INFILTRATOR
water technologies

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What the Future holds for Decentralized Wastewater Treatment Systems

Dennis F. Hallahan, P.E., Technical Director

Poll Question:

What factors will drive the future of Decentralized WWT?

a. Regulatory: The development of new regulations
b. Technology: mfg's develop new technologies
c. Funding: new legislation to increase investment by communities
d. E&E: an educated public will apply pressure to protect the environment
e. Other?

Poll Question

What do you see as the future of Decentralized Systems?

a. O&M programs, setting up RME's
b. The future will be limited, sewers are the solution
c. Reuse and recharge
d. Advanced Treatment
e. Addressing CEC's
f. Other? Look to the Hall (vendor displays)

The Future

Emerging Issues - National Perspective

- Dennis's List: (in no particular order)
- Advanced Treatment
  - Treat what?: N, P, CEC, Pfas, Microplastics
- To Sewer or not to Sewer
- Funding
- Groundwater Depletion (MAR)
- O&M
- Convention Center Trade Show
- AI, Sensors, Apps, Facility Types, Reuse, Other?

Emerging Issues - National Perspective

Let’s ask the experts:

Sara Heger, UMN associate professor

Past president of NOWRA, serves on the NSF International Committee on Wastewater Treatment Systems and chairs Minnesota's SSTS Advisory Committee:

“More technology - to meet new regulations and/or for difficult sites and receiving environments”

Advanced Treatment – is here

Florida: Miami-Dade, estuaries, springs, the Keys

Cape Cod – MA Title 5 revised

Long Island, NY: 360,000 systems

Chesapeake Bay

Hawaii – 88,000 Cesspools

Other Locations?

Quiz:

Decentralized Treatment Technologies can treat to the same level of treatment as Centralized Systems?

True or False

TRUE!

US EPA Published four Fact Sheets

Clean Water starts at Home — Decentralized Wastewater Program

DECENTRALIZ
CAN PROTE

HOW CAN DECENTRALIZED WASTEWAT
ENVIRONMENT, PUBLIC HEALTH, AND W

Providing reliable wastewater treatment – Decentralized wastewater treatment systems can offer as much public health and environmental protection as centralized treatment systems. Like centralized treatment, decentralized treatment systems must be properly designed and constructed and well maintained. More than ever, these systems typically include good monitoring and backup that help prevent adverse discharges. The modern decentralized

Reducing convention
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– Decentralized treatm
effluent quality that is
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These decentralized s
same advanced treatm
discharging systems. Since they use the treatment capacity of the soil, they achieve high quality treatment at a lower cost than other options. Cluster systems, also called

multiple layers of treatment including, advanced treatment and disinfection which can help mitigate the risk of human exposure and disease transmission.

from decentralized systems stays in the local watershed as it returns to the drain field, dispersing into the underlying

to employ water reuse techniques and, as a result, reduce the demand for treated drinking water.

Reducing conventional pollutants, nutrients, and emerging contaminants – Decentralized treatment can produce effluent quality that is equal to or higher than other wastewater disposal options. These decentralized systems use the same advanced treatment technologies as discharging systems. Since they use the treatment capacity of the soil, they achieve high quality treatment at a lower cost than other options. Cluster systems, also called

DECENTRALIZED WASTEWATER TREATMENT CAN BE GREEN AND SUSTAINABLE

Decentralized wastewater treatment can meet the triple bottom line of protecting the environment, being efficient, and contributing to community well-being by:

- *increasing water quality and availability,*
- *using energy and land wisely,*
- *responding to growth while preserving green space, and*
- *using the natural treatment properties of the soil.*

STEWATER TREATMENT BE GREEN?

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Responding to growth while preserving green space – Decentralized systems can be flexible and scaled to a desired size or footprint. For example, decentralized systems can easily be scaled to a needed size for communities with rapid growth and/or where installing pipelines a long distance to a central waste facility can be

Using the natural treatment properties of the soil – Decentralized systems provide good opportunities to use the natural environment. They can help reduce the level of difficulty and cost to treat pollutants, such as nutrients, and keeping them from entering lakes, rivers, and streams. The soil acts as a natural filter and provides final

Advanced Treatment Technologies

- Pre-treatment Units
  - Aerobic Treatment Unit
    - Suspended Growth
    - Attached Growth
  - Fixed Film

Hawaii Military Base

Cesspool Conversions Community-Cluster Systems

15,000 gpd, a Series of ATU's & Pump Vaults, to community drainfields

Emerging Issues - National Perspective

Ask the Experts:

Dr. Gary L. Hawkins

University of Georgia

“PFAS will play a role”

PFAS

- What are they? per- and polyfluoroalkyl substances
- What is that? strong carbon-fluorine bond that allows them to accumulate over time in the environment and our bodies, posing health risks
- “everywhere chemicals” common in the products we use every day
- US EPA has started PFAS regulations for drinking water
- Estimated to be more than 9,000 PFAS chemicals

EPA sets Pfas limits…

EPA Announces Plans for Wastewater Regulations and Studies

(Credit: Canva Pro)

by Jessica Hunt | Jan 21, 2023

Chemical Management | Environmental Management | Reporting | Water Management

The U.S. Environmental Protection Agency (EPA) released 'Effluent Guidelines Program Plan 15' (Plan 15), which lays out how the Agency will work to protect the nation's waterways by following science-based research and the Clean Water Act to develop technology-based pollution limits and studies on wastewater discharges from industrial sources. The plan is designed to help achieve EPA's goals while taking into account current economic conditions.

