Human Contaminate Control and Water Recycling

Charles P. Gerba
University of Arizona
Dept. of Soil, Water and Environmental Science
Recycling is about repurifying the water by removal of potentially harmful contaminates introduced by humans.

- Most toxic substances are controlled at the source – or can be (i.e. heavy metals).
- Contaminates introduced by humans will always be present:
  - Pathogens
  - Endocrine disruptors
  - Pharmaceuticals
Issues Microbial Contaminates

- Levels in sewage depend on infection rate in the community
- New ones evolve or re-emerge all the time
- Short term exposure (one glass of water) can result in disease
Issues Microbial Contaminates

- Treatment plant process reliability is critical to prevent short term exposure
- Goal is to prevent low level disease transmission
- Impact of new processes and technologies on pathogen reduction
Impact of New Technologies

- Increase use of ultraviolet disinfection increases numbers of adenoviruses in sewage discharges
Exposure Issues – Dual Systems

RECYCLED WATER

DO NOT DRINK
Why are antibiotics an issue?

- Do they have an impact on microbial cycles – nitrogen cycle
- What about transfer of resistance genes?
- Most antibiotics come some soil bacteria. Thus, antibiotic bacteria are everywhere.
Pharmaceuticals and Endocrine Disruptors

- Have the potential to interfere with reproduction
- Since humans are the major source of problems associated with ED’s may largely be ecological
Water Recycling

- Risks can be safety managed
- Maximum utilization of recycled water for irrigation should be practiced before other options are considered (i.e. potable reuse)
- Combination of mechanical and natural systems are probably the most resilient – i.e. activated sludge and soil aquifer treatment
- Third party oversight for large reclamation projects (required in California). New contaminates emerge all the time and their fates need to be addressed.
Public awareness and education are essential. Best example in the world – NEW Water Project in Singapore.

- Refinement of Standards and Monitoring. Without strategic monitoring you can not ensure product quality. Indicators are not reflect of pathogen removal.

- Need data on treatment reliability for contaminate removal.