Emerging Issues

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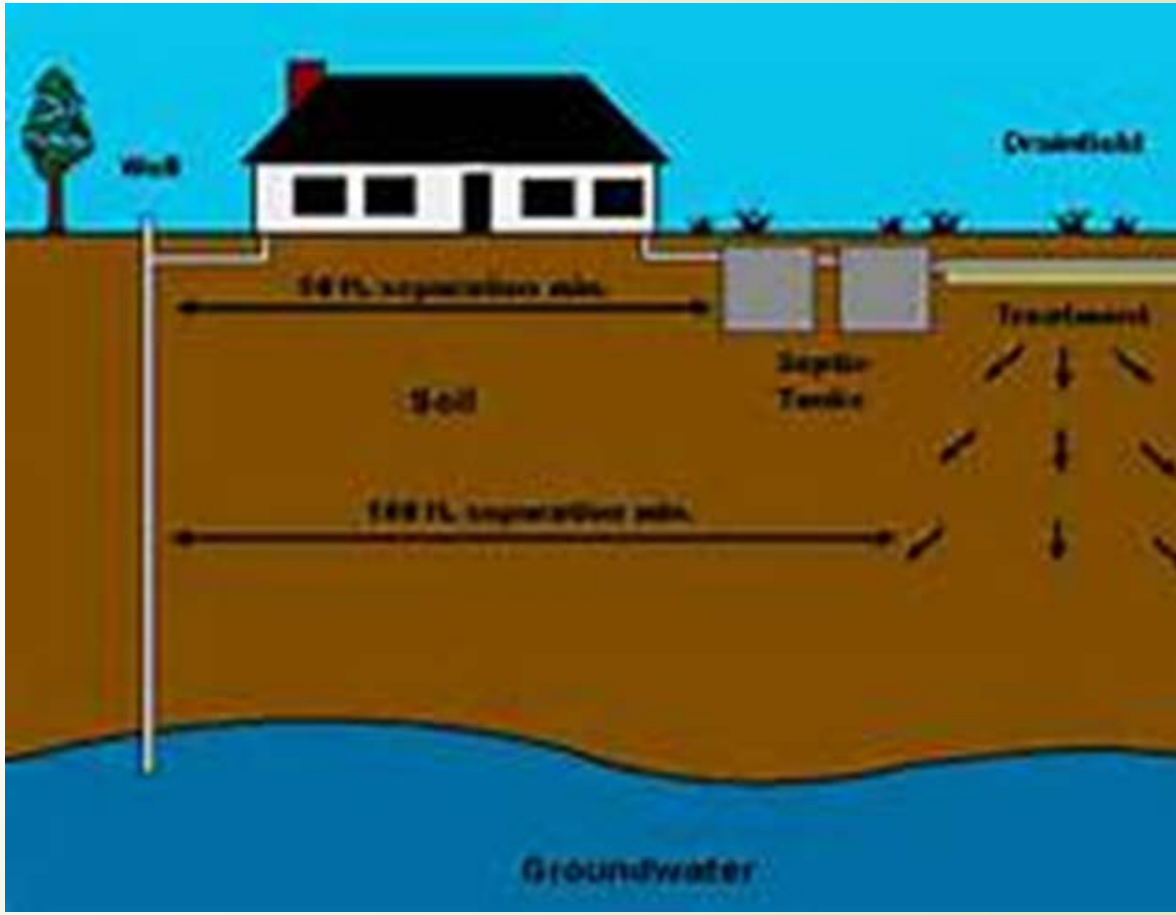
Industry Goals

