S.S. PAPADOPULOS & ASSOCIATES, INC.
ENVIRONMENTAL AND WATER RESOURCE CONSULTANTS

The Interpretation of Pumping Tests: Introduction

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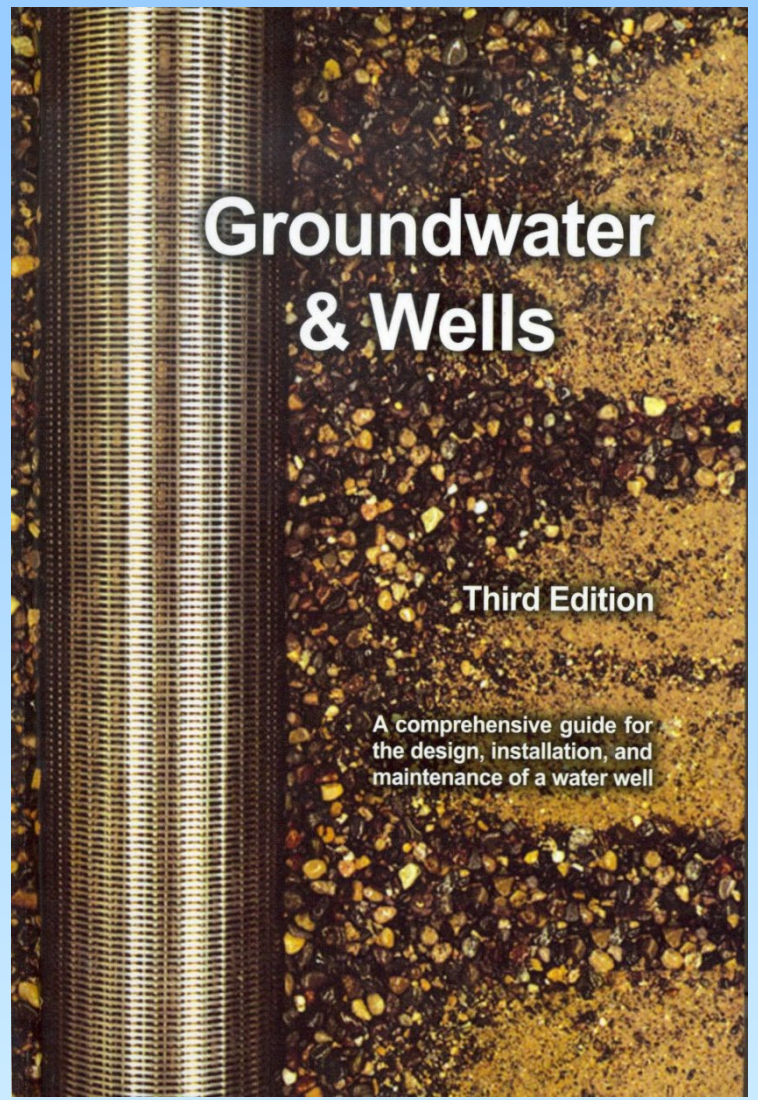
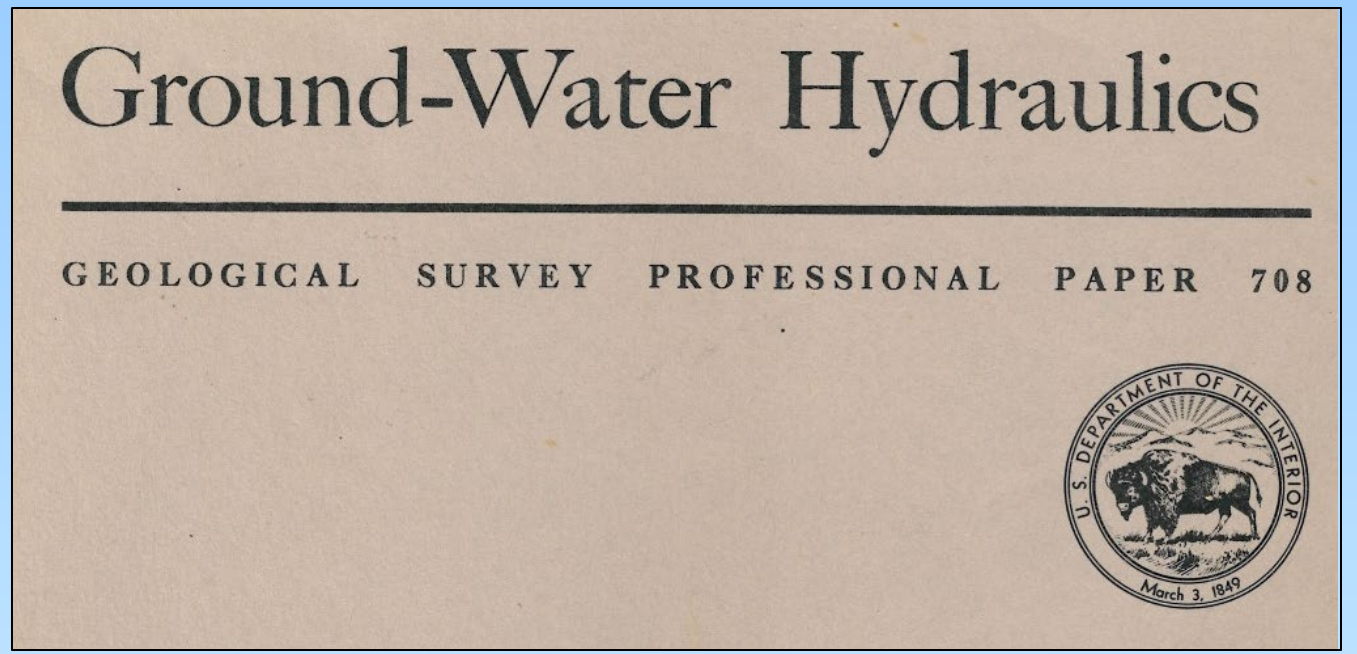
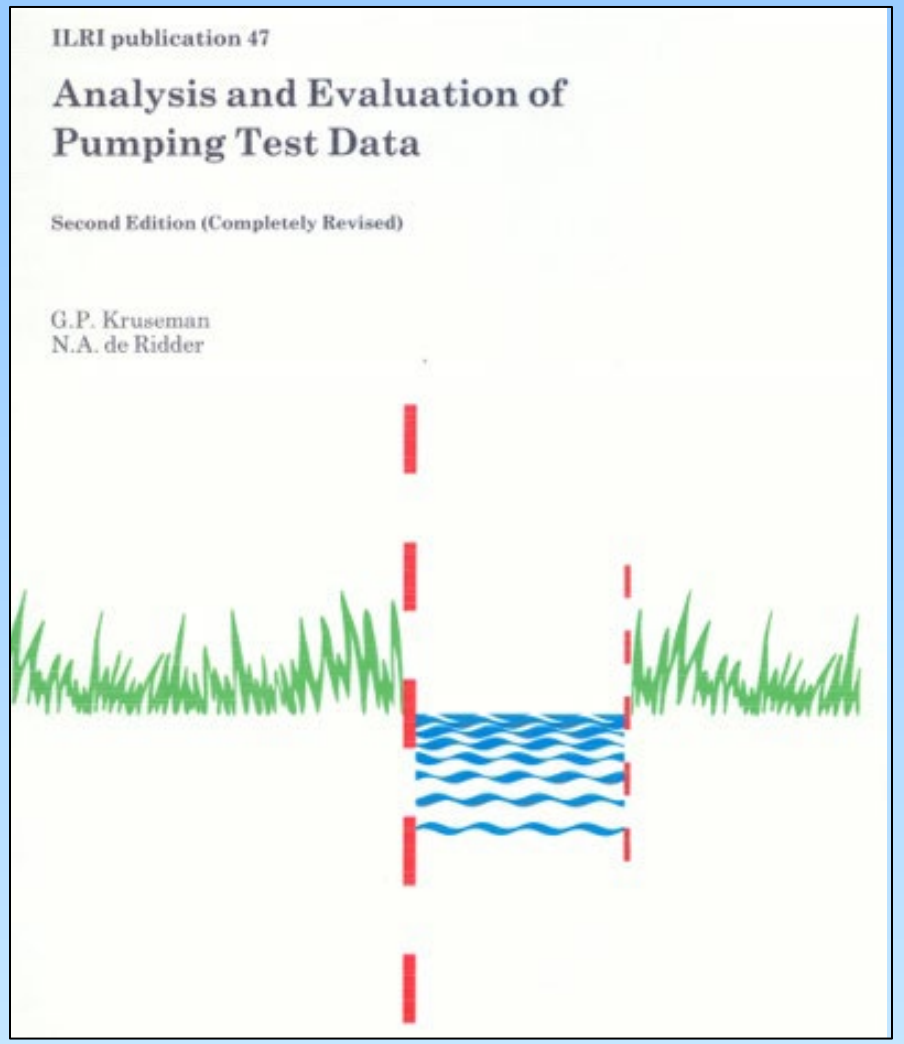
Outline