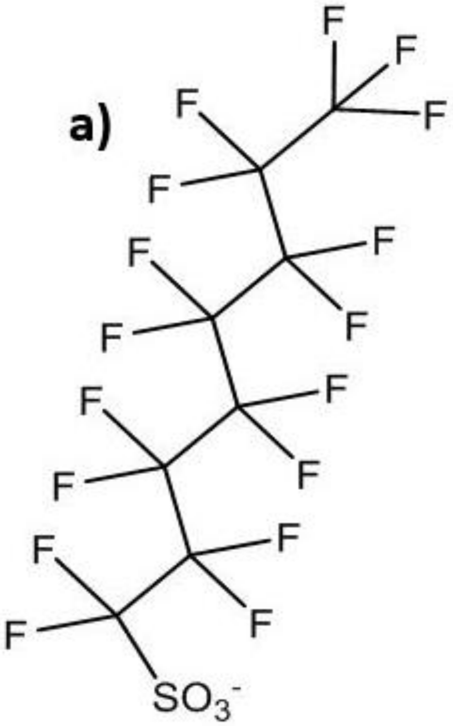
Plan 15 is intended to evaluate the extent and nature of both nutrient and per- and polyfluoroalkyl substances (PFAS) discharges from point sources. The EPA has committed in its Strategic Roadmap to restrict PFAS discharges from industrial sources through a multi-faceted Effluent Limitations Guidelines program.

"For 50 years, EPA has implemented the Clean Water Act to protect our nation's waters that are essential to healthy communities. This Effluent Guidelines Program Plan represents a critical next step to tackle pollutants like PFAS and nutrients at the source before they can harm our health and the environment," said Assistant Administrator for Water Radhika Fox. "With this action, EPA continues to demonstrate our commitment to using the best available data and

Reference: https://www.miamiwaterkeeper.org/pfas_are_forever_chemicals_and_they_re_everywhere

Pfas – long chain compounds

a)



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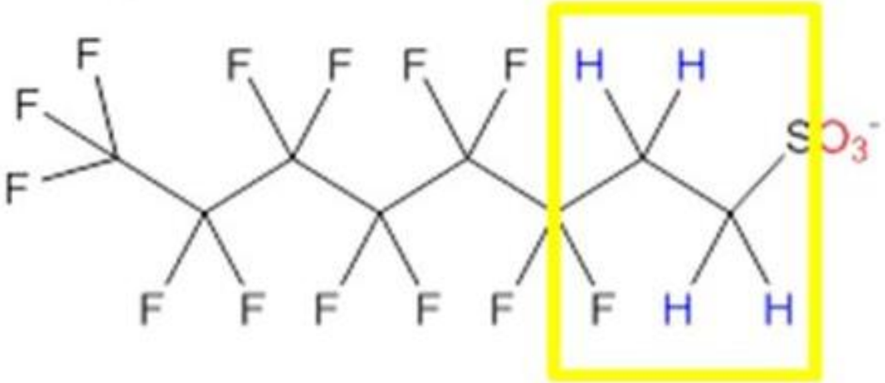


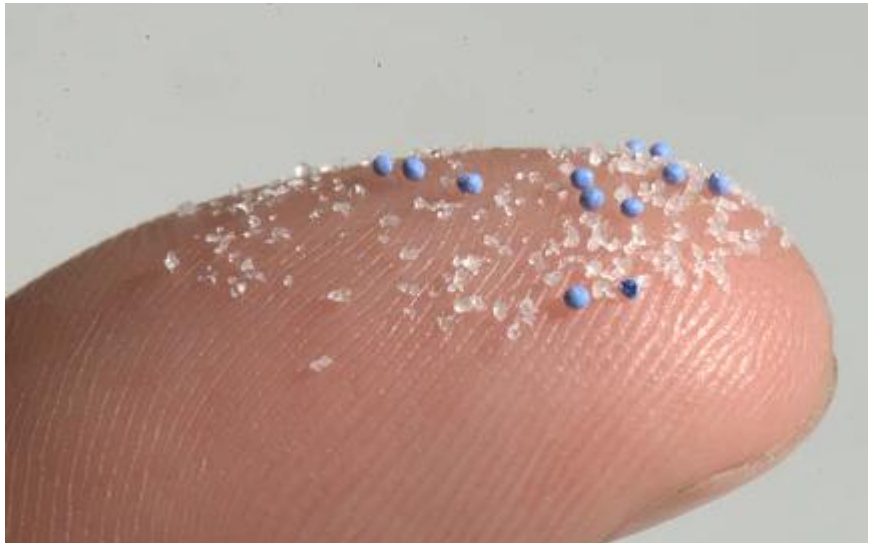
“Forever Compounds”

