REVIEW OF SUBSIDENCE - ASSESSMENT AND RISK MITIGATION (43)

I Main Topics
- A Recognition of subsidence hazards
- B Characterization of subsidence hazards
- C Evaluation of subsidence hazards (Subsidence mechanics)
- D Mitigation of subsidence hazards

I I Recognition of subsidence hazards

http://water.usgs.gov/ogw/pubs/fs00087/

http://water.wr.usgs.gov/subsidednce/ls_3.html

III Characterization
- A Monitoring of subsidence (surveying, GPS, InSAR)
- B Characterization of subsurface units, voids, and strain
- C Tracking fluid withdrawal
- D Mapping of surficial fissuring and faulting

IV Evaluation of subsidence hazards (Subsidence mechanics)
- 1 Consolidation theory
- 2 Empirical experience
  - A Typical maximum subsidence/Head loss $\approx$ 0.01-0.02
  - B "Extreme" maximum subsidence/Head loss $\approx$ 0.1-0.02
    (From Costa and Baker, p. 289, Santa Clara Valley)

V Mitigation (National Academy of Sciences)
- A Education
  - 1 "Recognize and avoid the problem"
  - 2 Adopted by California and Texas for fluid withdrawal
  - 3 Adopted by California and Louisiana for drainage of organic soil
- B Geologic mapping
  - 1 "Identify the areas to avoid" (recognition and characterization)
  - 2 Most popular mitigation method today for all forms of subsidence
- C Regulation of resource development
  - 1 "Reduce the risk"
  - 2 Adopted by California and Texas for fluid withdrawal
  - 3 Adopted by Florida for drainage of organic soil
  - 4 Adopted by Pennsylvania for mining

D Land-use management (and construction codes)
  1 "Reduce and avoid the risk"
  2 Adopted by California for fluid withdrawal, hydrocompaction, and drainage of organic soils
  3 Adopted by Florida for drainage of organic soil
E Penalties ("Market-based methods")
  1 "Accept the risk and pay for the damage caused"
  2 Adopted by California for fluid withdrawal
  3 Adopted by Pennsylvania for mining
F Insurance
  1 "Share the risk/pay for damage that might be incurred"
  2 Mostly used in Midwest U.S. for mining-induced subsidence