posed site since 1976. This work was performed under the direction of Sandia Laboratories, Albuquerque, under contract to the Department of Energy. The purpose of these geophysical investigations was to study the geologic conditions of the bedded salt deposit, including the evaporite section and overlying and underlying formations as part of site evaluation and characterization.

Both nonseismic and seismic geophysical techniques were employed. Seismic investigations were used to map from the top of the Salado Formation downward to Precambrian basement in order to locate and delineate (1) salt breccia pipes or collapse features that penetrate into and possibly through the Salado Formation, (2) an igneous dike that cuts the Salado Formation, (3) salt-dissolution fronts within or above the evaporite section, and (4) slump, faulting, or other structural disturbances above, below, or within the evaporite section.

The seismic site-evaluation studies included two Vibroseis programs plus a review of all the petroleum industry data available in the area of interest. The 1977 seismic program was for the semidetailed analysis of anomalies located during all earlier data studies. Any indications of slumping, faulting, and dissolution within the evaporite zones or any other structural departure from a "stable" condition in the post-Delaware deposits on the first review were subjected to additional seismic study. Forty-eight miles of extended frequency Vibroseis data were gathered over the anomalies in 1977. Sweeps to 110 Hz were utilized.

The results of the 1977 program indicated that in some areas the Castile and lower Salado Formations are deformed, a fact supported by a follow-up series of drill holes. Examples of the early interpreted anomalies with the normal petroleum industry field-recording parameters clearly show the need to modify the parameters to obtain shallow information. The latest Vibroseis data indicate the enhancement obtained by shortening the geophone and source intervals and by raising the sweep range to 100 Hz. The earlier observed anomalies are compared with later examples and, in all cases, the detailed studies give excellent definition as to salt deformation, timing of movement, and extent of structural effect on the salt beds.

HILL, GARY W., U.S. Geol. Survey, Menlo Park, Calif.

Applications of Crab-Burrow Orientation to Environmental Analysis

Burrows of the ghost crab *Ocypode quadrata* (Fabricius) are widespread in beaches of Texas and Georgia. The orientation of these burrows and the factors that influence it are potentially useful in recognizing and interpreting ancient beach environments, shoreline position and orientation, and direction of dominant winds.

O. quadrata burrows generally slope downward away from the shoreline with branches being landward of the main shaft. This preferred orientation is controlled by the direction of onshore winds. During the short excavation period (several minutes), individual crabs burrow 45° to either side of the local downwind direction. The mean orientation of all ghost crab burrows over days or larger periods of time, however, corresponds to the mean onshore wind direction.

Other factors that influence burrow orientation include temperature and local landforms. When air temperatures drop below 15.5°C, ghost crabs generally stay in their burrows and reduce their activity. In Texas and Georgia, winter winds of these temperatures are generally offshore winds and consequently have little effect on burrow orientation. Where fore-dune ridges exist, burrows are randomly oriented in the interdune flats owing to wind shadows. In other places, mean burrow orientation is parallel with geomorphic features such as swales which tend to funnel the wind in specific directions.

A model of ghost crab-burrow orientation was developed from laboratory experiments that can be combined with wind data to predict field observations in modern beach environments.

HILL, J. RANDEL, Texas Railroad Commission, Austin, Tex.

Responsibilities of Texas Railroad Commission for Uranium Mining Pursuant to Surface Mining and Reclamation Act of 1975

The Texas Surface Mining and Reclamation Act was enacted on June 21, 1975, with the expressed intent of regulating the surface mining of coal and uranium and activities associated with a surface mining operation. The Railroad Commission of Texas has certain responsibilities pursuant to this legislation, although some types of activities are not affected by this law.

HILL, P. J., and G. V. WOOD, BP International, Aberdeen, Scotland

Forties Field, United Kingdom Continental Shelf, North Sea

The Forties field, located about 180 km east-northeast of Aberdeen, mainly in UK Licence Block 21/10 in the North Sea, was discovered in October 1970 in Paleocene sandstones of the Forties Formation. Four appraisal wells drilled during 1971-72 proved the existence of a giant oil field with an area of about 90 sq km and estimated oil in place of 4,600 million bbl.

Additional geologic data from the 50 development wells drilled to date show rapid facies variations over the field, with some sand bodies having a cross section less than the prime well spacing of 700 m. A large, partly isolated sand body, the Charlie sand, is recognized in the upper, western part of the reservoir.

The sandstones and shales of the Forties Formation are considered to have been deposited in a middle and lower submarine-fan environment. A mixture of sedimentary processes including grain flow, debris flow, and turbidity currents have been identified and four broad facies defined from cores. The facies types form significant vertical associations that are related to specific depositional environments and recognized by petrophysical log patterns.

Detailed lithofacies studies, together with pressure-decline data and log-pattern analyses, provide a practical means of correlating and mapping the complex sand geometry. These techniques provide a method for well location and a better understanding of the reservoir performance.