Review of Source-Terms for a Repository in Tuff

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INTRODUCTION

- **Need for Cooperation and Consensus on Repository PA**
- **PA = Far-field PA + Near-field PA**
- **Summary of Selected PA Reports/ Documents**

REPORT	ORGANIZATION	ROLE OF NEAR FIELD
Project '90	SKI	HIGH
SKB-91	SKB	HIGH
TVO-92	TVO	HIGH
PACE-90	USDOE	MEDIUM
WISP	USNAS	HIGH
PHASE 1	USNRC	LOW
PAR	PNC	HIGH
Kristallin	Nagra	HIGH
EIS (Draft)	AECL	HIGH

- **Evident Importance of Near-field within PA, as Well as Feedback to Site Charcaterization and Waste Package Design.**

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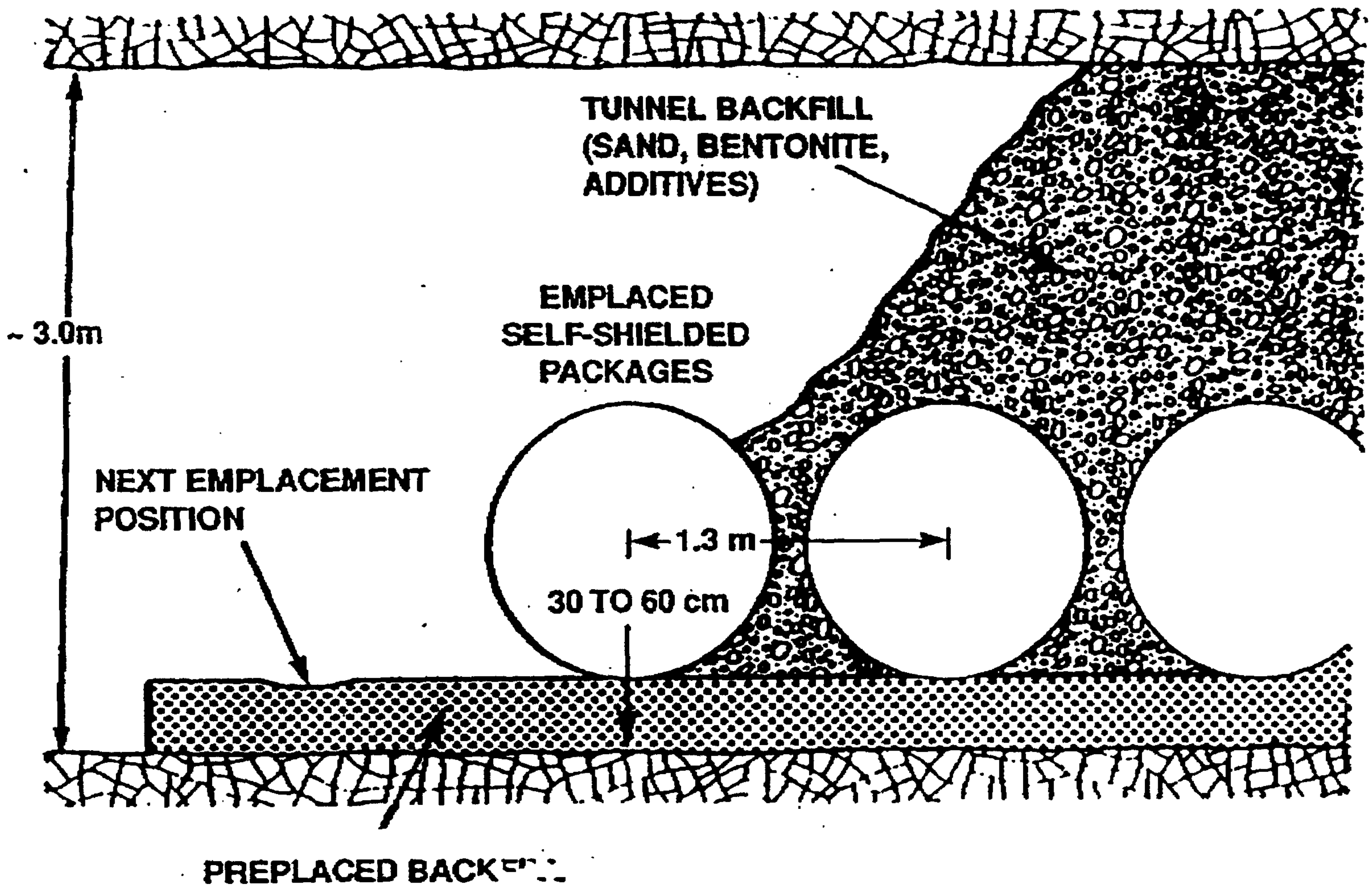
POSSIBLE EMPLACEMENT CONFIGURATION FOR SELF-SHIELDED WASTE PACKAGE DESIGN CONCEPT



