ever, except on the pronounced structural trends, producing fields have no particular pattern where the underlying rocks are of Mississippian age. In a thinner updip interval are what commonly are called "conglomerate sands." These also are productive and appear to be a product of the same transgression and as such are genetically related.

More than 5,000,000 bbls of oil has been produced from Cherokee sandstone pools. Additional reserves found during the past 2 years should increase the oil already produced by 30%. More prospecting will discover additional structural traps and furnish further control for the search for stratigraphic traps—a search which should not be neglected.

RAY H. POTTS, JR., Potts-Stephenson Exploration Co., Oklahoma City, Okla.

DEPOSITIONAL ENVIRONMENT OF SPIRO SANDS IN ARKOMA BASIN

Isopachous maps, electric-log cross sections, and Kodachrome slides of the Sprio Sands in Wilburton, Kinta, and Milton-Cartersville fields are used to illustrate the writer's interpretation of the depositional environment of these sandstones in the Arkoma basin.

At least three sandstones, differing genetically and in age, have been termed the Spiro Sand in the Arkoma basin.

In the Wilburton field, the Spiro Sand appears to be a marine facies of the Wapanucka Limestone and possibly is Morrowan in age.

Such characteristics, as geometry of the sandstone bodies, sedimentary structures, composition, nature of the boundaries, and other features, lead the writer to believe that, in the Kinta and Milton-Cartersville areas, the Spiro Sands were deposited in an environment likely to have channel, as well as transgressive, unconformity sandstone deposits.

MARTIN W. SCHRAMM, JR., Cities Service Oil Co., Tulsa, Okla.

APPLICATION OF TREND ANALYSIS TO PRE-MORROW SURFACE, SOUTHEASTERN HUGOTON EMBAYMENT AREA

Trend analysis is a technique used to distinguish between trends, such as regional dip or thickening, which may influence a whole region that is the object of study, and small-scale effects (anomalies) which are influential locally. Because oil and gas fields are in almost every place associated with anomalies or departures from the regional trend, whether governed by structural, thickness, or lithologic factors, trend analysis should prove to be an important prospecting tool.

The electronic computer has permitted the application of trend analysis and numerous other techniques to large areas by the oil industry. A procedure involving the computer has obvious advantages in that it provides a degree of rigor that more elementary methods lack, and reduces considerably the amount of time involved in computation.

Application of the technique to the pre-Morrow surface in the southeastern part of the Hugoton embayment, using few control wells, reveals objectively the combined topographic and structural relief that existed before Pennsylvanian deposition. With few exceptions, Morrow sandstones, and hence production, are found to be related empirically to the flanks of structures or in depressions.

HUGH M. THRALLS, Geo Prospectors, Inc., Tulsa, Okla.

GEOPHYSICAL EVIDENCE OF UNTAPPED OR INSUFFICIENTLY EXPLORED PARTS OF STRATIGRAPHIC SECTIONS

Beginning with the development of the seismic-reflection method of geophysical profiling about 1930, blanket-type surveys were begun in which a crew (or crews) was placed in a prospective area with the assignment to "map the subsurface." The survey progressed section by section, township by township, and county by county, mapping regional features as well as local detail. The objective was to be there first and to acquire acreage on interesting structures. Those organizations without the financial ability to carry on such programs, or who were late in arriving in the area, learned early that acreage acquisition in an active area even without geophysical or geological information was good protective strategy. Those organizations which acquired strong land positions so often obtained positions of power that land acquisition and the land departments who created this position became dominant factors in the industry.

About 1950, so much of the acreage in recognized oil provinces was leased that little incentive remained for conducting blanket or regional-type surveys. Because of the lack of available acreage and other economic factors, geophysical prospecting degenerated into individual prospect analysis. This forced change in exploration philosophy has been a large contributing factor to the decrease in geophysical activity.

Unfortunately, the instrumentation and techniques used in the blanket-survey era were inadequate for some areas and some exploration problems. Many of the improvements in seismic-instrumentation and seismic-prospecting techniques have been made possible by developments in government-sponsored research and these improvements were developed too late to be applied to the blanket survey.

