SESSION 5: *Onsite Wastewater Treatment*

TWON
TEXAS
Well Owner
NETWORK

ARROYO COLORADO WPP IMPLEMENTATION PROJECT- CAMERON COUNTY OSSF INVENTORY

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Onsite Wastewater Treatment

- What is an On Site Sewage Facility (OSSF)?
- Why are we concerned about wastewater?
- Evolution of onsite wastewater treatment
- Function of a septic system
- Evaluation of septic tank operation
- When should a septic tank should be pumped?
- How to live with a septic system

Onsite Wastewater Treatment

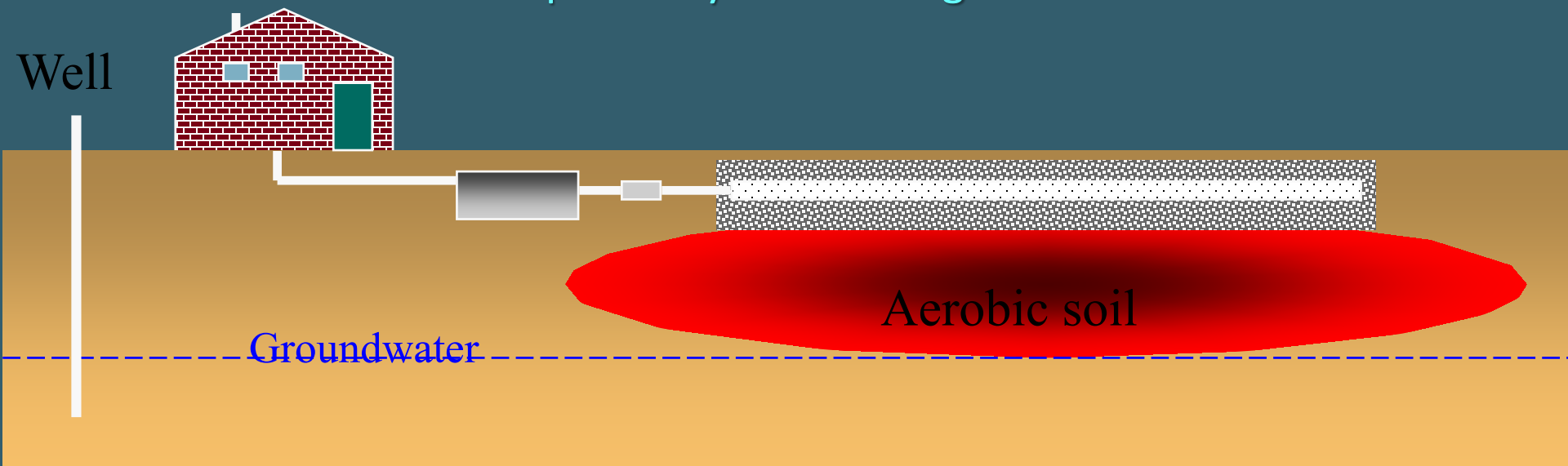
Permitting Wastewater Treatment Systems

- Texas Commission on Environmental Quality (TCEQ), Chapter 285 for 5000 gallons per day or less
  - On-Site Sewage Facilities (OSSF)
  - Local Authorized Agent; Usually local Health Department
  - TCEQ Regional Office
- TCEQ, Chapter 217 for more than 5000 gallons per day.

Malfunctioning Onsite System

Evolution of Wastewater Management

- Evolving goal:
  - Disposal: effluent goes away versus treatment
  - Dispersal: TREATMENT
- Public health AND environmental issues addressed
- Management:
  - Disposal: often no management at all
  - Dispersal: system management is critical