Steady-State Mass Transfer Rate for Diffusive-Advective Transport (Chambre' 1991)

$$M_b = \frac{4 \pi \varepsilon \Psi D_b r_o c_s [Sh\, r_1 \sqrt{\kappa}]}{[(Sh - 1) \sinh d + r_1 \sqrt{\kappa} \cosh d]}$$

$$\kappa = \frac{\lambda K_b}{D_b}$$

$$d = (r_1 - r_o) \sqrt{k} = b \sqrt{k}$$

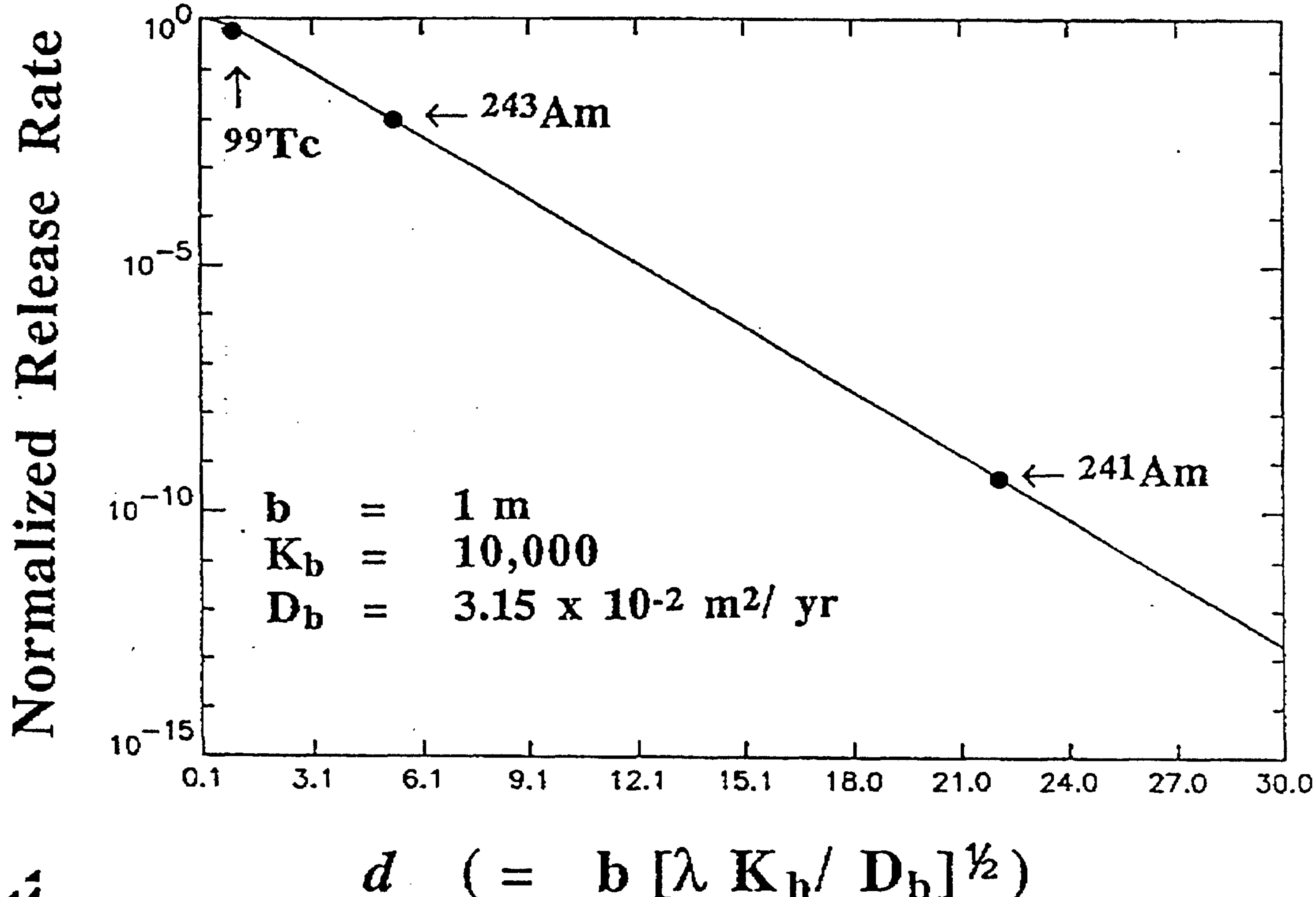
$$Sh = \frac{1 + 0.5\, Pe}{1 + 0.63 \sqrt{Pe}}$$

$$Pe = \frac{r_1 U}{Db}$$

where:

