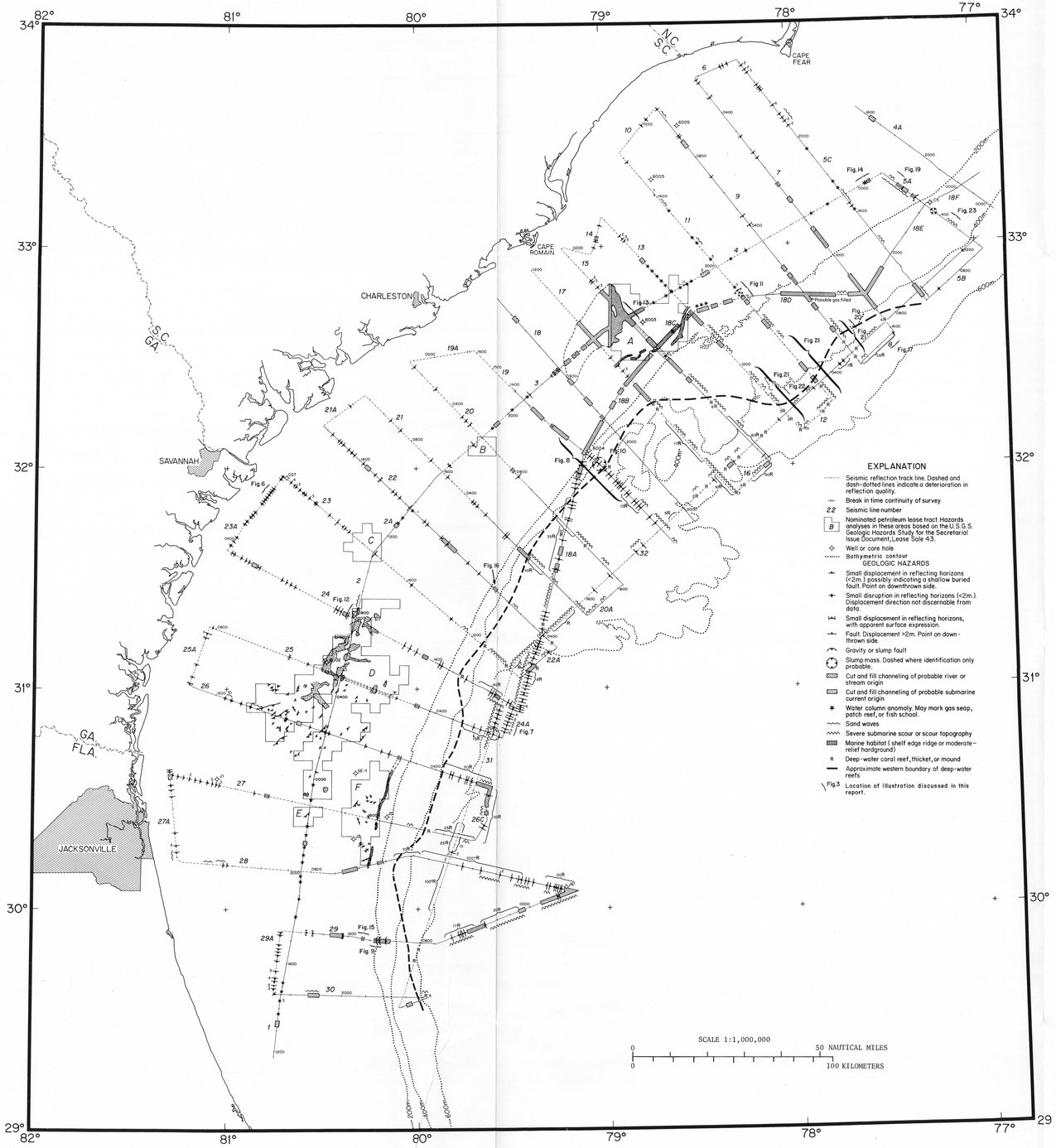
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH THE
U.S. BUREAU OF LAND MANAGEMENT

MISCELLANEOUS FIELD STUDIES
MAP MF-1276
POPENOE AND OTHERS—SOUTHEASTERN U.S.
ATLANTIC SHELF POTENTIAL GEOLOGIC HAZARDS
SHEET 1 OF 3



EXPLANATION

- Seismic reflection track line. Dashed and dash-dotted lines indicate a deterioration in reflection quality.
- Break in time continuity of survey
- 22 Seismic line number
- B Nominated petroleum lease tract. Hazards analyses in these areas based on the U.S.G.S. Geologic Hazards Study for the Secretarial Issue Document, Lease Sale 43.
- Well or core hole
- Bathymetric contour