Microplastics - Microbeads

What are they? bits of manufactured or decayed plastics

Where are they? Found everywhere from the Artic to our drinking water

Overall, food intake results in the consumption of up to 52,000 microplastic fragments per person each year.



To Sewer or not to Sewer?...

Are centralized systems better?

What costs more?

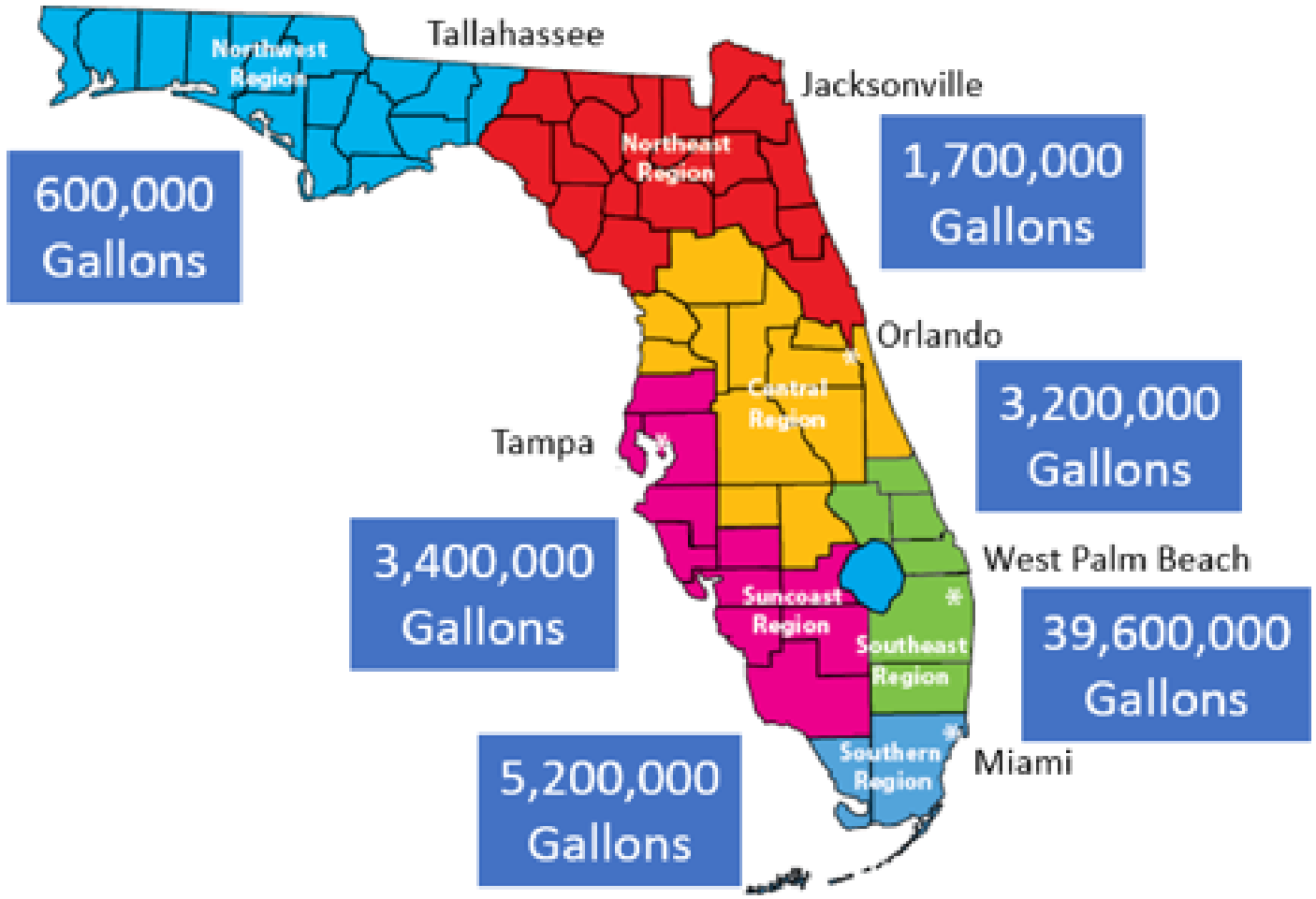
Which Treats better?

Which pollutes more?

