MILLER, ROBERT E., D. M. SCHULTZ, H. E. LERCH, D. LIGON, JR., and P. BOWKER, U.S. Dept. Interior, Minerals Management Service, Vienna, VA

Thermal Maturation and Burial History Processes in Lower Mesozoic Sediments of North Atlantic Georges Bank Basin

The time-temperature burial relationships that influence organic maturation processes in the Upper Triassic–Lower Jurassic rift basin sediments and the Middle Jurassic shelf-edge carbonates and sand-shale facies of the North Atlantic Georges Bank basin are believed to be regionally influenced by sediment loading and residual subsidence associated with the contractions and cooling of a thinned lithosphere and crust. Localized zones of high heat flow may have occurred during the rifting process. Relict heat flow from such sources may have influenced the principal zone of oil formation (PZOF) in the Georges Bank basin. Plots of specific temperature-sensitive, intercompound ratios of isomeric groups for light hydrocarbons that separate chromatographically in the cyclohexane through methylcyclohexane range and plots of the molecular ratio of n-hexane to methylcyclohexane were found to be consistent with the temperature-sensitive, saturated hydrocarbon to organic carbon ratios. These ratios suggest that the threshold of intense oil generation in the depocenter of the basin begins at a depth of about 3.2 km with the PZOF occurring between 3.9 and 4.9 km. Correlation of these temperature-sensitive maturation parameters with the time-temperature burial history models indicates that Middle to Lower Jurassic and probable Liassic to Upper Triassic units may be the most favorable exploration targets within the main Georges Bank basin.

MIXON, R. B., G. W. ANDREWS, L. W. WARD, and D. S. POWARS, U.S. Geol. Survey, Reston, VA

Miocene Calvert and Choptank Formations in Inner Coastal Plain of Virginia: A Record of Marine Onlap and Late Cenozoic Deformation

The 200-ft thick section of lower and middle Miocene beds in the Maryland-Virginia coastal plain includes two diatomaceous sand-silt-clay sequences, the Calvert Formation (below) and the Choptank Formation. The Calvert has been mapped over much of eastern Maryland and Virginia and is commonly believed to represent the maximum marine transgression during the early and middle Miocene. In contrast, a much more restricted distribution for the Choptank was suggested because it was known only in southern Maryland and northeasternmost Virginia. Thus, until recently, a general picture of offlapping relationships of the Calvert and Choptank beds has prevailed.

Our field studies show that both the Calvert and the Choptank are widely distributed in the central and inner Virginia coastal plain. The sandy and silty Calvert beds contain diatom assemblages typical of diatom zones 3 and 4 of Andrews; the Choptank is lithologically similar, but its diatom assemblage correlates with diatom zones 6 and 7. In updip areas in Virginia, the formations are separated by an erosional unconformity that is equivalent, in part, to the time interval represented by diatom zone 5.

The Calvert is truncated by the Choptank beds well east of the Fall Line. The Choptank laps over the Calvert and successively overlies, from east to west, Eocene, Paleocene, and Cretaceous strata and crystalline rocks of the Piedmont. These relations indicate extensive marine onlap during Choptank deposition and record a major transgression of the Miocene sea. Choptank beds thicken and thin across coastal plain structures, a result of erosion over structural highs following deformation of the Choptank and preceding deposition of higher rock units.

MORRELL, CHRISTINA C., Old Dominion Univ., Norfolk, VA, and LAUCK W. WARD, U.S. Geol. Survey, Reston, VA

Comparison of *Cubitostrea* (Mollusca, Bivalvia) Assemblages from Atlantic and Gulf Coastal Plains

Specimens of the oyster genus *Cubitostrea* from lower and middle Eocene beds in Maryland and Virginia were compared with collections of that taxon from correlative units in North Carolina, South Carolina, Alabama, and Mississippi. Material from these collections indicates some differences with Stenzel's model of successional speciation. Stenzel proposed a single lineage of *Cubitostrea* including (from oldest to youngest) *C. perplicata* (Dall)—l.m. Eocene, *C. lisbonensis* (Harris)—m.m. Eocene, *C. smithvillensis* (Harris)—m.m. Eocene, and *C. sellaeformis* (Conrad)—m.m. Eocene. Stenzel's model suggested a change from a primitive trigonal form to one with well-developed auricles and finally to one with a profound fold in the valves. The development of auricles and folds in the genus *Cubitostrea* appears to depend on the maturity of the individuals, however, and is not an evolutionary progression, because the oldest known representative, *Cubitostrea* sp. from the lower Eocene Nanjemoy Formation, exhibits both of these tendencies.

