3. Unconformably on the Miocene are estimated 500+ feet of extremely fossiliferous Pliocene silts and sandstones.

4. Fossiliferous marine Pleistocene terrace deposits are faulted and gently tilted on the mainland. Emerged wave-cut benches are prominent on the islands.

5. The dominant structural pattern is a series of large northwest-trending faults separating the region into strips of older and younger rocks. Some faults have shear zones hundreds of feet wide containing a remarkable assemblage of more or less serpentinized basement rocks, most of which are not found in outcrops elsewhere. Four episodes of deformation can be differentiated; the earliest is pre-Miocene and the latest post-Pleistocene.

6. The San Benito Islands share in the northwest structural grain but lack the Miocene and younger rocks. Glaucophane schists, red cherts, graywackes, altered basic volcanics, and serpentine are highly sheared and suggest that these islands may be entirely within a large northwest-trending fault zone.

JOSEPH LIPSON, JACK EVERNDEN, AND GARNISS CURTIS, University of California, Berkeley, California
Potassium-Argon Dating of Sedimentary and Igneous Rocks

This laboratory has developed techniques for dating samples of low radiogenic argon content. Results of three principle lines of study utilizing these techniques will be reported. (1) Ages of a series of well classified glauconites from New Zealand ranging from the Cretaceous (55 million years) to the Miocene (20 million years). (2) Ages of two near surface igneous micas from Sutter Buttes, California, less than two million years in age. (3) Ages of a series of related plutonic igneous micas from the Sierra Nevada around 90 million years in age.

JACK W. KNIGHT, Petroleum Research Corporation, Denver, Colorado
Hydrodynamics—Practical Exploration Tool

Those effects of hydrodynamics which result in tilted oil pools have been known for some time, but the problem has been whether or not a practical application of these effects could be used in exploration. What is not commonly realized is that hydrodynamics plays a very important part in stratigraphic, fault, and unconformity oil accumulations which do not exhibit a noticeably tilted oil/water contact.

In tilted oil pools the tilt of the oil/water contact for a potentiometric surface increases as the gravity of the oil decreases. This tilt is accomplished, not by rapid movement of water through the aquifer past the oil/water interface, but rather by the pressure drop across the area of the oil accumulation due to extremely slow movement of the water through the pores of the aquifer.

Under static conditions, the size of an oil accumulation below a pinch-out or against a fault is dependent solely on the entry pressure of the barrier. If hydrodynamic conditions exist, however—and this appears to be almost universal—the size of the accumulation is increased or decreased from what would normally be expected, according to the direction of hydrodynamic force. This can result in very large oil accumulations or barren "traps" under what appear to be the same structural and stratigraphic conditions.

The practical application of hydrodynamics begins with the mapping of the potentiometric surface of the various reservoirs of interest. The map is then used in conjunction with the geology of the prospects to be evaluated and the gravity of the oil expected in the trap.

The application of hydrodynamics is developing into a very important exploration tool.

DON J. MILLER, U. S. Geological Survey, Menlo Park, California
Tertiary Sequence on Northeast Coast of Gulf of Alaska

Sedimentary rocks of Tertiary age exceeding 25,000 feet in composite thickness are intermittently exposed in a lowland and foothills belt 300 miles long and 2–40 miles wide on the northeast coast of the Gulf of Alaska. Three major subdivisions of the Tertiary sequence are recognized: (1) interbedded and intertonguing non-marine, brackish-water, and shallow-water marine strata that contain a tropical to warm-temperate flora and marine invertebrate fauna of late Eocene age and include the Stillwater, Kushtaka, and Tokun formations in the Katalla district and an unnamed formation in the Yakataga and Malaspina districts; (2) shallow- to deep-water marine strata that contain a warm-temperate to subtropical invertebrate fauna of Oligocene and early Miocene age and include the lower part of the Katalla formation in the Katalla district, the Poul Creek formation in the Yakataga district, and the basal part of the exposed Tertiary sequence in the Lituya district; (3) shallow-water marine strata, in part marine tillite, that contain a cool-temperate to sub-boreal invertebrate fauna of late Miocene and Pliocene age and include the upper part of the Katalla formation in the Katalla district, the Yakataga formation in the Yakataga and Malaspina districts, and the upper part of the Tertiary sequence in the Lituya district. Oil seeps and other indications of petroleum are associated mainly with the two lowest subdivisions of the Tertiary sequence.