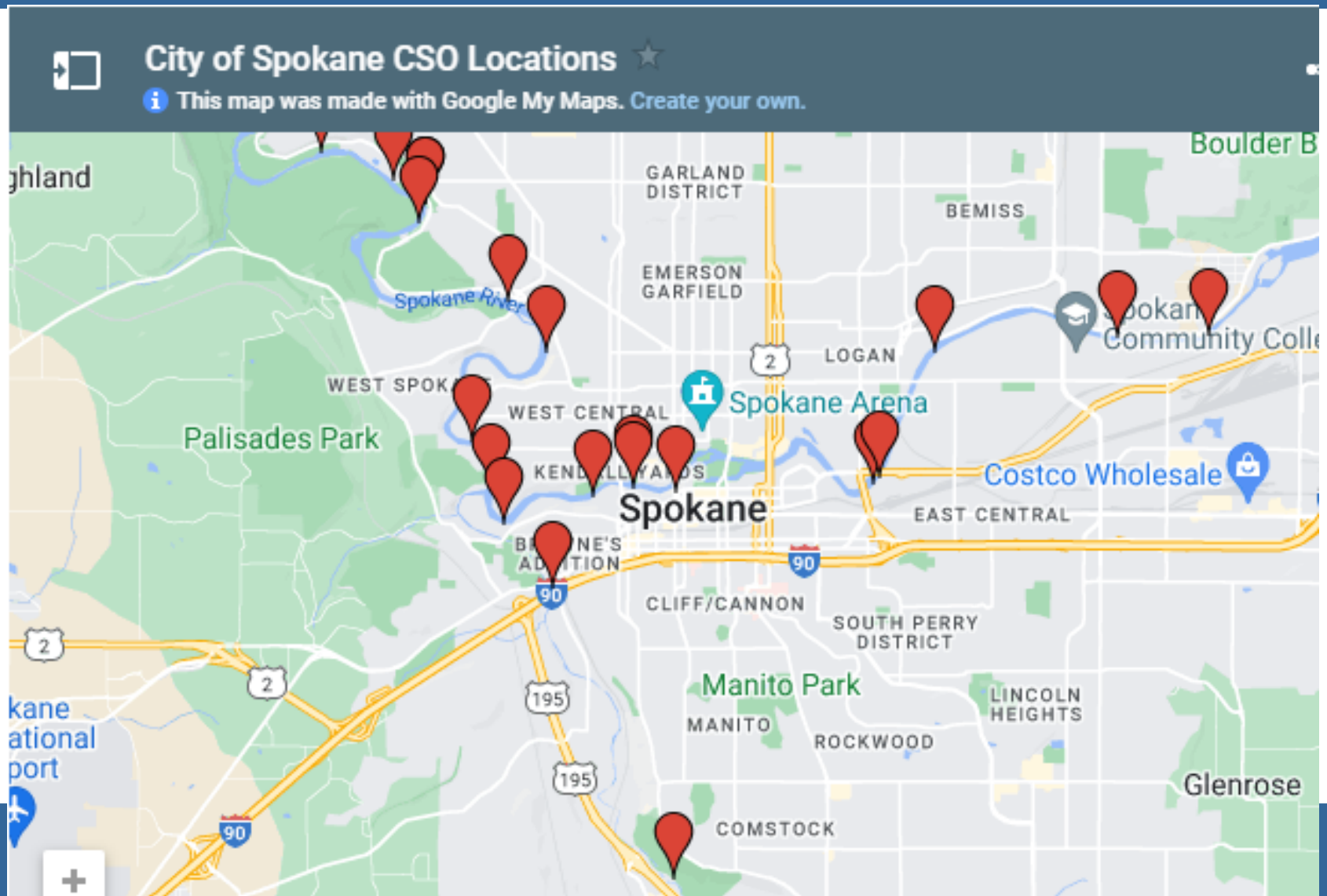
Which uses more energy?

2018 Reported Releases of Untreated and Partially Treated Sewage

- The map at right shows consolidated data from the Florida DOH Notice of Pollution database for central sewer system wastewater releases exceeding 50,000 gallons[1].
- Over **53 million gallons of untreated and partially treated sewage was released** by Florida central sewer systems between January 2018 and January 2019[1].
  - Equivalent to releasing the daily sewage flow produced by over 3,400,000 single-family homes (assuming 157 gallons of water per household per day).
- The summary at right does not include many more releases of less than 50,000 gallons.
- Example reported releases:
  - City of Miami – 4.8 million gallons to Oleta River on September 3, 2018
  - City of Pompano Beach – 39.4 million gallons to the canal on January 4, 2019
  - Manatee County – 0.5 million gallons to Palma Sola Bay on February 12, 2018

