



### Training Course Development Status

#### **Section 1 - Overview / Management Session - DRAFT IN REVIEW**

- Concepts and principals behind SmartSampling
- Sorts of problems addressed by this process
- Review of tools required and terms used (glossary provided)
- Ways to use this process
- Objective Function
- Conceptual process flow / Illustrated case study
- Review of “outputs” of the process

#### **Section 2 - Exploratory Data Analysis - DRAFT IN REVIEW**

- Mapping of the data set
- Histogram techniques
- Probability-plotting techniques
- Correlation between multivariate data
- Data transformations

#### **Section 3 - Quantification of Spatial Continuity - DRAFT IN REVIEW**

- Calculation of experimental variograms
- Fitting models to experimental variograms
- Bi-gaussian check
- Concepts of anisotropy and nested structures in variograms
- Other techniques for defining spatial variability
- Hands-on exercise using software for calculation & modeling of variograms
- Incorporation of subjective knowledge into modeling of variograms

#### **Section 4 - Spatial Estimation - DRAFT IN REVIEW**

- Review of techniques for spatial estimation
- Concept of a “best” linear unbiased estimate
- Hand calculations to solve the kriging system on a small example data set
- Hands-on exercise using kriging software on example data set
- Indicator kriging, probability kriging
- Explanation of kriging variance
- Checking of kriging output

#### **Section 5 - Spatial Simulation - DRAFT IN PREPARATION**

- Difference between estimation and simulation
- Basics of probabilistic risk assessment
- Transfer of uncertainty in spatial distribution to uncertainty in decision making
- Review an example spatial simulation
- Hands-on exercise using software to create simulations
- Process realizations to test the model - is the input reproduced?



### **Section 6 - Probability and Excavation Mapping - RUN THROUGH SCHEDULED 8/3/99**

- Concept of probability of exceedence
- Concept of probability mapping
- Incorporation of spatial uncertainty in remediation maps
- Cross validation (additional data)
- Estimation vs. Simulation in probability mapping
- Hands-on exercise using software to create probability maps

#### **Introduce Independent Work**

- Problem and data set for independent solution
- Initiate analysis

### **Break for Independent Analysis of site-specific data set**

### **Section 7 - Independent Analysis Results**

- Students present their independent analyses
- Comparison, evaluation and discussion of model variation
- Solutions presented to managers and stakeholders from opening session (optionally, this element could be scheduled following Section 9)

### **Section 8 - Economic Analyses**

**- DRAFT IN REVIEW**

- Cost elements, Cost assumptions
- Basis of cost/benefit analyses in decisions involving spatial uncertainty
  - Objective function
- Loss functions and their effects on decisions (how cost of failure is calculated)
  - Linear loss function
  - Squared loss function
- Data worth and determination of # and location of additional samples
  - Ranking of potential additional sampling sites
- Probabilistic calculations in re regulatory action levels
- Cost calculations in re probability of exceedence levels
- Economic risk / Human health risk

### **Section 9 - Scaling Issues**

**- RUN THROUGH SCHEDULED 8/3/99**

- Measurement and remediation scales
- Case study - review of effects of scale discrepancy
- Analytic techniques to address scale discrepancies
- Numerical techniques to address scale discrepancies
  - Block kriging
  - Averaging

### **Section 10 - Summary**

**- RUN THROUGH SCHEDULED 8/3/99**

- Results of process
  - review output
  - defensibility of plans generated by process
- Background Materials
  - Software survey
  - Bibliography - sources and references



### **Additional Requirements**

- ❖ **HANDS-ON TECHNICAL EXERCISES** - **Drafted, to be modified per site data**
- ❖ **SOFTWARE COLLATION / FRONT END PREP** - **In Process**
- ❖ **SITE DATA PREPARATION** - **Site chooses PRS, provides electronic files**  
From Draft Syllabus 7/97:
  - Site-provided data set with about 150 data points and description of problem (2-D or 3-D, if it needs detrending, other pertinent information) on which to base the course
  - Second site-provided data set for independent solution following course sessions
- ❖ **PRE-COURSE REVIEW MATERIALS** - **TBD per site data selection**