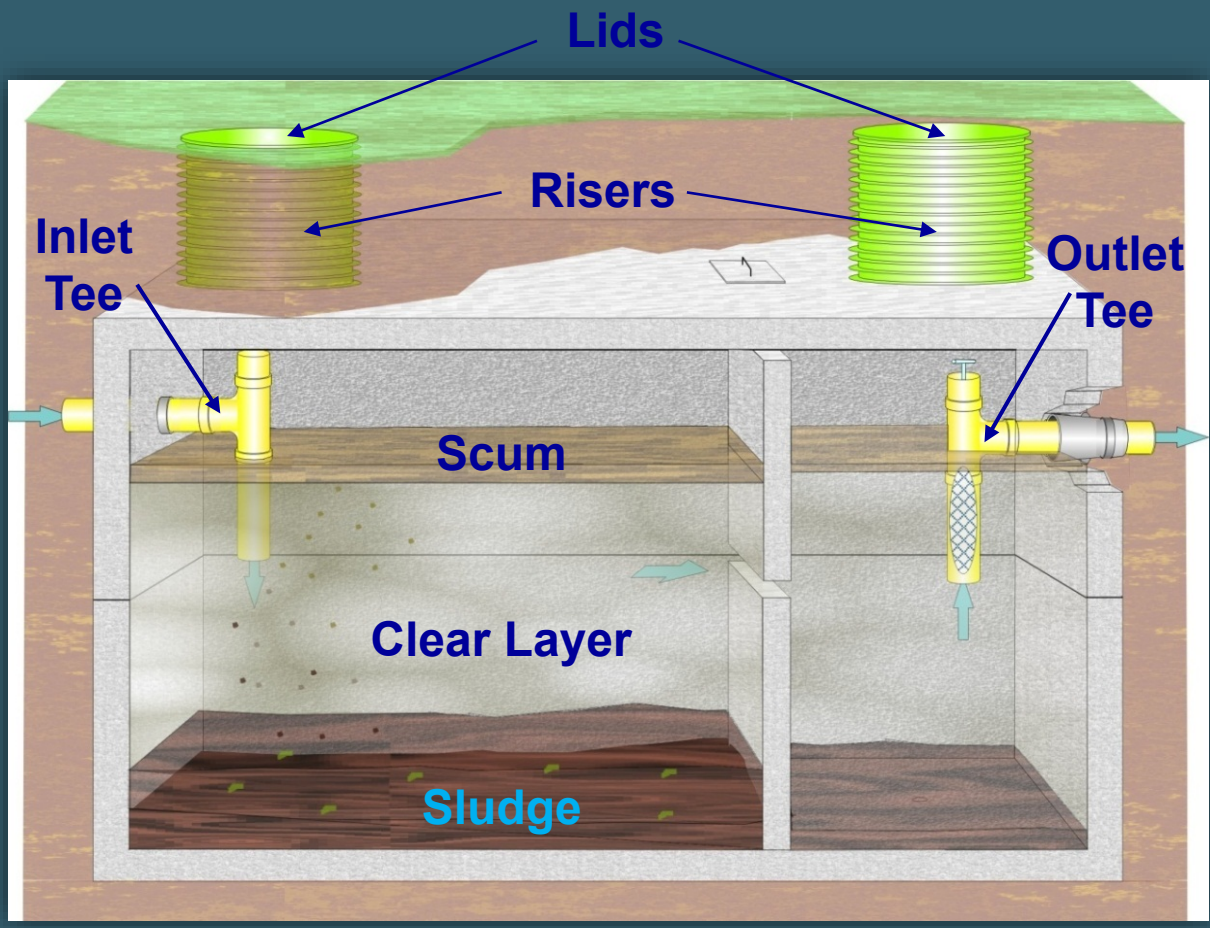


How do we make the OSSF work?

- Evaluate the wastewater source:
  - Hydraulic and organic loading
- Evaluate site
  - Wastewater treatment
  - Wastewater acceptance
- Choose a final treatment and dispersal component
- Choose the appropriate pretreatment system
- Operation and maintenance

What is a Septic Tank?