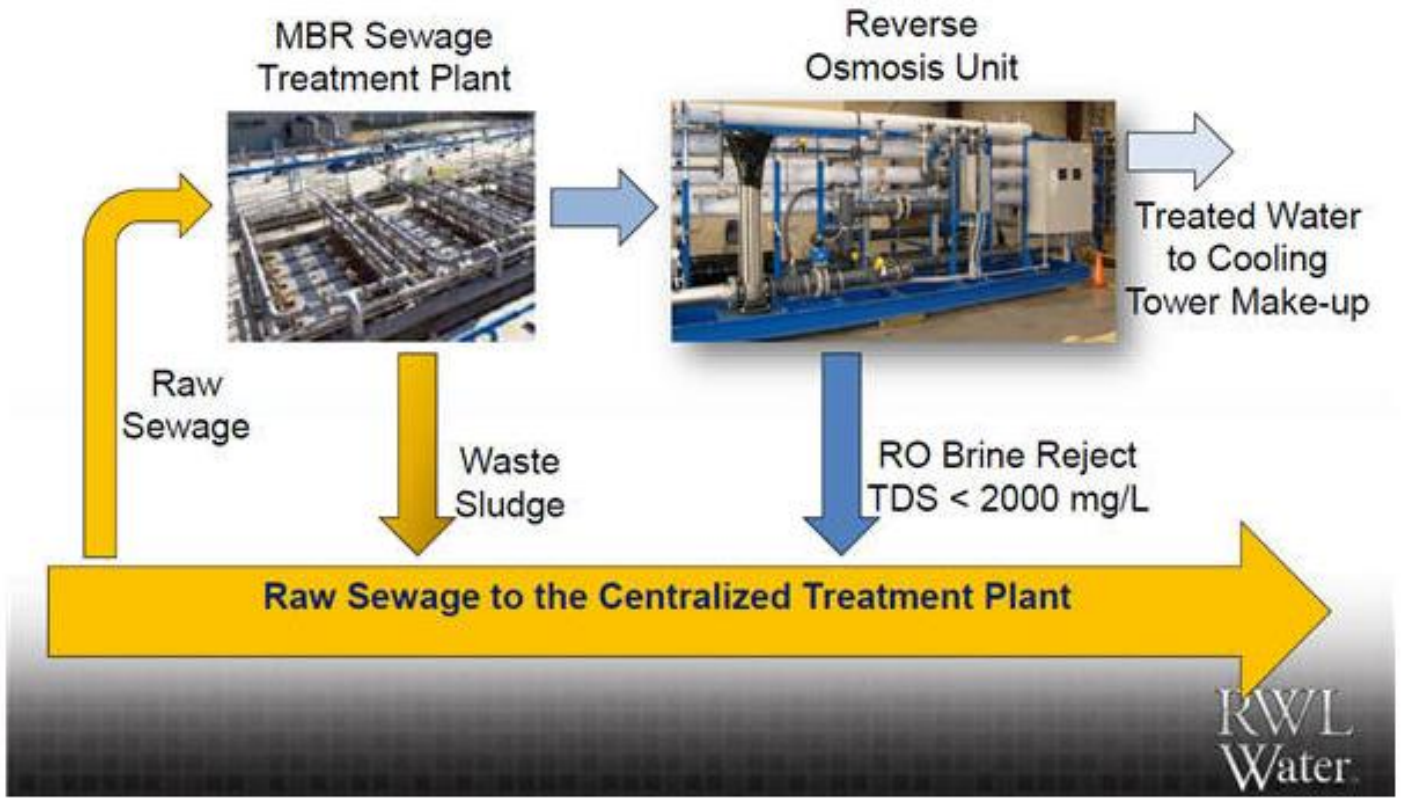


CSO's – Here?


City of Spokane CSO Locations
This map was made with Google My Maps. Create your own.
GARLAND DISTRICT
BEMISS
EMERSON GARFIELD
Spokane River
LOGAN
WEST CENTRAL
Spokane Arena
Palisades Park
Costco Wholesale
Spokane
EAST CENTRAL
CLIFF/CANNON
SOUTH PERRY DISTRICT
Manito Park
LINCOLN HEIGHTS
MANITO
ROCKWOOD
Glenrose
COMSTOCK
90
2
195

Sewer Mining

Very Site Specific based upon need



Source: Water OnLine, 11-16-15
Sewer Mining: An Unconventional Solution To Water Scarcity

Managed Aquifer Recharge (MAR)

