Desalination in California: What will it take to catch-up with the rest of the world?

Dennis Dickerson
Principal Regulatory Policy Manager
McGuire Environmental Consultants

Desalination of Ocean Water

- What if?
  - You could sell an acre-foot of water for $2,608,000, who would you be?
    - Metropolitan Water District
    - Coca-Cola Corp.
    - A ocean water desalination facility
    - City of Los Angeles
    - One very wealthy entrepreneur
  - Ans. All of the above

Who would you really be?

- Coca-Cola Corp.
  - Dasani water
    - Sell each 16 oz. bottle for $1
    - 8 bottles/gallon
    - 326,000 gallons per ac-ft (approx)
    - 2,608,000 bottles/ac-ft

Reality Check Time

- If an ac-ft of water really were to cost $2,608,000
  - Washing your car would cost
  - Taking a bath would cost
  - Filling your swimming pool would cost
- Actually, an ac-ft of water costs from $600-1,000

Cost has Consequences

- Because water has been traditionally provided at extremely low cost
  - Subsidized by water storage/transport projects
  - alternative sources of supply have been priced out of the market
- But
  - water supplies are not as plentiful as they were
  - water demand is increasing as population grows
  - the economics of water supply are changing

A changing dynamic

- Demand: Historical
  - MWD 1980 3.1 million ac-ft per year
  - MWD 1990 3.9 million ac-ft per year
- Demand: MWD Projection
  - 2000 3.8 million ac-ft per year
  - 2020 4.9 million ac-ft per year

Meeting the demand

- Conservation is being used
  - reclaimed water is replenishing groundwater supplies or used directly for irrigation
  - water conservation education efforts
  - Without aggressive conservation and conjunctive use, the water crisis would now be upon us
- Alternative supplies
  - desalination is now being seriously considered as a means of providing a limited but highly reliable supply of drinking water

The State of Desalination Worldwide

- Used extensively in locations with limited local supplies
  - Islands
  - Middle east 60% of world desalination capacity
  - Spain 5% of total water supply is from desalination
  - Singapore
    - Construction underway on a $200 million (S) plant to produce 110,000 cu meters/day (10% of national demand)
  - Australia
    - Western Australia's government recently announced plans to construct a $350 million (AUS) plant producing 45 gigalitres per year (33 MGD)

Desalination in the United States Tampa

- Tampa facility
  - First major desalination plant in the US
  - Will produce up to 50 MGD
  - Currently partially operational
    - Problems with location of feed water intake
      - Not related to operational concept or capability
      - Inadequate filtration to avoid clogging of filters and membranes
        - Results in frequent maintenance
        - Reduces membrane lifespan
        - To be remedied by improved filtration of feed water

Desalination in California

- No major facility currently operational
- Santa Barbara experience in early 1990s
- A number of smaller plants currently operate
  - water supply
  - pilot scale testing
- Several large scale plants being pursued

Desalination is Ready for Prime Time

- Costs are within range
  - delivered water ranges from $500-$1,000
  - desalinated water can be provided at a cost that is competitive
    - $1,000 to $1,200 per ac-ft
    - Cost trend is making desal ever cheaper
- Provides a highly reliable "local" supply
- Provides exceptional water quality

Most major California desal proposals feature co-location with power plants

- Co-location
  - Existing industrial use property
  - Already existing intake and outlet structures
    - Use cooling water as feed water
      - Water already at elevated temperature
      - Location of intake after 316(b) regulation point
  - Concentrate is mixed into cooling water flow prior to discharge
  - Existing power facilities needed into the future
    - CEC "Aging Power Plant Study"

Industrial use property

- Using existing industrial property avoids distracting land use controversies
  - Desalination facilities are unremarkable
    - No smokestacks, cooling towers, etc.
    - Viewed from outside, non-differentiated from a warehouse building or low profile commercial building

Existing intake structures

- For optimum desal operation, water should be at an elevated temperature
- Use of cooling water as feed water avoids need for pre-heating
  - Location of desal intake after 316(b) regulation point does not significantly increase impacts associated with impingement and entrainment - they have already occurred

Cooling water as pretreatment

- Blending of concentrate with cooling water
  - Comparatively small volume of concentrate blends with very large volume of cooling water
    - 600 MGD cooling water intake
    - 100 MGD diverted for desalination process
      - 50 MGD removed to drinking water supply
      - 50 MGD returned to cooling water flow
    - 550 MGD discharged to ocean
  - Results in minor differences in salt concentration between intake and discharge

Barriers to Desalination in California

- Regulatory Hurdles
  - Discharge permit from RWQCB
    - Will need to meet specific provisions for NPDES permits
      - Ocean Plan is more favorable than Inland Waters Plan given dilution ratio and receiving water effluent limitations
  - California Coastal Commission
    - Has issued a paper raising many questions about desalination
    - May try to assert authority it does not have whether or not warranted

Barriers to Desalination in California

- Policy Conflicts
  - State agencies may not be of one mind
    - Dept of Water Resources
    - Coastal Commission
    - Water Boards
  - Adds a level of uncertainty

NIMBYism

- Huntington Beach experience is not encouraging
  - Draft EIR recommended for approval by city staff
    - Certified EIR by Planning Commission
    - EIR not certified by City Council (Dec 2003)
    - Revised Draft EIR being developed
  - Co-location and extending the life of existing power facilities a major issue

Benefits of Desalination

- Reduce demand on State Water Project
  - Allows retention of water in Bay-Delta for natural uses
  - Incrementally reduces demand for electrical energy for SWP
  - Increases water supply for other uses that would otherwise be limited by lack of water availability or a commitment to divert to other locations
  - Drought proofing for coastal areas reduces demands for water transfers in dry periods

Benefits (cont'd)

- Benefits will be proportional to the amount of water produced
  - Benefits need to be considered together with costs of desalination
    - Energy requirements
    - Environmental impacts
- Desalination especially critical in areas affected by supply constraints
  - Alternate supply availability changes the cost/benefit relationship

Catching up to the World?

- What do we need to do?
  - Recognize the West and So California are arid environments
    - Our water is "borrowed" from others
    - Assumes others don't need "their" water
  - Intelligently embrace seawater desalination in responsible environmental site locations
    - Recognize that environmental impacts are limited and that existing regulatory programs will address them

Catching up to the World?

- What else do we need to do?
  - Understand that desalination is a technology that is now reliable and cost effective
  - Develop policies to support desalination as part of the water portfolio
  - Avoid creating unwarranted barriers
    - Understand the nature of the water cycle