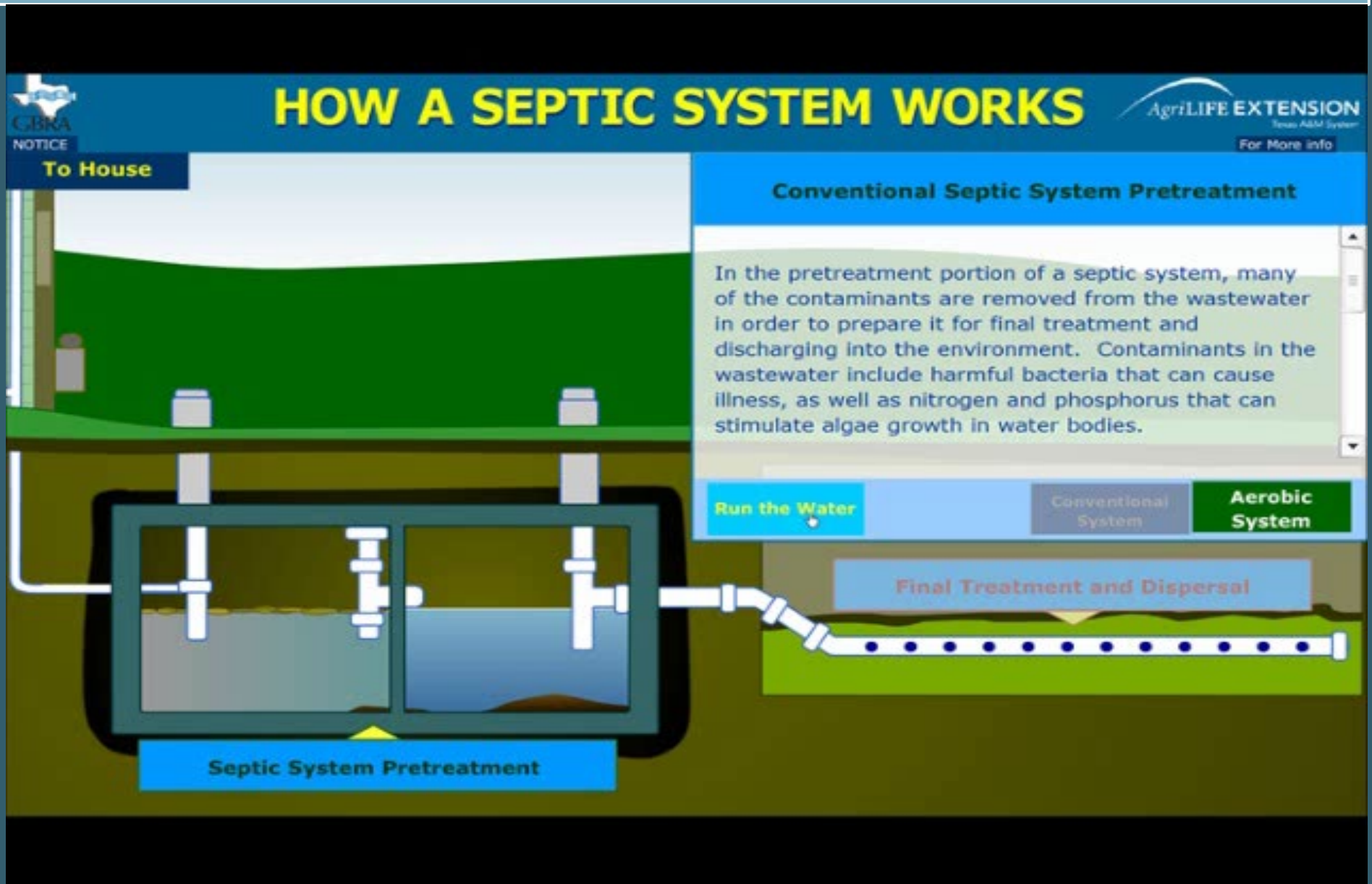
- Water tight containers
  - Concrete
  - Plastic / Fiberglass
  - NOT Metal
- Detention time
  - Typically 2-3 days
  - Calm conditions
- Gravity separation
  - Heavy sinks
  - Lighter floats
- Anaerobic digestion