- **Dr. Bruce Lesikar, P.E. TOWA**

  The Cheap water is gone

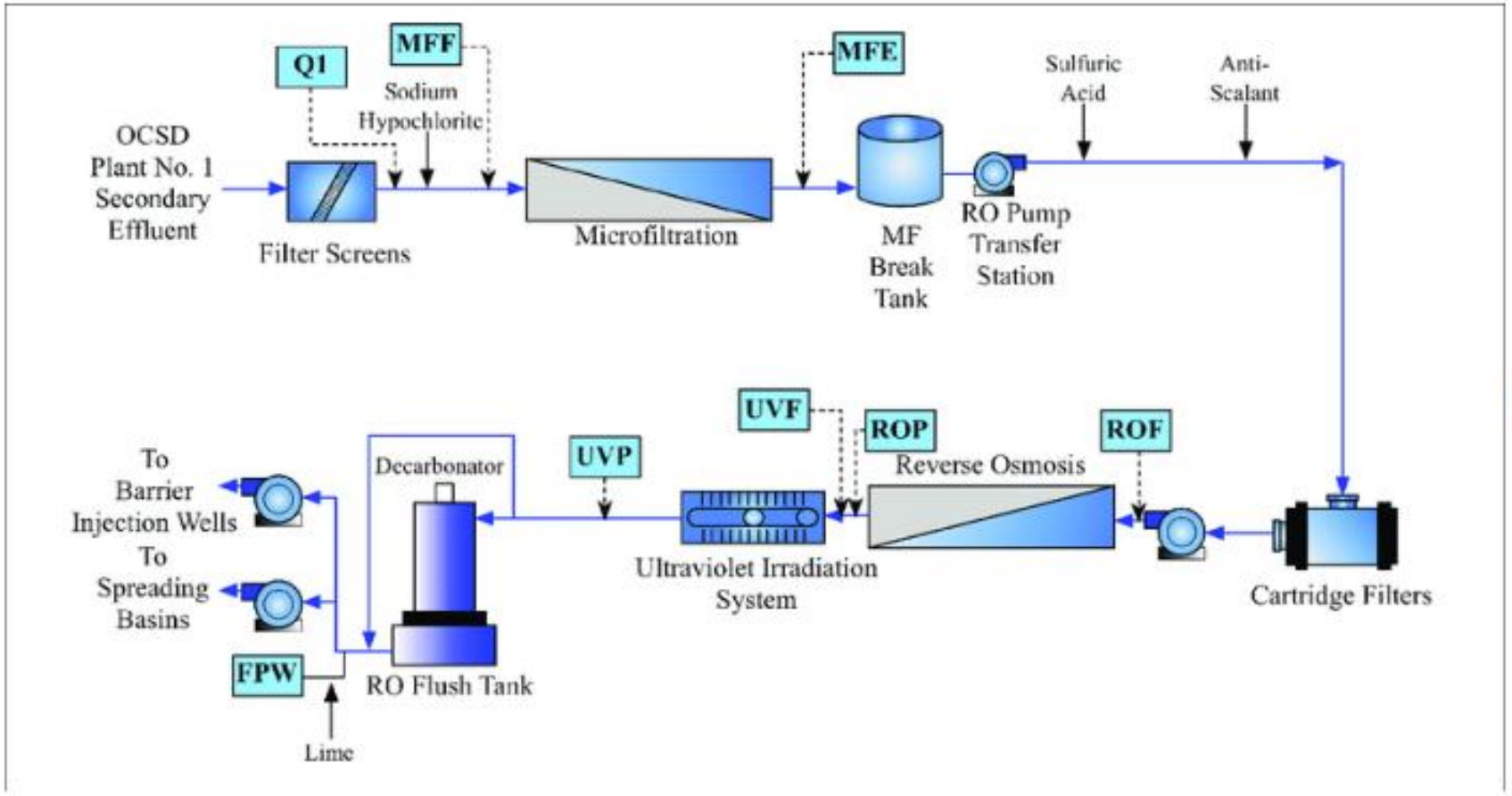
  Mother Nature is Tapped out: our water resources are stressed due to drought, population increase, AG increase

- **Water Supply is:**
- **Life Support**
- **Economic Viability for industry**
- **Food Security**
- **And is critical to maintain health ecosystems**

