

Exploration activity in Washington has increased during the past 3 years. Thirty-nine drilling permits were issued in 1961-63 compared with 22 permits in the previous 3 years. Exploratory footage drilled in 1962 was 42,463 in 10 wells, and footage in 1963 was 44,757 in 13 wells. Interest is shifting offshore. Six or more major companies conducted marine seismic, gas exploder, gravity, and aeromagnetic surveys during 1963. Approximately 35,000 acres of offshore lands owned by the State of Washington were under lease prior to 1962. Subsequent to 1962, offshore lands under lease increased to an estimated 183,000 acres.

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29D MONARCH AND 10-10 POOL, A "SLEEPER" IN OLD MIDWAY-SUNSET FIELD, KERN COUNTY, CALIFORNIA

The 29D Monarch & 10-10 pool is located 2½ mi. southeast of Taft, California, in the "29D" area of the Midway-Sunset field. Although surrounded by wells in an old producing area, the pool remained undiscovered until December, 1962.

Closure is not present in the uppermost upper Miocene beds on the 29D portion of the Spellacy anticline, but westward thickening of deeper sediments provides localized structural reversal and closure in the Monarch and 10-10 sandstones.

As a result of the pool discovery, seven significant phenomena were noted: (1) long interval tests recovered only strong gas blows in intermingled gas, oil, and water zones; (2) 1,000 feet of productive interval were found in a gross sandstone body having less than 200 feet of structural closure; (3) 10 ft. or less of shale was sufficient to form vertical barriers; (4) a natural boundary within the gross sandstone body separates the Monarch and 10-10 intervals; (5) tilted oil-water interfaces were found in all reservoirs; (6) a 1 ohm-meter increase in resistivity over that of a wet sandstone may indicate clean oil sandstone; (7) comparison of sonic logs before and after testing may show intervals of gas entry in an oil and gas sequence when only gas is recovered.

Cumulative production through March, 1964, exceeds 2,000,000 barrels of 32° API oil and gas equivalents. Daily production approaches 9,000 barrels from 32 flowing wells having an average total depth of 4,700 ft.

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ORIENTED SAMPLING IN CONTINENTAL BORDERLAND

An instrument has been designed which records the orientation of coring devices and other apparatus with respect to magnetic north, and can be used in any depth of water.

Orientation data on Recent marine structures from depths greater than shelf depth have not been obtained in routine fashion in previous studies, thus omitting an important factor of considerable stratigraphic importance. Paleodirectional studies have few modern marine counterparts.

Examples of oriented samples are described from test stations in the San Pedro basin.

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BACKGROUND AND HISTORY OF OUTER CONTINENTAL SHELF MINERAL LEASING PROGRAM

Since hydrocarbons were first discovered near submerged lands, interest has increased in offshore mineral development. President Truman's proclamation of 1945 asserting jurisdiction over the natural resources of the continental shelf of the United States by the Federal Government initiated numerous claims by states and nations as to the control and exploitability of such areas. Also arising from this action were several Supreme Court cases and finally the passage by Congress of the Submerged Lands Act and the Outer Continental Shelf Lands Act allowing leasing and development of the Federal portion to begin in 1954. Further consideration was given by the International Law Commission and the United Nations Conferences on the Law of the Sea regarding possible solutions to unilateral action of nations asserting jurisdiction to large areas of submerged lands including the waters above the subsoil.

Rapid development of the mineral resources of submerged lands during the past 10-15 years has precipitated numerous legal, technical, and associated problems, some of which have been conquered and others of which still challenge the best minds available. It is expected, however, that further accomplishments will allow development in areas previously thought to be incapable of exploitation.

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OFFSHORE EXPLORATION AND DEVELOPMENTS—SOUTHERN SANTA BARBARA COUNTY

The offshore area of southern Santa Barbara County, California, shows every indication of becoming a major oil and gas producing province. This rapidly developing province extends westerly from Rincon Point to Point Conception, a distance of 56.6 statute mi. The total area, within the State 3-mi. limit, currently undergoing exploration and development amounts to 195 sq. mi. A brief discussion of the regional geology and the mode of hydrocarbon accumulation are presented. Approximate statistical estimates are: 223 wells have been drilled to date as exploratory tests or as development wells into objective sandstones; 139 of these were completed as oil producers and 16 were completed as gas-condensate producers; 18.5 million barrels of oil and 70 billion cubic feet of gas have been produced. Speculation on future exploration activities is discussed.

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ORIGIN OF REDBEDS, UNSOLVED PROBLEMS

The currently favored "primary detrital redbed" hypothesis requires modification as a general explanation.

The pigment in some redbeds probably was inherited from red upland soils, but the available data suggest that many redbeds were derived from tan to brown soil and alluvium.

Diagenetic processes played a significant role in (1) converting varied suites of clay minerals in brown alluvium to the dominant illite-chlorite suite in redbeds;

(2) altering brown goethite and amorphous ferric oxide in mud to hematite pigment in mudstone; and (3) oxidizing inherited magnetite to specular hematite, and altering iron-bearing silicates which supplied some of the hematitic pigment.

