RAU, WELDON W., Department of Conservation, Olympia, Wash.

BIOSTRATIGRAPHY OF "OLIGOCENE" STRATA, SOUTHERN OLYMPIC PENINSULA, WASHINGTON

Just south of the Olympic Mountains of western Washington, the Refugian stage of Schenck and Kleinpell and the Zemorrian stage of Kleinpell comprise a continuous sequence about 9,000 feet thick. These strata locally constitute the Lincoln Creek Formation, known throughout the Grays Harbor basin of western Washington. Rocks of the Refugian stage are divided into the *Sigmomorphina schencki* zone and *Cassidulina galvinensis* zone, which are also known throughout the basin, although the latter originally was named the *Eponides kleinpelli* zone. Because the foraminiferal composition of the Zemorrian strata is so nearly similar throughout, they are subdivided locally in only a general way and are informally termed the upper and lower zones of the stage.

Foraminifera from both the Refugian and Zemorrian strata suggest that the environment of deposition was reasonably uniform in a cool to cold open sea at upper bathyal to possible lower neritic depths.

REEDY, ROBERT D., Signal Oil and Gas Co.

DUTCH SLOUGH GAS FIELD, CONTRA COSTA COUNTY, CALIFORNIA

Dutch Slough gas field, discovered in October, 1963, by Signal Oil and Gas Company, is conveniently located 40 miles east of San Francisco and adjacent to one of the leading energy markets in the State of California.

A reserve of approximately 300 billion cubic feet of natural gas has been established in former "dry hole" country. A full spectrum of anomalous structural and stratigraphic occurrences has provided for an accumulation of quality natural gas and condensate. Present production is obtained from the Paleocene Meganos and Martinez Formations, but deeper Cretaceous objectives offer considerable future potential.

REESE, R. J., International Business Machines Corp.

RECENT APPLICATIONS OF DIGITAL COMPUTERS TO GEOPHYSICAL PROBLEMS

The oil-finder of the near future will carry out interpretation with the aid of recently developed computer techniques in which the functions of geology and geophysics are intimately interrelated and are guided by a highly skilled interpreter who operates in a man-computer feed-back loop.

Geologic in-put data will be derived from computer well data files, similar to those now being developed in several cities. Geophysical data in digital form will be entered from mass storage devices capable of storing thousands of seismic records. The professional interpreter will select and control the sequence and type of operations carried out by the computer system. Such operations might typically include network adjustment of survey data, stacking and digital filtering of seismic data, creation of contour maps, derivation of trend surfaces of geologic and geophysical data, computations of continuations and derivatives of potential field data, detailed well log analysis, and other methods.

Computed out-put will be displayed almost instantaneously on a cathode ray tube. The interpreter can communicate with the computer by means of a light-pen attached to the cathode ray tube. With the aid of the light-pen, the interpreter can cause the computer to modify displayed out-put such as seismograms, logs, and maps. The interpreter also initiates interpretive routines to act on the modified data in subsequent analyses.

The advantages of such a man-machine system are: fast and effective retrieval of in-put data from mass storage, high-speed computation of complex and repetitive problems, almost instantaneous display of results, and feed-back from a highly skilled interpreter to direct the course of further analysis.

SANEM, ROBERT E., and ROBERT R. STODDARD, Standard Oil Co. of California, Western Operations, Inc.

STRATI-STRUCTURAL TRAPS IN STEVENS SANDS

Extensive drilling of the upper Miocene Stevens sandstones on the Bakersfield arch for almost 30 years has led to the classification of this area as one of mature exploration. Yet recent drilling, based on detailed structural-stratigraphic studies, has led to the discovery of a new field, English Colony, and new pools at Northwest Strand, Canal, and Ten Section.

In these studies, emphasis was placed on the diligent use of conventional geologic exploratory methods, including the detailed study of older fields, isochore and isolith mapping, stratigraphic sections, and detailed seismic mapping. In addition, specific geologic techniques have proved useful in particular areas. These techniques and their application to these recent discoveries on the arch are discussed.

A project of the type reviewed here is especially suited to a mature area of exploration where extensive subsurface control, production data, and adequate seismic coverage are present.

SAVIT, CARL, Western Geophysical Co., and M. N. MAYUGA, Long Beach Harbor Department

LONG BEACH HARBOR GEOPHYSICAL AND GEOLOGICAL CASE HISTORY

An offshore seismic survey in 1954 showed a continuous anticlinal structure extending from the presently developed area of the Wilmington oil field in Long Beach Harbor to an undetermined distance toward the southeast. Seventy miles of line were shot with "L" spreads during 9 operating days.

A number of normal faults transverse to the axis of the anticline were found in a pattern similar to that in the developed portion of the field. Information from 8 core holes drilled in 1962 verified the structural interpretation of the 1954 seismic survey. Only minor modifications of structural trend, depths and extent of productive zones, and location of major faults were required to make the seismic map conform with the core hole information. All stratigraphic units in the developed portion of the field are present in the undeveloped area under Long Beach Harbor. At least 5 zones (Ranger, Upper Terminal, Lower Terminal, Union Pacific, and Ford) are expected to yield commercial production. Based on current information, it is estimated that the undeveloped, easterly extensive of the Wilmington field will produce 1.1 to 1.5 billion barrels of oil during the next 40 years under a pressure maintenance operation.

SEIDEN, HY, consultant

ASPHALTO FIELD

The Asphalto field is in Kern County on the western side of the San Joaquin Valley. It lies about 2 mi. east