

LETTER TO THE EDITOR

The analysis and planning of step drawdown tests: a clarification**L. Clarke**

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I have received letters from Mr D. M. Milne and Dr P. F. Worthington pointing out an error in the application of the analytical methods in this paper, (published in 1977 in *Q. Jl Engng Geol.* **12**, 125–143). I would therefore like to take this opportunity to clarify the matter.

The source of the error lies in the use of mixed time-units in the evaluation of the storage coefficient S . Time is given in minutes while the discharge rates are given in m^3/day throughout the paper. These units, if applied consistently throughout an analysis, will give correct values for the various well-loss equations and the aquifer transmissivity. The value of the storage coefficient, however, will be 1440 times too great.

The storage coefficient is obtained (p. 139) by the evaluation of the equation:

$$a = \frac{2.3}{4\pi T} \log \frac{2.25 T}{r_w^2 S}$$

or

$$a = b \log \frac{2.25 T}{r_w^2 S}$$

The discharge rates used in obtaining a and T in this equation are expressed in m^3/day . However, a is derived through Figs. 4 and 5 using the specific drawdown at unit time, $t = 1$ minute, in order to remove the expression $(b \log t)$ from $(a + b \log t)$ (p. 132). The units in this equation above have to be made consis-

tent with this derivation and the equation therefore becomes:

$$1440a = \frac{2.3 \times 1440}{4\pi T} \log \frac{2.25 T}{r_w^2 S 1440}$$

or

$$\frac{a}{b} = \log \frac{2.25 T}{r_w^2 S 1440}$$

where 1440 = number of minutes in one day.

This procedure was carried out in the original paper in order to get the storage coefficient in Table 2 but was not adequately explained in the text.

It is possible to remove the source of this confusion by keeping absolutely consistent units of time and expressing the discharge rates in m^3/minute . This would, however, require changing the unit of m^3/day to this less common m^3/minute , and would result in the values of transmissivity being expressed in m^2/minute , a rather unusual unit. I would suggest that it is more convenient to maintain the units used in the original paper and merely make the units consistent for the evaluation of S . Three other errors in the paper have come to my notice: the last line of paragraph two, p. 132 should read, 'intercept will be a because $b \log t$ will be zero' instead of 'slope will be . . .', and the equations on Fig. 4 should read:

$$b = \Delta s_w / Q \quad \text{and} \quad T = \frac{2.3Q}{4\pi \Delta s_w}$$