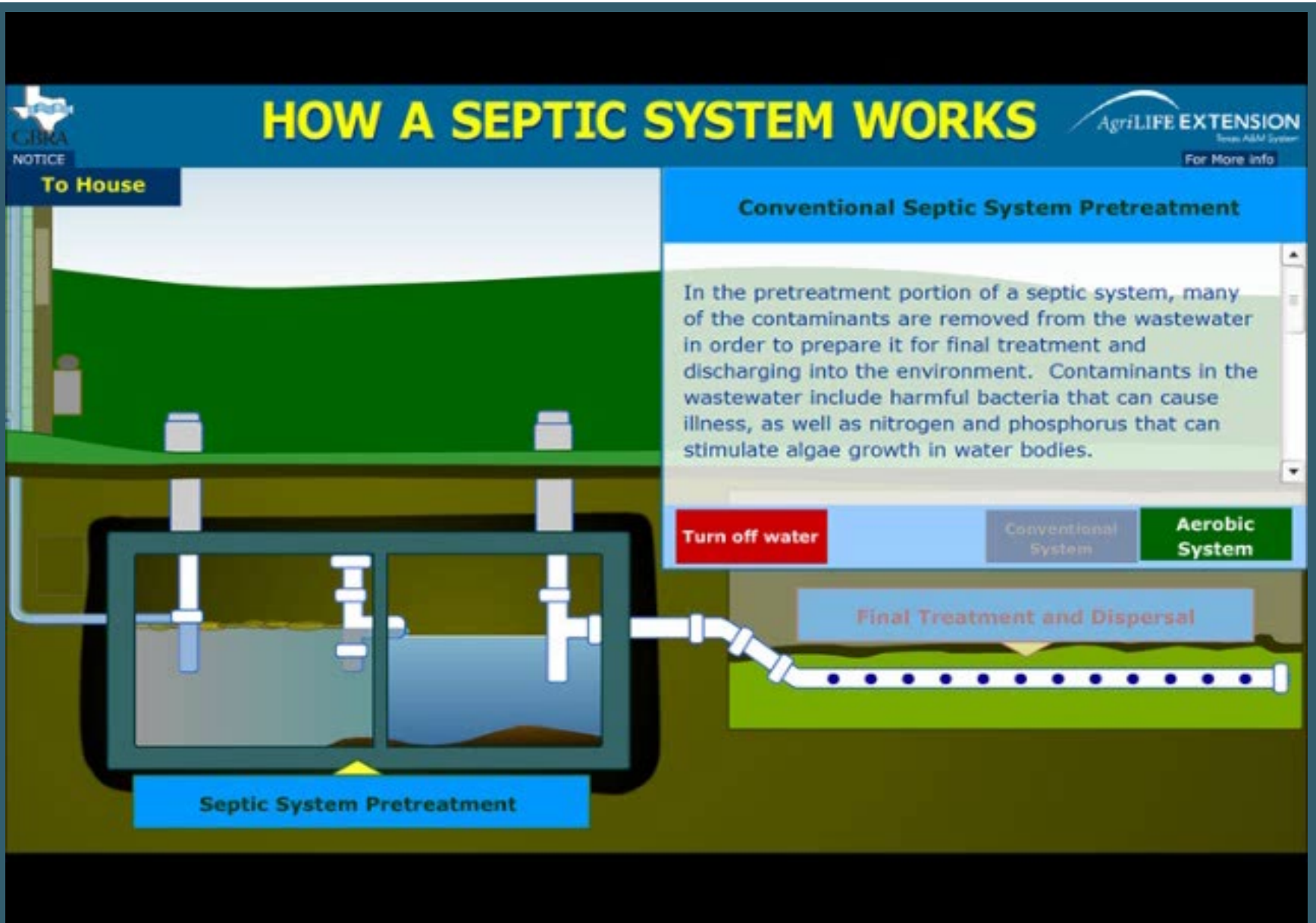
Square & Round Septic Tanks

Round-500 gallon

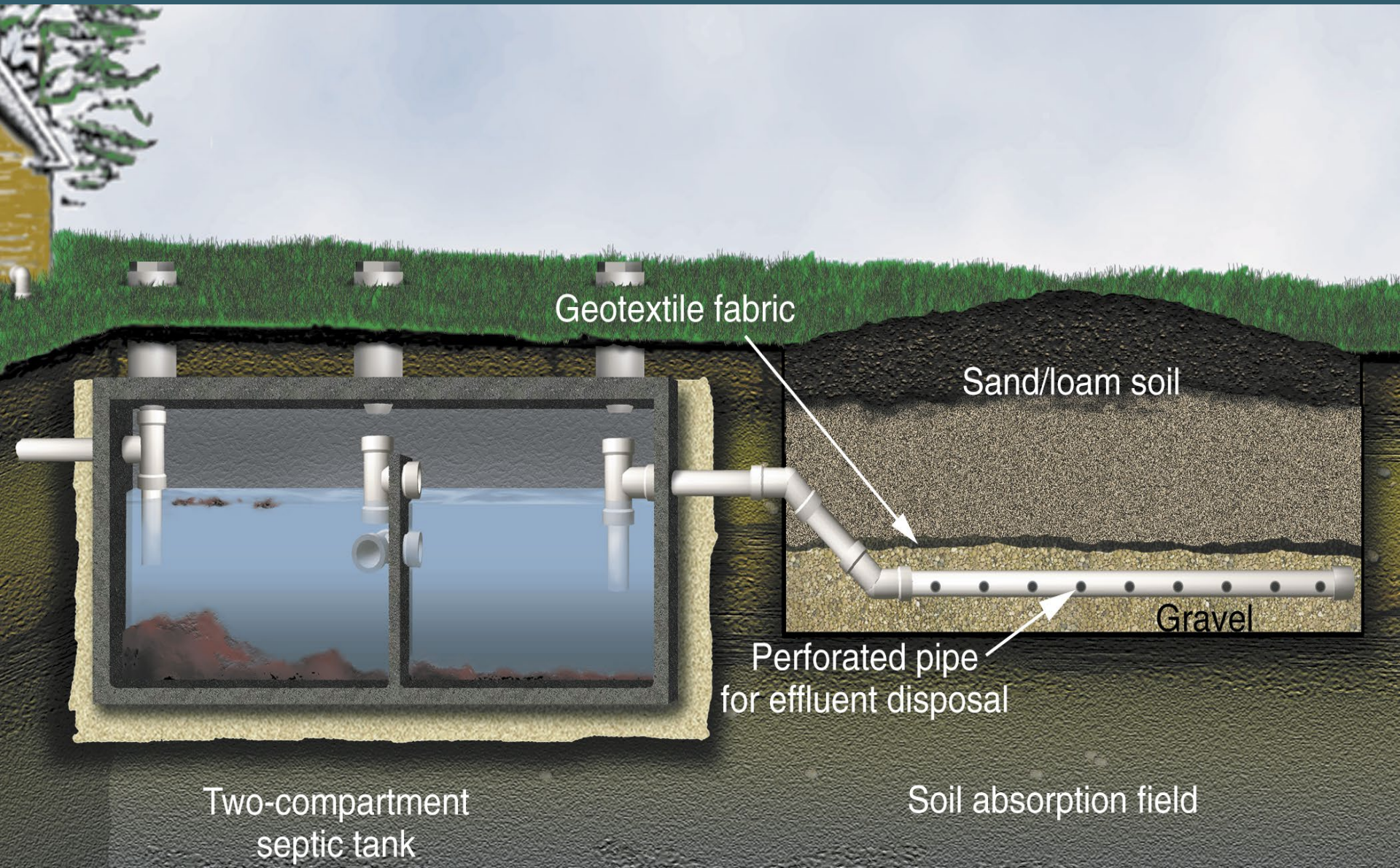