- Longterm
- Treatment
- Affordable



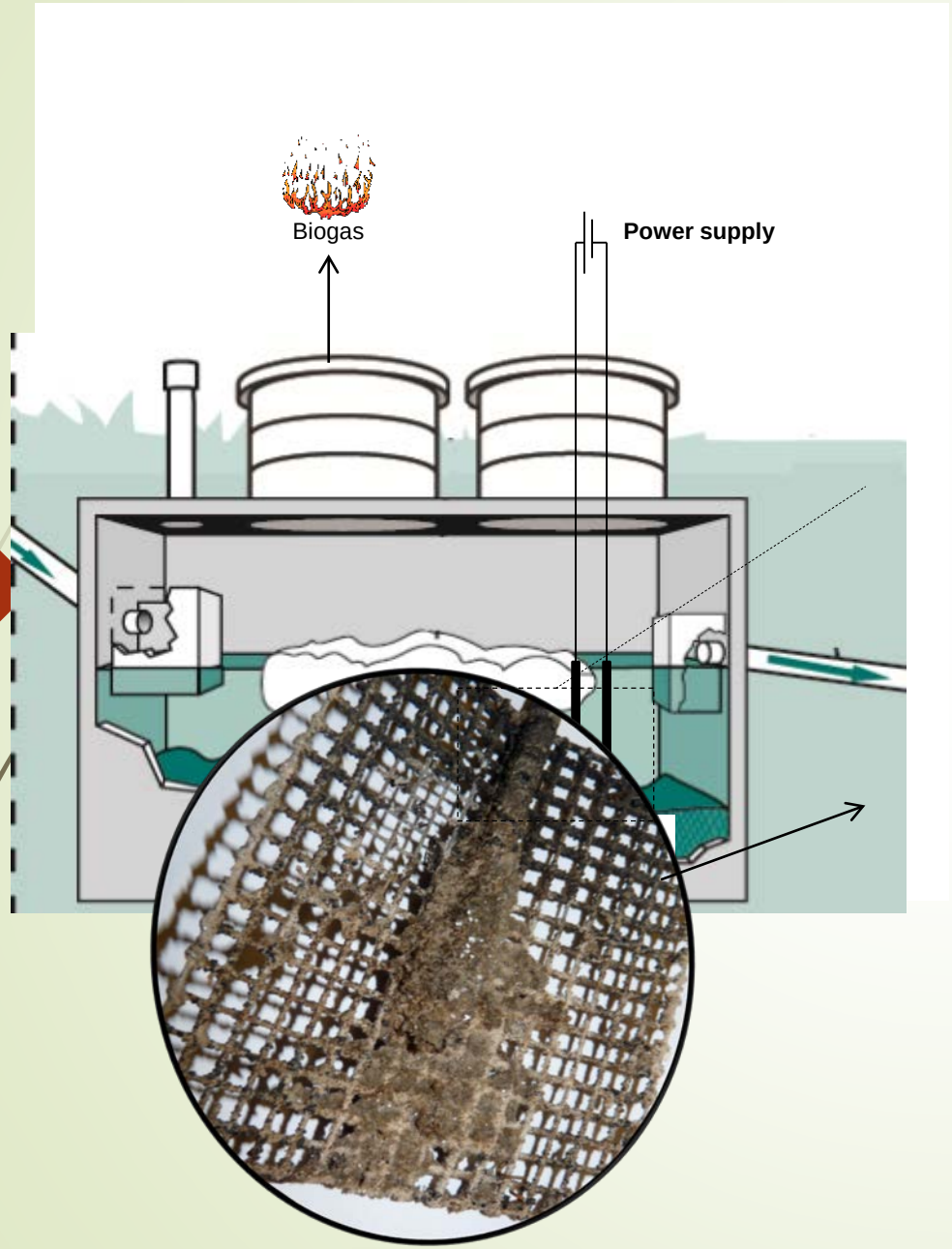
What are the Issues

- Treatment concerns
- System operation
- System care
- Industry Changes

Climate Change

- Heavier rains
- Warmer temperatures
- Higher Groundwater levels
  - Greater variation