ε = porosity of backfill,
D_b = species diffusion coefficient,
r_o = waste-form radius,
r_1 = radius of backfill/rock interface,
λ = decay constant for the species,
c_s = constant concentration of the species at the waste-form surface,
Kb = retardation coefficient in the backfill,
b = backfill thickness,
Sh = Sherwood number,
Pe = Peclet number,
U = groundwater pore velocity,
Ψ = degree of saturation.

Normalized Release Rates as a Function of Decay, Sorption, and Backfill Thickness



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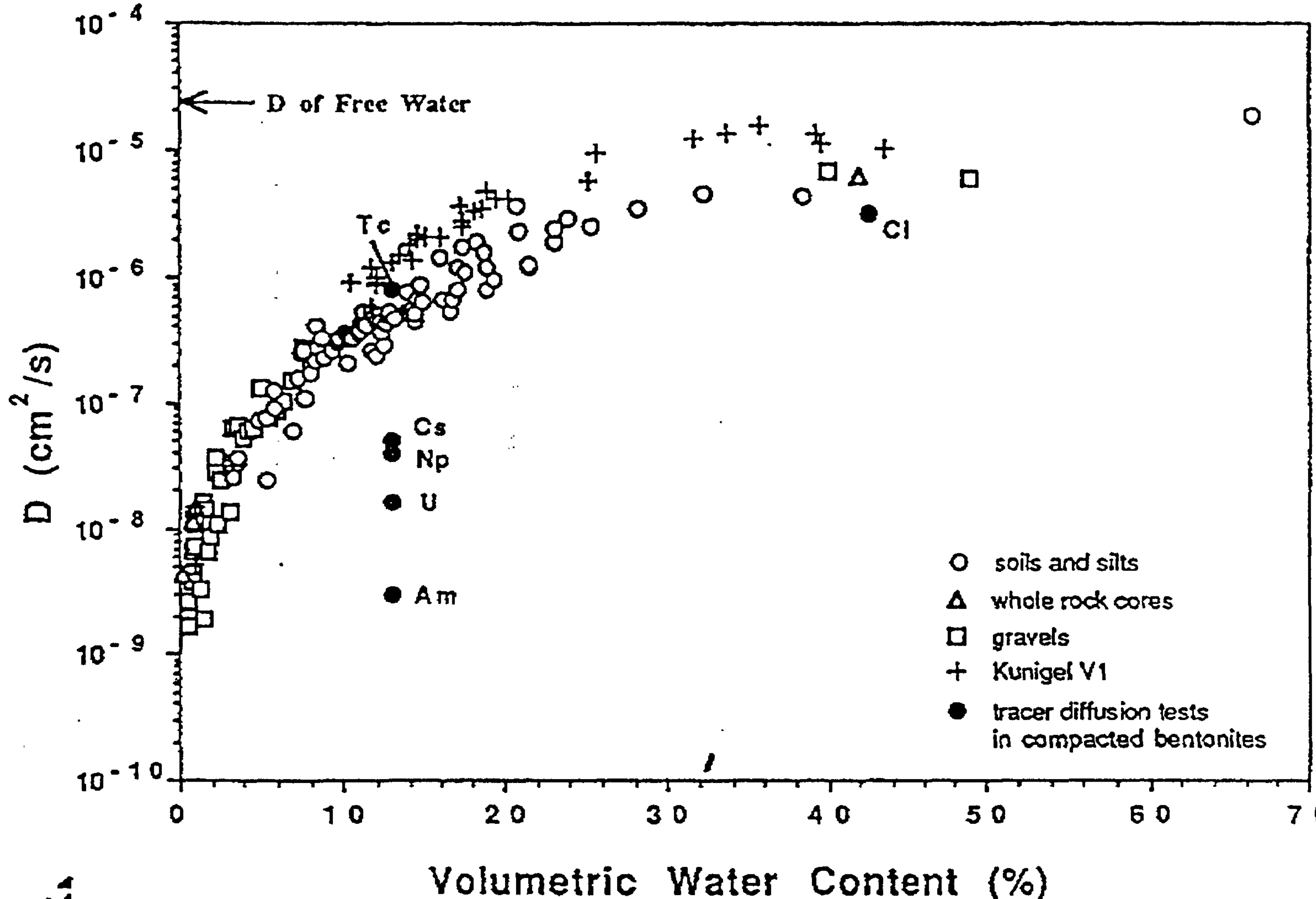
Diffusion Coefficients as a Function of Volumetric Water Content (Conca 1990)



