# Cowshed Wastewater for Indirect Potable Reuse

Sabrina Smith, Kendric Clagett, Chase Minehan and Nadav Shpieglar

# Cowshed Wastewater

Wastewater coming from agricultural use:

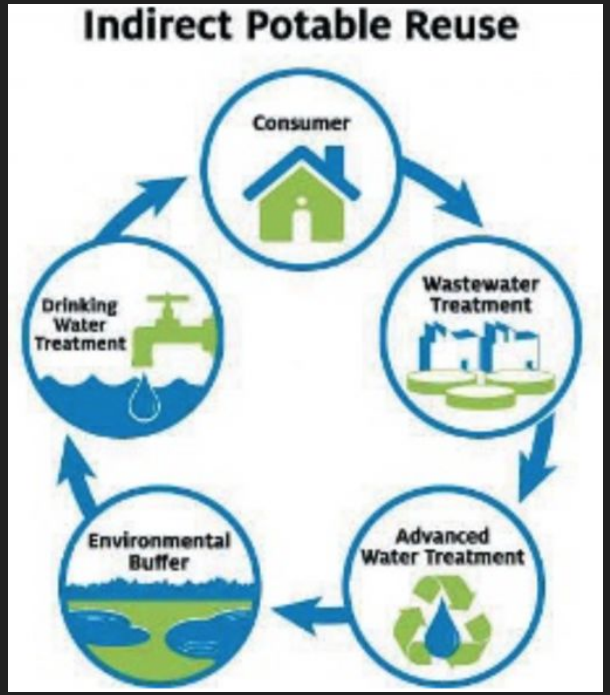
Typical Contaminants:

- High levels of organic matter
- HIgh Nutrient Levels
- High salt levels

# Indirect Potable Reuse

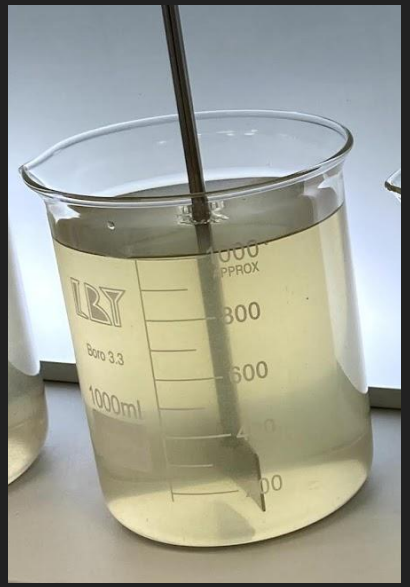
Indirect potable reuse:

- Wastewater that has been treated to required standards of  drinkable water
- Specifically an environmental buffer is used.
- Already practiced in a number of Southern California communities including Los Angeles, and Orange County



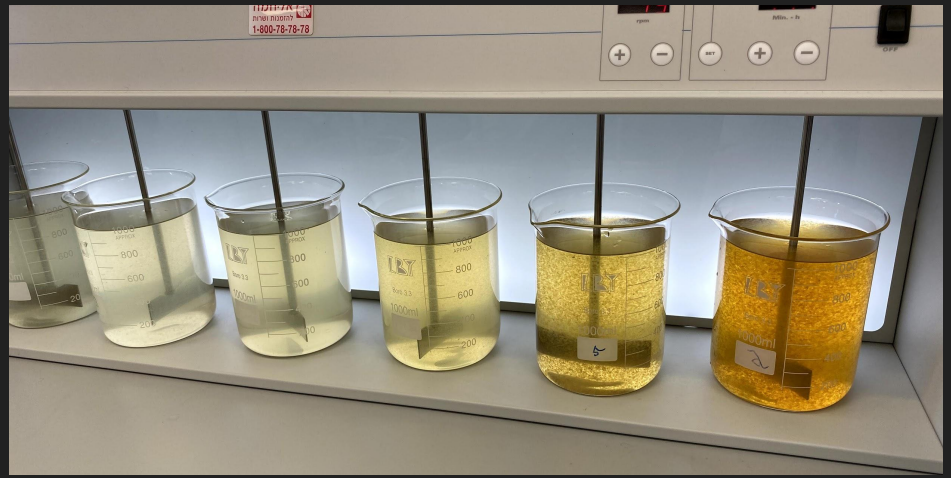
# Analysis

- Physical Parameters:
  - Turbidity: 12.6 NTU
  - TSS: 551 mg/L
- Chemical Parameters:
  - Phosphate: 45 mg/L
  - COD: 3632 mg/L
  - pH: ~ 6.83
  - Ammonia: 0.393 mg/L
- Biological Parameters:
  - Coliforms (CFU): Above Detection Limit



# Treatment

6 Vessels of wastewater with different concentrations of $FeCl_3$



| $FeCl_3$ | 0 mg/L | 2 mg/L | 5 mg/L | 10 mg/L | 20 mg/L | 50 mg/L |
|---|---|---|---|---|---|---|
| Turbidity | 12.6 NTU | 9.00 NTU | 6.29 NTU | 4.95 NTU | 2.70 NTU | 3.26 NTU |

# Treatment

- Coagulation
  - Fast mixing @ 120 rpm for 30 sec
- Flocculation
  - Slow mixing @ 15rpm for 15 min
- Settling
  - 15 minutes of settling
- Disinfection
  - Using Ozone $O_3$


# Cowshed Wastewater in Israel

Kibbutz Shaar Haamakim

- 350 Cows
- 30 m^3/day

1. Pretreatment at 3 main sources
    a. Milking Parlour
    b. Collecting Yard
    c. Rinsing Water
2. Natural biological filter through wetlands

Objectives

1. Removal of solids
2. Reduction of Organic Load
3. Rinsing Water

# Cowshed Wastewater in California

- California is the largest dairy state
  - 80% located in Central Valley
- The Dairy Program
  - Implements strict measures to protect water quality
  - Monitoring liquid and solid animal waste/byproducts that could affect surface and groundwater quality
- Runoff pollutants
  - Pesticides
  - Fertilizers/Nutrients
  - Salts
  - Pathogens
  - Sediment

# Reuse/Treatment Plan

- Potential use:
  - Crops/landscape
  - Natural Water Source
- Treatment plan:
  - Point Loma Wastewater Treatment Plant
  - Same treatment, but effluent discharges into ocean

# Discussion

- Would you (the public) still consume produce, knowing that it has been irrigated with indirect potable water from treated agricultural wastewater?

- What will it take for the public to accept indirect potable wastewater as a drinkable water after the tertiary treatment? Is ignorance bliss in the scenario?

- In what other areas could indirect potable water be used? (besides irrigation)?

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