Treatment concern



ENVIRONMENT AND NATURAL RESOURCES TRUST FUND

Electrochemical Assisted Anaerobic Digestion

Experimental set-up

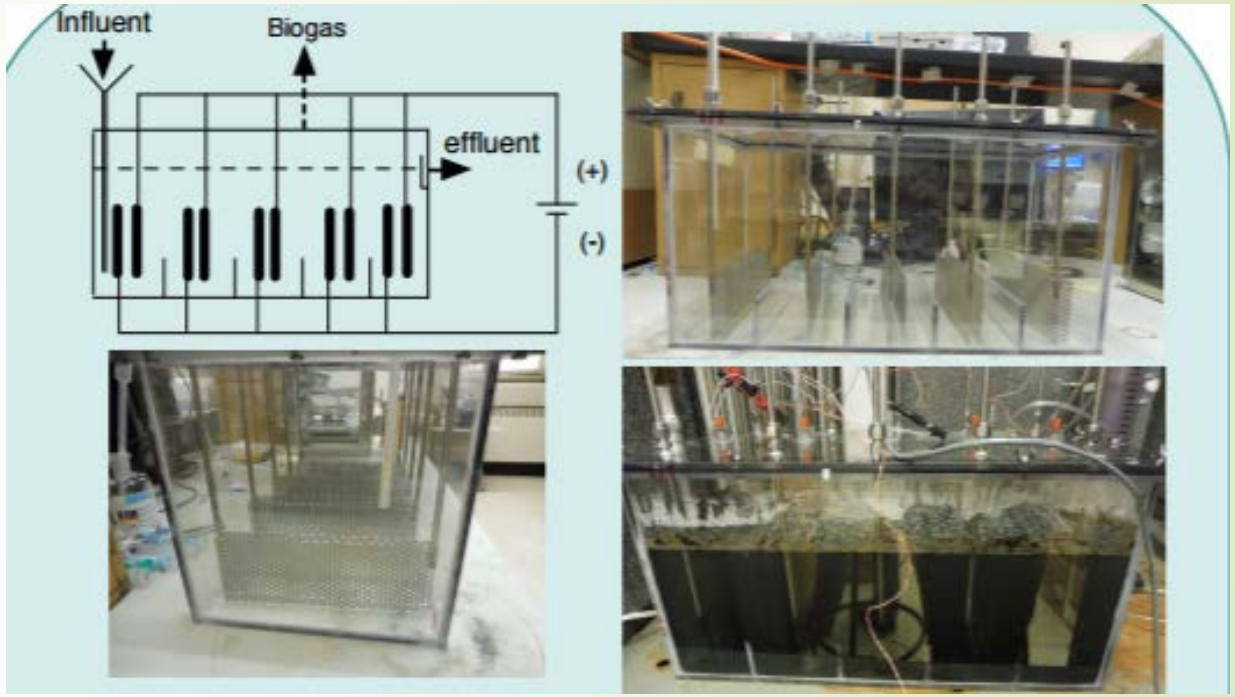
20 Liter reactor of the modified septic tank with electrodes

