

Fossil organic reefs have a multitude of morphological characteristics which may be explained in terms of hydraulics, rate of subsidence, influence of deep-seated faulting, and other factors not of a strictly stratigraphical nature.

The interpretation of buried landscapes presents many problems still unresolved among geomorphologists and also high lights several lesser-known geomorphological phenomena. Subsurface data reveal that many landscapes exposed for millions of years, although technically "peneplains," still have sufficient relief for the accumulation of sizable hydrocarbon reserves. The solution of paleogeomorphological problems is aided greatly by applying quantitative geomorphological principles. The geological aspects of paleogeomorphology concern primarily the identification of erosion-resistant and less resistant horizons and the influence of structure (folding and faulting) on ancient drainage systems.

Sandstone bodies filling buried valleys commonly are dissected by river meanders and thus exhibit shapes that are different from the shape of the valley. The analysis of a drainage system from headwaters to delta can help to relate sandstone reservoirs to source areas.

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EXPLORATION AND DEVELOPMENT IN UTAH AND NEVADA, 1964-1965

Utah's Uinta basin continues to be the best part of that State in which to prospect for oil and gas. Wildcaters discovered gas at two localities and oil at six localities out of 24 wells drilled in the Uinta basin between September 1, 1964, and June 1, 1965. Excluding the Four Corners area, half of the wells drilled in Utah were in the Uinta basin. Other wildcat wells were drilled at scattered localities through the northern Paradox basin, the northern plunge of the Uncompahgre uplift, the northern San Rafael swell, and the Kaiparowits region. These wells resulted in one oil and one gas discovery.

All but two of the new oil discoveries were completed in Tertiary Green River sandstones near Red Wash field and in the belt of productive Green River sandstone extending west from Red Wash. Of the others, one was a new "pay" discovery (Jurassic Entrada Sandstone) in the old Ashley Valley field, and the other was an oil discovery in the Permian Kaibab on the Ferron anticline, between the San Rafael swell and the Wasatch plateau.

During the first half of 1965, approximately the same number of wells were completed in Utah as during the first half of 1964. However, fewer wells were completed in 1964 than during 1963. Daily oil-productive capacity is down to 75,000 barrels per day from 90,000 barrels in 1964. The number of acres of Federal land under lease declined by 150,000 acres during the first quarter of 1965 from the previous quarter.

Oil and gas industry expansion plans include a 6-inch gas transmission line to be built south from Price, Utah, to the Ferron gas field by Mountain Fuel Supply Company. Gulf Oil Corporation is considering the construction of a 3-million dollar viscosity breaker plant at the Wonsits Unit (near Red Wash) where its productive capacity of high-pour-point waxy crude oil exceeds the amount that can be accommodated by existing pipelines.

A successful $\frac{3}{4}$ -mile step-out well east of the oil production in the Tertiary Sheep Pass Sandstones, Eagle Springs field, was completed early in 1965; this discovery

gave added stimulation to leasing and drilling in Nevada. By mid-year, four development wells were being drilled around the step-out.

An additional $\frac{1}{2}$ million acres of Federal lands were leased during the first half of 1965, to bring the total to slightly more than 2 million acres of Federal lands under lease in Nevada. Northern Railroad Valley, White River Valley, and Jakes Valley are all leased. Large blocks of acreage also have been leased in Long Valley, Butte Valley, Steptoe Valley, and Newark Valley. Since the current play started in March, 1964, one dry hole has been drilled in Newark Valley, two in White River Valley, and one on the eastern flank of the Eagan Range.

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EXPLORATION AND DEVELOPMENT HIGH-LIGHTS IN DENVER BASIN

A resurgence of industry interest in Denver basin oil and gas prospects has been reflected by a 30 per cent increase in the number of wells completed in western Nebraska during 1965. Eastern Colorado drilling activity has shown decline of less than 10 per cent compared with 1964. Any significant increase in the number of wells drilled ultimately will reverse the continuing decline of oil and gas production.

Exploratory drilling to the shallow, Cretaceous "D" and "J" Sandstone objectives was well dispersed throughout the basin and resulted in the discovery of many commercial, though no truly significant, fields. The 11-well Stage Hill field on the Scotts Bluff-Banner County line is representative, both geologically and economically, of the better structural-stratigraphic type oil accumulations discovered in western Nebraska. The Moccasin field of eastern Adams County is typical of the small, though profitable, structural-stratigraphic "J" Sandstone oil accumulations discovered in eastern Colorado.

Several exploratory tests to pre-Cretaceous objectives on the western flank of the Chadron arch and in extreme northwestern Nebraska were unsuccessful. Encouragement in searching for pre-Cretaceous oil and gas production on the fringes of the Denver basin in Colorado was afforded by a gas discovery in the Pennsylvanian Morrow Sandstone, Kit Carson County, and an oil discovery in the Mississippian Osage, northern Prowers County. The gas discovery is high on the eastern flank of the basin and appears to be a stratigraphic accumulation trapped in lenticular Morrow sandstones. A unique feature of this Morrow gas is its high helium content—more than 4 per cent.

The Comanche field discovery of oil in Mississippian Osage carbonates is the first indication of commercial oil production in the Mississippian in eastern Colorado. This discovery, even though it is located in the Hugoton embayment of the Anadarko basin, suggests that Mississippian carbonates may be prospective for oil and gas throughout much of the eastern flank of the Denver basin. The Comanche field appears to be primarily a structural accumulation on the western, or upthrown, side of a major northeast-trending fault zone.

Seismic activity and exploratory drilling to the Permian Lyons Sandstone and Big Blue carbonate objectives in the deeper part of the basin have increased during 1965. The increased interest in pre-Cretaceous objectives, combined with a continuing search for new Cretaceous "D" and "J" Sandstone fields, should maintain a relatively high level of exploratory activity during the coming year.