

The effects of ground water on hydrocarbon migration

Abstract

Katalin Csondor¹, Virág Boglárka Török¹

¹: Department of Physical and Applied Geology, Institute of Geography and Earth Sciences, Eötvös Loránd University, 1/c Pázmány Péter sétány, 1117 Budapest, Hungary

In complex basins the undulation of the water-table generates hierarchically nested flow systems of different orders (local, intermediate, regional), each of them possessing three flow regimes (recharge, midline, discharge). Water in these systems interacts with its environment, it can dissolve, mobilize, transport and deposit matter, modify pore pressure and transport heat, by this creating gravity-flow related hydrogeologic phenomena. Different forms of hydrocarbons can migrate with the ground water as well. However, the necessary energy for migration comes from several sources.

The migration of the petroleum and the functional relation between petroleum migration and basin evolution can be presented by different migration models. These models try to describe the migration and portray the natural processes while describing the interaction between the rock framework and the hydrocarbons in different approaches.

Petroleum deposits may be considered as manifestations of regional groundwater flow and they can also occur together with other flow-related phenomena. Fluid potential minimum, superhydrostatic pore pressures, flowing artesian wells, slight or zero lateral potential gradients, positive geothermal anomalies, marshes, soil salinization, and salt-water discharge, increases in formation water salinity, reducing near-surface conditions, altered soils, H₂, radiometric and electrotelluric anomalies are created by processes that can also generate petroleum deposits, while oil springs and seeps, hydrocarbon gases in spring waters, soil wax, anomalous growth of hydrocarbon-metabolizing bacteria are direct indicators of hydrocarbon entrapment. Both indirect and direct indicators are useful tools in petroleum exploration.

Reference: Tóth, J. (1988) Ground water and hydrocarbon migration. In *Hydrogeology. Geology of North America*, v. O-2, ed. W. Back, J. S. Rosenshein and P. R. Seaber. Geological Society of America, Boulder, Colorado, pp. 485-502.