0. Introduction: Key concepts in groundwater hydraulics
1. Setting the stage
2. Foundations of pumping test interpretation, Part 1
3. Foundations of pumping test interpretation, Part 2
4. Interpretation of pumping tests in aquifers with linear boundaries
5. The significance and interpretation of recovery data
6. The interpretation of pumping well drawdowns and the estimation of the long-term capacity of a production well
7. Success factors in pumping test practice

Key concepts in groundwater hydraulics
Reference materials







WATER WELL TESTING IN THE ATHABASCA OIL SANDS, COMPLEMENTARY GUIDANCE

Submitted To:

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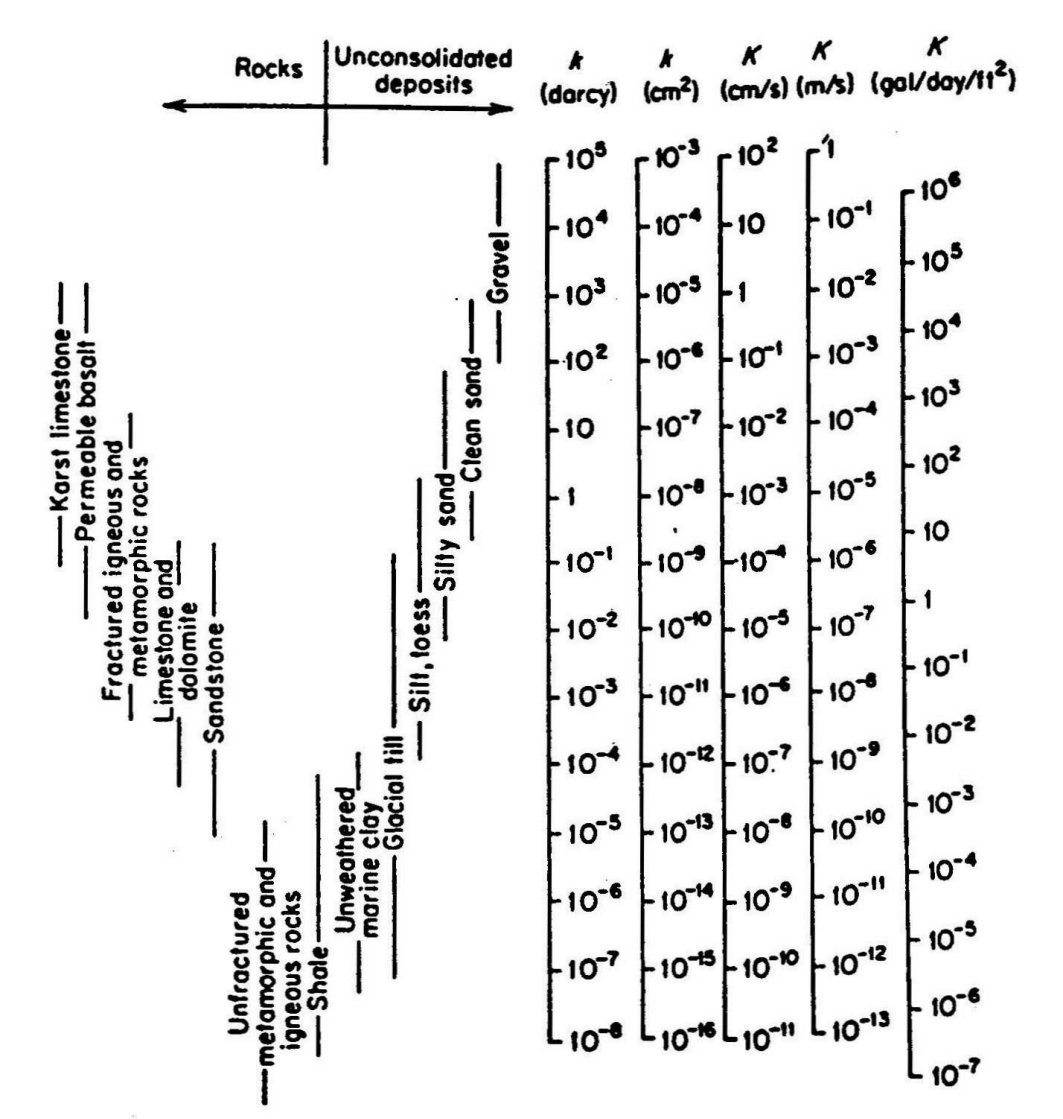
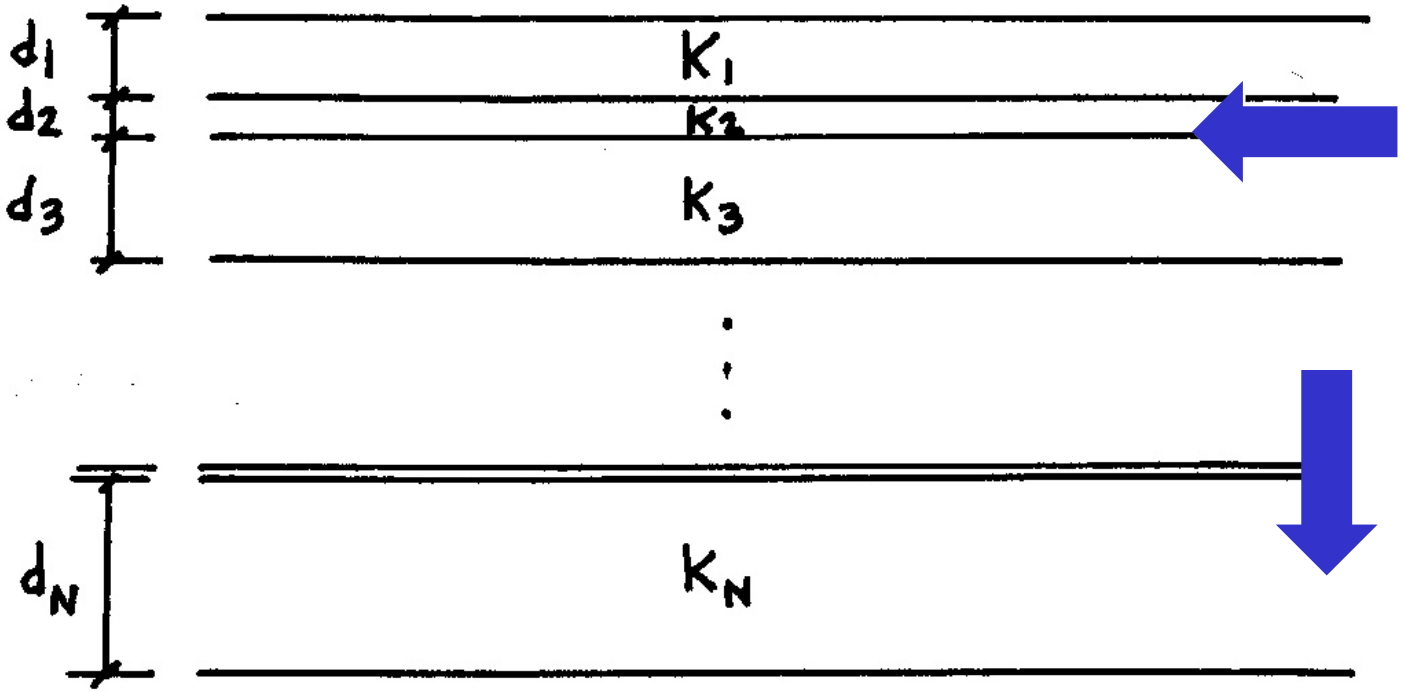
Hydraulic conductivity



