5. The Activity of Paricutin Volcano,* Ray E. Wilcox, United States Geological Survey.

During the 5½ years since its birth Paricutin Volcano has been constantly active, with lava issuing at a remarkably uniform rate and ash and bombs somewhat less uniformly. In the first two years the dense ash eruptions destroyed many thousands of acres of crops, pastures, and forests in the area near the volcano, while ash-laden flood waters caused damage well outside the immediate area. During the past three years the less continuous ash eruptions have permitted a limited agricultural and biological recovery in the marginal zones, although some processes, such as erosion, continue almost unchecked.

The current investigation of the geochemical activity and eruptive behavior of Paricutin and of the petrology of its ash deposits and lava flows is for the purpose of adding to our knowledge of the poorly understood processes of volcanic eruptions and ore formation. Because the volcano area is itself a giant natural laboratory, it has been the object of a variety of studied—some of them of a continuous nature—not only in geology and geophysics, but also in biology, geography, agriculture, and other natural sciences.

6. Geology of Gulf Coastal Area and Continental Shelf, J. Ben Carsey, geologist, Humble Oil and Refining Company.

A coastal plain varying in width up to 100 miles borders the Gulf of Mexico in the southern portion of the United States. This plain is tilted 5 feet per mile toward the Gulf. This almost imperceptible slope extends out into the open water where the gradient is 8–12 feet per mile on top of the continental shelf, but steepens to 400–600 feet per mile off the edge of the shelf. This change in slope occurs at the 100-fathom line. The shelf is 50 miles wide south of Mobile Bay and 70 miles wide at the mouth of the Rio Grande, but reaches a maximum width of 150 miles between these points south of the Sabine River.

Several hundred salt domes have been discovered on the coastal plain, and domes have already been located by geophysical work in the open water. More than 140 dome-like topographic prominences with relief varying from 12 feet to 600 feet are present along the edge of the shelf.

The Mississippi River is building its delta across the shelf at the rate of one mile in 16 or 17 years and is now within 12 or 15 miles of the edge of the shelf. The natural levee along the Mississippi serves as a ramp from which oil operations have taken place, and ten or more domes are now producing from this ramp. These domes are well out on the shelf, thus there is actually nothing new about oil production from the shelf area.

7. Marine Exploration in Gulf of Mexico, C. T. Jones, manager, foreign exploration department, and Shirley T. Mason, senior geologist, Texas-Louisiana Gulf Coast division, Stanolind Oil and Gas Company.

Marine exploration is one of the most expensive types of development ever undertaken by oil companies; the great amount of capital which must be hazarded before any returns are assured, necessarily restricts these operations to the larger companies. To meet this enormous cost, some of the large companies, which otherwise are unrelated, have combined for marine work. A complete exploration department of landmen, geologists, and geophysicists is required. Operations of these integrated departments must be coordinated continually without delay by an understanding management. The risks encountered in marine work are great. In addition to executive efficiency, proper management calls for daring in the use of capital and clear vision as to future values of resources now uncommercial.

Modern marine exploration for offshore oil and gas fields was apparently started experimentally in 1940, but had not reached its present large scale until 1946. The first offshore leases of the present type were obtained off the coast of Louisiana in 1945 and off Texas in 1947. Leasing requirements are different in Louisiana and Texas, and the more favorable conditions in Louisiana have resulted in the greater development there. The tidelands title controversy remains unsettled. Government agencies, such as the Corps of Engineers and the U. S. Coast Guard, demand that all of their regulations be respected. The fishing interests of Louisiana and Texas have made it difficult for the oil companies to plan and execute exploratory campaigns properly, thus increasing the cost. The high rentals paid for leases force early development.

All types of geophysical exploration have been utilized in the Gulf of Mexico campaign. Originally, the gravity meter was used by lowering it with an operator in a diving bell; later, the present remote-controlled gravity meter was evolved. Magnetic surveying, using both airborne and boat-towed instruments, is also employed. Early seismograph work, with charges and seismometers on the Gulf floor, was slow and costly. Experience has greatly refined seismic methods until, today, this

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type of exploration is rapid, economical and obtains excellent results. It is estimated that all of the offshore areas of Louisiana, out to the 10-fathom depth, and about half of those of Texas, along a similar belt, have been mapped to date.

