Reference: Luffel, D.L., Howard, W.E., and Hunt, E.R., 1991, Travis Peak core permeability and porosity relationships at reservoir stress: Society of Petroleum Engineers Formation Evaluation, v. 6, n. 3, pp. 310-318.

Author's affiliation: ResTech Houston Inc.

Reference: Dutton, S.P., and T.N. Diggs, 1992, Evolution of porosity and permeability in the Lower Cretaceous Travis Peak Formation, East Texas: American Association of Petroleum Geologists Bulletin Bull., v. 76, n. 2, p. 252-269. (This paper discusses the lithology and alteration of samples from 26 wells in east Texas, including the eight cored wells sampled by Luffel et al.)

Reference: Soeder, D.J. and P. Chowdiah, 1990, Pore geometry in high- and low-permeability sandstones, Travis Peak Formation, East Texas, Society of Petroleum Engineers Formation Evaluation, p. 421-430.

Reference: Davies, D.K., B.P.J. Williams, and R.K. Vessell, 1993, Dimensions and quality of reservoirs originating in low and high sinuosity channel systems, Lower Cretaceous Travis Peak Formation, East Texas, USA in North, C.P. and Prosser, D.J. (eds.), Characterization of fluvial and aeolian reservoirs, Geological Society Special Publication No. 73, p. 95-121.

Age: Early Cretaceous

Formation: Travis Peak Formation

Location: locations in four counties in east Texas, United States

Well: eight cored wells

Depth range: 5800 - 10,155 feet.

Deposition: The Travis Peak was deposited as a complex of delta lobes on a broad, shallow shelf … most of the initial deposits were reworked by fluvial and marine processes as the depocenters for the sediment shifted back and forth across the shelf (Soeder and Chowdiah, 1990). Luffel et al mention three sandstone facies (fluvial/deltaic channel sand, fluvial/deltaic crevasse splay, and delta fringe channel) and two siltstone and mudstone facies (fluvial/deltaic flood plain and delta fringe tidal flat).

Depositional control: Davies and others (1993) present data from six counties in east Texas (not given here). They show permeability-porosity data in splay, lake, and channel sandstones from low sinuosity and high sinuosity environments. Channel sandstones from high sinuosity channel systems have the highest permeability and porosity. They maintain that "Despite extensive diagenesis, permeability values reflect original depositional environment and bedding style, even in rocks which have lost more than 80% of their original, depositional porosity."

Lithology: Dutton and Diggs (1992): "Most Travis Peak sandstones are fine to very fine grained (62.5 to 250 microns) quartzarenties and subarkoses having an average composition of 95% quartz, 4% feldspar, and 1% rock fragments. Most clean fluvial and paralic sandstones are moderately sorted to well sorted."

Alteration: Dutton and Diggs, 1992: "The three significant petrographic variables for a regression with porosity were sorting, quartz cement, and carbonate cement. … We interpret the observed decline in porosity and permeability between 6000 and 10000 feet in Travis Peak sandstones to result from the following combination of diagenetic and physical modifications with depth: (1) increased quartz cement, (2) decreased secondary porosity, and (3) greater overburden pressure that closes narrow pore throats but does not significantly change grain packing." Figure 14 of Dutton and Diggs apportions porosity reduction in the following way: compaction (-14%), quartz cement -- moderate burial (-15%), quartz cement -- deep burial (-5%), all other mechanisms (-5%).

Alteration: Soeder and Chodiah (1990): "Photomicrographs show a close, interlocking grain structure common in tight sandstones. This is usually caused by the precipitation of syntaxial quartz overgrowths on sand grains and is only very rarely a product of quartz pressure solution. The overgrowths expand into the primary pore spaces and form the flattened, interlocked grain network when the crystal faces join and grow against one another. Quartz, precipitated as overgrowths, generally fills most, if not all, of the primary porosity, reducing it to narrow, flat, sheet- or slot-like pores between butting overgrowth faces."

Production: gas.

Core measurement conditions: Porosity and permeability were measured directly at net overburden stress. All measurements are either corrected for the Klinkenberg effect or were conducted at high pore pressure.

Data entry: data file received from the first author.