

Modeling Differences in Drawdown between a Horizontal Water Well and a Vertical Water Well within a Confined Clastic Aquifer

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ABSTRACT

Horizontal well drilling methods were originally developed for the production of oil from thin reservoir units. Horizontal well drilling methods have recently been applied in the water well industry. Studies of horizontal water wells have been made in shallow unconfined aquifer systems, but the focus has been on water flow to the well and the amount of water produced by the well, with remediation applications. There has been no research that has focused on the physical distribution of drawdown from a horizontal well when compared to a vertical water well.

This research focuses on modeling and comparing the performance of a horizontal water well and a vertical water well drilled in a confined clastic aquifer in a controlled laboratory environment. The basic premise for this research is to construct a small-scale porous media scale model under equilibrium conditions in order to simulate and observe the potentiometric surface for each well.

The results of this study produced geometrically different cones of depression for the two well configurations. The model results indicate that the horizontal well has a greater area of influence associated with the potentiometric surface and higher draw-down at the well.