Another specialized group consists of reefs and beds that are dominated by in-place organic remains. Carbonate rocks of this group are unique and must be set apart in any classification scheme.

Carbonate rocks that are strongly dolomitized may be classified in the same way as ordinary limestones, provided only that relicts of the original calcium carbonate sediment are preserved. Other dolomites, originating as wave-swept grains that do not replace limestone, are classified according to grain size into dololutites and dolosiltites.

The major classification scheme of normal limestones is based on the concept that the rock consists of grains that have been transported away from the site at which the carbonate particles were originally fixed from the marine water. In moving away from their original depositional site, the grains have an opportunity to become sorted by size, shape, and density, with the resulting formation of calcilutites, calcisiltites, calcarenites, and calcirudites. Only four compositional features of these grains are quantitatively important -- skeletal grains; lithoclasts, derived by mechanical erosion of consolidated or semi-consolidated carbonate sediment; fecal pellets and other composite grains that have originated by agglutinization on the sea floor, these two types being genetically dissimilar but extremely difficult to distinguish in consolidated rocks; and oolites, pisolites, and other similar grains that are coated through organic, mostly algal, activity.

In addition to the composition of the grains and a quantitative measurement of their size, the classification of normal limestones must also consider whether the interstitial space between grains is an open pore space or is filled with lime mud or with clear calcite cement. A consideration of just three paramaters -- grain composition, graith size, and interstitial pore space, matrix, or cement -- is enough to provide a working classification for basic investigations of most limestones for petroleum research.

January 28, 1963

Frank J. Gardner, Oil & Gas Journal, Tulsa, Oklahoma

"Exploration Review and Forecast"

February 4, 1963

James F. Johnson, Sinclair Research Laboratories, Inc., Tulsa, Oklahoma

"Oil Exploration From the Research Standpoint"

Abstract

Progress and trends in oil exploration are evaluated from the overall view afforded by a research organization. The state of development of current exploration methods is discussed briefly in relationship to their effectiveness in the present exploration picture. The ineffectiveness of present geophysical methods in stratigraphic trap exploration leads to the conclusion that new methods must be developed if stratigraphic traps are to be located routinely. These methods will involve parameters more closely related to oil accumulation than geologic structure. The idea is advanced that in all probability these new methods exist today in prototype form, or even in a stage of considerable development. They may be unpopular or controversial and may have been assumed invalid by many people on the basis of second-hand evidence. Special emphasis is placed on the difficulties, psychological and industrial,

in initiating new approaches or techniques in commercial enterprises. The broad, general fields of geochemical and electrical prospecting are believed to afford the best opportunity of developing new stratigraphic oil exploration methods. The breadth of the geochemical field is illustrated by examples of the use of geochemical measurements in oil exploration. In the field of electrical methods, several promising, undeveloped techniques are briefly discussed. The technical material in this paper is offered only to show the unexploited possibilities inherent in geochemical and electrical methods of petroleum prospecting and to indicate the depth of our ignorance in these fields.

February 11, 1963

Norman F. Williams, Arkansas Geological and Conservation Commission, Little Rock, Arkansas

"Recent Petroleum Exploration in Eastern Arkansas"

February 18, 1963

Richard A. Geyer, Geophysical Surveys Inc., Dallas, Texas

"Use of Combined Gravity and Magnetics as Oil Finding Tools"

Abstract

The resolving power of gravity and magnetic surveys can be markedly increased under certain geologic conditions when data from both types of surveys are available. A number of theoretical as well as actual examples are discussed as they apply to the solution of both regional as well as local exploration problems. A discussion of the basic principles of these two methods and their application to interpretation techniques is also presented.

February 25, 1963

Ralph W. Disney, Sinclair Oil & Gas Co., Tulsa, Oklahoma

"Basin Development, Mountain Building, and the Accretion of Continents"

Abstract

The modus operandi for the origin of continents is a recurring, integrated geological process; first, basin development, second, mountain building, and third, granitization producing marginal, external additions to the continent. It is hypothesized that the continents (shields, cratons, mountain belts, and continental shelves) with their underpinnings of granite were not a part of the original crust but have continually formed, accretion by accretion, throughout geologic time, with much of this process occurring during the long history of the Precambrian.

The keystone of this concept is found among the results of recent high pressure, high temperature experiments being carried on by George C. Kennedy, Gordon J. F. MacDonald, and others; namely the Mohorovicic discontinuity is a phase change.

The M discontinuity is dynamic in character; its depth is controlled by pressure-temperature relationships. Through seismic investigations it is known to be deepest under mountain ranges, intermediate under the continents, and shallowest under the sea floor. Mineralogy of the rocks differs on either side of the M discontinuity, but not the chemical composition. Most important is that the gabbroid rocks above have a mean density of approximately 2.8 and the eclogitic rocks below, 3.2.