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Petroleum Exploration Results in Western Labrador Sea, Canada

Exploration drilling commenced on the Labrador Shelf in 1971 but it was not until 1973 that gas was discovered; 30 wells have been completed—2 on the shelf off Baffin Island and 19 on the Labrador Shelf. Five gas condensate discoveries have been made in widely separated areas and four productive horizons have been established. Discoveries are: (1) Hekja—Hekja sand, deltaic Paleocene; (2) Snorri—Gudrid sand, marine Paleocene; (3) Bjarni—Bjarni sand, Lower Cretaceous, fluvial, mainly nonmarine; (4) Gudrid—Carboniferous dolomite outlier; (5) Hopedale—Ordovician dolomite outlier.

On the Labrador Shelf, Mesozoic clastics up to 5 km thick were deposited in the Erik graben. After collapse, the filled graben was covered with Cenozoic deposits. On the shelf off Baffin Island Mesozoic and Cenozoic clastics were deposited in association with submarine volcanics probably extruded from the fracturing of the Ungava transform fault zone; grabens are small and as yet not well outlined.

Traps include Paleozoic outliers, pinch-outs, drape over structural highs, and growth faults.

Future exploration off Labrador will test structures at greater depths than those already drilled, with penetration of more mature stratigraphic horizons and therefore better possibilities for oil. Farther north, off Baffin Island, because resinite constitutes up to 15% of the organic matter, oil perhaps can be found at shallower depths. Drilling will be continued for the foreseeable future to delineate known discoveries and to test the estimated 80 known remaining prospects.

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Peat—A Potential Energy Resource for Atlantic Coastal States

Peat is a neglected and viable energy resource for the Atlantic coastal states. Russia, Finland, and Ireland are now producing electricity from peat-fired plants. The coastal states have peat deposits that could be used for the production of energy on a variety of scales. In North Carolina plans are underway for the construction of a 120-MW electrical plant and for the mining of peat to be used as fuel for local industries.

The coastal states probably have about 5 billion tons of moisture-free peat representing about 100 quads of energy. The U.S. Department of Energy has a program that is currently reevaluating the peat resources of the country.

In the coastal states peat has accumulated in the past 10,000 years in swampy depressions of a variety of origins: (1) depressions associated with glaciation, (2) depressions on the younger coastal terraces, (3) stream backswamps, (4) Carolina bays, and (5) tidal marshes. The largest and purest deposits are in the coastal terrace swamps in the Everglades of Florida, the Okefenokee Swamp of Georgia, the Albemarle-Pamlico swamps of North Carolina, and the Dismal Swamp of North Carolina and Virginia; but all coastal states have some deposits.

A typical, high-quality southern peat is highly decomposed and contains 85 to 90% water, 5% ash, 0.2% sulfur, and 10,000 Btu/lb on a moisture-free basis. The northern peats are more fibrous and have a slightly lower heating value.

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Atlantic Coal Deposits and Their Future Potential

Coal has been produced commercially from the Carboniferous Narragansett basin in Rhode Island and Massachusetts, from the Triassic Richmond and Farmville basins in Virginia, and from the Triassic Sanford and Durham basins in the Deep River coal field in North Carolina.

The Narragansett basin coals range from semianthracite to anthracite. Coals of the Triassic basins range from low to high-volatile bituminous. Metamorphism of Triassic coal is caused by the heat and pressure of intruding diabase dikes and sills which cause the local deposits of natural coke and anthracite.

Deposits of commercial lignite of Late Cretaceous and Tertiary age similar to those of the Gulf Coast province are conspicuous by their absence along the emerged segment of the Atlantic continental shelf. However, thin lignite beds not exceeding a few feet in thickness have been reported in Georgia. A thin 20-cm lignite bed was encountered at 328 m below sea level in a bore hole on Nantucket Island. Lignite and subbituminous coal has been reported from offshore "COST" wells, but data from exploration wells are not available.

There are reported coal resources for two of the four basins: Narragansett basin 233,000,000 short tons (211,380,000 Mg), and Sanford/Durham basins 130,000,000 short tons (117,940,000 Mg). A better definition of the stratigraphy and structure of each basin and its coal deposits, coupled with improved recovery methods, must preclude any development of East Coast coal. Detailed studies of coal deposits will provide better definition of the area's depositional environment and a possible aid to locating commercial deposits of hydrocarbons in other forms.

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Foraminiferal Paleontology and Paleobathymetric Interpretations of Lower Claibornian Rocks of Inner Coastal Plain of North Carolina

Outcrop samples of the Castle Hayne Limetone and the Castle Hayne and New Bern Formations and equivalent subsurface rocks yielded 188 species of Foraminifera. Planktonic Foraminifera indicate that these carbonate units are of middle Eocene age and were deposited during the time represented by the upper *Globigerinatheka subconglobata* (P11) and *Morozovella lehneri* (P12) Zones (44 to 46.5 m.y.B.P.). This section is bounded above and below by depositional hiatuses; it is overlain by Oligocene and younger rocks and underlain by Paleocene and older rocks. Previous studies have included some of these bounding units as part of the Castle Hayne Limestone. The section studied: (1) correlates with the lower part of the Claiborne Group of the Gulf region; (2) is defined as an informal time-stratigraphic unit; (3) is herein designated the lower Claibornian unit to distinguish it from Castle Hayne s. l.; (4) does not contain internal hiatuses of significant duration.

Cluster analysis of samples of the lower Claibornian unit indicate benthic foraminiferal biofacies representing inner, middle, and outer shelf depositional environments. Paleobathymetric reconstructions utilizing these interpretations indicate that this unit was deposited on an actively block-faulted sea floor.