Oil and Gas Potential of Southern Arizona

Two highly prospective areas in southern Arizona are the Pedregosa basin in Cochise County and central Yuma and Maricopa Counties.

The best source rocks were deposited during the Paleozoic before the inception of thrust faulting. They include dark mudstones and dark-gray cherty limestones. In addition, the Jurassic evaporitic environment may have contained prolific growth of phytoplankton which was preserved and matured into a rich source rock. Good reservoir rocks are found in Paleozoic marine sediments (primarily Ordovician, Silurian, and Permian) and in Cretaceous marine sediments. Early Cretaceous reefs may be especially good reservoirs.

Two major types of tectonism provide models for structural traps: (1) overthrust faulting, and (2) basin-and-range block faulting. Sediments resting on a glide plane of Jurassic evaporites may have been thrust over reservoir rocks. This trap would be analogous to that of the Pineview field in northern Utah with a carbonate source rock, sand reservoir, and a salt seal. The primary exploration tool is reflection seismology. Basin-and-range faulting would create the fracture systems necessary for petroleum genesis through hydrothermal convection, hydrocarbon migration, and the upward travel of Jurassic salt. Salt diapirism may have caused additional fracturing in flanking reservoir rocks, thus increasing porosity and permeability. Reconnaissance prospecting for basin-and-range traps should include gravity surveys to locate salt and infrared air photo surveys to detect heat flow.

SNELL, JONATHAN P., Univ. Oklahoma, Norman, OK

Oil Recovery from Aquifer Beneath Refinery

The Sun Oil Co. refinery on the Arkansas River in Tulsa, Oklahoma, is underlain by a pool of hydrocarbons up to 6 ft (2 m) thick that is floating on the ground water and has an estimated volume of over 600,000 bbl. These oils have an API gravity range of 20 to 60°. The source is thought to be leaks and spills during the 50+ years of refinery operation.

An active recovery system is now in operation using a two-pump-per-well system in which one pump removes water, creating a cone of depression which brings the floating hydrocarbons to the well. From there it is removed by the second pump.

This paper describes the alluvial aquifer, oil detection techniques, recovery methods, and the flow of oil and water through the alluvium.

THIBODEAU, DAWNE M., Wright State Univ., Dayton, OH

Paleomagnetic Study of Upper Triassic Carbonate Rocks from Northwestern Sicily

Forty-two Upper Triassic carbonate cores from two sites in the Immerese basin in Sicily were exposed to alternating current demagnetization to isolate the primary component. The intensities of the X, Y, and Z axes were measured on a cryogenic magnetometer. The resultant declinations and inclinations of the magnetic vectors were tectonically corrected. The results of study of the carbonate rocks, together with volcanic paleomagnetic data from the same area now being studied by Gregor and Nairn, will test the hypothesis that Sicily has undergone post-Mesozoic rotations as a result of the Alpine orogeny.

The carrier of the magnetism is unknown because the carbonate rocks are fine-grained and the magnetic particles are highly dispersed. The demagnetization curve is characteristic of hematite although reflected light, X-ray diffraction, chemical analysis, and the scanning electron microscope cannot substantiate the presence of this mineral.

TRAVISONO, JEANNE, Univ. Maryland, College Park, MD

Otoliths of Brightseat Formation (Danian) of Maryland

Otoliths are calcareous secretions accumulated within the auditory chambers of bony fishes. Resting on the sensitive inner lining of the chambers, the otoliths vibrate in response to sound waves and changes in position of the fish.

Fossil otoliths are commonly the only record of ancient fish fauna. They are generally distinctive of taxa to generic level and have good potential as biostratigraphic tools and paleoenvironmental indicators of significant sensitivity.

Otoliths range in size from less than 1 to 5 mm. They are common microfossils in Tertiary Atlantic and Gulf coastal plain sediments, including the Danian Brightseat Formation of Maryland. This study is the first attempt to classify the otoliths in the Brightseat.

USSEGLIO, MICHAEL, Univ. Oklahoma, Norman, OK

Deltaic Cherokee Sandstones of Central Oklahoma

Exploration for delta reservoir sandstones on the Mid-Continent craton can be enhanced by a better understanding of facies character, depositional environments/processes, and factors that controlled their distribution. Appreciation of the dynamic nature of deltaic sedimentation permits the geologist to predict more precisely the stratigraphic relations and sandstone geometry. It also enables the explorationist to predict areas or trends that may previously have been overlooked.

A detailed, subsurface stratigraphic study of the Cherokee sandstones (early Desmoinesian) in central Oklahoma (including parts of Lincoln, Logan, Oklahoma, Cleveland, and Pottawatomie Counties) gives insight into the processes of deltaic sedimentation which should provide help in local exploration and development operations, and in regional exploration in similar rocks encountered throughout the world. Interpretations will be based on core analyses, examination of well cuttings, study of regional and detailed stratigraphic cross sections, and analysis of structure, paleotopographic/paleodrainage, paleogeologic (subcrop), and isolith maps of several key horizons.

No Abstract Available

CLARK, ROBEY H., Diamond Shamrock Corp., Amarillo, TX

Bridging the Energy Gap

JI-LIANG, Y., and L. MIN-ZHONG*

Geology of Daqing Oil Field