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**Shallow Gas Fields in High Porosity Chalk:
An Independent's Exploration Strategy**

The Niobrara gas producing area on the eastern flank of the Denver basin is an interesting example of the recognition of shallow gas potential and development of production in an area where many unsuccessful wildcats had previously been drilled and abandoned in the futile search for production from deeper prospective formations. Exploration strategies have included the development of bypassed fields as indicated by logs from older deeper wildcats, subsurface mapping, pattern drilling, random drilling, and seismic surveys directed toward structural definition or observance of amplitude anomalies.

Natural gas is produced from the Cretaceous Niobrara Formation at approximately 40 fields in eastern Colorado and nearby counties in northwestern Kansas and southwestern Nebraska. The discovery for the province was in 1919 at the Beecher Island field in Yuma County, Colorado, but commercial development did not commence until 1972.

Biogenic gas is produced from a primary chalk reservoir with high porosity but low permeability at the top of the Smoky Hill Chalk Member of the Cretaceous Niobrara Formation at depths ranging from 900 to 3,200 ft. (275 to 975 m). The chalk reservoir is comprised dominantly of coccolith plates, and is 85 to 95% calcite. Accumulations are normally on low-relief anticlinal and faulted anticlinal closures. The wells are stimulated with a foam fracturing treatment and will deliver from 20 to 500 MCFGPD. The estimated recovery per well is normally 100 to 500 MMCF and a few exceptionally good wells should recover more than 1,000 MMCF. Cumulative production from the Niobrara wells through 1982 is 28 BCF. Ultimate production is estimated to be 320 BCF. Although Niobrara gas wells are small, the low cost of drilling and completion permits an attractive economic return for a small independent.