Effective hydraulic conductivities of stratified formations

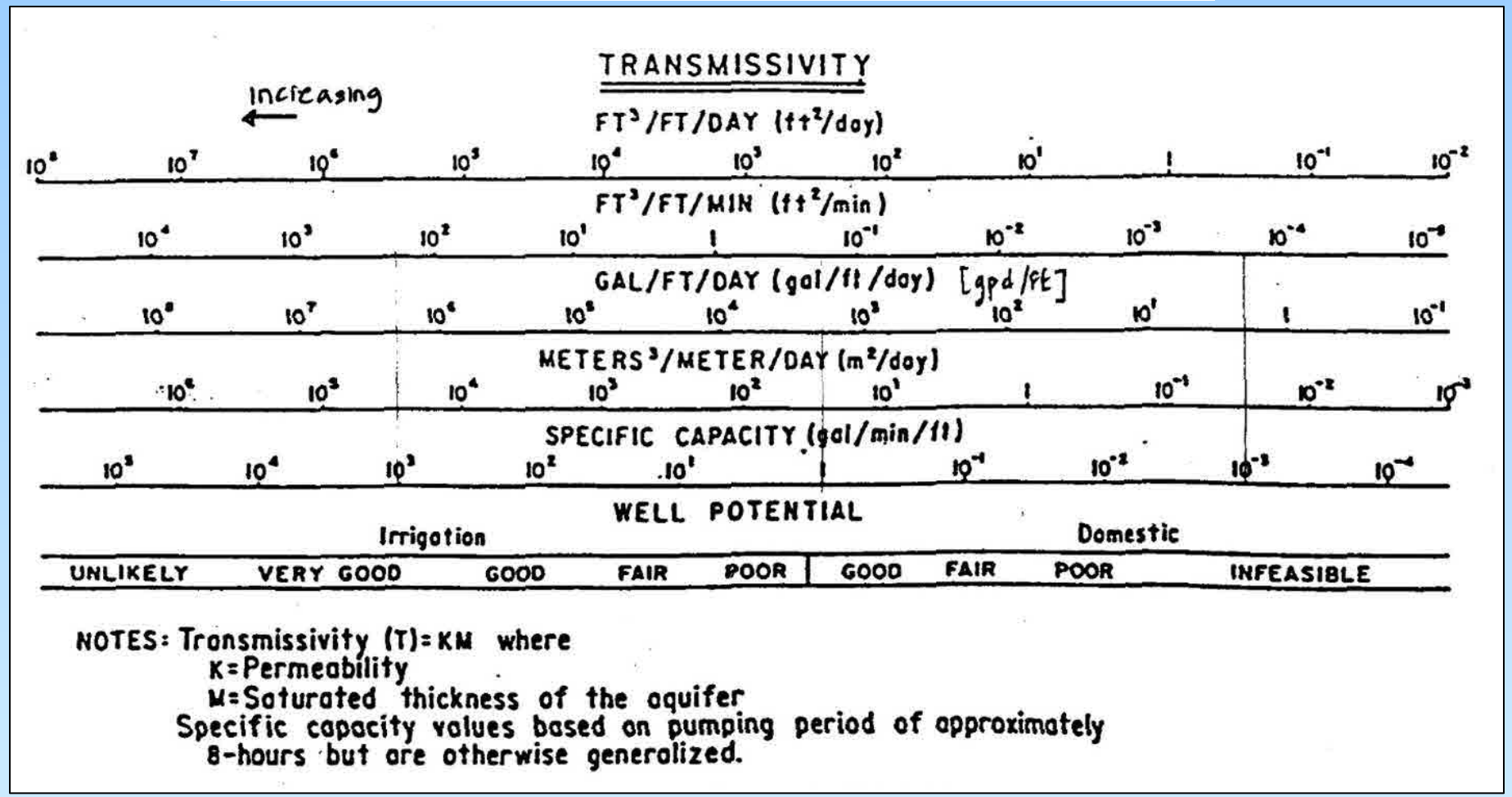


$$\bar{K}_{\mathrm{H}} = \frac{\sum_{i=1}^{N} K_i d_i}{\sum_{i=1}^{N} d_i}$$

$$\bar{K}_{\mathrm{V}} = \frac{\sum_{i=1}^{N} d_i}{\sum_{i=1}^{N} \frac{d_i}{K_i}}$$

