CHAPTER 3

Groundwater Law for Mineral Lawyers

Joseph W. Dellapenna

Professor of Law

Villanova University

Philadelphia, Pennsylvania

Synopsis

§ 3.01. Groundwater Hydrology.

About one-fourth of the water consumed in the United States today comes from subsurface sources,[(1)] including about one-third of the total usage in the western states.[(2)] Today, as much as one-half of the population of the United States relies on groundwater for its drinking water.[(3)] Groundwater in storage to a depth of one-half mile is roughly equivalent to the total recharge during the last 160 years--a volume approximately six times as much as the available surface water in the United States.[(4)] Usable groundwater (at least 46 billion acre-feet) approximately equals the total precipitation for ten years or about thirty five times total annual runoff.[(5)] Recent experience has shown that, despite the apparently vast amount of groundwater, it is not an inexhaustible resource. Exhaustion is only achievable, however, through withdrawals substantially in excess of natural recharge of the groundwater.[(6)]

Owners or operators of mines, oil wells, or the like can encounter groundwater problems in acquiring the water for their operations or in disposing of water impeding their operations. Changes in technology and related changes in demand for groundwater have given the controlling law a dynamic character over the past century. This law can be expected to continue to change. The present Chapter addresses the law applicable to disputes between private parties, each of whom seeks to use the same groundwater source. To understand this law and its changes, one must grasp the basic concepts of groundwater hydrology, including both the patterns of groundwater's occurrence and the advantages of using groundwater rather than surface water sources.

[1]--Groundwater's Occurrence.

All water found over, on, or under the earth is part of a long-term hydrologic cycle.[(7)] The cycle has no known beginning or end. Atmospheric vapor makes a good starting point as this is one point in the cycle through which all water eventually will pass; all of the alternative paths through the cycle sooner or later lead back to the atmosphere despite their differing courses and durations.

Water vapor in the atmosphere condenses and falls as precipitation. Some of this moisture is taken up by plants and transpired back into the atmosphere. A good deal of the moisture collects on the surface to form glaciers, streams, lakes, ponds, swamps, and so on, nearly all of which (apart from that consumed temporarily by plant or animal life or that which evaporates directly into the air) flows eventually to the sea. Evaporation from the sea in turn replenishes the atmosphere and provides much of the energy that drives global weather. Much of the water that falls on the ground, however, follows neither of these paths, instead seeping or sinking into the ground.[(8)] Eventually, this water is released into streams and other surface bodies or directly into the sea. From either, it will return to the atmosphere.[(9)]

Precisely how water that sinks or seeps into the ground will move and what becomes of it will vary considerably with the geology and geography affecting the groundwater.[(10)] Groundwater moves more