Appendix 3

HYDROGEOLOGY EQUATIONS CHEATSHEET

$$n \equiv \frac{V_v}{V_b}$$

$$S_y \equiv \frac{V_w(\text{drained})}{V_b}$$

$$S_r \equiv \frac{V_w(\text{retained})}{V_b}$$

$$n = S_y + S_r$$

$$n = 1 - \frac{\rho_b}{\rho_s}$$

$$S = \frac{V_w}{A\Delta h}$$

$$k = Cd^2$$

$$K = \frac{k\rho g}{\mu} = \frac{k\gamma}{\mu}$$

$$\frac{K_T}{K_{15.5°C}} = \frac{\mu_{15.5°C}}{\mu_T}$$

$$T = Kb$$

$$h = h_p + z$$

$$p = h_p\gamma$$

$$\varphi = hg = h_p g + zg$$

$$Q = KA\frac{dh}{dl}$$

$$V \equiv \frac{Q}{A} = K\frac{dh}{dl}$$

$$v = \frac{V}{n} = \frac{Q}{nA} = \frac{K}{n}\frac{dh}{dl}$$

$$N_R = \frac{\rho V d}{\mu}$$

$$h = h_0 - \frac{Q}{Tw}x$$

$$h^2 = h_0^2 - \frac{2Q}{Kw}x$$

$$\bar{K}_x = \frac{\sum^{n} K_i z_i}{Z}$$

$$\bar{T}_x = \sum^{n} T_i$$

$$\bar{K}_z = \frac{Z}{\sum^{n} \frac{z_i}{K_i}}$$

$$\bar{K} = \sqrt[n]{K_i K_{i+1} \ldots K_n}$$

$$\frac{K_1}{K_2} = \frac{\tan\theta_1}{\tan\theta_2}$$

$$\alpha = \frac{dV_t/V_t}{d\sigma_e}(=1/E)$$

$$\beta = \frac{dV_w/V_w}{dP}(=1/E)$$

$$S_s = \gamma(\alpha + n\beta)$$

$$S = S_s b$$

$$\frac{\delta^2 h}{\delta x^2} + \frac{\delta^2 h}{\delta y^2} = \frac{S}{T}\frac{\delta h}{\delta t}$$

$$\frac{\delta^2 h}{\delta r^2} + \frac{1}{r}\frac{\delta h}{\delta r} = \frac{S}{T}\frac{\delta h}{\delta t}$$

$$s = \frac{Q}{4\pi T}\int_u^\infty \frac{e^{-u}}{u}du$$

$$u = \frac{r^2 S}{4Tt}$$

$$W(u) \equiv \int_u^\infty \frac{e^{-u}}{u}du$$

$$s = \frac{Q}{4\pi T}W(u)$$

$$T = \frac{Q}{4\pi s}W(u)$$

$$S = \frac{4\,Tut}{r^2}$$

$$s = \frac{2.3Q}{4\pi T}\log\frac{2.25Tt}{r^2 S}$$

$$T = \frac{2.3Q}{4\pi\Delta s} \qquad S = 2.25T\left(\frac{t}{r^2}\right)_0$$

$$T = \frac{2.3Q}{4\pi\Delta s} \qquad S = \frac{2.25Tt_0}{r^2}$$

$$T = \frac{-2.3Q}{2\pi\Delta s} \qquad S = \frac{2.25Tt}{r_0^2}$$

$$s = \frac{Q}{4\pi T}W(u_A, u_B, \beta)$$

$$T = \frac{Q}{4\pi s}W(u_B, \beta)$$

$$S_y = \frac{4Tt}{r^2}u_B$$

$$K_v = \frac{K_h b^2 \beta}{r^2}$$

$$Q = \frac{2\pi T(h_2 - h_1)}{2.3\log\frac{r_2}{r_1}}$$

$$Q = \frac{\pi K(h_2^2 - h_1^2)}{2.3\log\frac{r_2}{r_1}}$$