

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

**PRESENTATION TO
THE NUCLEAR WASTE TECHNICAL REVIEW BOARD**

SUBJECT: TOTAL-SYSTEM ANALYSIS

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**ARLINGTON, VIRGINIA
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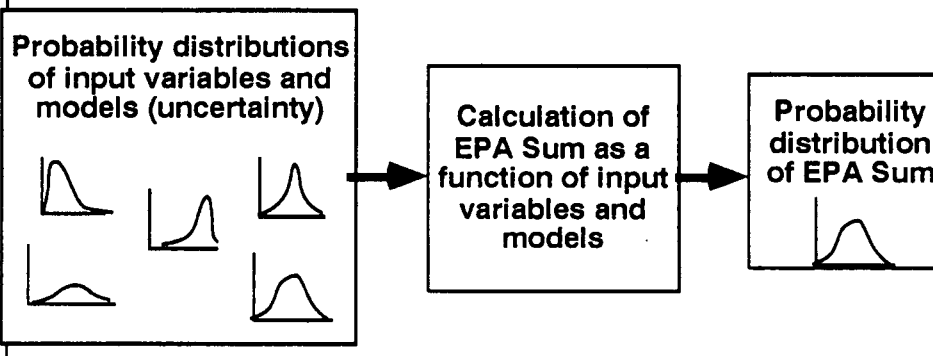
TOTAL-SYSTEM ANALYSIS

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Nuclear Waste Technical Review Board
Arlington, VA
May 20, 1991

Propagation of Uncertainty

- EPA regulations are *probabilistic*
- Normalized release is a random variable with some uncertainty



Types of Uncertainty

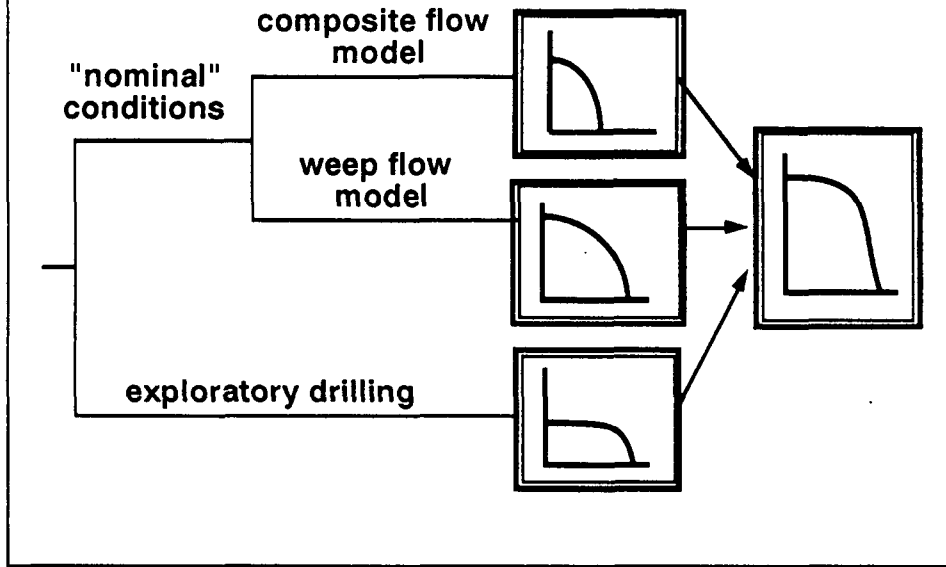
Probability distributions of input parameters represent:

- **spatial variability**
- **time variability**
- **uncertainty due to limited number of measurements**
- **uncertainty about process models**