GEOLOGIC HAZARDS

- Small displacement in reflecting horizons (<2m.) possibly indicating a shallow buried fault. Point on downthrown side.
- Small disruption in reflecting horizons (<2m.). Displacement direction not discernable from data.
- Small displacement in reflecting horizons, with apparent surface expression.
- Fault. Displacement >2m. Point on down-thrown side.
- Gravity or slump fault
- Slump mass. Dashed where identification only probable.
- Cut and fill channeling of probable river or stream origin
- Cut and fill channeling of probable submarine current origin
- Water column anomaly. May mark gas seap, patch reef, or fish school.
- Sand waves
- Severe submarine scour or scour topography
- Marine habitat (shelf edge ridge or moderate-relief hardground)
- R Deep-water coral reef, thicket, or mound
- Approximate western boundary of deep-water reefs
- Fig.3 Location of illustration discussed in this report.

Universal Transverse Mercator Projection

MAP OF POTENTIAL GEOLOGIC HAZARDS

INTRODUCTION

This report presents and analyzes seismic-survey data and bottom-instrument data as they pertain to a regional assessment of potential geologic hazards and other constraints to petroleum exploration and development on the southeastern United States Continental Shelf (see fig. 1). The high-resolution seismic-reflection data were collected by the U.S. Geological Survey in cooperation with the U.S. Bureau of Land Management as part of over 10,000 kilometers (km) of trackline (grid spacing about 25 km) (fig. 2) covered during four cruises between 1975 and 1978 (R.V. *Fay* cruises 17, 18, and 25, and R.V. *Iselin* cruise 3). Only data from the R.V. *Fay* cruises 17 and 18, collected in 1975-1977 are illustrated here. Data from the R.V. *Fay* cruise 25 and the R.V. *Columbus Iselin* cruises collected during 1978 are still being analyzed and are not discussed in this report.

The Continental Shelf offshore of North Carolina, South Carolina, Georgia, and northern Florida consists of four physiographic areas (fig. 1):

1. The Florida-Hatteras Shelf (hereafter termed the shelf)--an inner shelf with water depths generally less than 100 meters (m).
2. The Florida-Hatteras Slope (hereafter termed the slope)--a gently sloping transitional surface.
3. The Blake Plateau--a broad, flat plateau of intermediate depth (350-1,000 m).
4. The Blake Escarpment--a steep escarpment that slopes down to the deep ocean.

This regional assessment considers potential hazards on the Florida-Hatteras Shelf, Slope, and inner Blake Plateau. Areas of the shelf were leased for petroleum exploration in 1978 and others are scheduled for leasing in 1981. The Blake Plateau is scheduled for a petroleum lease sale and exploration in 1981 and 1984.

In this report, potential geologic hazards and constraints are defined as processes or conditions that might endanger the deployment of facilities or the containment of oil and gas during recovery and transfer operations or that may pose environmental restrictions to rig or pipeline placement. Among the potential hazards discussed here are shallow faults and areas of cut-and-fill, slope instability, and submarine scour. Reefs, fishing grounds, and offshore aquifers that must be protected constitute major restrictions to development. Currents and sediment mobility on the shelf affect the dispersal of pollutants (therefore the disposal of drilling fluids) and may cause scour around the legs of bottom-mounted structures; therefore, they are potential constraints.

The map of potential geologic hazards shows the location of seismic tracklines and features identified as possible hazards and constraints to petroleum exploration or production. Each figure in this report is located on the map. In the vicinity of the lease tracts, areas of cut-and-fill channeling, reefs, and faulting are outlined. These data are based on an interpretation of an 800-m x 3,200-m grid of seismic-reflection profiles that were collected and interpreted for lease sale 43 (U.S. Geological Survey, 1977).

AQUIFERS

In offshore petroleum development, care must be taken to assure that units corresponding to the principal onshore artesian aquifer of Georgia, South Carolina, and Florida are not contaminated by either salt water or drilling fluids. Onshore the aquifer is mainly confined to Eocene-age rocks, although its boundaries may overlap into rocks of Oligocene and Paleocene age (Paull and Dillon, 1980). We assume that the aquifer is confined to rocks of Oligocene-Eocene age offshore. Figure 3 shows the depth to the top of the Oligocene-Eocene sequence, and figure 4 shows the depth to the bottom of the sequence. Figure 5 shows the thickness of the sequence. For a more comprehensive discussion of the offshore aquifer see Paull and Dillon (1980).

REFERENCES CITED

Paull, C.K., and Dillon, W.P., 1980, The stratigraphy of the Florida-Hatteras shelf and slope and its relationship to the offshore extension of the artesian aquifer, *in* Arden, D.D., Beck, B.S., and Morrow, E., eds., Second Symposium of the Geology of the Southeastern Coastal Plain: Georgia Department of Natural Resources Information Circular 53.

