PREFACE

This report presents a computer program for calculating drawdowns and estimating hydraulic properties for confined and water-table aquifers. The program has been successfully tested for a variety of applications. Users are requested to notify the USGS if errors are found in this report or the program.

Although this program has been used by the USGS, no warranty, expressed or implied, is made by the USGS or the United States Government as to the accuracy and functioning of the program and related materials. Nor shall the fact of distribution constitute any such warranty, and no responsibility is assumed by the USGS in connection therewith.

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CONVERSION FACTORS AND DEFINITION OF SYMBOLS

CONVERSION FACTORS

Multiply	By	To Obtain
cubic meter per second (m^3/s)	35.31	cubic foot per second
meter (m)	3.281	foot
meter per second (m/s)	3.281	foot per second
square meter per second (m^2/s)	10.76	square foot per second

DEFINITION OF SYMBOLS

[L, length; T, time; --, dimensionless]

Symbol	Dimension	Definition
b	L	Thickness of confined aquifer or saturated thickness of water-table aquifer
d_s	L	Thickness of the well-bore skin
F'	L	Modified Hvorslev (1951) observation well shape factor
h	L	Head in aquifer
h_c	L	Model calculated drawdown
h_D	--	Dimensionless drawdown
h_i	L	Initial head (or potentiometric surface) in aquifer
h_m	L	Measured drawdown
K_D	--	Dimensionless ratio of vertical to horizontal hydraulic conductivity
K_s	L/T	Hydraulic conductivity of well-bore skin
K_r, K_z	L/T	Horizontal and vertical hydraulic conductivity of aquifer, respectively
L	L	Length of the screened interval of observation well
Q	L^3/T	Pumping rate of well
r	L	Radial distance from axis of pumped well
r_c	L	Inside radius of the pumped well in the interval where water levels are changing during pumping

Symbol	Dimension	Definition
r_D	--	Dimensionless radial distance to observation well or piezometer from axis of pumped well
r_p	L	Inside radius of the observation well in the interval where water levels are changing during pumping
r_w	L	Radius of the screened interval of the pumped well
S	--	Storativity (storage coefficient) of aquifer
S_s	1/L	Specific storage of aquifer
S_w	--	Well-bore skin
S_y	--	Specific yield of aquifer
t	T	Time
t_D	--	Dimensionless time
t_{Dy}	--	Dimensionless time with respect to specific yield
T	L^2/T	Transmissivity of aquifer
W_D	--	Dimensionless well-bore storage
W'_D	--	Dimensionless delayed response factor
z	L	Depth below top of aquifer or initial water table
z_1	L	Depth below top of aquifer or initial water table to the top of screened interval of observation well
z_2	L	Depth below top of aquifer or initial water table to the bottom of screened interval of observation well
z_p	L	Depth below top of aquifer or initial water table to center of piezometer
z_{pd}	L	Depth below top of aquifer or initial water table to the top of screened interval of pumped well
z_{pl}	L	Depth below top of aquifer or initial water table to the bottom of screened interval of pumped well
α_i	1/T	*I*th empirical drainage constant
β	--	Dimensionless product of β_w and the square of dimensionless radial distance to observation well or piezometer
β_w	--	Dimensionless product of anisotropic ratio of vertical to horizontal hydraulic conductivity and the square of dimensionless radius of screened interval of pumped well
γ_i	--	*I*th dimensionless empirical drainage constant
π	--	Pi (3.141592654)
σ	--	Dimensionless ratio of aquifer storativity to aquifer specific yield
∞	--	Infinity