

US EPA ARCHIVE DOCUMENT

**Multi-Objective Decision Model  
for Urban Water Use: Planning  
for a Regional Water Re-Use  
Ordinance**

# A collaborative effort involving

- Illinois Institute of Technology
- Illinois Waste Management and Research Center
- Northeastern Illinois Planning Commission
- Regional stakeholders

# Metropolitan Chicago water use

- Six-county area in NE Illinois is growing
- Estimated & projected water consumption
  - 2000 = 1230 MGD
  - 2030 = 1860 MGD
- Supply problems
  - Lake Michigan withdrawal is limited
  - Groundwater sources unknown, decreasing

# Wastewater reuse options



# Barriers and incentives

- Regulatory Issues
- Existing institutional or policy programs
- Potential human or ecological health concerns
- Technical requirements
- Economics

# Optimization objectives

- Minimize costs
  - Water and wastewater treatment
  - Water distribution (new dual distribution)
  - New treatment costs (chlorination)
  - Hydroelectric facility
  - Waste heat
- Minimize potential risks
  - Human health
  - Ecosystem
- Minimize water withdrawal from Lake Michigan

# Constraints

- Limited supply (surface, groundwater)
- In-stream flow requirements
  - Aeration
  - Wastewater dilution and conveyance
  - Habitat protection
  - Transportation
  - Recreation
- Treatment system capacity
- Public acceptance



# Decision support system

- Capture information in an optimization model
- Present the model as a decision support system
- Work with stakeholders:
  - What objective(s) do they want to see?
  - Do we have all the constraints?
  - What and where are the reuse applications?
- Similar applications throughout Great Lakes