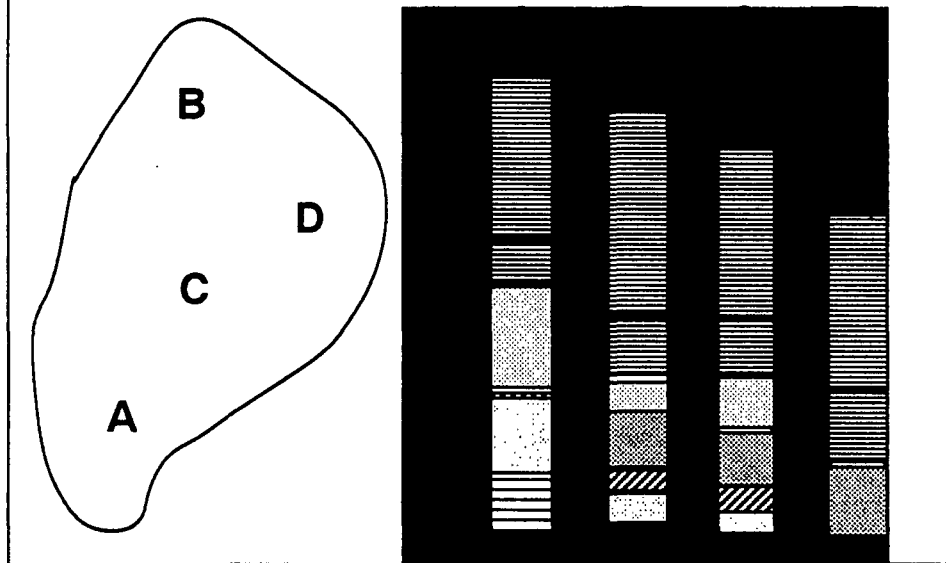
Hierarchy of Modeling Capabilities

- **Less-detailed calculations, intended from the start to be stochastic**
- **Detailed calculations, but with more restrictions (1-D, single phase, isothermal)**
- **Detailed multidimensional, multiphase, nonisothermal calculations**

