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B. W. BEEBE, independent, Boulder, Colorado

Natural Gases of North America

In 1935, the American Association of Petroleum Geologists published a symposium, *Geology of Natural Gas*. Since that time, huge gas transmission systems have been constructed to all heavily populated areas in the country. Consumers have recognized natural gas as a premium source of energy, not only because of its cleanliness and ease of handling, but because natural gas is grossly underpriced. More than six times as much natural gas will be furnished consumers in 1960 than was furnished in 1935. Natural gas marketed currently is equivalent in energy to approximately 5,750,000 barrels of oil daily. Current oil production in the United States is approximately 6,800,000 barrels daily. The impact of this growth on the market for crude oil needs no comment.

Recognizing the rapidly increasing importance of natural gas as a source of energy, the Executive Committee of AAPG has authorized a new two-volume symposium, *Natural Gases of North America*, now in preparation. It will be by far the most comprehensive study of this type to be available to those interested in natural gas.

In the immediate future, as in the past, Tertiary rocks of the Gulf Coast Embayment of Texas, Louisiana, and Mississippi will continue to be major sources of gas. With depletion of reserves in the Permian Basin of West Texas and the Hugoton-Panhandle field of Kansas, Oklahoma, and Texas, importance of the Paleozoic rocks in the Mid-Continent and Permian Basin will probably diminish, to be replaced by gas discoveries from Tertiary and Cretaceous rocks in the huge intermontane basins of the Rocky Mountain region. These two provinces, then, probably will be the major sources of new gas reserves within the United States excluding Alaska, importance of which as a gas productive area can not be predicted at this time. Vast untapped reserves of natural gases no doubt exist in Canada and Mexico, but demands for energy in both are expanding rapidly, and only a small fraction of these will be available to consumers in this country.

We must therefore depend on discoveries of gas in our own country for the near future to satiate the ever increasing demand. The geologist exploring for natural gas faces a unique and unprecedented challenge. Not only must he deal with problems and risks inherent in all exploration, but he is beset by unique economic considerations which are often confusing and contradictory, and which often appear to defy solution. With the constantly declining ratio of reserves to yearly production, can the demands be met?

EVERETT G. TROSTEL, DeGolyer & MacNaughton, Dallas, Texas

Relative Importance of Natural Gas in the Southwest

TOM G. CALHOUN II, DeGolyer & MacNaughton, Dallas, Texas

Pipeliners' Problems of New Reserves (To Connect Or Not to Connect)

OTTO K. WETZEL, JR., Purvin and Gertz, Inc., Dallas, Texas

Natural Gas—Its Value as a Function of Its Chemical and Physical Properties

Natural gas as it is produced from the ground (after having been separated from the concurrently produced crude oil or condensate) is a mixture of compounds which have widely varying physical characteristics. These compounds are composed of hydrogen and carbon atoms in various molecular arrangements and are generally referred to as hydrocarbons. Impurities sometimes occur in natural gas and are usually removed. Except in special situations, these impurities are not valuable enough to warrant their recovery and purification.

Natural gas obeys the so-called gas laws relating pressure, volume, and temperature as well as certain relationships dictated by the characteristics of the individual compounds. These characteristics are determined by the molecular structure or arrangement of the carbon and hydrogen atoms. Among the characteristics which affect natural gas or its components values are boiling point or vapor pressure, critical pressure and temperatures, specific gravity, and heat of combustion. These same characteristics govern the separation of the mixtures in processing plants. Partly because of the characteristics of the individual hydrocarbons the relative amounts of the separate compounds vary appreciably, with the lighter hydrocarbons being much more prevalent than the heavier hydrocarbons.

The two principal uses for natural gas are for fuel and as a basis for the manufacture of chemicals. By far the largest use of natural gas as produced, as well as some of the constituents extracted therefrom, is for fuel. However, a small but important amount of natural gas is used in manufacturing chemicals. These chemicals are called petrochemicals since their origin is petroleum. The ability of carbon and hydrogen to bond together in a variety of forms makes the constituents of natural gas perfect building blocks for many modern day chemicals.

Many interesting future developments are in store for natural gas. These include extension of existing and the building of new pipeline systems, both for natural gas and for natural gas liquids. In addition, transoceanic movement of natural gas in liquefied form is an accomplished fact and will play an increasing role in the world's energy balance. Future expansion of the petrochemical use is also anticipated.

SAMUEL P. ELLISON, JR., The University of Texas, Austin, Texas

Oil and Gas Geology of North-Central Texas

In this area of more than 42,800 square miles more than 2,615,653,966 barrels of oil have been produced from Paleozoic rocks. Sandstone, conglomerate, and carbonate reservoirs have oil and gas accumulations in both stratigraphic and structural traps. Cambrian, Ordovician, Silurian, Devonian, Mississippian, Pennsylvanian, and Permian rocks reaching a total maximum thickness of about 19,000 feet prevail in the area. Pennsylvanian and Permian strata contain remarkable carbonate reefs of various kinds which if completely encased in shale form excellent oil and gas traps.

Major structural features include the Bend arch, Electra arch, Muenster arch, Fort Worth basin, Baylor basin, Fort Chadburne fault zone, Concho arch, and