Groundwater Analytical Formulae For Radial Flow To A Well

Theis Equation Theis (1935)	Consistent Units (length, time)	Traditional Units (ft, gpm, gpd/ft, days)
	$T = \frac{QW(u)}{4\pi s}$ $u = \frac{r^2 S}{4Tt}$ $S = \frac{4Tut}{r^2}$	$T = \frac{114.6QW(u)}{s}$ $u = \frac{1.87r^2 S}{Tt}$ $S = \frac{Tut}{1.87r^2}$
Jacob Approximation Cooper and Jacob (1946)	$s = \frac{0.183Q}{T} \log\left(\frac{2.25Tt}{r^2 S}\right)$	$s = \frac{264Q}{T} \log\left(\frac{0.3Tt}{r^2 S}\right)$
Time-Drawdown	$T = \frac{0.183Q}{\Delta s \text{ per log cycle } t}$ $S = \frac{2.25Tt_o}{r^2}$	$T = \frac{264Q}{\Delta s \text{ per log cycle } t}$ $S = \frac{0.3Tt_o}{r^2}$
Distance-Drawdown	$T = \frac{0.366Q}{\Delta s \text{ per log cycle } r}$ $S = \frac{2.25Tt}{r_o^2}$	$T = \frac{528Q}{\Delta s \text{ per log cycle } r}$ $S = \frac{0.3Tt}{r_o^2}$
Recovery Analysis Theis (1935)	$T = \frac{0.183Q}{\Delta s \text{ per log cycle } t/t'}$	$T = \frac{264Q}{\Delta s \text{ per log cycle } t/t'}$
T = Transmissivity Q = Flow Rate s = Drawdown S = Storage Coefficient t_o = Time at Zero Drawdown r_o = Distance at Zero Drawdown	t = Time Since Pumping Began r = Radial Distance W(u) = Well Function t′ = Time Since Pumping Ceased	