the moratorium of Arab oil imports in 1973. Domestic drilling activity declined by more than 50 percent from 1956 to 1971. Corresponding average annual reserve additions declined by more than 30 percent. Restrictions on development of large reserves such as Prudhoe Bay resulted in loss of almost 2.5 million BOPD in 1974.

Industry is charged with irresponsibility but the record shows tremendous response to the crisis. Is there monopoly when the 30 largest companies account for less than 20 percent of U.S. drilling? About 600 operators drilled in the Rockies during 1973. Industry responded to increased prices with 30 percent more gas completions in 1973. In two provinces, first quarter 1974 stripper well recompletions increased by 100 percent. A study of Wind River basin indicates that even more incentives may be required to increase gas development in similar provinces.

It is uncertain that adequate incentives will be provided to meet the goal of energy self-sufficiency. Analysis of a recent U.S. energy model requires annual drilling of 53,000 wells to meet 1985 forecasts without depleting reserve/production ratios. Computer well-data files are available to assist the massive information analysis required for this task. Computer maps such as trend residuals assist in focusing exploration on the most favor-