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FLUORESCENT TRACER STUDY OF EOLIAN SAND TRANSPORT¹

Ten pounds of eolian sand were dyed fluorescent red and released on the crest of a large shadow dune at Windy Point, San Geronio Pass, California. The dune surface was sampled by pressing 3×3-in. Vaseline-coated cards onto the sands at predetermined stations downwind of the tracer point source. Westerly winds blew at 15–25 m.p.h. during the test.

Sample cards were examined under ultraviolet light and the number of fluorescent grains per square inch determined for elapsed times of 3, 20, and 60 min. after tracer release. Isopleths of equal tracer concentration at the three elapsed times all delineated lobate patterns presumably in response to variable wind "streamlines" over the dune.

At 2.5 hrs. after tracer release a lag deposit of very coarse fluorescent grains remained at the point source. The lag grains formed ripples with lengths three times those of the natural ripples. This suggests that ripple length is governed primarily by grain diameter and wind velocity.

Analysis of tracer distribution revealed that fluorescent sand entered and left the sample grid at a constant rate. A decay curve of tracer loss from the point source indicated extinction of the point source occurred 157 min. after release. Difference between decay value and per cent of the total tracer on the dune at any moment was equivalent to per cent of tracer loss from the sample grid at any moment. Knowing the distance of grain movement, this relationship yielded an average tracer grain velocity of 30.36 in./min. Time-lapse motion pictures established that creep velocity, assumed to be equivalent to ripple velocity, was 0.153 in./min., indicating that grains in saltation were traveling roughly 198 times faster than grains in creep. This magnitude of difference between creep and saltation velocity is physically inconsistent with Bagnold's classic division of eolian sand load.

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GEOLOGY AND PALEONTOLOGY OF A PORTION OF MANIX BASIN DEPOSITS, SAN BERNARDINO COUNTY, CALIFORNIA

Late Pleistocene fluvial and lacustrine deposits in the Manix Lake basin occupy about 250 sq. mi. of the Mojave Desert including Coyote Lake and Troy Lake. The sediments have been exposed by recent downcutting of the Mojave River along part of the margin of the basin.

The lowest sediments are conglomerates that lie unconformably on metamorphic and volcanic basement rocks of the Cady Mountains. These alluvial-fan deposits dip gently to the northwest and interdigitate with lacustrine clays and silts in the center of the basin. About 70 ft. of fossiliferous lacustrine clays, silts, and

sands lie horizontally above the conglomerates and older lake sediments. The uppermost sediments are alluvial arkosic sands and conglomerates that overlie the youngest lake beds, and are about 15 ft. thick.

Originally Manix Lake was restricted to the central portion of its basin and flanked by alluvial fans. As the basin was filled, lake sediments lapped on and covered over portions of the alluvial slopes. A wedge of fluvial arkosic sand in the eastern part of the basin within the later lake beds may indicate a temporary retreat of the lake. A continuous sequence of lake beds near the center of the basin shows that one permanent lake was present until an outlet through Afton Canyon developed.

Fossil remains of fresh water gastropods, pelecypods, fish, tortoise, and water birds represent members of lake and lake-shore communities. Grassland and riparian communities are indicated by the following mammal genera: *Canis*, *Felis*, *Equus*, *Camelops*, *Tanupolama*, *Ovis*, *Bison*, *Mammuthus*, and *Nothotherium* (not previously reported). A preliminary examination of the fauna reveals a Rancholabrean North American mammal age.

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SINCLAIR DINOSEIS

The *Dinoseis* seismic system, developed during the past 2 years by Sinclair Research, Inc., is described. This system uses a unique seismic pulse generator activated by a confined explosion. The pulse generator and recording equipment are shown in field operation movies. A comparison is made between *Dinoseis* and conventional seismic records in Texas and Oklahoma.

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HIGH-SPEED DIGITAL CORRELATOR FOR GEOPHYSICAL APPLICATION

Many of the processes used in the interpretation of geological and geophysical data basically involve the correlation or cross-comparison of related sets of well logs, seismograms, and other graphical data.

Commonly the correlation is done by visual inspection. Two sets of graphical data are viewed side-by-side, and displaced relative to each other until a maximum degree of correspondence is observed.

However, with the ever-increasing volume of accumulated geological information, there is a growing trend toward the automatic processing of data. The digital correlator described is a special-purpose computer specifically designed to perform correlation operations at speeds sufficiently high to permit "on-line" or real-time processing of geophysical field data.

The paper describes the basic correlation process and, schematically, how the process is carried out in the correlator, and includes pictures and description of the correlator itself.

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STRATIGRAPHIC EVIDENCE FOR LAS VEGAS VALLEY SHEAR ZONE

Longwell (1960) has postulated about 25 mi. of right-lateral displacement along a major shear zone in Las Vegas Valley, extending from Frenchman Mountain northwest past Mercury, Nevada. Because of their areal distribution, several Paleozoic stratigraphic units in

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