

# QUESTIONS TO ASK ABOUT BRACKISH AQUIFERS AS A SOURCE OF FRESH WATER

# Four Environmental Issues

- Environmental impacts of acquiring the water
- Environmental impacts of concentrate and waste management
- Water quality of desalinated product water
- Air emissions related to energy consumption

# Impacts of Acquiring the Water

- Effects of withdrawal on the aquifer
  - Quantity (depletion)
  - Water flow
  - Aquifer water quality
- Effects of withdrawal on land and geology
- Surface impacts of drilling and pumping
- Energy demand for pumping

# Impacts of Waste and Concentrate Management

- What elements, salts in the concentrate?
- What system for disposal of the concentrate?
  - Land disposal (evaporation ponds or on land)
  - Discharge to surface water
  - Underground injection
- Disposal of biocides and water treatment chemicals

# Quality Issues in Product Water

- Reverse Osmosis may not remove all constituents of health concern
  - Boron
  - Bromide and brominated compounds
  - Disinfection byproducts

# Energy-related Air Emissions

- Need careful assessment of the energy requirements of the full system
  - Withdrawal from aquifer
  - Desalination process
    - Quality of raw water
    - Technology to be used
  - Delivery of product water
  - Transfer of concentrate and waste
- What will be the source(s) of the electricity?
  - Fossil fueled
  - Renewable
  - Nuclear

# Getting the Answers

- Environmental impact assessment
- Environmental permitting
  - Clean Water Act wastewater discharge permit
  - Underground injection permitting (SDWA)
  - Drilling or surface impact permitting
- Aquifer withdrawal permitting?
- Longer term and national scale
  - Site specific assessments
  - Concentrate discharge impact assessments

See generally, National Academy of Sciences, Desalination: A National Perspective (2008)  
[http://www.nap.edu/catalog.php?record\\_id=12184](http://www.nap.edu/catalog.php?record_id=12184)