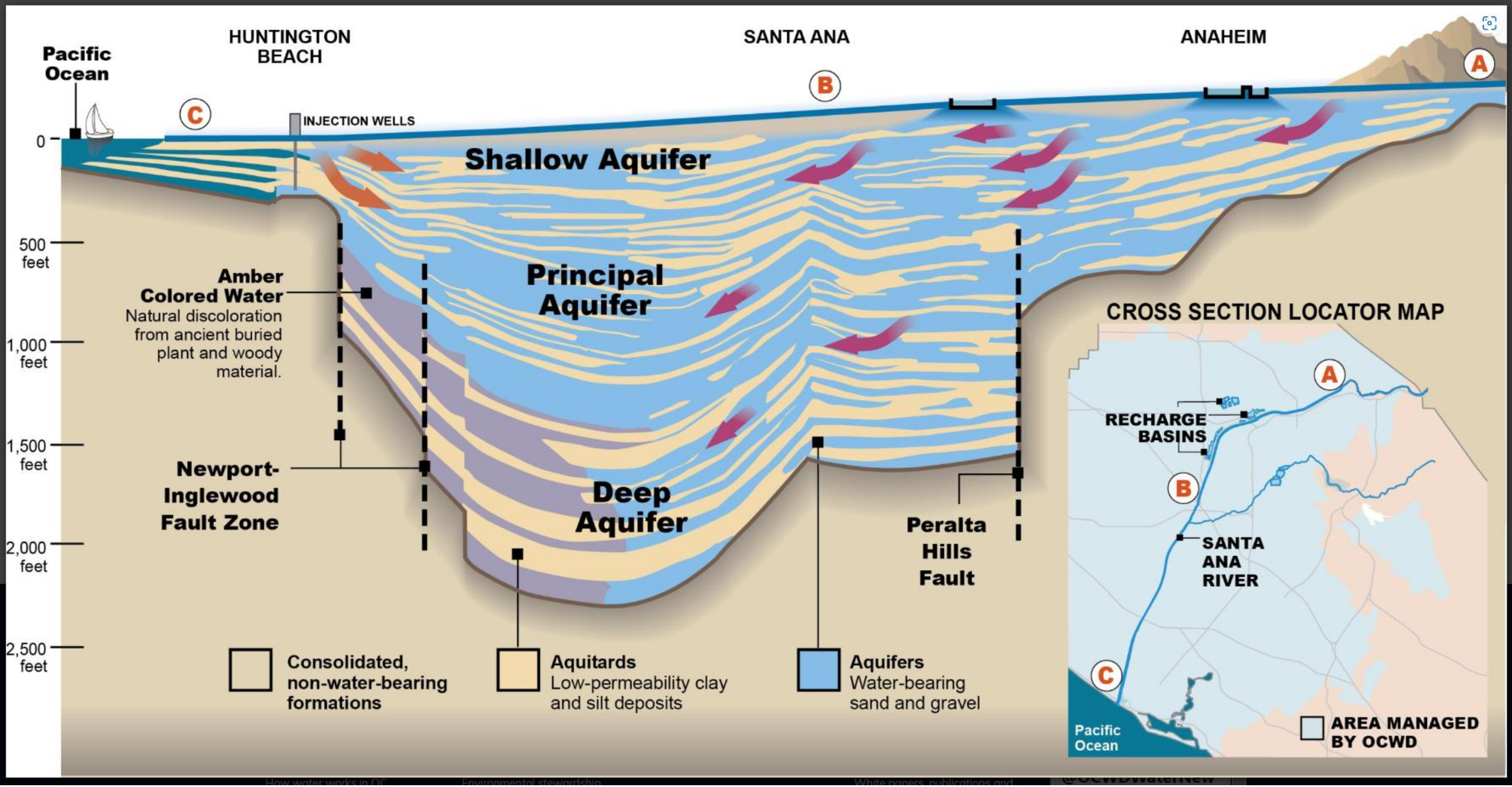
Groundwater Replenishment System Orange County, California

- Jan 2008, currently at 100MGD expanding 30MGD
- World's largest water purification and reuse project
- 50% is diverted to recharge the Orange County basin aquifer and the remaining amount is injected into the seawater intrusion barrier
- An example of indirect potable reuse
- The final product is of near-distilled water quality that meets or exceeds all state and federal drinking water standards. In fact, the treated water is so pure that minerals have to be added back into the water to buffer and stabilize it

Treatment Process Flow Diagram



| Process flow diagram of the Orange County Water District (OCWD) Groundwater Replenishment System (GWRS) Advanced Water Purification Facility (AWPF). Sample locations are shown in blue boxes, with approximate location in the flow diagram shown by dashed arrows. Hydrogen peroxide is also added prior to UV treatment (not shown).


Pacific Ocean
HUNTINGTON BEACH
SANTA ANA
ANAHEIM
A
B
C
INJECTION WELLS
0
500 feet
1,000 feet
1,500 feet
2,000 feet
2,500 feet
Shallow Aquifer
Principal Aquifer
Deep Aquifer
Amber Colored Water
Natural discoloration from ancient buried plant and woody material.
Newport-Inglewood Fault Zone
Peralta Hills Fault
Consolidated, non-water-bearing formations
Aquitards
Low-permeability clay and silt deposits
Aquifers
Water-bearing sand and gravel
CROSS SECTION LOCATOR MAP
RECHARGE BASINS
SANTA ANA RIVER
Pacific Ocean
AREA MANAGED BY OCWD

Aquifer Recharge: Los Osos, CA

Design Flow: 1.6 MGD

Installed: Summer-Fall 2013

Recharge System: Large Chamber dispersal field

Issues Resolved:

- **Small lots, outdated systems, code compliant systems could not fit,**
- **Long history of nitrogen issues. Coastal community, N-sensitive**
- **Ocean outfall prohibitive, needed to address saltwater intrusion via aquifer recharge**

Los Osos Recharge Area

Gold Beach, OR

The Problem: Existing centralized system was experiencing I&I problems. This resulted in the plant overflowing, solids carry over and then recharge system plugging and then overflowing.

