

**U.S. DEPARTMENT OF ENERGY
OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT**

**NUCLEAR WASTE TECHNICAL REVIEW BOARD
FULL BOARD MEETING**

**SUBJECT: UNSATURATED-ZONE
HYDROLOGIC DATA SET
AND ELICITATION OF EXPERT
OPINION**

PRESENTER: PAUL G. KAPLAN

**PRESENTER'S TITLE
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**DALLAS, TX
APRIL 7-8, 1992**

Hydrologic Data Set

Probability distribution required for each parameter in each hydrostratigraphic unit

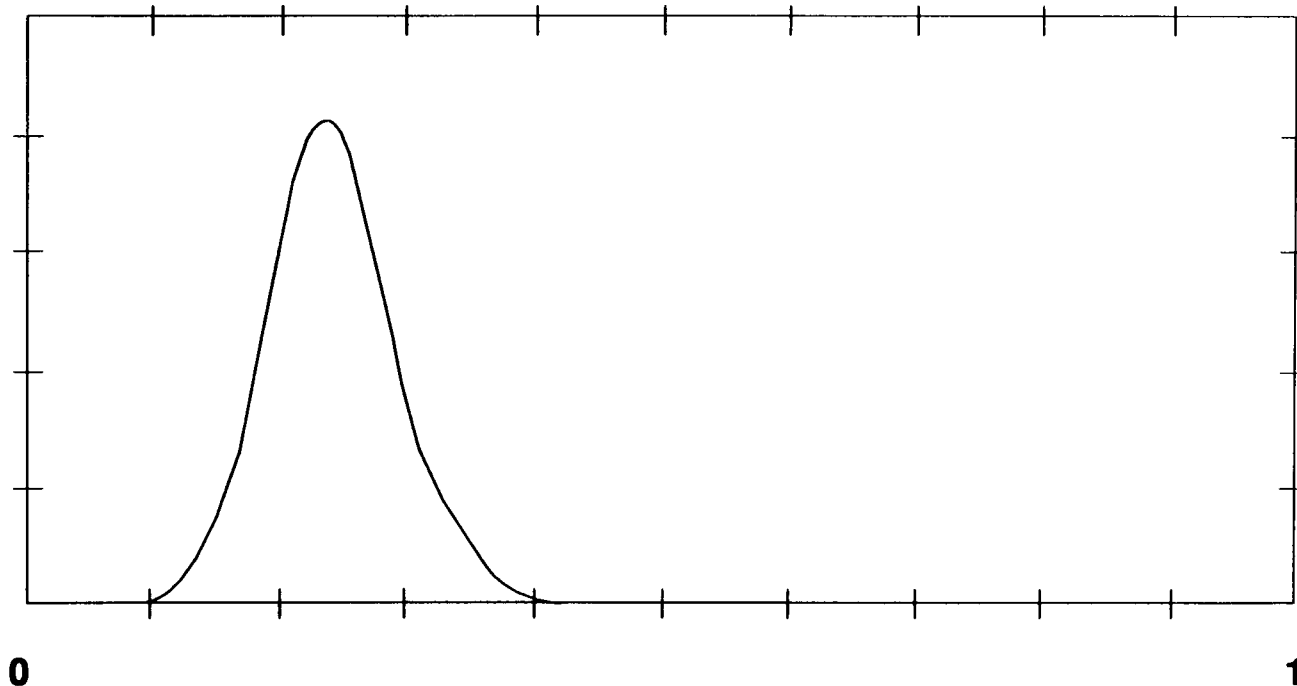
- **Matrix Saturated Hydraulic Conductivity**
- **Matrix Porosity**
- **Matrix Saturated Volumetric Water Content**
- **Matrix Air-Entry Parameter**
- **Matrix Desaturation Parameter**
- **Matrix Residual Saturation**
- **Fracture Saturated Hydraulic Conductivity**
- **Fracture Saturated Volumetric Water Content**
- **Fracture Air-Entry Parameter**
- **Fracture Desaturation Parameter**
- **Fracture Residual Volumetric Water Content**
- **Fracture Density**

Followed Formalism in Kaplan, 1991

- **Parameters defined as random variables**
- **The probability density function is a model of the analyst's uncertainty**
- **Uncertainty has a quantitative basis**
- **Information reduces uncertainty**
- **Information is defined as the elements of a set of quantitative constraints**
- **Constraints are defined as the minimum value, the maximum value, the expected value, and the coefficient of variation of the random variable**

