coal resource estimates is proposed. This model is based upon defining the area of influence of bore holes in different depositional settings with respect to consistency of coal thickness and coal quality. The model is being developed through evaluation of lignite occurrences in the Texas Gulf Coast Tertiary basin. In this basin, lignites occur in three Eocene stratigraphic units, the Wilcox Group, Yegua Formation, and Jackson Group, as component facies of three depositional systems—fluvial, deltaic, and strand plain/lagoonal. Within a particular depositional setting, densely-drilled deposits are being compared with areas of sparse drilling to characterize variability and, thus, determine the optimum spacing necessary to define seam geometry. Geostatistical analyses such as variograms, which estimate the range of influence of a bore hole as a measure of spacing, should aid in determining optimum spacing for a specific degree of certainty, within a given depositional setting. In this way, certainty ranges could be established for different depositional systems within a given coal basin. It is anticipated that this evaluation could lead to more reliable coal resource estimates.

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Geologic Setting and Oil and Gas Potential of Eastern United States Continental Margin North of Cape Hatteras

Two sedimentary basins, the Georges Bank basin off New England and the Baltimore Canyon Trough off the Middle Atlantic states, have been examined for geologic setting and hydrocarbon potential. Georges Bank basin, a complex-shaped trough, is on a block-faulted basement of igneous, metamorphic, and sedimentary rocks. The deepest part of the basin (deeper than 8 km) and the oldest sediments are restricted to south-central Georges Bank. Toward the northeast and southwest, the sedimentary section thins to less than 2 km over the Yarmouth Arch-LeHave platform and the Long Island platform. The only deep wells in the area are the COST G-1 and G-2; data from these wells will not be released until 60 days after the first oil and gas lease sale. Seismic correlation with the Shell Mohawk B-93 well on the Scotian Shelf indicates that most of the sedimentary rocks in the Georges Bank basin are Jurassic and older. Jurassic sandstone and limestone units serve as potential reservoir rocks. Potential hydrocarbon traps may occur on structural highs associated with draping of Jurassic and basal Lower Cretaceous strata over basement blocks.

The Baltimore Canyon Trough is an elongated northeast-trending basin that contains at least 14 km of Jurassic and younger marine and nonmarine sedimentary rocks. Lithologic and stratigraphic data from the COST B-2 and B-3 wells indicate that Lower Cretaceous and Jurassic rocks are predominantly nonmarine to shallow-marine sandstone and shale. Analyses of organic carbon and identification of low thermal maturity suggest that gas rather than oil will be produced. Nineteen wildcat wells have been completed; three are significant natural-gas discoveries. The largest discovery is probably associated with a large rollover trap on the downthrown block of a Cretaceous and Jurassic growth fault. Potential hydrocarbon traps in carbonate rocks beneath the present continental slope have not yet been explored.

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Definition and Development of Mackerel Field, Gippsland Basin, Australia

The Mackerel oil field, located offshore in the Gippsland basin, Australia, was discovered in April 1969. The field, which is a topographic-erosional feature, contains oil in high-quality Eocene-Paleocene reservoir sands which lie beneath an unconformity at the top of Latrobe Group, and is sealed by calcareous shales and mudstone of the Oligocene Lake's Entrance Formation. The initial definition of the field was based on 235 km of seismic data which had been shot in an irregular grid involving seven different surveys and on a total of four exploration wells. At the end of 1974, 145 km of high-resolution seismic data were shot over Mackerel to better define the top of Latrobe unconformity and the internal reservoir configuration. In 1976 a detailed pre-development structural interpretation was undertaken and a stratigraphic model of the field was constructed from detailed analysis of the seismic data.

The pre-development seismic structural and stratigraphic mapping was used to determine the final platform location and to choose the initial development well locations. These well locations were picked to gain early structural control on the top of Latrobe, to test the interpretation in the problem areas, and to investigate the internal geometry of the reservoir units.

Development drilling started in July 1977, and these well results have provided feedback to both the structural and stratigraphic models, which are being continuously updated. The pre-development mapping of the Mackerel field was successful in delineating the basic size and shape of the field and its internal stratigraphic configuration and in identifying all the geophysical and geologic problems which were subsequently encountered in the development drilling. Thus a rigorous seismic interpretation provided the geologists and engineers with a sound basis for field development planning.

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Phosphorite, Organic Carbon, and Hydrocarbons in Permian Phosphoria Formation, Western United States

The Permian Phosphoria Formation in the northwestern interior United States contains two phosphatic and organic carbon-rich shale members that include both phosphorite and petroleum source beds. The association suggests an intimate relation between factors which generate phosphorite deposits and hydrocarbon source beds. The two members, the Meade Peak Phosphatic Shale Member and the Retort Phosphatic Shale Member, were deposited at the periphery of a foreland basin between the Cordilleran geosyncline and the North American craton. The concentration, distribution, and coincidence of phosphorite, organic carbon,