We believe that there are two distinct oyster lineages, both belonging to the genus *Cubitostrea*. The first lineage consists of *C. perplicata* and *C. lisbonensis;* the second consists of *C.* sp. and *C. sellaeformis. C. smithvillensis* appears to be an ecophenotypic variant of *C. sellaeformis* as are *C. divaricata* (Lea) and *C. vermilla* (de Gregorio). Specimens of *Cubitostrea* that have been identified as *C. lisbonensis* from South Carolina (Santee Limestone) and North Carolina (Castle Hayne formation) are immature and resemble the young of *C. sellaeformis* from Virginia and Alabama.

MUMCUOGLU, CETIN H., and ALAN C. DONALDSON,* West Virginia Univ., Morgantown, WV

Detailed Deposystem Analysis of Reservoir Sandstones of Catskill Delta, North-Central West Virginia

Upper Devonian Hampshire and Lower Mississippian Pocono sandstones were correlated over a 370-mi^2 area in north-central West Virginia using 400 gamma-ray logs. Isolith maps show the geometry, position, trend, and distribution pattern of the sandstones. Sandstone belts occur in north-south (strike) trends particularly in the western part (Lewis County), whereas east-west (dip) trending sandstone belts and dendroids generally occur in the eastern part (Upshur County) of the study area. The north-south–trending sandstone belts are interpreted as barrier islands, and their adjacent eastward facies consisting of some plant-rich black shales and thin sandstones are interpreted as lagoonal. Tidal inlets are associated with barrier islands along the strike trend. Sands probably were supplied to the ancient barrier islands by east-trending distributary channels that were affected by both tidal and fluvial processes. East-west cyclic shifting of the barrier islands and the north-south shifting of the feeder systems were strongly influenced by the paleotopography of the next lower sandstone unit. The nearly 5-mi (8-km) shoreline shift east-west within sand intervals (Fourth, Thirty-foot, Fifty-foot) of these shoreline sandstones probably resulted from combinations of changes in sea level, sediment supply, and differential compaction. The interpreted "feeder systems" of tidal and fluvial channels trending east-west indicate a history of distributaries shifting with time also. The Hampshire Formation and Pocono Group of north-central West Virginia are interpreted facies of coastal plain–nearshore environments in which marine-dominant deltas characterize the shoreline.

NEWELL, WAYNE L., U.S. Geol. Survey, Reston, VA, and EUGENE K. RADER, Virginia Division of Mineral Resources, Charlottesville, VA

Eastover (Upper Miocene) and Yorktown (Lower Pliocene) Formations in Virginia—Tracking a Shifting Depocenter

Detailed mapping and regional studies indicate that fossiliferous marine formations and nonfossiliferous upland deposits of the Tertiary Chesapeake Group can be integrated into two major sequences that reflect a systematic change in depositional patterns. The lower sequence (Calvert, Choptank, and St. Marys Formations of Miocene age) largely consists of marine-shelf deposits that collectively thicken toward the center of the Salisbury embayment. The upper sequence (Eastover and Yorktown Formations of late Miocene and early to middle Pliocene age) includes complex assemblages of marine-shelf, marginal marine, and nonmarine deposits. A major erosional unconformity and overlying basal deposits of the Eastover Formation are the first evidence of depositional shift southward into the Albemarle embayment.

The Eastover and Yorktown Formations have been recognized and mapped as fossiliferous shelf sediments. Recent fieldwork has shown the two formations to be much more extensive and lithologically variable from the Fall Line to the Chesapeake Bay. Each formation comprises a typical transgressive-regressive sequence. Landward, the base of the