U.S. Geological Survey, 1977, Proposed O.C.S. Lease Sale 43, potential geologic hazards report: Unpublished report to the U.S. Department of the Interior for the Secretarial Issue Document.

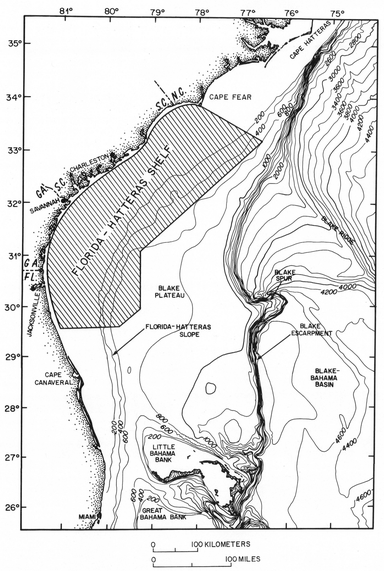


Figure 1.--Index Map. Shaded area shows location of seismic survey discussed in this report. Bathymetry is in meters.

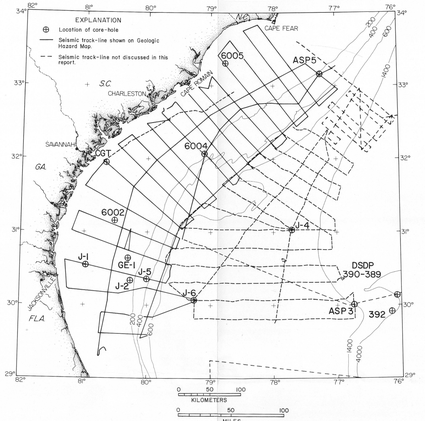


Figure 2.--Trackline locations of U.S. Geological Survey high-resolution seismic-reflection data and of coreholes in the survey area. Dashed lines indicate recently obtained data not discussed in this report. Circles indicate locations of core holes used in seismic-stratigraphy analyses.

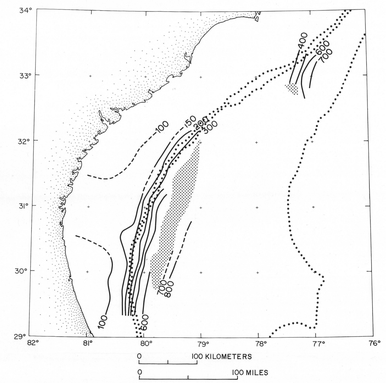


Figure 3.--Contour map of the top of the Oligocene-Eocene sequence, in meters below sea level. Contours dashed where approximately located. Dotted pattern indicates absence of Neogene sediments in subcrop. Dotted lines are the 100-, 200-, and 1,000-m bathymetric contours.

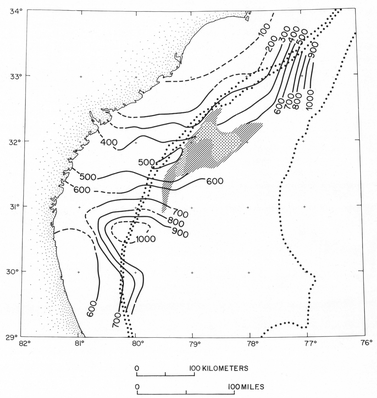


Figure 4.--Contour map of the base of the Oligocene-Eocene sequence, in meters below sea level. Contours dashed where approximately located. Lined pattern indicates outcropping Paleocene strata; dotted pattern indicates absence of Paleocene strata. Dotted lines are the 100-, 200-, and 1000-m bathymetric contours.

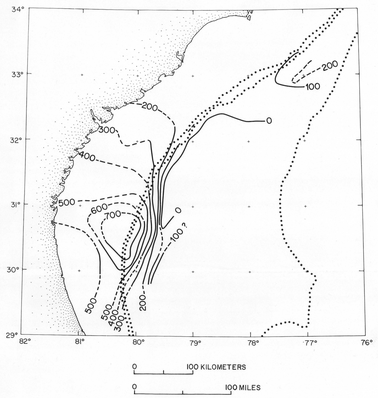


Figure 5.--Isopach map of Oligocene and Eocene sediments, in meters. Dashed where approximately located. Dotted lines are the 100-, 200-, and 1000-m bathymetric contours.

INTERPRETATION OF GRAPHIC DATA ON POTENTIAL GEOLOGIC HAZARDS ON THE SOUTHEASTERN UNITED STATES ATLANTIC CONTINENTAL SHELF

By
Peter Popenoe, Bradford Butman, Charles K. Paull,
Mahlon M. Ball, and Stephanie L. Pfirman

1981

INTERIOR—GEOLOGICAL SURVEY, RESTON, VA.—1981

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