An Example

Porosity in the lower hydrostratigraphic unit



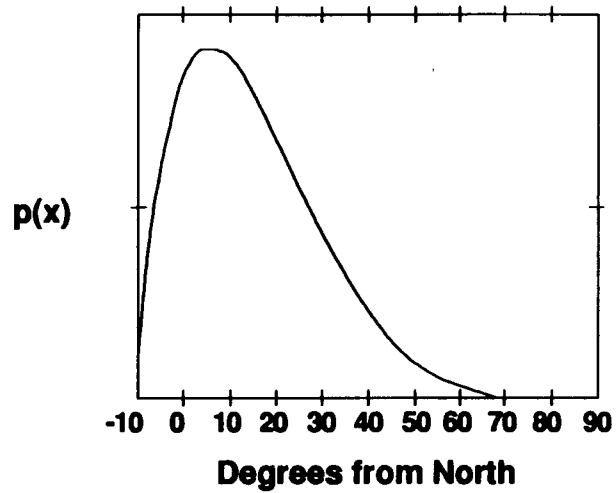
sample	expected value	=	0.21
analog	coefficient of variation	=	0.20
definition	minimum value	=	0.0
definition	maximum value	=	1.0

Expert Elicitation

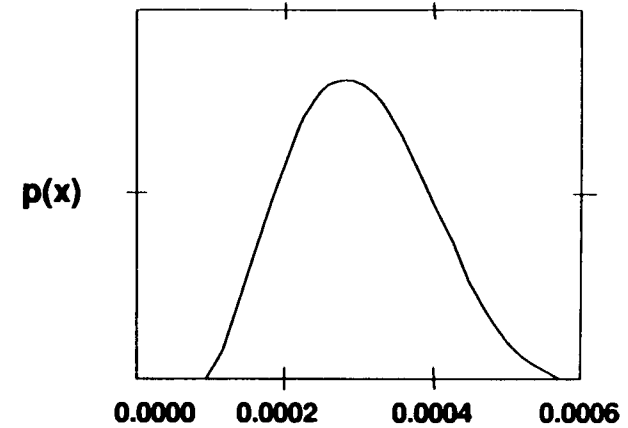
Probability distributions required for each of the following parameters

- **Dike Trend**
- **Dike Width**
- **Erupted Volume of Magma**
- **Fraction of Wall Rock Entrained by Dike**
- **K_d , Cesium Vitric Tuff**
- **K_d , Cesium Zeolitic Tuff**
- **K_d , Neptunium Devitrified Tuff**
- **K_d , Neptunium Zeolitic Tuff**
- **K_d , Uranium Vitric Tuff**
- **K_d , Uranium Devitrified Tuff**
- **K_d , Uranium Zeolitic Tuff**

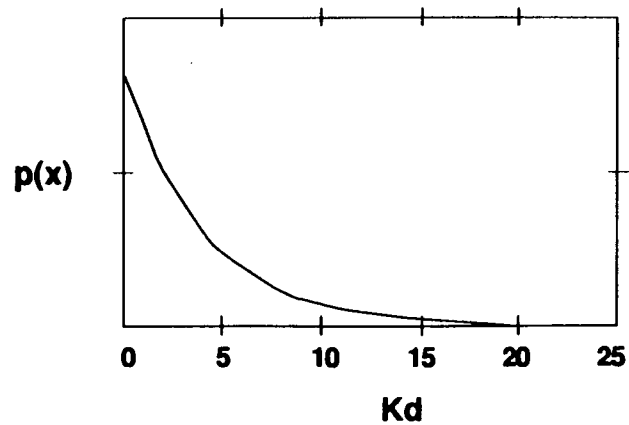
Dike Trend



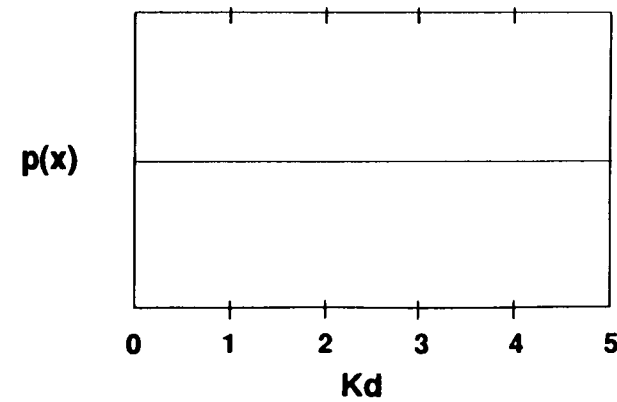
Fraction of Wall Rock Entrained



Neptunium Zeolitic Tuff



Uranium Devitrified Tuff



Results of the Expert Elicitation

- **Easy for a trained interrogator to apply**
- **Graphic and interactive**
- **Fast results**
- **Product appears to satisfy both the expert and the analyst**
- **Cost effective**

Summary

Generated a probabilistic data base that can be used for sensitivity and uncertainty analyses in future PA efforts