MID-CONTINENT REGIONAL MEETING, WICHITA, SEPTEMBER 30–OCTOBER 2, 1953

ABSTRACTS

1. JOHN C. FRYE, State Geological Survey of Kansas, Lawrence. Activities of the State Geological Survey of Kansas

The State Geological Survey of Kansas, organized as a division of the University more than 50 years ago, has acquired its present scope and general plan of operation during the past 15–20 years. As the only State-supported agency charged with the responsibility of research in geology and mineral resources (including ground water) and service to the State's ever-expanding mineral industries this is indeed a large responsibility. The Kansas raw mineral output has been substantially exceeding 400 million dollars annually and the value of well water to agriculture, industries, and municipalities may approach a like amount. In addition to oil, natural gas, and coal, Kansas raw minerals now in production include: chalk, chat, clay, diatomaceous marl, dimension stone, gypsum, lead, limestone, salt, sand and gravel, sandstone, shale, silica sand, volcanic ash, and zinc. Mineral materials that have been investigated and constitute potential future additions to this list include anhydrite, asphalt rock, bentonite, feldspar, glass sand, high-alumina clay, lignite, oil shale, phosphatic shale, and pyrite.

In recent years the Survey's program has expanded from areal geologic mapping, subsurface studies, production statistics, and county ground-water investigations to diversified work in the field of mineral technology including petroleum engineering. In fact, at the present time the technical staff of the organization contains about as many ceramists, chemists, physicists, and engineers as it does geologists. The Kansas Survey is organized in departments of basic geology, publications and records, mineral resources (including sections of oil and gas, subsurface studies, petroleum engineering, ceramics, geochemistry, petrography, and the Pittsburg district office), ground-water resources, mineral fuels, and topographic mapping—the last three of which work cooperatively with the U. S. Geological Survey.

2. E. C. REED, Nebraska Geological Survey, Lincoln. Paleozoic History of the Central Nebraska Basin and Its Relation to Anticipated Oil and Gas Exploration

The western part of the Central Nebraska basin, which appears to be a northward extension of the Salina basin of Kansas, has been the scene of active leasing and seismographic investigations during the past year, particularly in Harlan, Phelps, Kearney, Buffalo, Sherman, Valley, eastern Custer, and eastern Dawson counties and an active drilling campaign in this area is anticipated. Most of the interest seems to be localized within a broad band along the western side of the basin where the truncated edges of the pre-Pennsylvanian Paleozoic formations are overlapped by the Pennsylvanian and west thereof where there are stratigraphic trap possibilities in connection with Lower Pennsylvanian sands that may wedge out against the pre-Cambrian surface as it rises in the Cambridge arch.

The known distribution, stratigraphy, and lithology of the pre-Pennsylvanian formations within this basin are discussed and the probable Paleozoic history of the region reviewed. The Pennsylvanian lithology, distribution, and facies changes are outlined. It is concluded that suitable reservoir rocks occur at reasonable drilling depths in connection with formations of several geologic ages although oil source possibilities and local structural conditions are hard to evaluate. Important unconformities at the base of the Mesozoic, at the base of the Pennsylvanian, and at the base of the Simpson present some interesting possibilities but also suggest that the region should not be condemned on the basis of a comparatively few tests that may not be located to test more than one possibility adequately.

3. JOHN EMERY ADAMS, Standard Oil Company of Texas, Midland, Texas. Non-Reef Limestone Reservoirs

Bedded limestones and reefs are normally parts of a gradational sedimentary series with the reefs concentrated in the seaward areas. Many major oil fields produce from bedded limestone reservoirs. Bedded limestones are composed of clastic particles which, when coarse-grained and cleanly washed, resemble clean sharp sands. If porous, permeable accumulations of clastic carbonates are connected with source beds and sealed with an impervious cap, primary reservoirs result. Lime muds may be excellent source rocks. Dolomitization and secondary solution may improve but do not initiate limestone reservoirs. Fracturing is the main agent for secondary reservoir development.

4. D. A. MCGEE, Kerr-McGee Oil Industries, Inc., Oklahoma City. The Petroleum Geologist in the Atomic Age

As petroleum geologists, we are in the business of finding and supplying energy. It has been estimated that the world has used two-thirds as much energy in the last 100 years as in the preceding 18½ centuries. The United States is now using approximately 50 times more energy than it did 150 years ago. Oil and gas are now supplying 57 per cent of the energy requirements of this country.

