TECHNICAL PROGRAM

1. ADDRESS OF WELCOME, by Rizer Everett, president, Oklahoma City Geological Society.

2. ASSOCIATION AFFAIRS, by C. W. Tomlinson, president, A.A.P.G.

3. RELATION OF ANADARKO BASIN MOVEMENTS TO THEORY OF CONTRACTING CONTINENTS, by Robert R. Wheeler, C. P. Burton Company, Dallas, Texas.

Part I—Orogenic Movements in Anadarko Basin

This paper attempts to clarify controversial articles regarding the age and magnitude of deformation in the Anadarko basin, diastrophism which seems to have occurred at different times and in varying intensity across the Mid-Continent region. Evidence is cited and inferences defended to support the following sequence of events: (1) the appearance and rejuvenated arching of the Central Kansas and Ozark uplifts, upon which converged (northward with increasing interruption) deposits of Cambrian to pre-Mississippian age out of an original basin centering in southern Oklahoma; (2) an episode of regional tilting and broad gentle warping that successively beveled off northward the Hunton to Arbuckle sequence; (3) the advent of full-scale orogeny in post-Morrow pre-Des Moines (early Pennsylvanian time) which established the Amarillo, Wichita, Arbuckle, and Ouachita uplifts (increasing in deformation from west to east) and the adjoining Anadarko, Ardmore, and McAlester basins on their flanks; (4) rejuvenated faulting, warping, and over-thrusting, culminating in late Pennsylvanian and early Permian time, that re-elevated these features as well as northwest-trending adjustment axes in the adjoining basins to locally reëxpose basement rocks which contributed a thick and widespread arkose facies to contemporaneous deposition.

Thus, the Anadarko basin, defined in origin as post-Morrow pre-Des Moines in age and in outline as flanked by the Amarillo-Wichita-Arbuckle uplifts and Nemaha ridge on the east was involved in numerous Paleozoic movements on the north flank which have no counterpart on the south flank. This is the same contest of simultaneous, world-wide orogenic dogma that is more and more frequently raised by geologists.

The pattern of differential crustal shortening with maximum compression to the east in the Ouachitas encourages a new concept: that contraction of the crust in continental areas bordering the Gulf of Mexico may explain the pronounced positive gravity anomaly of that area indicative of a basaltic, high-density floor and an absence of granitic crust, conceivably withdrawn during deformation of surrounding orogenic belts.

Part II—Contracting Continents—A Theory

Geologists have revived their search for a concept that will replace the extremes of "permanent" and "drifting" continents and ocean basins by means of "foundering" or the gravitational withdrawal of crust from the Pacific to create our satellite moon—a theory that will relate accumulating geophysical and geological facts bearing upon the derivation of continents, ocean basins and orogenic belts. Such a theory must explain (1) the localization of continents from the logically assumed crustal shell of granitic material originally covering the surface of the earth, (2) the presently existing contrast in physical properties and relief of continents and ocean basins, (3) the strategic position of major orogenic belts within and paralleling the margins of the continents and their relation to similar structural trends in the continental nuclei, or shield areas, (4) the distribution of critical organisms, dependent on climate and dry land, whose similarity of morphology requires land connections between widely separated continents.

This theory of contracting continents on the face of a shrinking globe accounts for the great ocean basins by the withdrawal of the original granitic crust from these areas during the processes of orogenesis and crustal shortening in which successive belts of deposition and diastrophism were folded and thrust toward pre-existing shield areas which acted as buttresses to contraction from all directions because they had been stabilized in pre-Cambrian time by intense deformation, injection and re-crystallization. If Paleozoic to recent crustal shortening measurable in the mappable sediments and basement rocks could not explain a sufficient withdrawal of crustal material from the ocean basins, it is obvious that the creation of the pre-Cambrian continental nuclei must have already begun to differentiate the continents and ocean basins.

On the North American continent, orogenic belts are peripheral to the shield, have counterparts in the lineation of shield structures, and border the continental margins which they evidently have established. If the continents contracted and withdrew crust during successive movements into late Cenozoic time, it is conceivable that suitable land connections for organic migration existed throughout much of Paleozoic to Recent time.

This theory also seeks to explain specifically, (1) the Gulf of Mexico, a pronounced and unexplained positive gravity anomaly, as a typical ocean basin devoid of its granitic veneer, withdrawn by crustal shortening of Mid-Continent and Tertiary orogenic movements on the north and south, (2) the Mediterranean, a comparable anomaly, by crustal shortening most pronounced on the north in the Alpine structural system, (3) the other great ocean basins by the process of peripheral orogenic contraction of the adjoining continents, for example, the Cordilleran and eastern Asiatic (Himalayan) systems, resulting in tensional by-products of volcanic islands, earthquakes, and vulcanism bordering the Pacific basin.