Transmissivity, *T*

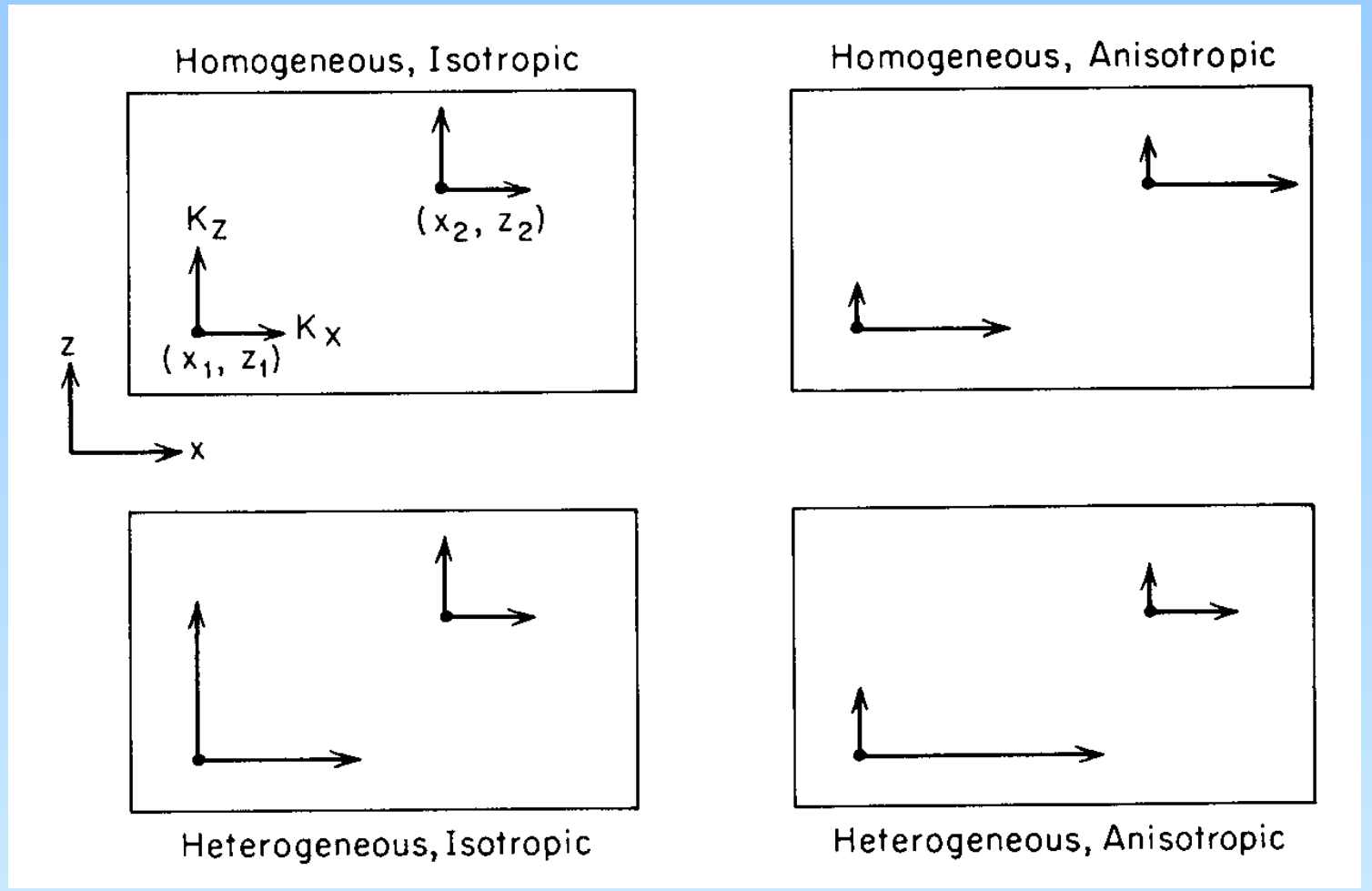
$$T = K_{\mathrm{H}} \times B = \sum_{i=1}^{N} K_i d_i$$



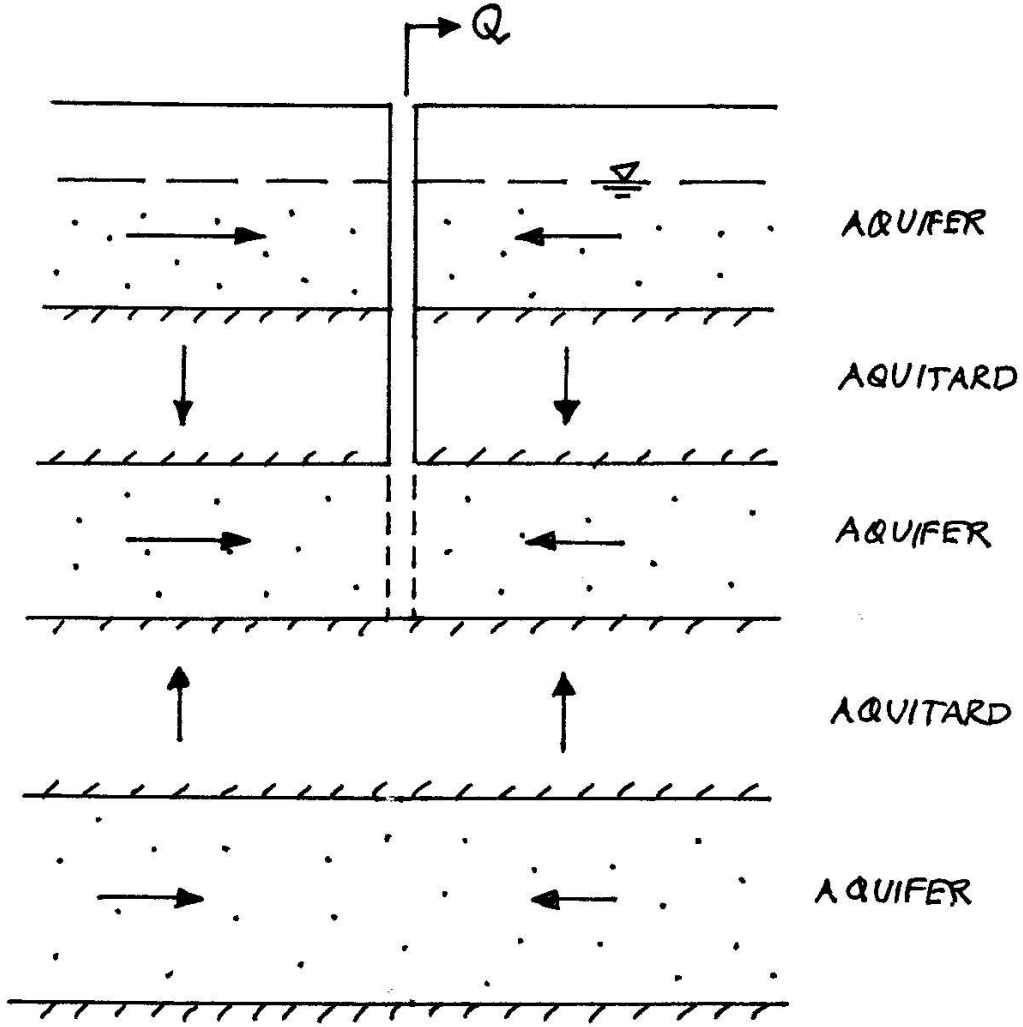
NOTES: Transmissivity (T) = KM where
K = Permeability
M = Saturated thickness of the aquifer
Specific capacity values based on pumping period of approximately 8-hours but are otherwise generalized.