What is a Septic Tank?



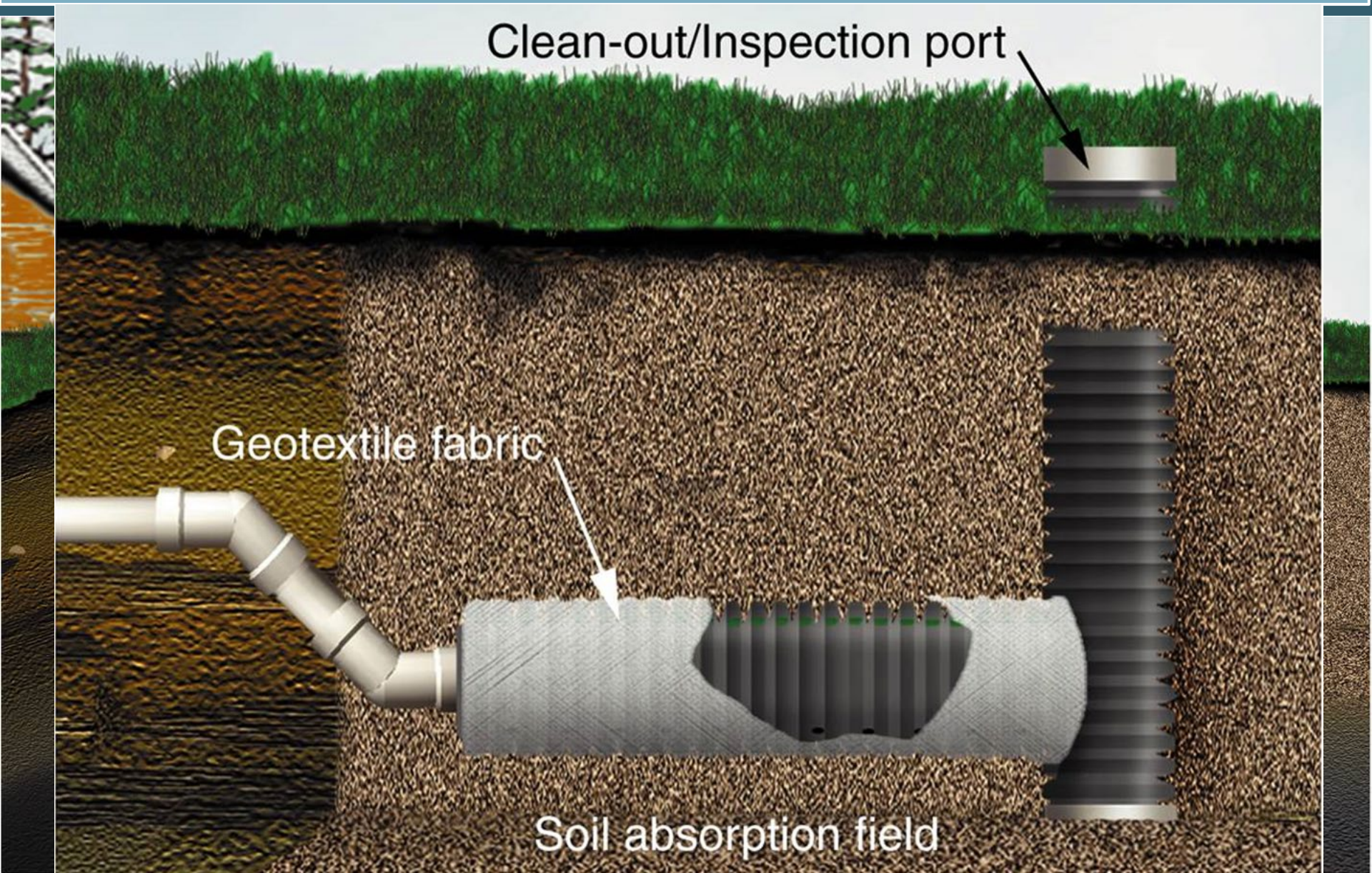
What is a Septic Tank?