4. REGIONAL DISCUSSION OF PENNSYLVANIAN REEFS OF TEXAS, by Carl B. Richardson, Barnsdall Oil Company, Tulsa, Oklahoma.

Pennsylvanian reefs in western and northern Texas are known over an area of 50,000 square miles. They show a great variety of shapes and a wide stratigraphic range in their periods of growth. The reefs were formed far from major shorelines in an epicontinental sea. Some of the reefs adjusted themselves to sharp eminences created by early Pennsylvanian uplifts. There are numerous indications that other reefs may have indirect and offset relationships to gentle pre-Pennsylvanian uplifts and flexures.

Some reef fields have produced for many years but most of the fields and most of the reef information were developed since 1946. Pennsylvanian reefs in Texas now account for eight major fields and more than 20 of less importance.

5. GEOLOGIC MAP OF OKLAHOMA, by Robert H. Dott, director, Oklahoma Geological Survey, Norman, Oklahoma.

Assembling data for a new areal geologic map of Oklahoma has been in progress since September, 1947, as a joint project of the United States Geological Survey and Oklahoma Geological Survey, with magnificent cooperation of geological departments of oil companies, universities, and individual geologists. Hugh D. Miser, of the United States Geological Survey, is in charge.

Maps being acquired consist of all those published since compilation of the first map in 1923–1924, manuscript maps representing work in progress by the Oklahoma Geological Survey and theses of graduate students, and maps from oil companies and individual geologists made since 1923. Fully three quarters of the state will be covered by new mapping.

It is estimated that two more years will be required for accumulating maps, filling in critical gaps with field work, making a complete assembly of the data, and arriving at a satisfactory system of classification. Final drafting will require an additional year, and printing probably will require still another. A new base map on which the geologic map will be printed is being prepared by the United States Geological Survey in cooperation with several State agencies.

6. GEOLOGY OF LINDSAY AREA, GARVIN AND MCCLAIN COUNTIES, OKLAHOMA, by R. M. Swesnik, Anderson-Prichard Oil Corporation, Oklahoma City, Oklahoma.

The Lindsay area in southwest McClain and northwest Garvin counties may be generalized as a complex, highly faulted cross-fold on the Pauls Valley arch, producing from a variety of porous formations of Ordovician, Siluro-Devonian and Pennsylvanian age. Originally separated because of different water levels and producing zones into three distinct fields by the Corporation Commission of Oklahoma, it is treated here as one complex pool.

The structural history is illustrated by a series of structural contour maps of the more important producing zones. The stratigraphy of the several producing formations is discussed in some detail. Presented also in the generalized historical geology of the geologic province in which the pool is located.

Colored maps show the areal distribution of the reservoir fluids, controlled by intersecting fault traps. A study of the maps seemed to indicate that the first and second Bromides act as one reservoir while the third Bromide is separate. Detailed stratigraphic studies indicate the third Bromide is probably Tulip Creek which accounts for its behavior as a separate reservoir. The McLish and underlying Oil Creek also behave as separate reservoirs. It is commonly possible to encounter water in the second Bromide, third Bromide, and McLish sands and produce oil or distillate from the Oil Creek. Each reservoir within each separate fault trap must be tested to determine its possible productivity. Water levels in adjacent fault blocks are of no value in predicting possible productive zones in a new fault block. Every well which is drilled in a new fault sector is wildcat; however, the multiplicity of producing zones reduces the dry-hole risk.

The Lindsay pools have produced, as follows: East Lindsay from 68 wells since December, 1946, has produced 4,812,128 barrels; North Lindsay from 22 wells since August, 1945, has produced 2,272,428 barrels; and Northeast Lindsay from 28 wells since January, 1947, has produced 1,642,742 barrels, or a grand total of 8,727,298 barrels from 118 wells which are now producing an average of 10,644 barrels per day. The pay-out on these wells which cost $175,000 to $250,000 varies as the allowable. In general, a dual completion making its full allowable from each formation pays out in less than a year while a well producing from only one formation may be expected to pay out in less than 2 years. The current allowable for North Lindsay Bromide is 190 barrels per day per well, East Lindsay Bromide 270 barrels per day per well, while the Hunton allowable is 190 barrels per day per well in all the Lindsay pools.