Homogeneity - Heterogeneity

Isotropy - Anisotropy

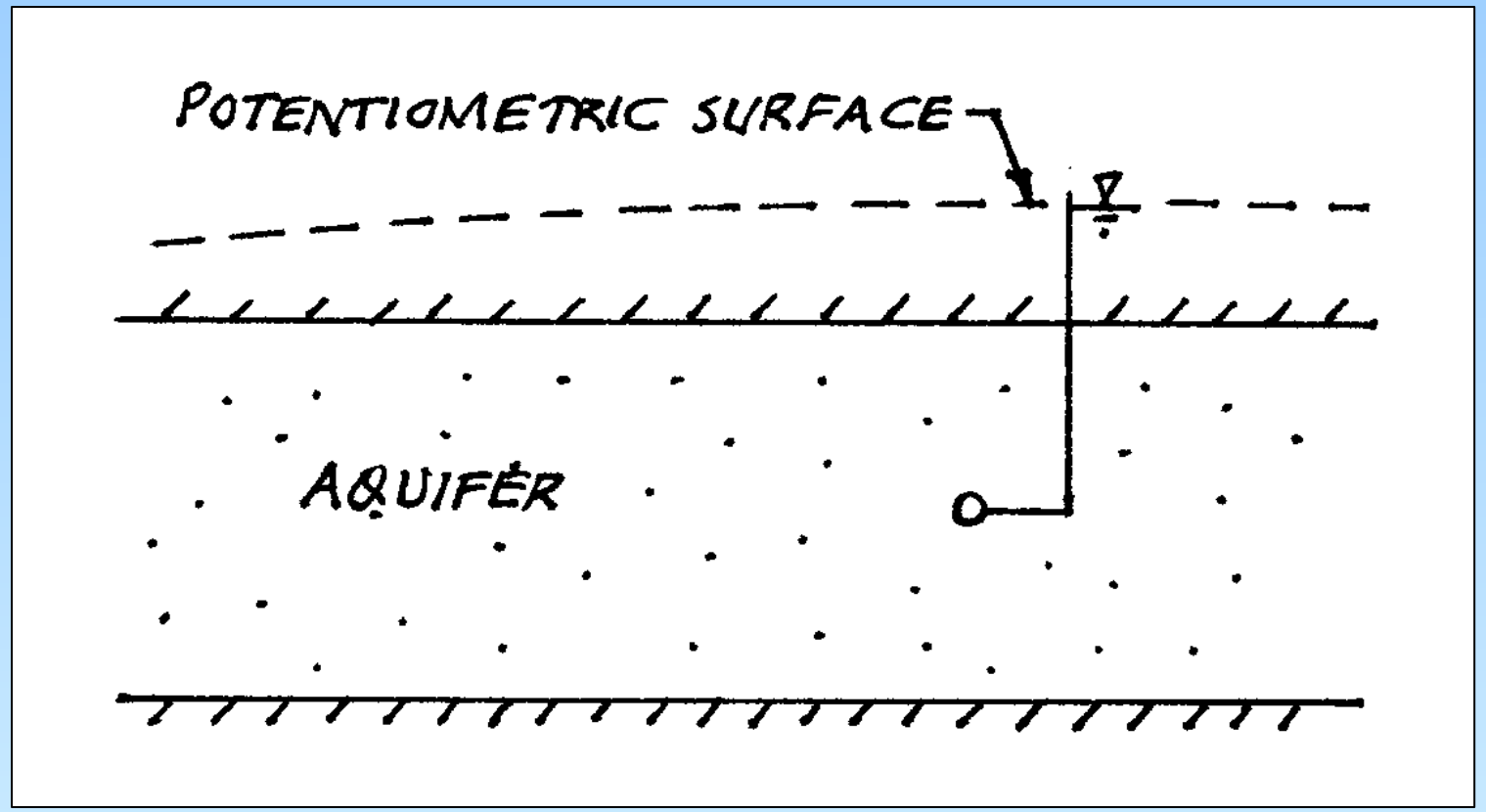


Aquifers and aquitards



