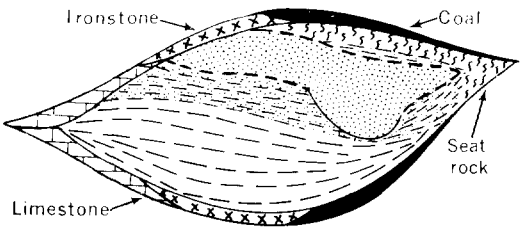

with "chemical" rocks as limiting members, represents a cross section of a Pennsylvanian cycle extending from seaward to landward (left to right) extremities. Examples show that this simple model is modified by local as well as regional conditions.

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RECENT CARBONATES OF ISLA MUJERES? QUINTANA ROO

Isla Mujeres, off the northeast tip of Yucatan, consists of oölitic dunerock. The Caribbean coast is subjected to heavy waves, and the sediments are coarse, well sorted, highly polished and rounded; coralline algae, carbonate rock fragments, *Halimeda* and coral are abundant. The lee (western) beach is protected; sands are finer, well sorted, dull, and angular with *Halimeda* greatly predominant. Straits separating Isla Mujeres from Yucatan are swept by strong northerly currents: sediments are poorly sorted, negative-skewed, and consist of a bimodal mixture of (1) dominant small, polished oölites, and (2) subordinate coarse oölitic rock fragments with some skeletal grains.

Sorting of beach sediments is a sinusoidal function of mean grain size; best sorting is at 2ϕ, -3ϕ, and -8ϕ. Sorting values (σ) of 0.3–0.6ϕ are characteristic of all beaches regardless of grain size, from fine sand to coral boulders, regardless of composition and regardless of wave energy of the coast. Protected bay sediments are muddy and poorly sorted (immature); sediments from current-swept straits are winnowed, but poorly sorted (submature); sediments of lee beaches are well sorted but dull and angular (mature); and sediments of beaches exposed to high waves are well sorted, rounded and highly polished (super-mature).

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RESEARCH AND THE PETROLEUM INDUSTRY

If research were to be considered as an industry in itself, it would rank among the largest in the United States. Ever since the beginning of World War II, the amount of money invested in research and development has been increasing much more rapidly than the Gross National Product (GNP); growing from a few tenths of a per cent of GNP in 1939 to about 3 per cent of GNP in 1961. Although research by and for the U. S. Government is now more than half of the total, the expansion of research in the petroleum industry has been almost entirely financed by that industry. Research in the earth sciences has become a large part of the petroleum industry effort. It is, however, different in many ways from research on processes and products. For many years, a lack of appreciation of the true nature and role of geological and geophysical research inhibited effective integration of the results of research into the operations of the industry. By now, research is widely recognized as an important and valuable ally of the exploration geologist and geophysicist.

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DETAILED STRATIGRAPHIC CONTROL THROUGH DIP COMPUTATIONS

Recent dip interpretation techniques utilize high-density computations to define depositional and structural features. The definition of stratigraphic patterns is accomplished in both shallow and deep horizons. The method is of increased importance in the deeper provinces, where seismographic techniques lack resolution.

Faults may be recognized and defined, both as to direction of dip and to strike. Characteristic dip patterns delineate channels, bars, and unconformities. Definition of complex channeling has provided the necessary control for more efficient development of some deep South Louisiana fields. Patterns of deltaic depositions, with definition of foreset beds, are also apparent from dip computation results.

Reef structures can be located and defined by interpretation of dips resulting from deposition on the irregular reef surface, from talus slopes, and from differentially compacted formations.

In several instances, the presence of shale diapirs has been confirmed.

Machine computations of Dipmeter surveys, with dips computed as frequently as one per foot of hole, are particularly suited to these problems.

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ANALYSIS TECHNIQUES AND SIGNAL ENHANCEMENT METHODS APPLIED TO THE BELLSHILL LAKE STRATIGRAPHIC TRAP PROGRAM

A test program was conducted in the Bellshill Lake field to investigate the application of seismic techniques to finding the stratigraphic trap formed by the irregular sand bar type build-up within the Basal Quartz section controlling production in the field.

The seismic interpretative criteria were postulated from synthetic seismograms.

Controlled field tests were conducted to find the factors which influenced record quality, to examine the effect of each factor on the signal-to-noise ratio, and to evaluate the field techniques developed from the test results. Critical field techniques were the selection of charge sizes and hole depths yielding both suitable shot wave forms and a means for attacking the ghost reflection problem, the attenuation of shot generated boundary waves through wave length filtering with arrays of multiple seismometers, and the preservation of true amplitude information in the recording procedure. Special data processing techniques included the application of a velocity filter, the "pie slice" process to improve the signal-to-noise ratio without signal distortion, and the stacking of vertically distributed charges with a process designed to eliminate the ghost over a broad frequency range without signal distortion.

The emphasis in the experimental survey was in the methods of investigation and the particular balance in techniques which must be struck to solve an explora-