

sively deeper into the section until basement rocks were exposed on the highest portion of the Muenster arch.

It is postulated that the Strawn beds, which then covered the platform, furnished the source and seal for the Oil Creek production in the following examples: Ouachita and Arbuckle orogenies (late Pennsylvanian) rejuvenated earlier faulting on the platform, and this faulting partially controls the production.

Exploration is quite attractive, especially for independent operators.

Lease costs are about \$10-\$15/acre for 1- to 2-year leases except in the Walnut Bend areas where it ranges much higher. Mineral ownership is fairly simple, and 7/8 leases can usually be obtained. The productive areas are not large, hence large lease blocks are unnecessary. Drilling costs are nominal, a 5,000-6,000-foot dry hole costs \$20,000-\$25,000.

There are classic examples of oil occurrence in subtle stratigraphic traps directly related to an unconformity.

Geology alone will find more of these fields with no dependence on structural closure or geophysics. Careful log correlation is essential; a small fault in the Pennsylvanian section may indicate an untested fault block in the underlying Oil Creek.

The economic incentive is already established in excellent reservoirs. The Oil Creek of North Texas and the other Simpson sandstones of southern Oklahoma offer a fertile hunting ground for truncation prospects.

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*"Conquest of the Barranca de Cobre"*

The Barranca de Cobre (Copper Canyon) is located in the Sierra Madre Occidental about 200 miles southwest of the city of Chihuahua, Mexico. Copper Canyon was cut by the Urique River in a thick series of volcanic flows of rhyolite, trachyte, basalt, tuff, and diorite. The canyon is heavily mineralized with copper and commercial quantities of gold, silver, and optical calcite.

Copper Canyon is part of a system of canyons approximately four times larger in areal extent and up to twice as deep as Grand Canyon. First recorded attempt to explore the Barranca de Cobre was by Robert T. Moore in 1950. His party suc-

ceeded in only getting to the bottom of the Barranca de Urique about 15 miles from Copper Canyon before being forced to climb out because of extremely hot weather and heavy rainfall. In 1952, a man named Griffith is believed to have explored about five or six miles of the Cobre before climbing out.

The most recent unsuccessful attempt to conquer the canyon was in October of 1963 when John Cross, a professional river runner from Orem, Utah, led a party of 14 into the head waters of the canyon. Cross's party progressed only about six miles when their heavy rubber boats became trapped between a 50-foot waterfall and a mass of tremendous boulders. This ill-fated attempt received nationwide attention and resulted in a massive rescue operation when two members of the Cross party succeeded in climbing out of the canyon, after having gone five days without food, and reported their companions lost and starving.

The writer, along with Rex Moore, Jr., of Oklahoma City and Bill Wetzel of Duncan, Oklahoma, joined with Cross and seven others in a second try at the canyon in November-December of 1963. By using two-man rubber kayaks, this expedition succeeded in conquering the Barranca de Cobre in its entirety, a distance of about 30 or 40 miles. However, the party was then forced to enter a second unexplored canyon, the Barranca de Urique, in order to find a way out of the maze of deep gorges. After three days of hunger and hardship in trying to climb out, Cross's group finally reached the small hamlet of Franciscan Antonio on the rim, exhausted but elated to be the first to conquer the Barranca de Cobre.

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*"Wolfcamp Stratigraphy, Western Delaware Basin"*

The major lithologic subdivisions of the "Wolfcamp" strata in the western part of the Delaware basin are described. Also presented is the probable stratigraphic relationship of these strata to equivalent beds present on the Northwestern shelf and in outcrops to the northwest and west.

The term "Wolfcamp" is used as an operational unit and may contain some beds slightly older and/or younger than the lower Permian Wolfcamp Series. The top