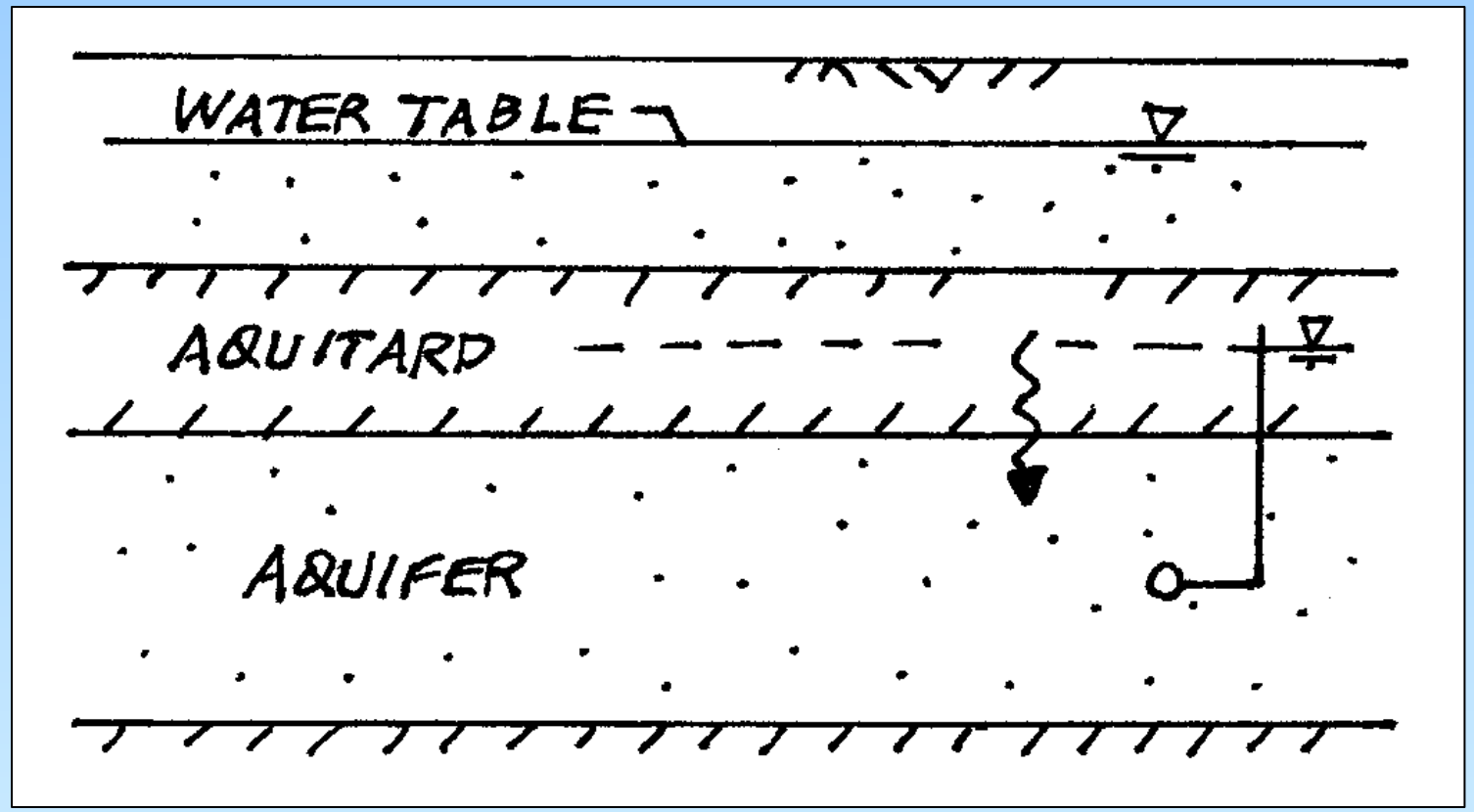
Aquifer types

Confined aquifer



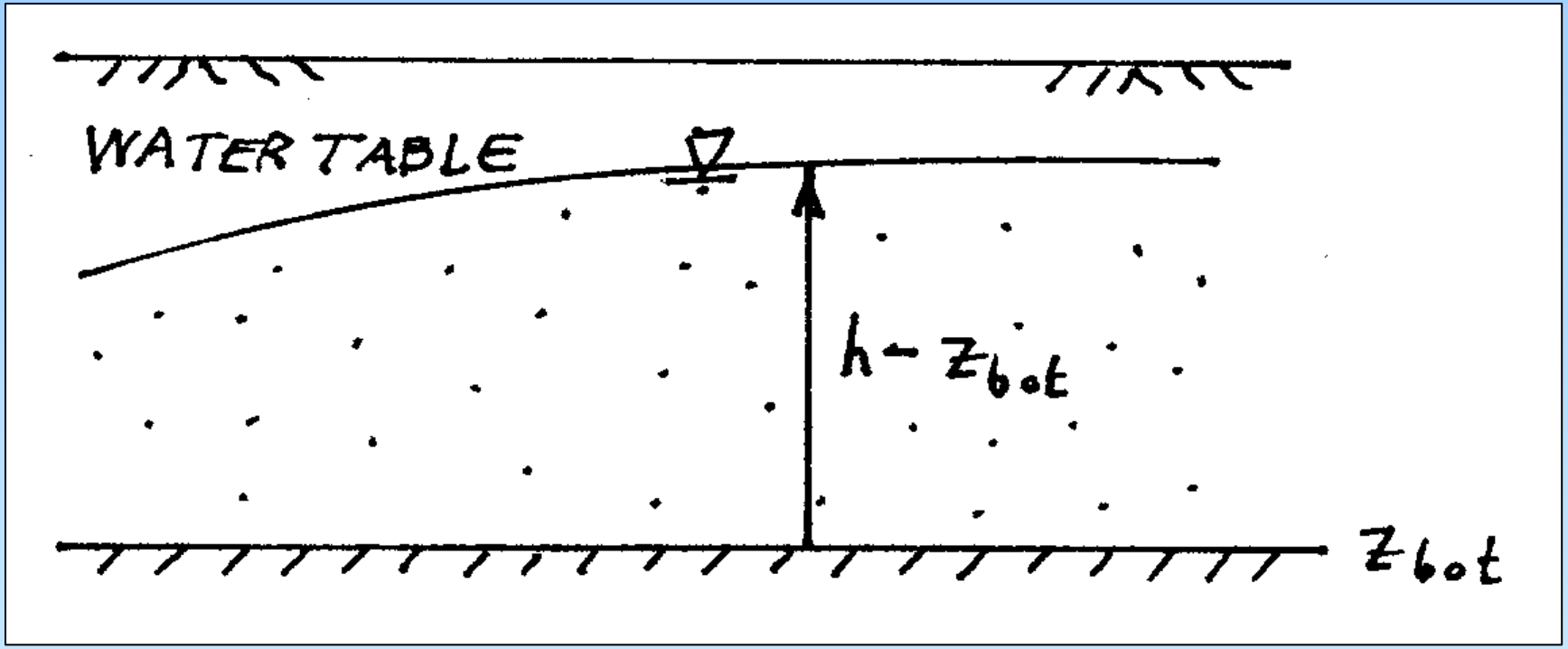
Aquifer types (2)