Schematics including electrodes position and connections

Photograph of empty reactor

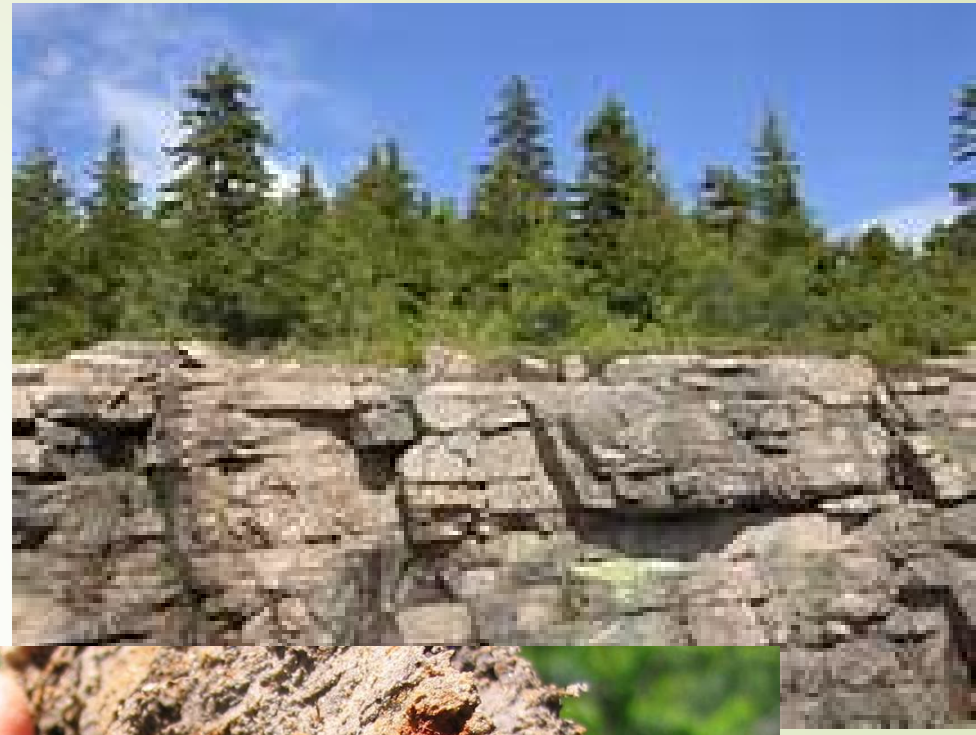
Reactor treating wastewater

The effect of increasing the Eap to 0.6 V and 0.7 V is being evaluated

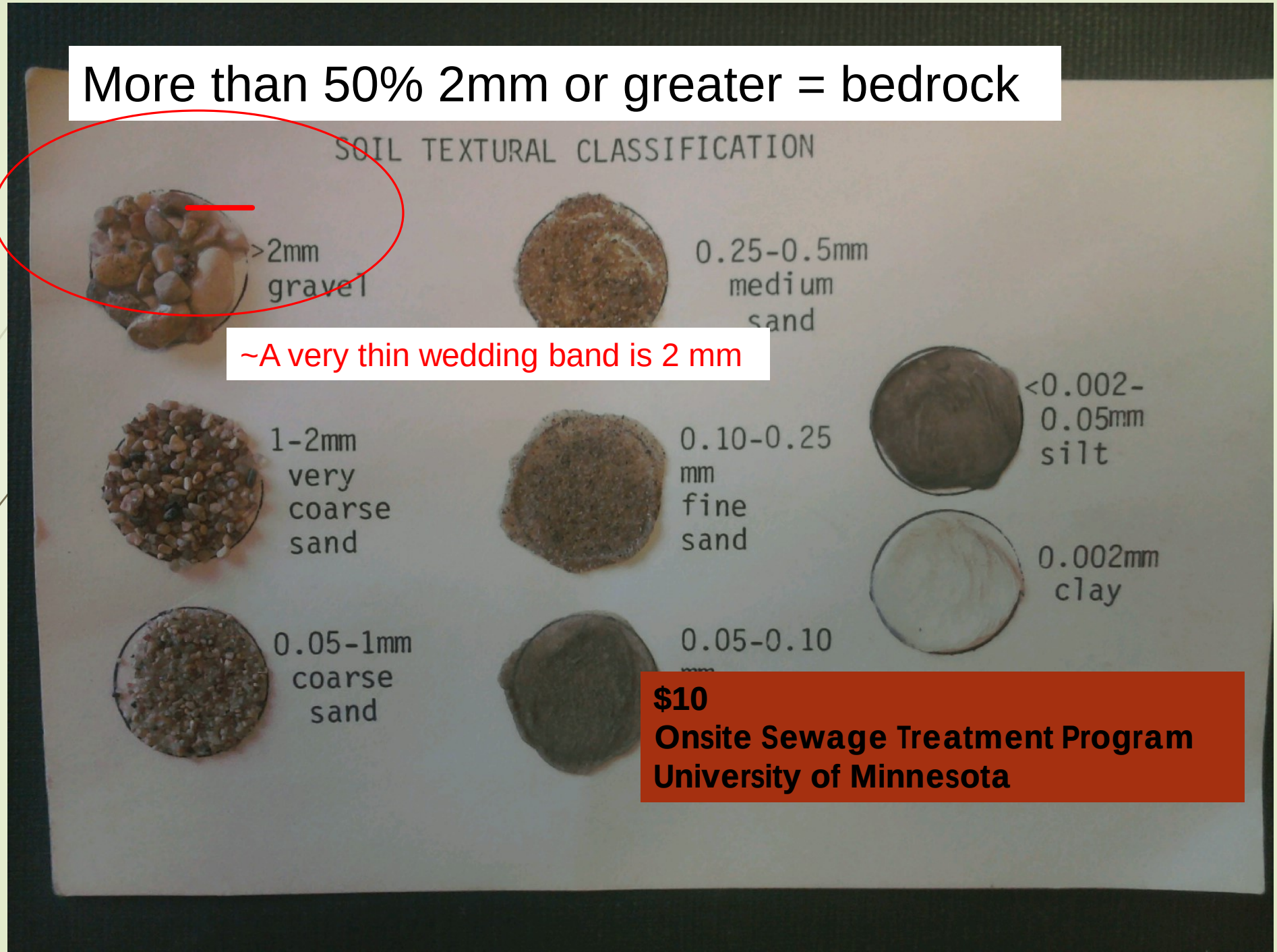


Limiting Conditions

- Saturated Soils
- Bedrock
  - Sandy soils
  - Rocky Soils



More than 50% 2mm or greater = bedrock



Saturated vs Unsaturated Flow

- Unsaturated for treatment
  - LTAR
  - SAR
- Saturated for speed
  - Hydraulic conductivity

Perc test does BOTH Characteristics

Surface water Protection

- Surface discharge
- Prescription drugs
- Grit

Treatment concern

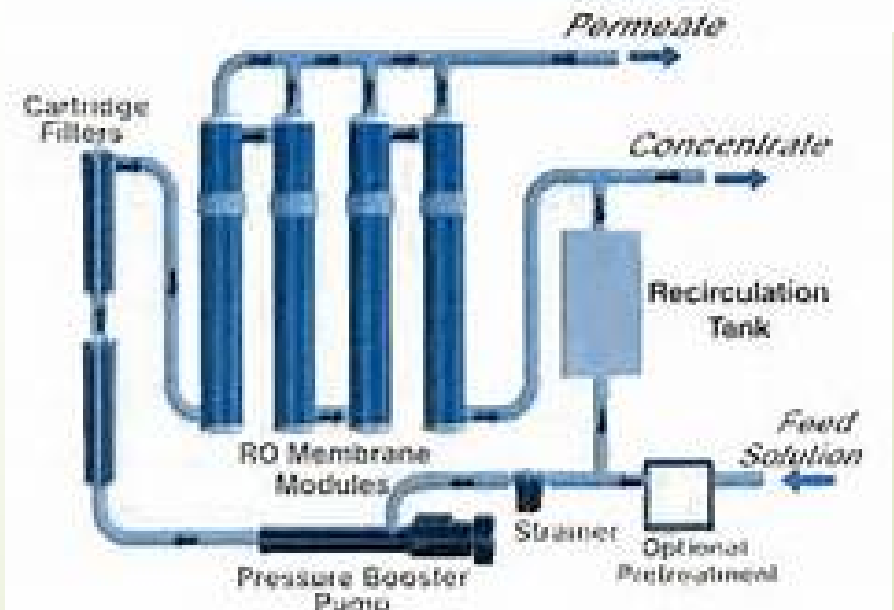
Ground water protection

- Water treatment
  - RO
  - Iron filters
  - Softeners
- System Compliance

Treatment concern

Water Conditioning

- Softeners
- Iron filters
- RO Units



Early Research

- Septic Tank/Water Softener "Potential Effects of Water Softener Use on Septic Tanks Soil Absorption On-Site Wastewater Systems"
  - *University of Wisconsin-Madison*

- "The Effect of Home Water Softener Waste Regeneration Brines on Individual Aerobic Wastewater Treatment Plants"
  - *NSF International*

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Recent Studies

- Novak et. al, VA Tech findings in regard to Industrial Aerobic Activated Sludge systems:
  - An imbalance in the monovalent to divalent (M/D) cation ratio can lead to poor settling
  - This had not been tested in anaerobic systems.
    - Poor settling and lack of clear zones may be due to excessive sodium (M) in relation to calcium (D) and magnesium (D).

