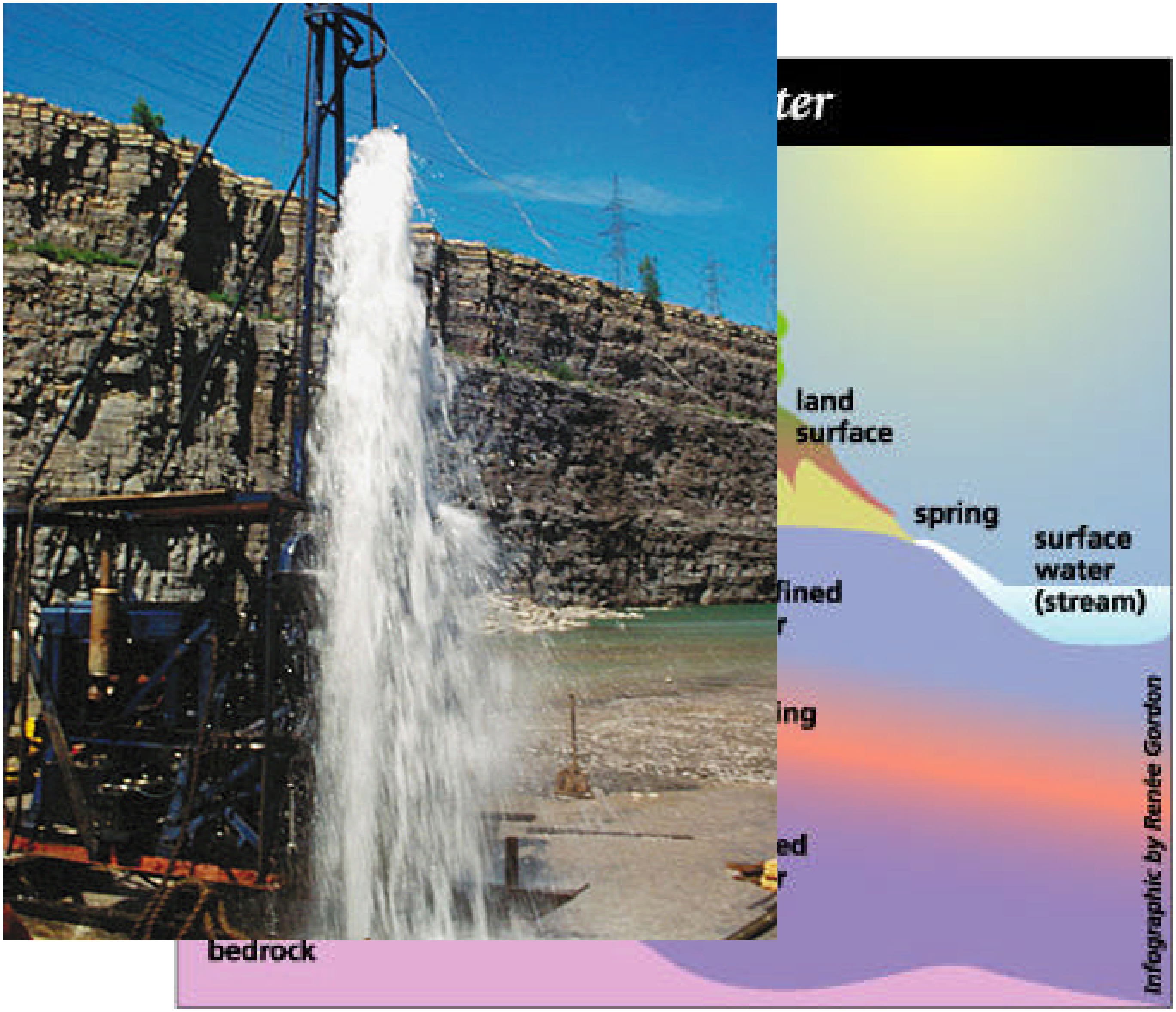
CONTENIDO

- INTRODUCCION
- POZOS AISLADOS EN ACUÍFERO INFINITO (CAUDAL CONSTANTE)
- PÉRDIDAS DE CARGA EN UN POZO AISLADO EN ACUÍFERO INFINITO (CAUDAL VARIABLE)
- SITUACIONES ESPECIALES
  - PRUEBA DE RECUPERACION
  - EFECTO BARRERA
  - POZO ARTESIANO


land
surface
spring
surface
water
(stream)
bedrock
Infographic by Renée Gordon


ARTESIAN WELL-TIRUTHURAIPUNDI, NAGAPATTINAM DISTRICT

Consider the radial form of the diffusion equation

$$\frac{1}{r}\frac{\partial}{\partial r}\left(rT\frac{\partial s}{\partial r}\right) = S\frac{\partial s}{\partial t}, r_o \leqslant r \leqslant \infty, 0 \leqslant t \leqslant \infty \tag{1}$$

with the initial and boundary conditions

$$s(r,0) = 0, s(r_o,t) = s_o, s(\infty,t) = 0 \tag{2}$$

where the symbols stand for aquifer transmissivity (T), storage coefficient (S), time (t), radial coordinate (r), well radius (r_o), drawdown (s) and drawdown at the well (s_o).

