

Applied Hydrogeology

C. W. FETTER, JR.

University of Wisconsin—Oshkosh

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Boundaries are considered to be either recharge or barrier boundaries. A **recharge boundary** is a region in which the aquifer is replenished. A **barrier boundary** is an edge of the aquifer, where it terminates, either by thinning or abutting a low-permeability formation, or has been eroded away. Parts A and B of Figure 8.21 show the effect of boundaries on the cross section of the potentiometric surface of a pumped aquifer. Boundaries have the most dramatic impact on the drawdown of a pumped well for the aquifer with no source of vertical recharge. As the well withdraws water only from storage in the aquifer, drawdown proceeds as a function of the logarithm of time.

Figure 8.22 shows a theoretical straight-line plot of drawdown as a function of time on semilogarithmic paper. The effect of a recharge boundary is to retard the rate of drawdown. Drawdown can become zero if the well comes to be supplied entirely with recharged water. The effect of a barrier to flow in some region of the aquifer is to accelerate the drawdown rate. The water level declines faster than the theoretical straight line.

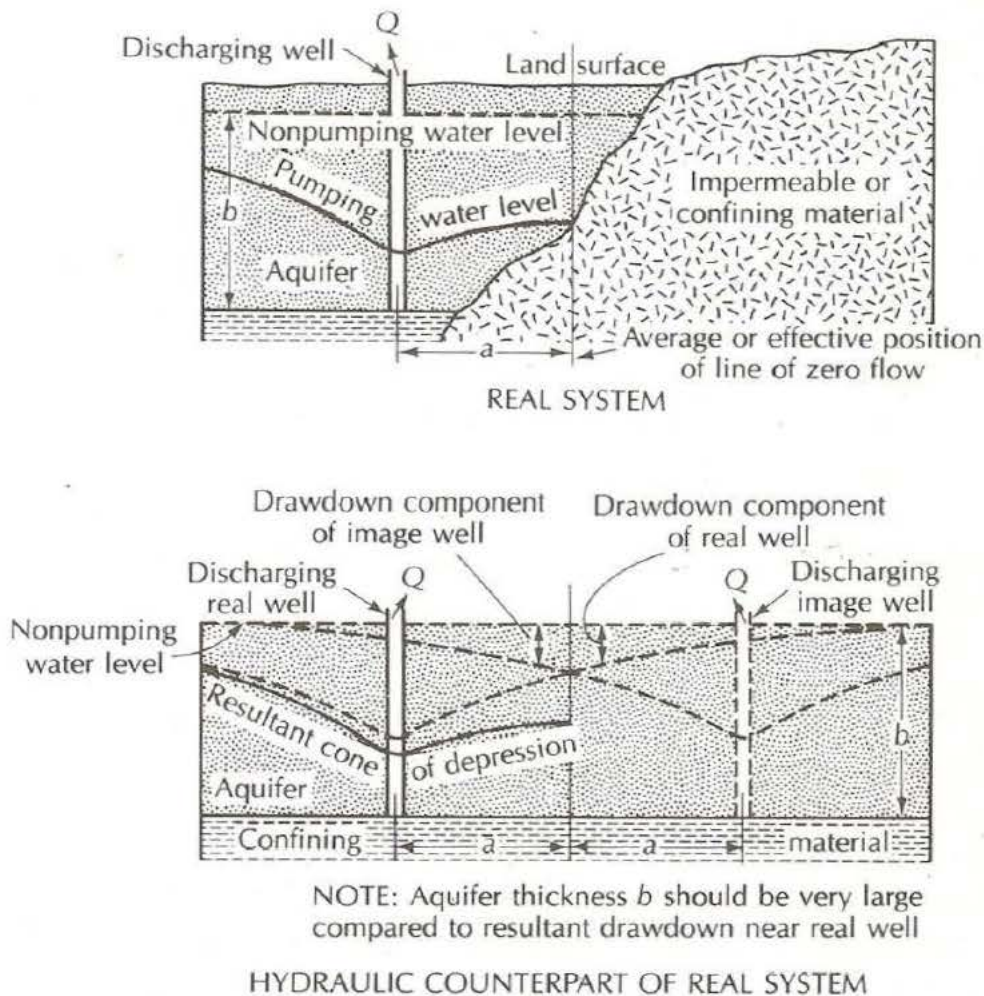


FIGURE 8.21B. Idealized cross section of a well in an aquifer bounded on one side by an impermeable boundary. SOURCE: J. G. Ferris et al., U.S. Geological Survey Water Supply Paper 1536-E, 1962.