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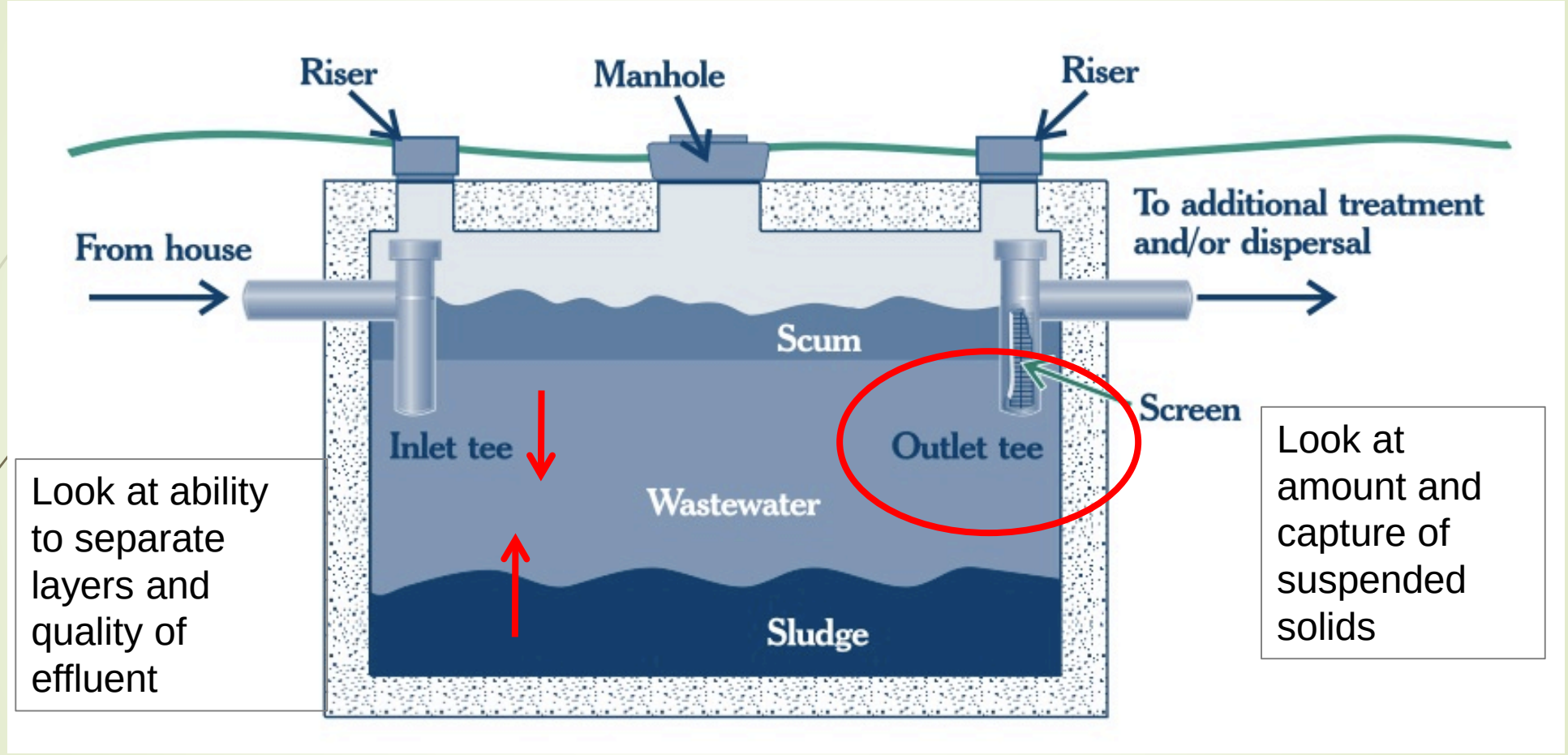
Study Goals



Look at ability to separate layers and quality of effluent

Look at amount and capture of suspended solids

Illustration from www.genie.com

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Outcomes

- More research
- Choosing “Better Units”
  - No Brine
  - Flow based
  - Time based – Potential issues
- Softener Care
- Be careful with Advanced technologies