Leaky aquifer

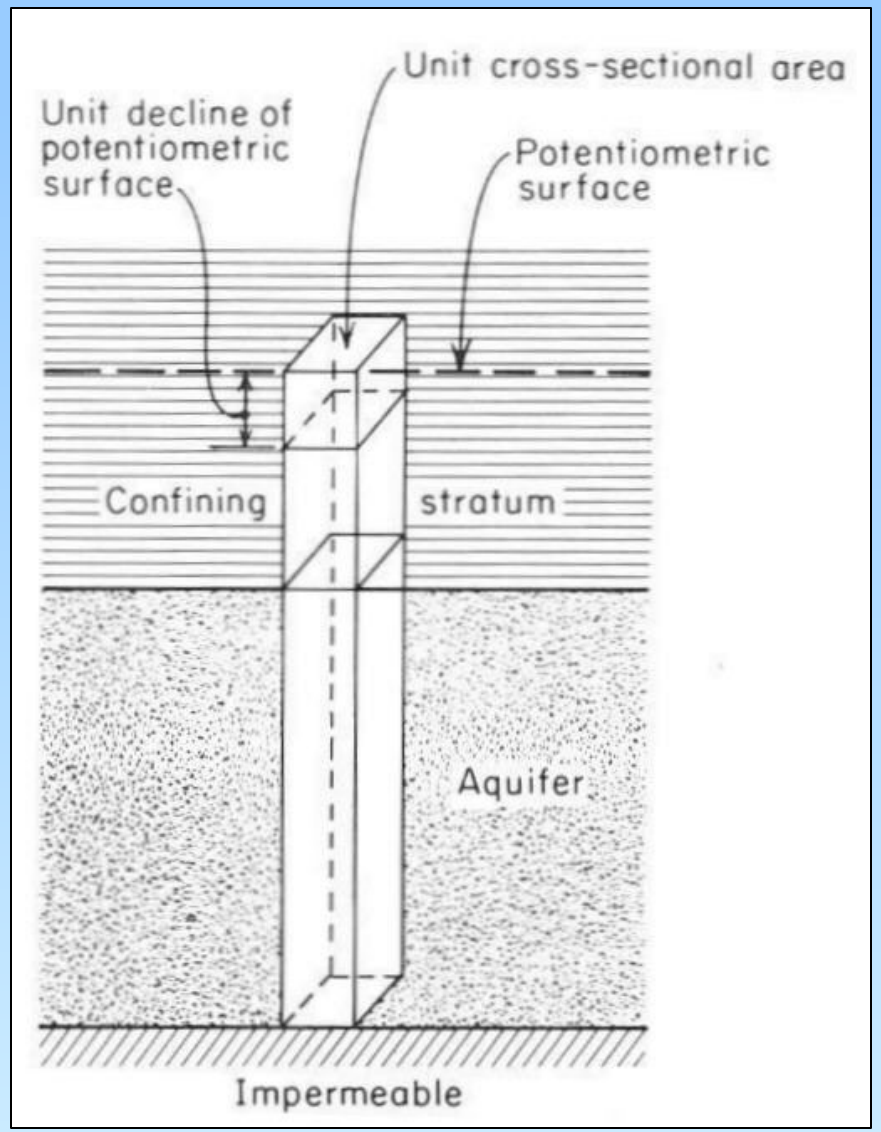


Aquifer types (3)

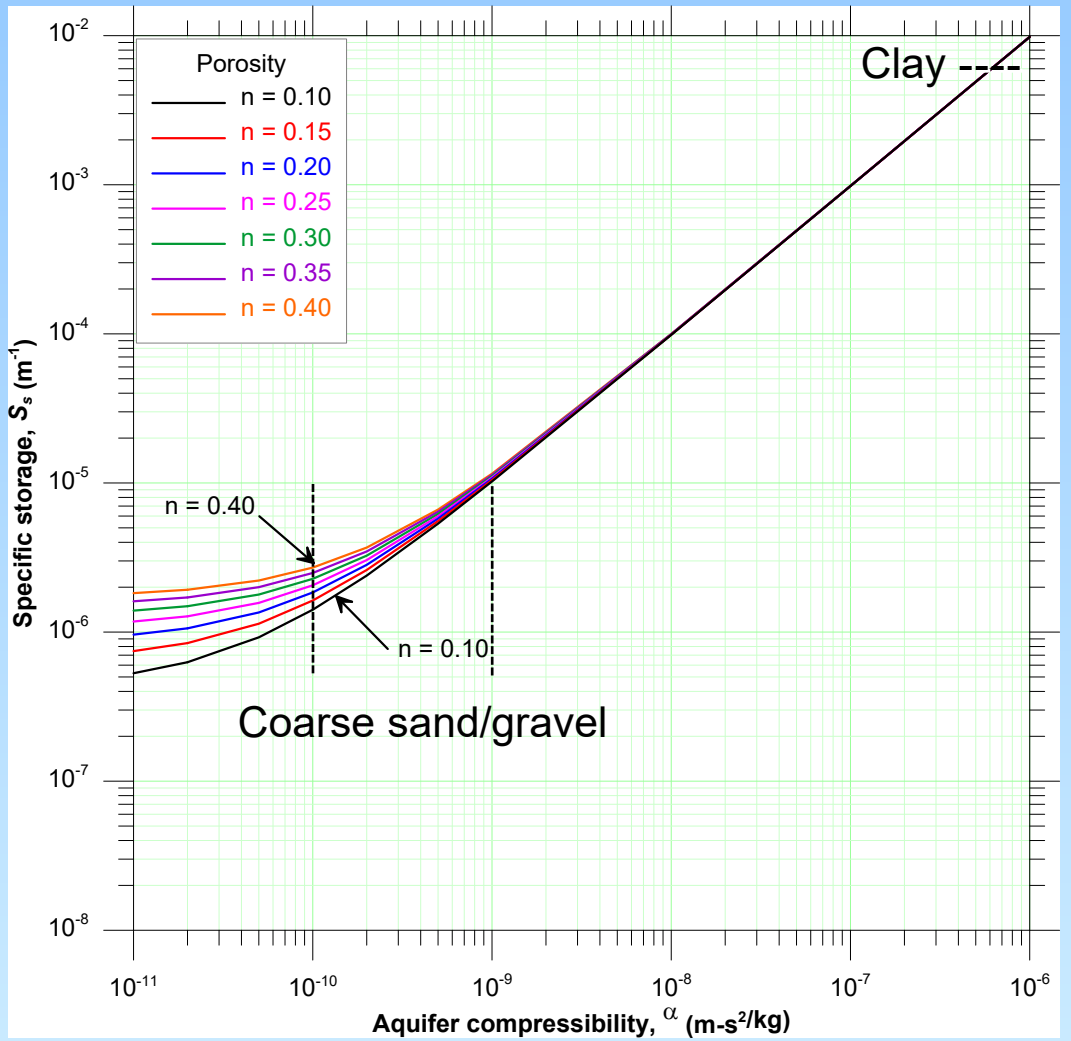
Unconfined aquifer



Confined storage coefficient, *S* (Storativity)

