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Rock Properties—Influence on Hydrocarbon Accumulation, Production, and Residual Oil Shows

No abstract available.

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Some Relations Between Diagenesis and Porosity (Real and Imagined), Sandstones of Mesaverde Group, Uinta Basin, Utah

Examination of core and surface samples from several nonmarine sandstones of the Upper Cretaceous Mesaverde Group in the southeastern part of the Uinta basin, Utah, reveals extensive diagenetic alterations. Diagenesis has significantly altered the porosity characteristics of the sandstones and is thought to have a definite influence on porosity log calculations and on the interpretation of various other geophysical logs, sometimes leading to erroneous interpretations of reservoir characteristics.

Leaching of rock fragments and carbonates—calcite, dolomite, and ankerite—has resulted in the development of significant amounts of secondary porosity which probably provide the favorable reservoir properties of the sandstones. Formation of authigenic pore-filling kaolinite, and illite, which replaces rock fragments and which lines pores, has produced microporosity, greatly increased pore surface area, and has created a tortuous pore network. These properties dramatically alter pore geometry and, thus, fluid-flow characteristics which significantly alter the response of resistivity logs and interpretation of sonic and neutron logs. Consequently, erroneous values may be obtained for calculated porosity and water saturation. Interpretation of mercury-injection curves is also influenced by authigenesis.

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Integrated Geologic and Geophysical Studies as Exploration Tool in Rift-Related Basins

The careful integration of gravity, magnetic, and well data can provide an economical exploration tool at least on a regional basis. Large, publicly available files of gravity and magnetic data are easily accessible. These data represent a valuable source of information which can be particularly effective when used to extrapolate between and below points of available well control. In addition to providing the information needed to optimize expenditures for seismic reflection surveys, the results from an integrated analysis may directly yield attractive prospects. This approach has been applied to several rift-related basins in the Mid-Continent and southwestern United States and the results are encouraging. The general subsurface geometry of the basin can be readily determined and, especially in the Mid-Continent region, the existence of large volumes of unexplored clastic sediments is indicated. In rifted areas, patterns of surficial faulting can be very complicated and sometimes misleading. In the basins studied, valuable information on the nature and subsurface extent of fault systems was obtained.

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Patterns of Thick Coal Deposition Across Powder River Basin in Northeastern Wyoming

Tertiary coal beds in the Powder River basin are the nation's largest resource of low-sulfur subbituminous coal. In northeastern Wyoming the north-trending depositional axis of the asymmetric, 100-km-wide basin is within 20 km of the west margin. Interlocking lines of cross sections prepared from geophysical logs of oil and gas wells and coal exploratory holes and set to a sea level datum, outline patterns, locations, and trends of thick coal deposition. Coal beds on the east flank of the basin dip west about 1/2° and tend to merge eastward. Five Paleocene (Fort Union) coals merge along the eastern margin to form a north-trending, 35-m-thick deposit known as the Wyodak coal. Near the depositional axis, five or more Eocene (Wasatch) coals merge to form a north-trending, 60-m-thick deposit known as the Lake deSmet coal. Across the intervening area two or more succeeding coals merge locally on broad depressed subsurfaces to form north-trending belts of thick coal, and succeeding belts of thick coal are offset westward toward the depositional axis. Lines of cross sections oriented north-south roughly parallel to the depositional strike provide stratigraphic control on the coal. Maximum structural relief (about 400 m) of coal beds on the east flank relates to basin subsidence during deposition of coal-bearing rocks when rates of subsidence progressively increased westward. North-trending patterns of thick coal deposition across paleoslopes are associated with connected areas for which optimum paleoenvironments were stable for extended periods of time and optimum rates of subsidence were maintained.

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Department of Energy Drilling Programs and the Geosciences

An understanding of the structure, dynamics, and genesis of the North American continent is critical to the Department of Energy (DOE). Geoscience programs and drilling on the continent by the DOE have, in the past, been designed for specific programs in fossil fuels, geothermal energy, uranium resource evaluation, and defense. Although not specifically used for studies of the continent, these programs have provided abundant data on lithologies and physical properties. Through the Continental Scientific Drill Program (CSDP), these existing data will be readily available to the scientific community through a central data facility. With the present attitude in Congress toward basic research, it is doubtful that any deep drilling program will be dedicated solely to the CSDP. It is more likely that many of the holes drilled for the DOE and other government agencies might be developed further as "wells of opportunity" by the CSDP to collect deep samples or be used for in-situ measurements. Through the use of wells drilled for other purposes but made available to the community for CSDP projects, feedback will continue to provide the answers needed by the DOE to understand and to develop the energy resources of the