Remains of marine mammals have been found in the upper part of the Poul Creek formation in association with Mollusca and Foraminifera that indicate correlation with the Blakeley formation of Weaver (1912), the Twin River formation of Arnold and Hannibal (1913), and the upper part of the Lincoln formation of Weaver (1912) in Washington. Further collecting and study of these vertebrate remains may aid in determining the position of the Oligocene-Miocene boundary on the Pacific coast of North America.

C. E. KIRSCHNER, Standard Oil Company of California, Seattle, Washington
Reconnaissance Observations on Geology of Trinity Islands, Alaska

The Trinity Islands, Tugidak on the west and Sitkinak on the east, form the southwesterly extent of the Kodiak Islands group. Each island is approximately 5 miles wide by 20 miles long. The surface of Tugidak Island is a series of low wave-cut terraces maximum elevation 200 feet. Sitkinak Island comprises a group of hills on the east and west, maximum elevation 1,640 feet, separated by a valley enclosing Sitkinak tidal lagoon.

The bedrock of East Sitkinak Island is Cretaceous (?) marine epineritic bedded graywacke and siltstone complexly folded and faulted. West Sitkinak Island is Cretaceous (?) marine infraneritic thin-bedded siltstone and fine graywacke isoclinally folded and faulted. The thickness of these units is unknown; structural trends are northwest.

Sitkinak lagoon and valley lie in a northwest-trending graben in which about 4,000 feet of Eocene (?) continental to brackish marine conglomerate, sand, silt, and coal crop out.

The bedrock of Tugidak Island consists of Plio-Pleistocene soft mudstone and thick-bedded gray sands, which strike N. 45° E. and dip 5° NW.

The Cretaceous sediments were deposited in a northeast-trending mobile, extra-continental, geosyncline and were probably derived from a volcanic landmass on the southeast. Late Cretaceous or Laramide diastrophism brought to a close the Cretaceous sedimentation cycle. The Tertiary sediments were deposited in a similar less well developed geosyncline but had a northwesterly source. Intermittent orogenic uplift near the close of this cycle caused non-deposition or erosion of mid-Tertiary sediments. Late Tertiary diastrophism that closed the Tertiary cycle of sedimentation has continued to Recent time and includes differential orogenic movements, in part along major northeast-trending faults.

J. G. VEDDER, U. S. Geological Survey, Pomona College, Claremont, California
Geology of San Nicolas Island, Ventura County, California

San Nicolas Island is the outermost of a group of eight islands off southern California. Point Mugu is the nearest point on the mainland, about 63 miles north; Los Angeles City Hall is approximately 90 miles northeast.

A geologic study of San Nicolas Island was begun by personnel of the U. S. Geological Survey in March, 1955, at the request of the director of Naval Petroleum Reserves.

About 3,550 feet of alternating sandstone, siltstone, and conglomerate constitute the exposed Tertiary section on the island. Foraminiferal studies indicate that these rocks are of late Eocene age. Several small igneous dikes that may be Miocene cut the sedimentary rocks in the southeastern part of the island. Quaternary dune sand and marine terrace deposits cover much of the central and western parts of the island.

Structurally, San Nicolas Island is a broad complexly faulted anticline with a southeast plunge. The axis roughly parallels the long dimension of the island and lies near the southwest shoreline. Two sets of intersecting faults which trend approximately north-south and east-west appear to have formed almost simultaneously. Most of these faults are high-angle normal faults, the largest having maximum apparent vertical displacement of about 400 feet.

Geologic diving operations were conducted off the west end of the island in an attempt to trace the seaward extent of the anticline mapped on shore. Self-contained underwater breathing apparatus was used by the divers in the study of approximately 5 square miles of sea floor at depths ranging from 30 to 120 feet.

ROY HAROLD WAITE, Shell Oil Company, Ely, Nevada
Silurian of Great Basin

The Silurian rocks in the Great Basin can be assigned to two distinct facies: an eastern carbonate facies and a western shale facies. The line separating the two facies, actually a narrow transition zone, trends northeast from Independence, California, through Beatty, Eureka, and Elko in Nevada.

The rocks in the eastern carbonate facies are composed almost entirely of dolomite. The dolomite is heterogeneous, varying from fine- to coarse-grained, black to white, and from almost pure dolomite to very silty dolomite.

The dolomite facies is one of the poorest systems for paleontological studies in the Great Basin. Fossils are scarce and where present are usually poorly preserved. A few localities yield silicified fossils that can be etched and studied in detail. Both Middle and Upper Silurian fossils are present in the dolomite. The faunas seem to be most closely allied to those of Australia and the Orient, and have little similarity to the Silurian forms in eastern North America. No Lower Silurian fossils have been