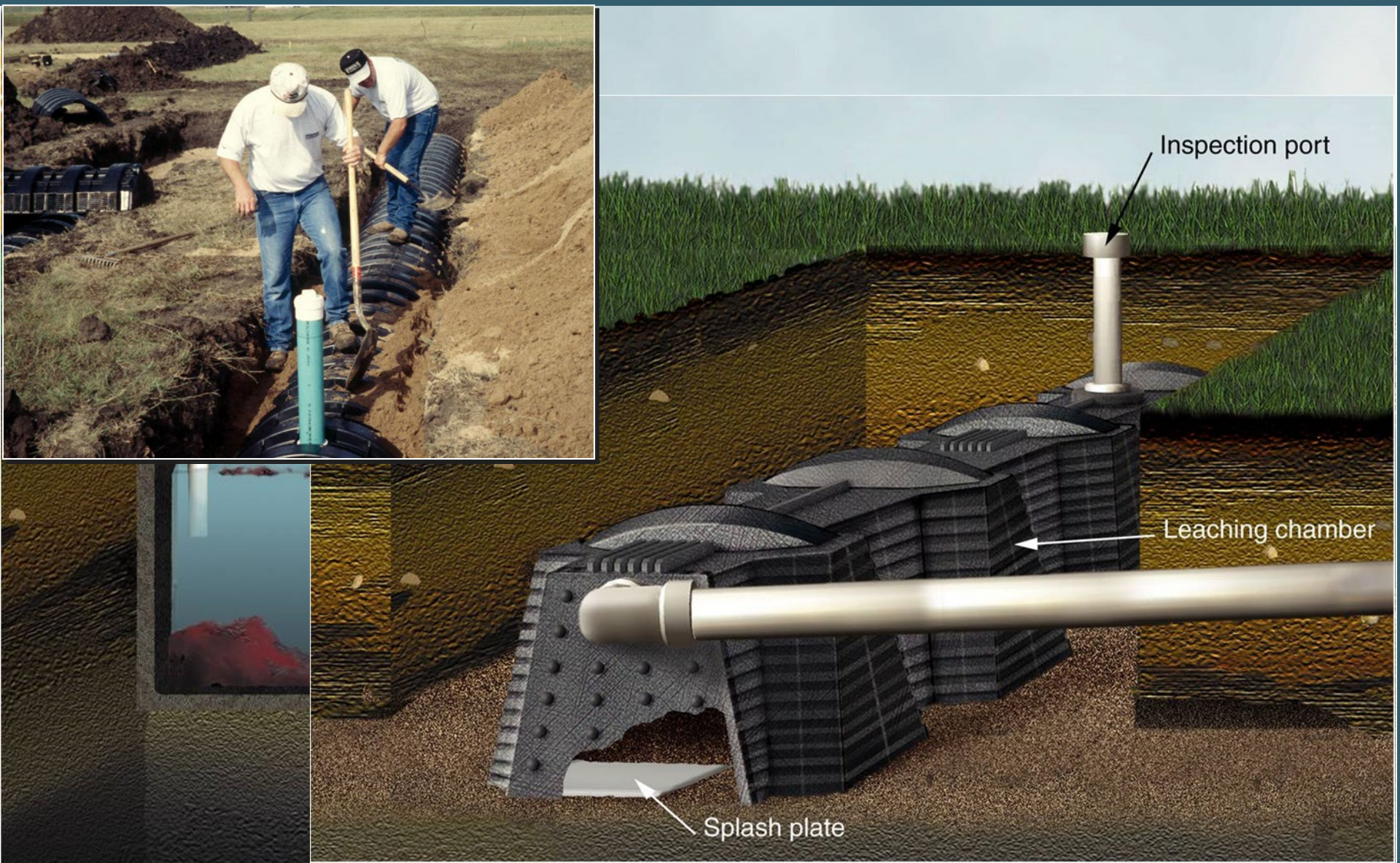
Conventional Septic Tank System



