pian and Arbuckle correlative sections, are prospective targets for oil or gas.

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History of Petroleum Development of Mississippian Oil and Gas

The purpose of the paper is to present a short summary of development programs in which the Mississippian was the primary objective and to give a few facts concerning how the reserves from the Mississippian were found. This treacherous part of the geological column presents a variety of difficult problems; some of these are pointed out in this paper.

The history of development of Kansas and Oklahoma is emphasized, but also mentioned is the development history of Utah, Wyoming, Montana, Illinois, and Canada. Maps include the fields producing from the Mississippian in Kansas and Oklahoma.

The recent play in Osage County shows how the land attitude can highly influence a play. Methods of prospecting are discussed and several prospective areas are pointed out. The final part of the paper includes recommendations for necessary changes in the economics of drilling wells where the Mississippian is an objective. The conversion of dry-hole money to bottom-hole money is highly recommended.

The foreign influence on our domestic picture, and general oil depreciation are discussed.

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Southwestern Nebraska (Cambridge Arch Area)

The task of science in general is the breaking-down of the unknown into basic simplicities and the rebuilding of its findings into understandable complexities. In the case of geology and of the petroleum geologists' tasks, this also holds true, with the addition that the rebuilding must be into economically profitable understandable complexities (oil fields). The Cambridge arch represents an area in the stage of development where these theories can be applied.

The Cambridge arch is a medium-size structurally positive area on a major structural belt of crustal weakness, pre-Cambrian in age. That is, it is a feature of intrastate size on a trend of interstate length, which is described by the alignment of: the Black Hills, South Dakota; Chadron and Cambridge arches, Nebraska; Central Kansas uplift, and perhaps additional extensions on both ends. Just as these intermediate features have a relationship to something bigger, there is a control and an interrelationship to something smaller. That is, smaller trends emanate from the intermediates that are pre-Cambrian in age and lineament- or fracture-pattern-controlled. It is through the studies of these lineaments and intersection of lineaments that we find the exploratory tool to resolve the findings into the economically profitable complexities.

Studies of the Warner, Cahoj, and Reiher fields are presented to bring out the salient points and offer evidence of lineaments that have had minor positive movement throughout long periods of geologic time and have in turn affected the stratigraphic deposition on a micro-scale.

Maps with regional scope, covering the entire geologic column, are presented to help locate lineaments, show the inter-relationship of the intermediates to their micro-counterparts, and illustrate the general stratigraphic conditions over the arch area.

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Government's Helium Conservation Program

Helium, one of the completely inert gases and a short time ago considered a rare gas, has become important in many ways. Large quantities are being used in metallurgical processes, in the development of nuclear power and in national defense. First discovered as a constituent of the sun in 1868, and on the earth in 1895, it was only in 1903 that it was found in natural gas. With first commercial production from natural gas on a very limited scale in 1918, the annual production and demand for helium today is approximately 330 million cubic feet—70 times the production in 1937. Increased demands are seen for the future.

Helium is being lost at the rate of more than 3 billion cubic feet per year through the marketing of fuel gas containing it, and there have been few significant discoveries of new helium sources in the last 15 years. The Department of the Interior proposes a helium conservation program that would extract helium from fuel gas going to market and store it for future use. By such a program it is anticipated that an adequate supply of helium will be reasonably assured up to the year 2000. Legislation to provide for such a program has been presented to the Congress for consideration. Private industry would be invited to participate in the program but if it should not indicate a willingness and capability to perform in a reasonable time, the Government would undertake the program as a Government operation.

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Application of Palynology to Geology

Palynology is the study of pollen and spores. Throughout much of geologic time, these microscopic plant particles have been accumulating in sediments. Their recovery from sediments enables the palynologist to establish correlation based on time equivalence. A brief sketch of the development of palynology is followed by an examination of the basic principles of the field. During the examination of these principles, their potential value to the field of geology is illustrated as well as some of the recent correlations established on the basis of palynological work.

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Marine Bank Development in Plattsburg Limestone (Upper Pennsylvanian) in Neodesha-Fredonia Area, Southeastern Kansas

The Plattsburg limestone is anomalously thick in the Neodesha-Fredonia area, swelling from less than 10 feet to maximum thickness of 115 feet. Thickening is due to large increases in thickness of two of the three members into which the Plattsburg has been divided. The Merriam limestone (lower member) varies only slightly in thickness, ranging from 1 to 3 feet, but the Hickory Creek shale (middle member) ranges from 1 to 45 feet, and the Spring Hill limestone (upper member) ranges from 3 to 88 feet in thickness.

The principal cause of thickening of the Plattsburg limestone is interpreted to be due to deposition of an extensive, lens-shaped shallow marine bank which rose above the general level of the surrounding sea floor. The shape of the bank is thought to be partly reflected by present thickness variations in the Plattsburg limestone. The bank was at least 14 miles long northwest and southeast, and about 12 miles wide northeast and south-