Cowshed Wastewater for Indirect Potable Reuse

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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$_3$

<table>
<thead>
<tr>
<th>FeCl$_3$</th>
<th>0 mg/L</th>
<th>2 mg/L</th>
<th>5 mg/L</th>
<th>10 mg/L</th>
<th>20 mg/L</th>
<th>50 mg/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turbidity</td>
<td>12.6 NTU</td>
<td>9.00 NTU</td>
<td>6.29 NTU</td>
<td>4.95 NTU</td>
<td>2.70 NTU</td>
<td>3.26 NTU</td>
</tr>
</tbody>
</table>
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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