

Petrology of the Benson Sand in
Barbour, Upshur, Lewis and Harrison
Counties, West Virginia

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Abstract

The Upper Devonian Benson sand is one of the better gas producing sands in central West Virginia. Generally, the Benson is no coarser than a very fine sand and most of the unit is an argillaceous siltstone. The sandstone was apparently deposited as an offshore marine bar west of the Late Devonian shoreline. Winnowing action exerted by the sea as it regressed westward has removed part of the argillaceous matrix from portions of the sandstone and left the remaining argillaceous material unevenly distributed. The amount of argillaceous matrix seems to be the primary factor controlling the presence of porosity in the Benson sand. More abundant argillaceous matrix generally is associated with less porosity. Diagenesis has also affected the primary porosity of the Benson. Constituents reducing porosity included secondary quartz overgrowths, feldspar overgrowths, carbonate and minor amounts of barite. Pressure solution has also decreased porosity, especially in the more argillaceous samples where clays appear to enhance the process. However, thin argillaceous coatings on some grains have inhibited the formation of overgrowths and thus preserved porosity. Also, some feldspar is partially dissolved producing secondary porosity. Carbonate cement may have been leached from certain areas because quartz grains around some pores are ragged, as if corroded by earlier carbonates. Vugs a few millimeters across may have resulted from leaching of

carbonates which had been in the form of fossil shells. However, the majority of pores are lined with euhedral quartz overgrowths which indicate free growth into empty voids.

The best reservoirs for hydrocarbons, therefore, are likely to be in the better developed offshore marine bar sequences where winnowing has removed much of the clay matrix. Suitable porosity is also more probable where solution of carbonate and feldspar is prominent or clay coatings are important in preserving porosity.

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