through compaction. Overburden pressure, uncompensated by pore pressure, has fractured and crushed brittle framework grains such as quartz and feldspar, and deformed (squashed) ductile, pelitic rock fragmants. In both quartz-rich and lithic sandstones, pores that either survived quartz cementation and compaction or were generated through dissolution phenomena are coated and lined with authigenic clays, principally chlorite and illite. The final product of diagenesis is sandstone which, regardless of the amount of its porosity, has an immense surface area to pore-volume ratio, high irreducible water saturation, and very low permeability. In general, clay mineral suites of sandstones and shales are different, and log interpretation of shaly sandstones should not be extrapolated from the log response of adjacent shales.

Diagenetic effects in addition to porosity and permeability loss in the tight reservoirs of the Green River Basin differ from those of conventional reservoirs in degrees, not kind. Each reservoir sandstone has unique petrologic and reservoir properties and must be evaluated individually. Although low permeability is of immediate concern for production and stimulation procedures, ultimate economic constraints will be imposed by porosity and pore-volume limitations.

GAUTIER, DONALD L., and POLLASTRO, RICHARD M., U.S. Geological Survey, Denver, Colorado

Petrology and Mineralogy in Relation to Reservoir Properties in the El Paso Natural Gas Co. No. 1 Wagon Wheel Well, Green River Basin, Wyoming

The El Paso Natural Gas Company No. 1 Wagon Wheel well was extensively cored in anticipation of nuclear stimulation. This well is located on the Pinedale anticline in the northern part of the Green River Basin. Cores were taken from depths of about 5,000 ft to almost 18,000 ft in a sequence of low-permeability, high-pressure gas-bearing rocks. These rocks are typical of the "tight" gas reservoirs of the northern Green River Basin. Reservoirs consist of lenticular, mainly fluvial sandstones enclosed in organic-rich continental mudstones. *In-situ* permeabilities of the sandstones to gas rarely exceed 0.01 md, and most permeabilities are orders of magnitude lower. Porosity maxima for each sandstone decrease systematically with depth, from about 20% at 5,000 ft to less than 3% at total depth. Both permeability and porosity reduction are the result of diagenesis.

In quartz-rich sandstones such as the Upper Cretaceous Ericson Sandstone, porosity and permeability loss are due to quartz cementation early in the burial history, prior to significant compaction of the sediments. In contrast, lithic sandstones, which are much more abundant than quartz arenities, have lost most of their porosity and permeability