

1941 but has failed to result in a new discovery in Louisiana. Louisiana, however, has made impressive additions to the reserves of previously discovered fields by extension and through the opening of new producing sands.

30. R. E. BAXTER, Colorado School of Mines, Golden, Colorado
HARRY A. AURAND, Consulting Geologist, Denver, Colorado
Oil Shales of the Rocky Mountain Area

Great areas of oil shale occur in the Rocky Mountain area. These shales, when subjected to destructive distillation, yield oil in varying quantities. Relatively little is known about the retorting of the shales on a commercial scale, the methods or costs of mining, or the probable value and expense of disposing of the spent shale.

The main value of the oil derived from the retorting of the shales apparently lies in the special products such as high grade lubricating oils and medicinal materials such as ichthyol.

31. V. F. PARRY, U. S. Bureau of Mines, Golden, Colorado
Coals of the Rocky Mountain and Great Plains Region with Special Reference to Their Value for Hydrogenation

The author discusses occurrence, reserves, and properties of western coals, and reviews the present status of hydrogenation of these fuels. Six lantern slides are used to present the data.

32. SIMON W. MULLER, Stanford University, Palo Alto, California
HUBERT G. SCHENCK, Stanford University, Palo Alto, California
Standard of Cretaceous System

A preliminary report on this subject was read before the Pacific Section of the Association on October 16, 1941. The present paper incorporates slight revisions based on suggestions from several colleagues, notably John B. Reeside, Jr., and his associates, Gayle Scott and Hans E. Thalmann.

The standard of the Cretaceous system represents a composite time-rock column—a total or complete sequence of strata between the Jurassic and the Cenozoic. This standard has been built up by fitting together continuous sections which are especially well exposed in several areas in Europe. The system is subdivided into Series, Stages and Zones. These divisions are based on paleontologic evidence, with no regard being paid to thicknesses of strata and their lithologic character. Particular attention is drawn to the early work of d'Orbigny in setting up the Stages, and a detailed analysis of a representative Cretaceous Zone is presented to clarify the meaning of the term zone. The study of the boundaries between the underlying Jurassic and the overlying Cenozoic leads to the conclusion that the lowest Cretaceous stage is the Berriasian and the highest is the Danian.

33. WAYNE LOEL, Consulting Geologist, Los Angeles, California
Sediments and Tectonics of the Upper Santa Clara River Drainage Area, California

The area is separated by the San Gabriel fault into two separate provinces. The Tertiary sediments of the Eastern province, or extreme upper portion of the Santa Clara drainage system, are principally of terrestrial origin, while those lying westerly from the San Gabriel fault are almost entirely marine. Sedimentation in both provinces was concurrent during most of Tertiary time. The paper consists of a paleogeographic analysis of the area.

34. JAMES R. DORRANCE, The Texas Company, Bakersfield, California
California Exploration and Development in 1941

California's decline in discovery rate was sharply checked in 1941. Thirteen new areas of production were officially acknowledged. Eight are definitely established as fields, this figure including one new gas field. The status of the remaining five remains unsettled either by virtue of their imperfect state of development, or because subsequent drilling may prove them extensions of old fields. In addition, there were discovered three significant extensions to old fields, and a deep zone in one of the new fields of this year.

Increase in discovery rate was associated with increased exploratory effort as indexed by wildcat drilling, geophysical activity, and geological employment.

Although numerically impressive, the addition to reserves by 1941 discoveries was disappointing, amounting to a tenth or less than the year's production. Nevertheless,