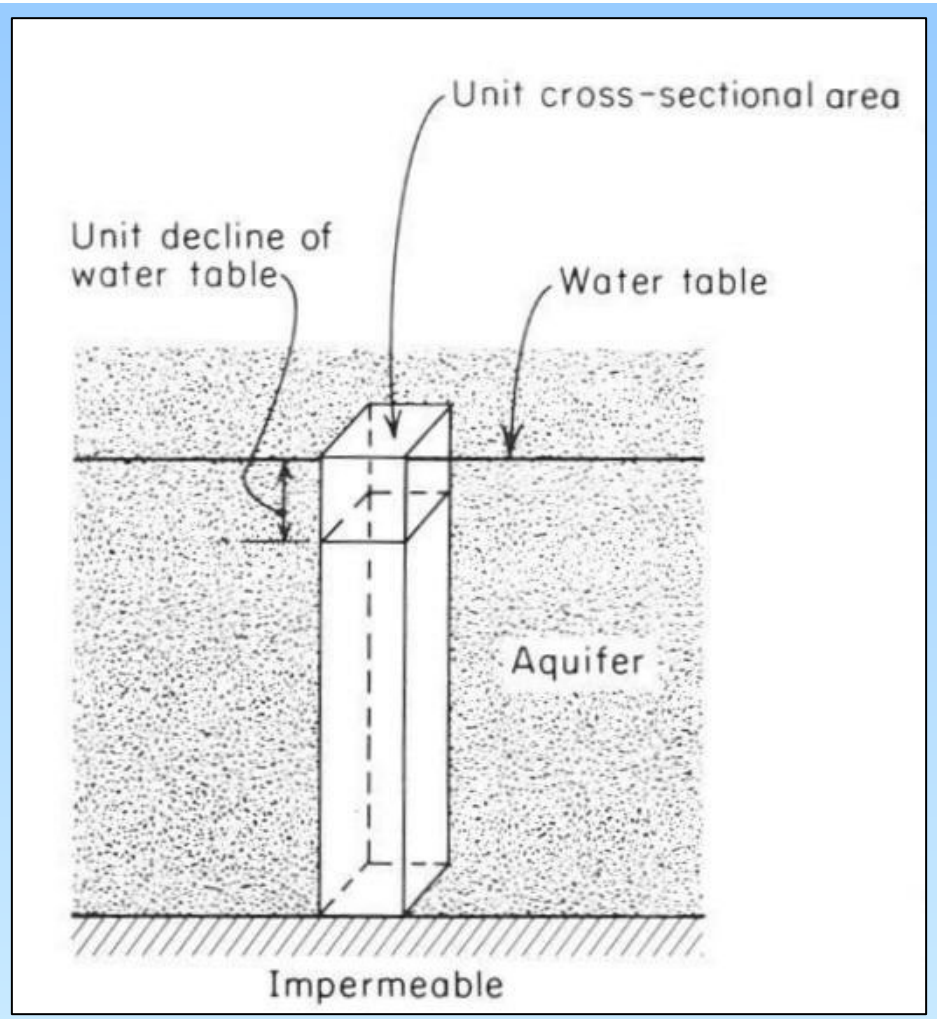


$$S = \rho_w g(\alpha + n\beta)B$$

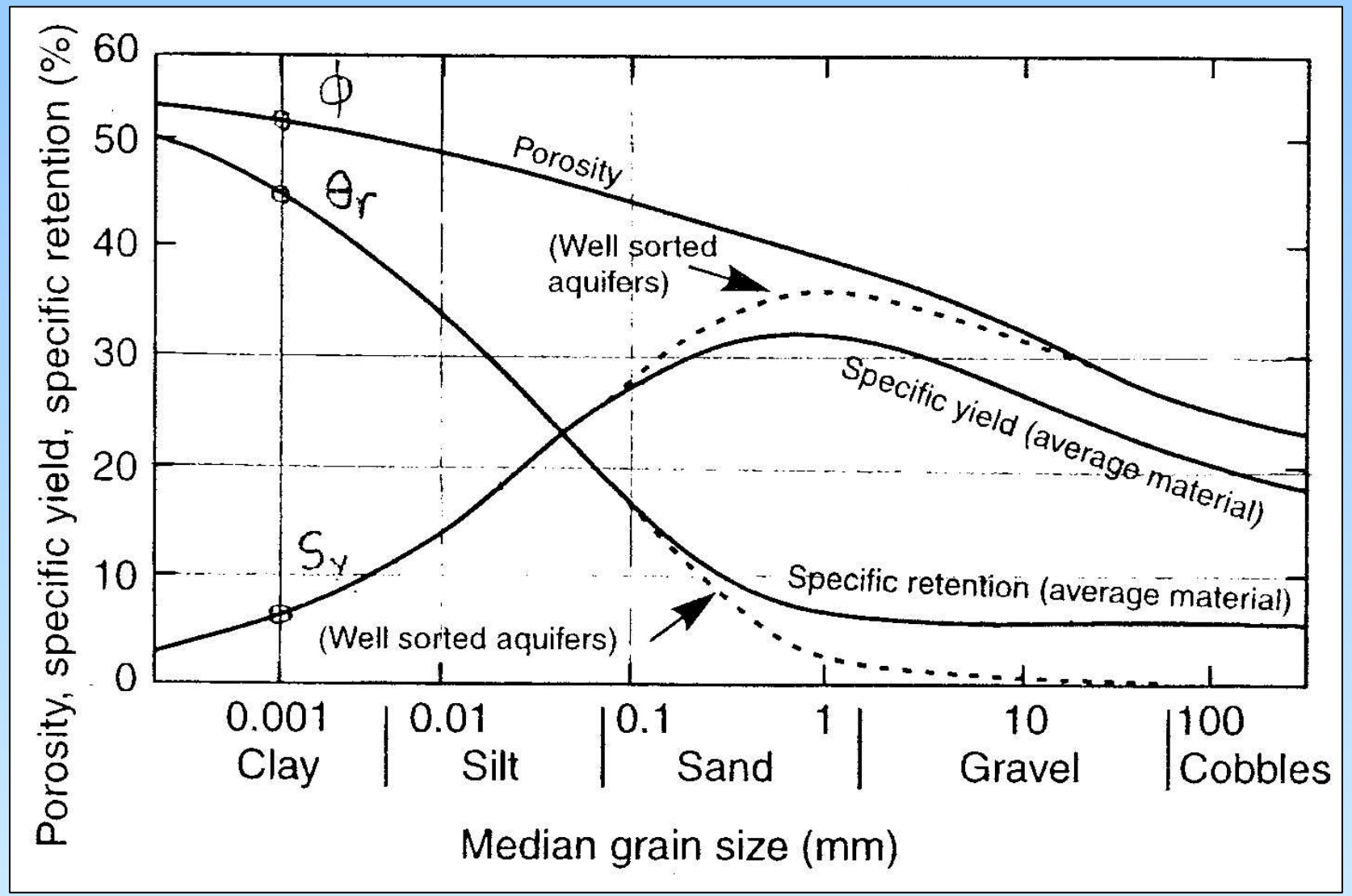


Lohman (1972)
$S_s \sim 3\times10^{-6}$ /m

Unconfined storage coefficient, S_Y (Specific yield; Drainable porosity)



$$S_Y = \phi - \theta_r$$



What else has been provided?

1. **Guidance materials for pumping test interpreters**
    1. Checklist for the execution of pumping tests
    2. Checklist for the interpretation of pumping tests
    3. Plots of diagnostic responses to pumping
    4. Literature values of hydraulic conductivity
    5. Literature values of transmissivity
    6. Literature values of specific storage and storativity
    7. Literature values of specific yield
2. **Reference lists**
3. **Additional readings**