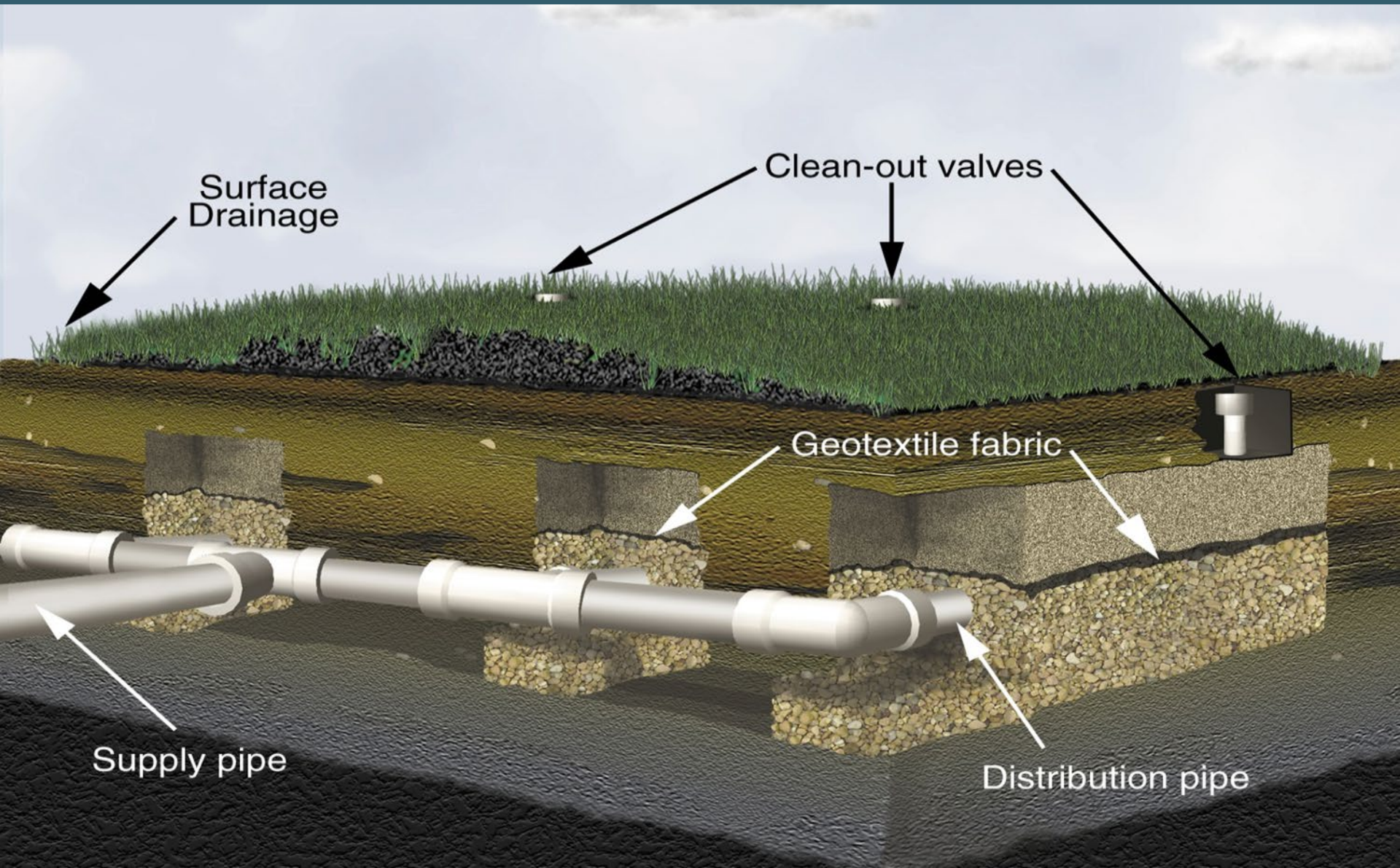
Gravel-less Pipe Distribution