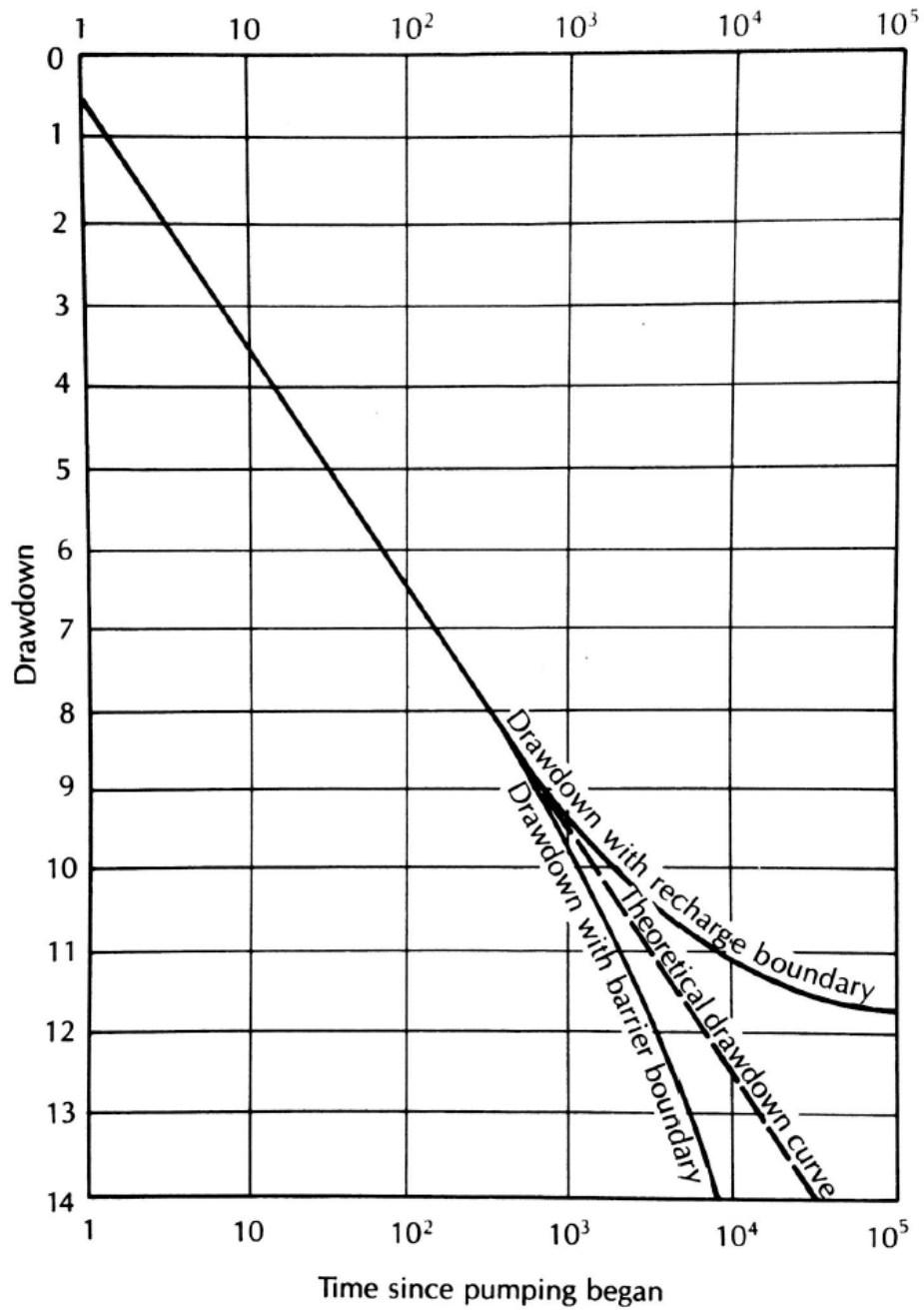


FIGURE 8.22. Impact of recharge and barrier boundaries on semilogarithmic drawdown-time curves.