

## INTRODUCTION (01)

## I Main Topics

A Engineers, Geologists, & SocietyB Approach to Engineering GeologyC Importance of case historiesD Mechanics

## II Engineers, Geologists, &amp; Society

A Engineers

- a Solve problems
- b Quantitative analysis emphasized
- c Models often simplified/simplistic

B Geologists

- a Study problems
- b Qualitative analysis emphasized (traditionally)
- c See earth as complex (heterogeneous & anisotropic)

C Society

- a Pays the bills for problems and regulates response
- b Confused by conflicting analyses
- c Sees geologists and engineers as mysterious

## II Approach to Engineering Geology

A Hazard Recognition (Regional & site-specific)

- 1 Hazard = condition, process, or potential event that poses a threat to personal or economic health, safety, or welfare
- 2 Province of geologist

B Hazard Characterization (Regional & site-specific)

- 1 Characterization: thorough description of system state & history
  - a What are the essential (and/or recurring) features/processes?
  - b Where are the features? (Geometry)
  - c What are their engineering and hydrologic properties?
  - d When did the geologic feature (structure/rock/deposit) form?
- 2 Province of geologist & engineer

C Risk Evaluation (Involves probabilities)

- 1 Risk = function (product) of probability of occurrence and potential loss. Example: Teton Dam.  $R = (1.5 \times 10^{-4}/\text{yr})(\$7 \times 10^8) \approx \$10^5/\text{yr}$
- 2 Province of geologist & engineer

#### D Risk Assessment

- 1 Province of society at large
- 2 Is the level of risk tolerable?

#### III Importance of case histories

- A Learn from the experience of others
- B What has happened can happen
- C Problems occur when all four of the above steps not executed
- D Don't ignore heterogeneity, discontinuities, and anisotropy
- E Demands vs. sufficiency of data often conflict
  - 1 Too little time
  - 2 Too little data (typical geologist's problem; exposures incomplete)
  - 3 Too much data
  - 4 Incorrect or inadequate data
- F Inadequate understanding of geologic processes ⇒ trouble
- G Investigators with different backgrounds see the same thing differently

#### IV Mechanics

- A How do the processes operate?
- B What factors are important?
- C Increasingly emphasized as part of quantitative analyses
- D What are the assumptions in the analyses?