The culmination of this marine exploration program began late in 1947 with the development of production on the first piercement-type salt dome at a comparatively shallow depth. To date, five additional discoveries have been made of either oil or gas fields, and tests on three other prospects are encouraging.

The great cost and risk of marine exploration work must be recognized as small in comparison with the expense and hazard of the later exploitation phase. The tremendous costs of this development, to say nothing of the losses incurred in the dry wildcat wells which have been drilled and will continue to be drilled, will only be justified if there are no restrictions to prevent reasonable profits on the successful operations. The results of offshore work to date tend to confirm the original anticipation that this risking of enormous quantities of private capital will eventually make a great addition to the oil and gas reserves of the Western Hemisphere.

8. Variations in History of Continental Shelves, Paul Weaver, president, American Association of Petroleum Geologists.

Some students think of shelves as hinge lines, with the land side uplifted and the sea side downwarped. The author discusses contrasting types of shelves which are more properly erosion features and not tectonic in origin, especially those in the region of the Gulf of Mexico.

9. Geology of Pacific Coast of Ecuador, Cecil Hagen, Hagen & Cantrell, consulting geologists.

The general geology of the Pacific Coast of Ecuador is described. The area is approximately 500 miles north and south, ranging from the Peruvian border on the south to the Colombian border on the north. The formations include Cretaceous, Tertiary, and Recent sediments. The coast is divided into three areas; Northern, Central, and Southern. An attempt is made to describe the structural and depositional conditions present in each area. The paper is illustrated by a general map, geologic maps, correlation charts, columnar sections, and cross sections.

Poza Rica Oil-Field Trip

Leave at 7:30 A.M. from convention headquarters and drive in busses to the town of Tulancingo, stopping to see an outcrop of obsidian, then proceed to Huauchinango where lunch will be served, after observing some outcrops of Jurassic rocks on the road in the neighborhood of this town. From Huauchinango to Poza Rica, a fine section of outcrops ranging from Jurassic to Miocene age will be seen. After supper in Poza Rica, part of those on the trip will spend the night there and the rest will be accommodated in the neighboring town of Papantla.

On Friday, October 22, after breakfast in Poza Rica, the Poza Rica field and refinery will be observed and the trip will proceed to Tecolutla for lunch. After lunch, the trip will proceed to Nautla, and from there to Teziutlan, stopping on the way to see some outcrops of Tertiary and Jurassic formations. In Teziutlan dinner will be served, and hotel accommodations will be available.

On Saturday, October 23, after breakfast in Teziutlan, the trip will leave for Perote and Puebla, observing on the way some igneous and metamorphic phenomena.

At Puebla, the largest and most typical colonial city, lunch will be served and the afternoon will be spent visiting the main interesting points and the group will leave for Mexico City, where they will arrive at about 7:30 P.M.

We do not recommend that members drive their own automobiles on this field trip and, as proper accommodations are not easily available for a great number of persons in the Poza Rica-Papantla area, the number taking this trip will be limited to 40 persons.

Paricutin Volcano Field Trip

Leave convention headquarters, Hotel del Prado, Thursday morning, October 21, visit Toluca, and stay overnight at San Jose Purua. The next night, October 22, will be at Uruapan which is the nearest town to the Volcano, returning to Mexico City the evening of October 23 after having lunch at Morelia.

The cost of this three day trip, which includes transportation, hotel, meals, etc., will be approximately $46 per person.

Passenger cars available will accommodate a maximum of four persons and will be driven by a chauffeur-guide who will give necessary explanations to the passengers. Horses will be available so that anyone desiring to go close to Paricutin Volcano can make the trip on horseback.

Anyone having a personal car can make this trip over a good highway. But if you are arranging your own transportation, we suggest that hotel accommodations be obtained before leaving Mexico City. It would not be necessary to return to Mexico City as the return trip to the States can be made