An Example Total-System Calculation

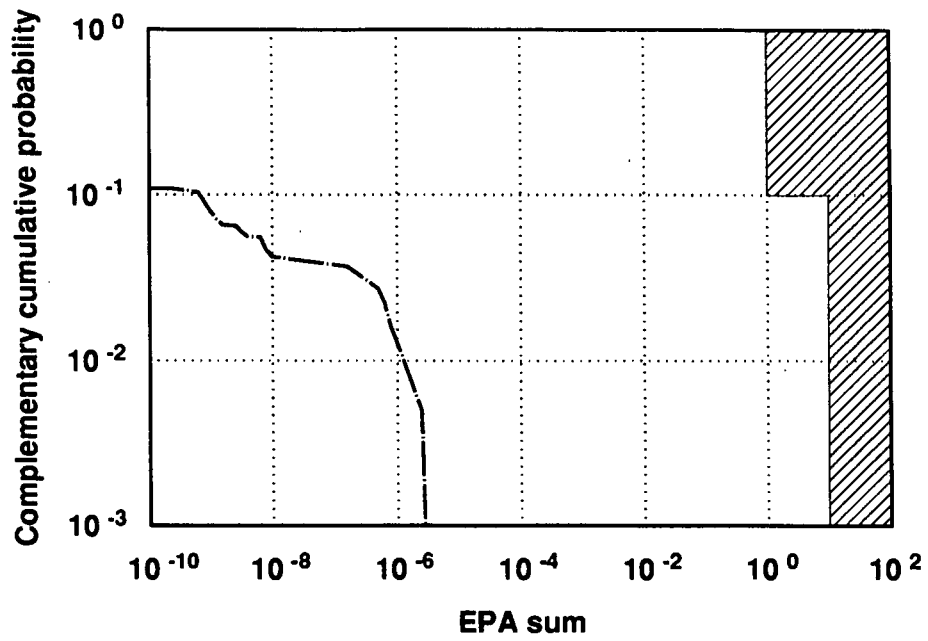


Stratigraphy for Example Calculation

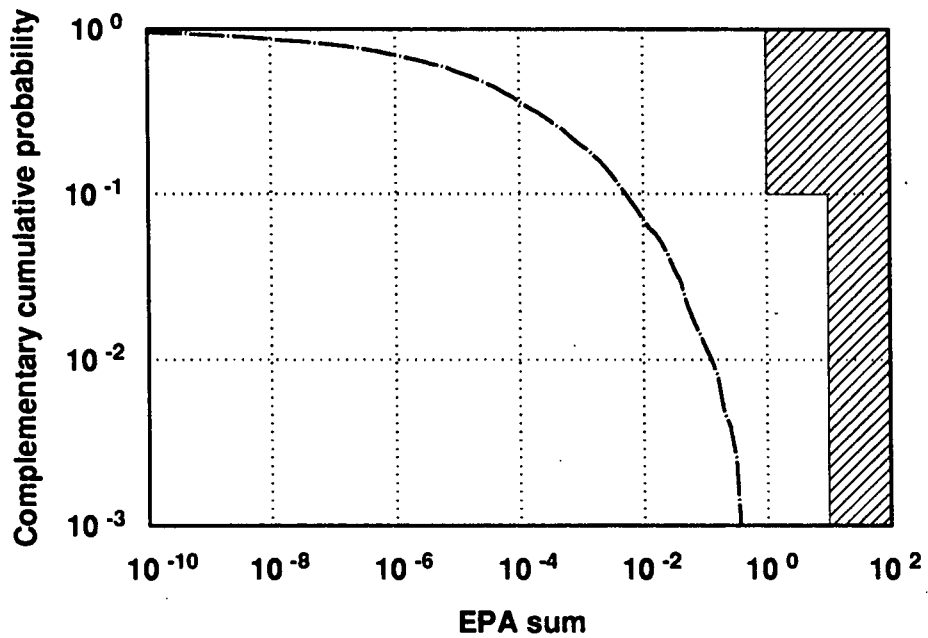


*“Complex problems have simple,
easy-to-understand
wrong answers.”*

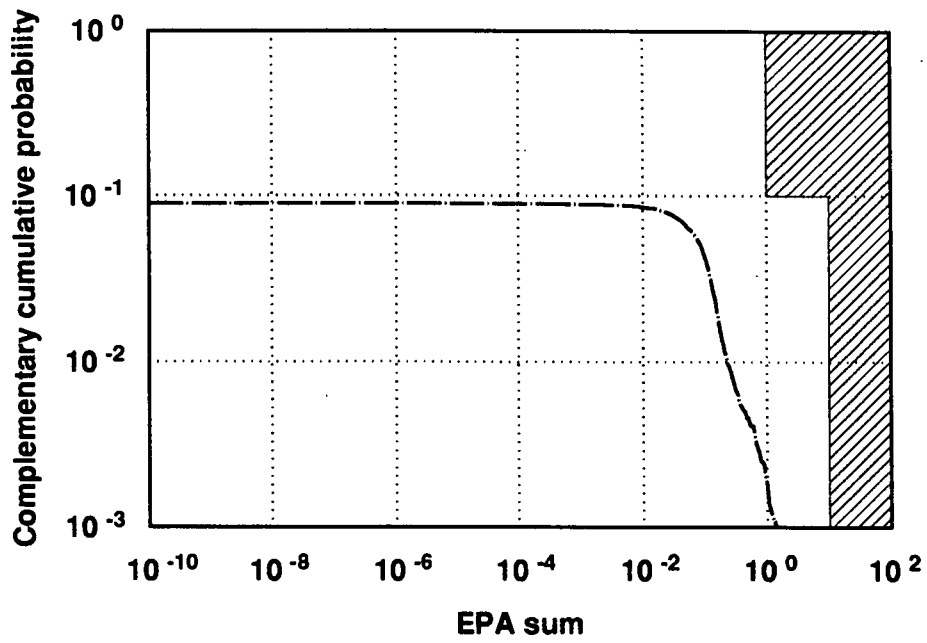
**CCDF Generated From 800 TOSPAC Runs
"nominal" conditions, composite flow model**



**CCDF Generated by SMS With 1000 Samples
"nominal" conditions, weep flow model**



**CCDF Generated by SMS With 10,000 Samples
direct releases due to exploratory drilling**



Composite CCDF

