How Water Travels Below the Earth's Surface

A common misconception about underground water is that it primarily occurs in underground rivers. This probably happens because most people only see (in person or in pictures of) underground water in caves, where it is usually presented by a tour-guide as an "underground river". These "rivers" are actually sections of rock, like limestone, that have been dissolved away and widened out by the movement of the underground water, creating both the caverns above and the underground stream at the bottom of the cave.

In reality, most underground water occurs within tiny void spaces, called pores, located between the solid mineral grains of sediments and rocks, as well as in cracks or fractures of the ground, rather like water filling a sponge. The pores and fractures in the rocks and sediments are saturated with water from near the surface to great depths. All geologic structures contain water, but the structures that have larger pore sizes, such as sands and gravels allow the water to flow more easily. These structures are called aquifers. The word "aquifer" implies ease of underground water flow.

The pore sizes in rocks are a function of the size of the individual grains making up the rock. A gravel deposit can have pores big enough to stick a pencil into. A siltstone has pores that can only be seen under a microscope. Like pipes, bigger pores carry more water.

Like surface water, underground water flows downhill. This is called the gradient, and most aquifers have a tilt or a dip to them that imparts a gradient and a flow direction to the underground water. Aquifers usually move much slower than streams.

Source: Daniel J. Soeder, Hydrologist
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The Nooks & Crannies
Through Which Underground Water Travels

Source: Applied Fluorescence Technology, Vol III, Page 13, April 1991:

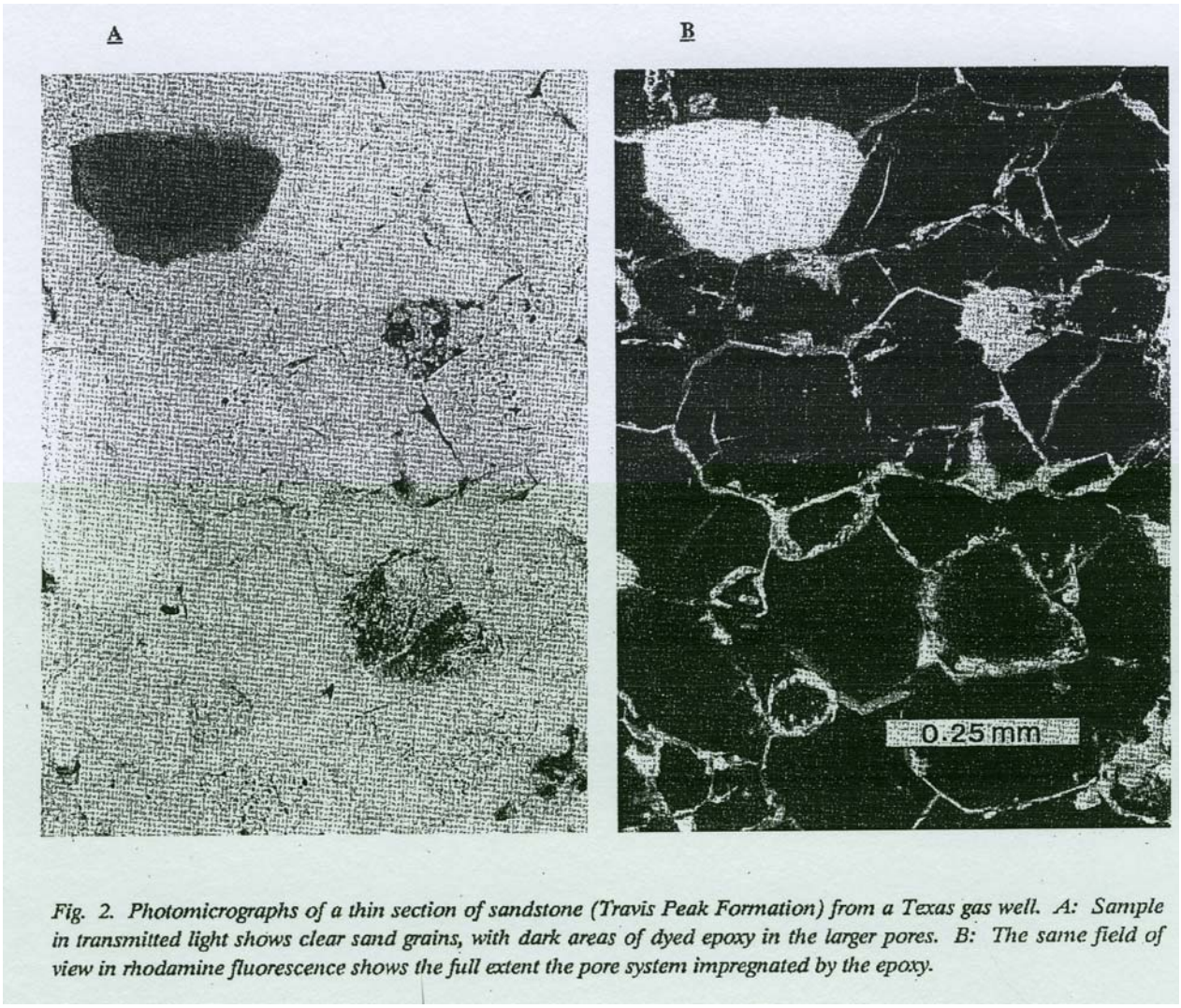

Fig. 2. Photomicrographs of a thin section of sandstone (Travis Peak Formation) from a Texas gas well. A: Sample in transmitted light shows clear sand grains, with dark areas of dyed epoxy in the larger pores. B: The same field of view in rhodamine fluorescence shows the full extent the pore system impregnated by the epoxy.