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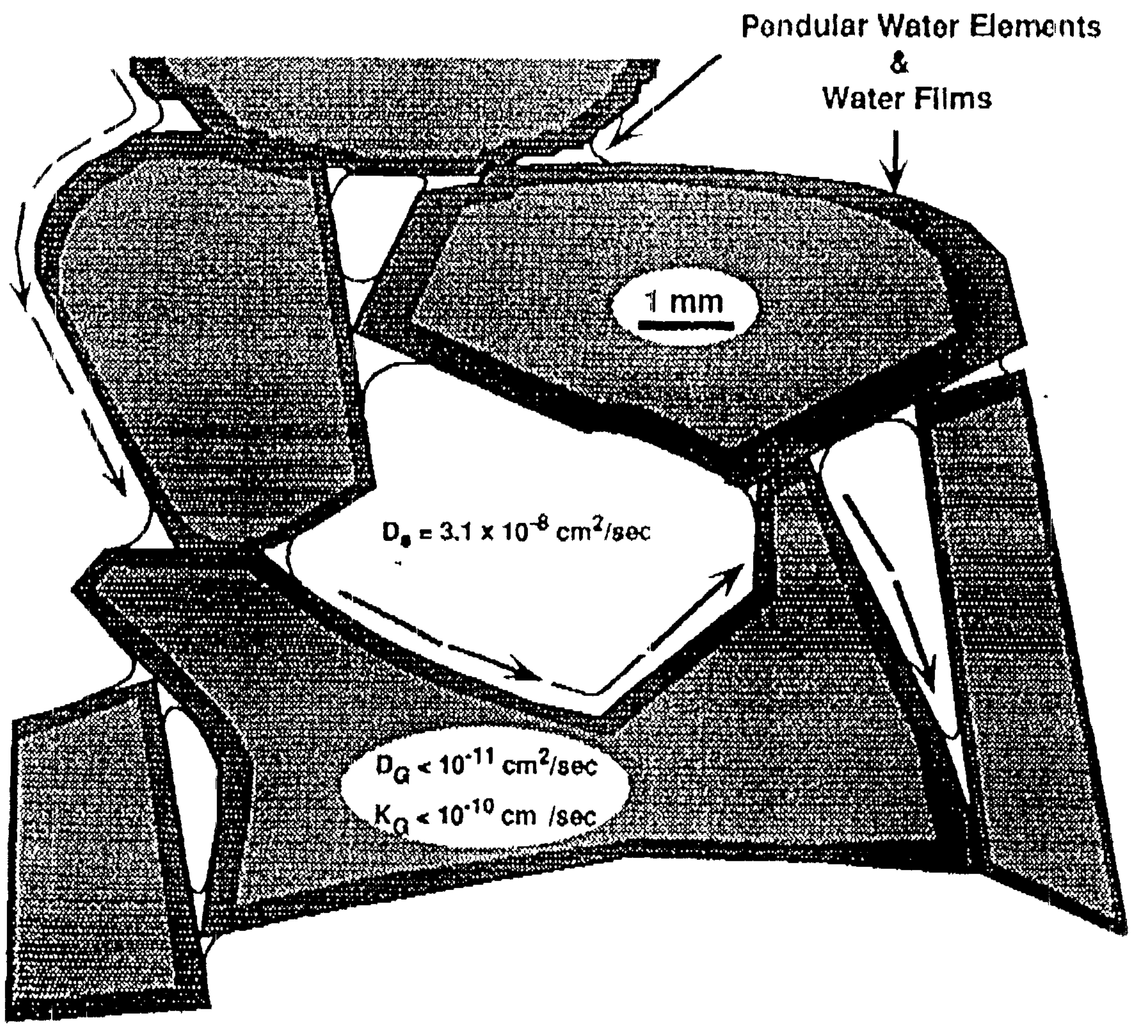
Inferred Water Distribution in Partially Saturated Tuff Gravel (Conca 1990)



Net ↓ Water ↓ Infiltration ↓