Predicting Future Oil Using Three-Dimensional Discovery-Process Model

A three-dimensional discovery-process model has been developed to predict the size distribution of future discoveries in partially explored regions. Such a forecast was made for the Midland basin in west Texas by using pre-1975 historical drilling and discovery data from this basin. The parameters of the model are the effective basin size and the efficiency of discovery. The effective basin size is defined as that part of the basin where exploration companies will actually drill exploratory wells. The efficiency of discovery parameter is a measure of the rate at which deposits will be discovered in this region. In the Midland basin both of these parameters were estimated directly from historical data. Approaching the forecasting problem in this manner removes the necessity for using analogies or subjective judgment to estimate these parameters. As the historical data base is quite large, a series of integrated computer algorithms have been developed to estimate parameters and predict future oil.

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Gwna Melange, Upper Precambrian Olistostromal Sequence, North Wales, United Kingdom

The Gwna melange of north Wales is a sequence of pebbly mudstones and broken formations interstratified with undisturbed volcaniclastic units. The individual clasts, generally lying in a matrix of arenaceous mudstone, locally range up to a kilometer in outcrop. The clasts include graywackes, arenites, quartzites, limestones, basalts, cherts, and volcaniclastics.

The melange has been frequently cited as the "type" melange indicative of a tectonic origin. Recent mapping, petrography, and sedimentologic analysis have produced evidence for a sedimentary (olistostromal) origin for most of the melange. Sedimentary structures present include clastic dikes, resedimentation and soft-sediment injection features, and dewatering "cleavages" in various stages of development. The upper contact of the melange is at least partly a sedimentary-erosional contact with overlying undisturbed beds of composition similar to that of the melange. Certain larger clasts (up to 50 m) of graywacke exhibit oriented tectonic kink folds. These large clasts are in sedimentary contact with the melange, and may be explained best as undisturbed sedimentary-slide units (olistoliths) that were folded by later regional tectonic deformation. Smaller clasts within the melange responded to these regional forces mainly by continued movement, or shearing, within their ductile matrices.

This olistostromal sequence possibly represents an unstable continental margin associated with a previously postulated late Precambrian subduction zone.

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Impact of Coal Properties on Combustion Characteristics

The combustion performance of fuels is important in determining fuel applicability to a given combustion process. Establishment of well-defined combustion-related parameters is of particular importance in dealing with low-rank fuels such as the western subbituminous coals and lignites in both conventional pulverized and novel applications. The characterization of these fuels takes two forms: (1) the evaluation of operational performance in terms of slagging and fouling potential, carbon burnout, flame characteristics; and (2) an assessment of environmentally related parameters such as emissions of nitrogen oxides, sulfur dioxide, particulates, and trace elements. In an attempt to address these problem areas, experimental and paper studies have been conducted. Attention is focused on (1) indicating the basic features of pulverized coal fired unit design, (2) ranking of coal types, and (3) the identification of the coal-quality parameters which significantly impact power plant design and operation. In this way, the exploration geologist will be able to develop an overview of the considerations associated with the coal selection and utilization.

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Resource Appraisal Predictions and Exploration Performance in Offshore United States

Geologic estimates of undiscovered oil and gas resources in the United States were published in 1975 in the U.S. Geological Survey Circular 725, and the ranges for offshore United States were 10 to 49 billion bbl of oil, and 42 to 181 Tcf of gas. The offshore area included 28 separate provinces within the regions of Alaska, Pacific coastal states, Gulf of Mexico, and Atlantic coastal states.

Assessments were limited to the shelf areas in water depths of 0 to 200 m. Important exploration wells have been drilled in five of the 28 provinces since the publication of Circular 725, and a comparison of the results of these exploratory efforts with the resource appraisals is the object of this study.

Resource assessments for the Gulf of Alaska were 0 to 4.4 billion bbl of oil and 0 to 13 Tcf of gas. Industry leased 76 tracts (409,057 acres; 163,623 ha.) for $560 million in April 1976, and has drilled 11 tests on nine structures without success. There has been no activity in the area since July 1978.

The Southern California Borderland includes two provinces: (1) inner basins and (2) outer basins and ridges. Resource assessments for the inner basins were 0.4 to 2.0 billion bbl of oil and 0.4 to 2.0 Tcf of gas. Outer province assessments were 0 to 0.2 billion bbl of oil, and 0 to 0.2 Tcf of gas.

A federal lease sale that was held in December 1975 included 56 tracts (310,049 acres; 124,000 ha.) in both the inner and outer areas. Subsequent drilling has resulted in at least one oil discovery in the inner area, and activity continues. Six tests in the outer area have been negative, and there is no activity in this area at present.

Resource assessments for the Florida Gulf platform (Gulf of Mexico), were 0 to 2.8 billion bbl of oil, and 0 to 2.8 Tcf of gas. The Mafla sale of December 1973, in which 87 tracts (485,397 acres; 354,159 ha.) were leased, preceded this estimate; some wells had been drilled in