Options investigated: Ocean Outfall, replace piping, replace recharge system

Solution:

- **I&I repair program**
- **Replace and expand the recharge fields**

Gold Beach, OR

- **Design Flow: 2 MGD**
- **Collection System: Existing gravity sewers and lift stations**
- **Treatment Plant: Sequencing Batch Reactor**
- **Recharge System:**
  - from 9 beds to 21
  - 3 separate zones of 7 beds each
  - Each zone served by its own pump, this allows for O&M flexibility and redundancy

Gold Beach System

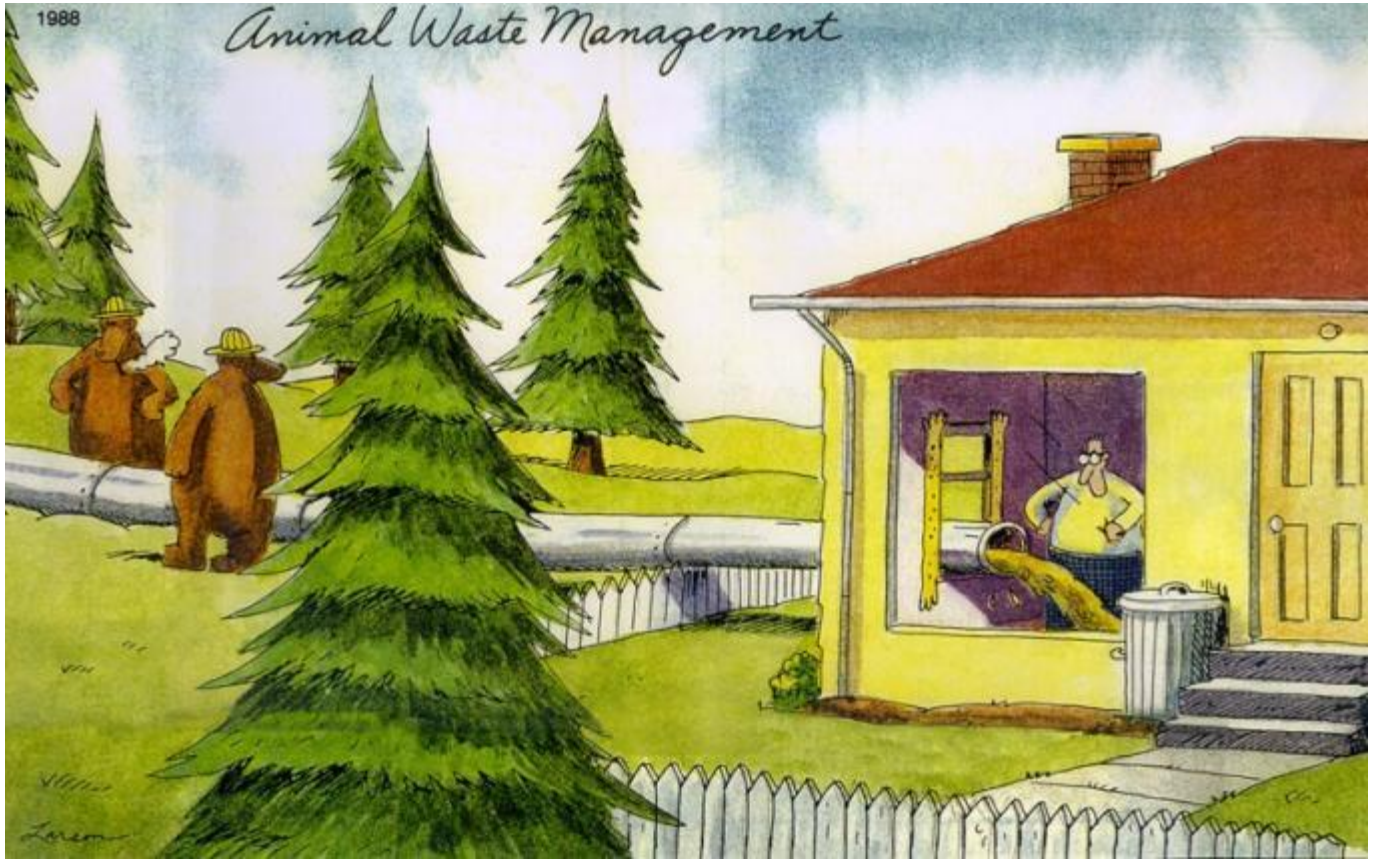
Conclusions: The Future

1. **The Decentralized Industry will continue to change – Change with it**

2. **Decentralized can offer the same treatment levels as centralized – and possibly offer a better cost position**

3. **O&M, O&M, O&M – design for it, stress the importance to the owner**

Thank you - Questions



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