System Specifics

- Design & Layout
- Special wastes
  - HSW
  - Hard to treat

- Closed restaurant [Really Famous Dave's ~ 20 seats and 15 seats in bar] wants to reopen and add patio seating [22 more seats]

System Loading

Design Confusion

- Residential
  - Assume BOD, TSS Loading
  - Estimated use [Bedrooms]
- Non-Residential
  - Higher Organic loading

THE CODE

Care facilities

VRBO

Flow Changes

- Check “Old Design” — **2,000 GPD**
- New Numbers
- 20 Seats [Food] x 30 gpd — 600 gpd
- 15 Seats [Bar] x 36 gpd — 540 gpd
- 22 Seats [Patio] x [30-36] gpd — 660-792 gpd
- 11 Employees x 15 gpd — 165 gpd

1,965-2,097 gpd

Tank Sizing

- Remember “Grease trap”
- Typically 1 times the Kitchen flow
  - 70% total flow
  - 2,000 x 70% = 1,400 gal
- Septic tank: 3 x Design flow
  - 2,000 gpd x 3 days = 6,000 gal
  - Or 4 times and skip grease trap 8,000 gal

System Sizing

- After service check STA loading
- Measured flow ~ 890 gpd
- Measured BOD_5 ~ 755 mg/L
- # BOD_5 = Flow x Conc. X 8.35÷1,000,000
- 890 gpd x 755 mg/L x 8.35÷1,000,000

5.6 LBS

Soil Organic Loading Rate

- SOLR = # ÷ Sqft
- 5.6 # ÷ 2,000 Sqft

Too High

0.003

2,000 sqft

TABLE 5.1 SOLR—Bottom Area Only

SHLR	lbs of BOD/ft²/day of total absorption area	lbs of TSS/ft²/day of total absorption area	lbs of FOG/ft²/day of total absorption area
Sand [1.2]	0.0017	0.0006	0.0003
Sandy Loam [0.78]	0.0011	0.0004	0.0002
FS, Loam [0.6]	0.0009	0.0003	0.0001
Silt Loam [0.5]	0.0007	0.0003	0.0001
Clay Loam [0.45]	0.0006	0.0002	0.0001

3,333 sqft

0.002

Too High

Solutions

- More Area
- # of BOD_5 ÷ SOLR
- 5.6 ÷ 0.0009 #/sqft= **6,222 sqft**
- Pretreatment

SIZING ISSUES~ SOLUTIONS

- Backward Design
  - Area Limited
  - Contour Limited
  - Treatable Design flow
    - *Flow equalization*

CLR Example~ Good Site

- Good site with only a 40’ contour available
- Recommended CLR = 12 gpd/ft
- Design flow = Contour length x CLR
- Design flow = 40 ft x 12 gpd/ft

480 gpd

- Timer setting = 70% of Design flow
- Timer setting = gpd x .7 [70%]

336 gpd

Example~ Ugly Site

Perc rate 133 mpi

Ugly site with only a 40’ contour available

Recommended CLR = 6 gpd/ft

Design flow = Contour length x CLR

Design flow = 40 ft x 6 gpd/ft

240 gpd

Timer setting = 70% of Design flow

Timer setting = gpd x .7 [70%]

170 gpd

Example: Limited width

- 5 Bedroom Type I home
- Site with Clay [88 mpi] and an available area of 35’ x 40’ on the site

Clay [88 mpi]

- MAR~ 5
- CLR = Width ÷ MAR
- CLR = 40’ ÷ 5 8 gpft
- System Max Flow = Length x CLR
- System Max Flow = 35’ x 8 gpft 280 gpd
- Timer Setting = 70% of Max flow
- Timer Setting = gpd x .7 196 gpd

The Industry

- **Unknowns**
  - MRSA Bacteria
- **Current practices**
  - Land Application
- **Business Transition**
  - Work force age

Safety

- OSHA
  - Excavation focus
- Pathogens
- MRSA
  - Methicillin-resistant Staphylococcus aureus
  - Anti-biotic Resistant

Today's Regulations

- Relationships
- Understanding
  - Two Parties
- Moving forward

MN example

Questions