The quality of analyses of the untested producing potential of some of the important basins of the Mid-Continent area depends on the quality of regional studies and regional information. The cost of obtaining this type of data is great and beyond the financial resources of the average company. Recognition of this problem has led to the formation of exploration combines of one type or another for the express purpose of acquiring quality data of regional type. Even though surveys of this nature are scarce, and data available to a limited number of people and organizations, the impact of these studies on new discoveries is considerable and will become much more of a factor in the immediate future. Geophysical "evidence" is rapidly being accumulated which eventually will lead to the discovery of new producing trends and to the redrawing of regional maps.

PHIL C. WITHROW, Consultant, Oklahoma City, Okla.

BASIS FOR RED FORK SANDSTONE EXPLORATION IN NORTHWEST OKLAHOMA

The Red Fork Sandstone produces oil and gas in a large area of north-central Oklahoma. There are indications that several oil fields comparable with the Burbank field (½ billion bbls) can be found in northwestern Oklahoma during the next few years by using available well control for detailed reconstruction of the depositional environments of the Red Fork Sandstone.

The Red Fork Sandstone was deposited west of the Nemaha ridge during "Cherokee" (Desmoinesian) time in a large embayment called the Enid embayment. There were two early phases of offshore bar deposition, followed by a brief period when the sea receded from the area and channel sandstones were deposited. Using this interpretation, several unusual problems can be explained.

The Oakdale field in southeastern Woods County has oil reserves in excess of 20 million bbls from the Red Fork Sandstone. The sandstone in this field is in two linear bodies. The Southwest Wakita field in Grant County produces from two fairly distinct Red Fork Sandstone bodies that correlate with the sandstone at Oakdale. The Wakita trend in Grant County produces from a thin Red Fork Sandstone slightly higher stratigraphically than that at Oakdale and Southwest Wakita. In the Cheyenne Valley field in Major County, the Red Fork is interpreted as a channel deposit, and it is higher stratigraphically than in the previously mentioned fields. This channel-type deposit is productive and fairly widespread in the Enid embayment. It has several distinguishing characteristics.

By reconstructing the depositional environment of the Red Fork Sandstone and by interpreting this interval as representing three fairly distinct phases, the Red Fork is seen to be a reservoir with great potential in the Anadarko basin. These are several good indications of potential major producing areas, and they can be found by basing an exploration program on detailed reconstruction of depositional environments to explain the problems that arise, and to make interpretations necessary to find prospective Red Fork Sandstone trends.

JUNE BULLETIN ORDERS

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ROCKY MOUNTAIN SECTION 17TH ANNUAL MEETING CASPER, WYOMING, OCTOBER 8–11, 1967

The 17th annual meeting of the AAPG Rocky Mountain Section will be held October 8 through 11 in Casper, Wyoming. Approximately 800 geologists are expected to attend the technical sessions, which will be held at the America Theater. The theme for this year's technical program is "Breaking Barrier Boundaries." Some of the boundaries to be broken are: (1) geographical—international boundaries, state boundaries, structural and topographic province boundaries, *etc.;* (2) boundaries relating to the exploration for and exploitation of natural resources other than oil and gas; (3) boundaries between old and new geologic concepts; and (4) boundaries between communication barriers, *i.e.,* intercompany, intracompany, government *versus* industry, communication breakdown between explorationists and their management, and between research and exploration organizations. The structural and stratigraphic papers, especially, will emphasize the regional aspect. The regional settings, provenance, depositional environment, and related facies will be presented without particular regard to present geographical boundaries. In addition to papers dealing with stratigraphy, structure, and oil exploration problems, talks dealing with lunar geology, the use of nuclear explosives in oil and gas production, natural steam resources, oil-field fires, tar sands, oil shale, coal, and uranium will be presented.

One field trip on October 8 will be conducted through the Casper Mountain-Alcova area south of Casper. This trip will illustrate the structure and stratigraphy of formations ranging in age from Precambrian through Late Cretaceous.

The keynote address will be given by THOMAS D. BARROW, Vice President and member of the Board of Directors of Humble Oil and Refining Co. JOHN B. CARRIER, Champlin Petroleum Co., Casper, is president of the Rocky Mountain Section. JOHN S. RUNGE, Independent, Casper, is general convention