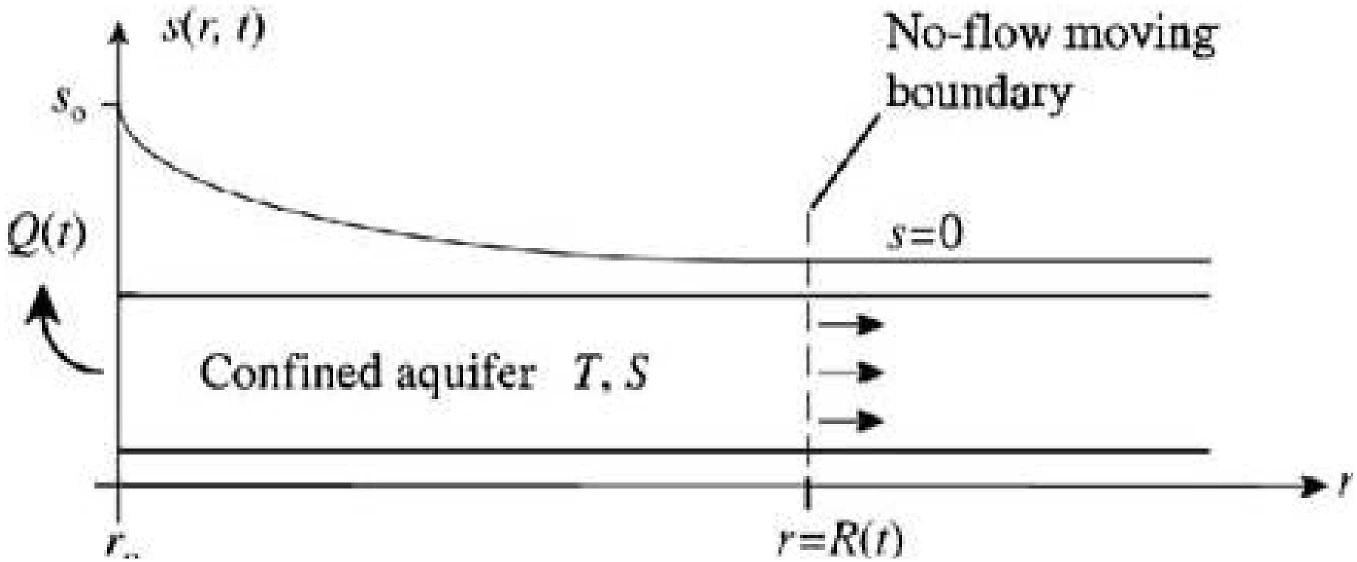
The above problem was analysed by Smith who resorted to Green's functions and integral transforms but could only find a solution for $\partial s/\partial r$ at the origin. Using this result, Jacob and Lohman deduced the flow rate at the origin (i.e. into the well) as

$$Q(t) = -2\pi r_o T\frac{\partial s}{\partial r}(r_o,t) = 2\pi T s_o G(\alpha) \tag{3}$$

with

$$G(\alpha) = \frac{4\alpha}{\pi}\int_0^\infty u\, e^{--\alpha u^2}\left\{\frac{\pi}{2} + \tan^{--1}\left(\frac{Y_o(u)}{J_o(u)}\right)\right\}du, \alpha = \frac{T\,t}{Sr_o^2} \tag{4}$$

where α is dimensionless time, J_o and Y_o are first and second kind zero-order Bessel functions respectively, and u is a dummy variable.



$$Q(t) = -2\pi r_o T \frac{\partial s}{\partial r}(r_o, t) = 2\pi T s_o G(\alpha) \qquad (3)$$

with

$$G(\alpha) = \frac{4\alpha}{\pi}\int_0^\infty u\, e^{--\alpha u^2}\left\{\frac{\pi}{2} + \tan^{--1}\left(\frac{Y_o(u)}{J_o(u)}\right)\right\} du, \alpha = \frac{T\,t}{S r_o^2}$$

$$\boxed{Q \cong \frac{2\pi T s_o}{\ln\left(1 + \sqrt{\frac{\pi T t}{S r_o^2}}\right)}}$$