There may be temporary leveling-off periods in the demand for energy, principally oil and gas, such as the one we are now experiencing, but long-range estimates indicate a steadily increasing demand.

How long will we petroleum geologists be able to continue the rate of discovery we have maintained for the last 15 years? Does atomic energy offer a threat to our markets or will we welcome it as a supplementing source of supply? Are there other energy competitors?

When you realize 140 tons of uranium has been estimated to be the equivalent in energy of all the oil and its products consumed in the United States in one year, it is apparent that atomic energy ultimately will have a profound effect on the energy markets of the United States and the world. All estimates for the foreseeable future indicate that it will supplement and not replace oil and gas uses. Solar energy may eventually have far-reaching effects on our every-day lives. In this connection, much research is now underway and some very interesting results have already been obtained with a form of algae known as chlorella. Research on the production of fuels synthetically continues to make progress, especially in the oil shale field.

It seems safe to predict that the oil industry and we, as petroleum geologists, will be called upon to supply the increasing energy needs of our country for some time to come. While we have performed through the years a praiseworthy job, it has only been in the last 15 years that we have hit our stride. By the end of the 1930's geophysical prospecting, principally the reflection seismograph, was having its full impact on oil finding. At about this same time the geologists and geophysicists laid aside any misgivings they may have been harboring for one another and began to join in a cooperative effort that through teamwork has found in the last 15 years approximately half of the oil that has been discovered in our country since Drake drilled his well. Since there are no new methods in sight, such as surface mapping, core drilling, subsurface geology, torsion balance, and reflection seismograph, which as each became available as a tool in the past, gave us new hope and extended successfully our frontiers of exploration, we must rely upon a further intensification of our teamwork of the last 15 years to find new oil fields in old producing areas, to push our exploration deeper into structural basins, to pioneer entirely new sedimentary areas of promise, and to develop the tidelands of our coasts. The job of keeping our country supplied with energy will be tremendous but we can accomplish it.

5. FRANK B. CONSELMAN, Consulting Geologist, Abilene, Texas. Oil and Gas Production from Carbonate Reservoirs

Non-reef carbonate reservoirs include some of the most famous and prolific oil and gas reservoirs in the world, despite the relative emphasis on reefoid masses in recent research and development programs. Approximately 20–25 per cent of the world's reserves are believed to be contained in non-reef carbonate rocks.

For general purposes, carbonates are classified broadly as of chemical, evaporative, biochemical, organic, and clastic origin, with examples cited. Although there are classic examples of limestones and dolomites which preserve their lithologic and stratigraphic character for thousands of square miles, probably the majority will exhibit some type of facies differentiation within relatively short distances, both vertically and horizontally. These facies changes provide excellent stratigraphic trap possibilities, even in non-reefed rocks.

Oil and gas reservoirs in carbonates may be caused by the structural deformation of rocks having widespread, relatively uniform, intergranular porosity; by the development of fracture and fissure systems at favorable positions with respect to fluid migration; and by permeability pinchouts in connection with facies changes.

Potentialities of carbonates as oil sources are not fully understood, but oil in minor quantities at least may be generated from certain facies.

Development practices in carbonate reservoirs are influenced by the characteristic irregularity of pore space, the chemical sensitivity of the rock to both natural and artificial leaching, and such physical characteristics as structural strength, rigidity, and competency. Although internal differences from conventional sand reservoirs are marked, nevertheless it has been demonstrated that production histories of carbonate reservoirs provide almost identical patterns with sand reservoirs of comparable drive. Primary recovery estimates by volumetric methods necessarily contain large factors of error.

Secondary-recovery programs are proving successful in carbonate reservoirs as well as in sands, but the effect of fracturing and channeling must be considered to avoid by-passing large reservoir volumes. Reservoir-heating techniques may be proved to be applicable.

In future prospecting, applied sedimentology may have as large a field in the carbonate rocks as it has had in the clastics. Practical "trendology" will also be useful, in addition to the conventional fold-finding techniques which have dominated exploration methods in the past.

6. W. H. TWENHOFEL, retired, Orlando, Florida. Environments of Deposition of Calcareous Sediments

Calcareous sediments are defined, but it is shown that sediments of calcareous composition enter into most deposits of all kinds of marine sediments. The fundamental condition controlling accumulation of calcareous sediments is that the sites of deposition are free from entrance of considerable