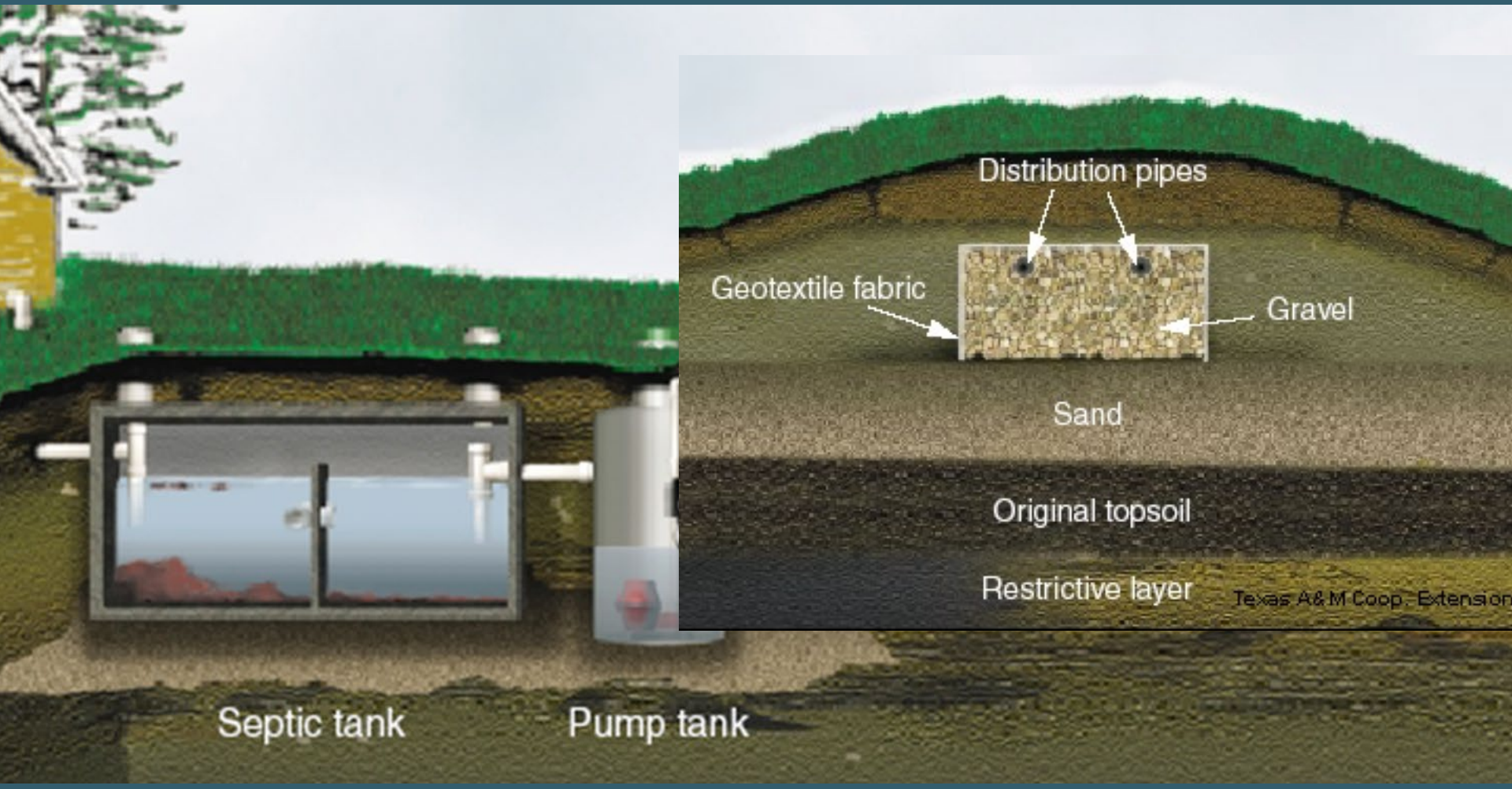
Leaching Chambers



Low-Pressure Distribution



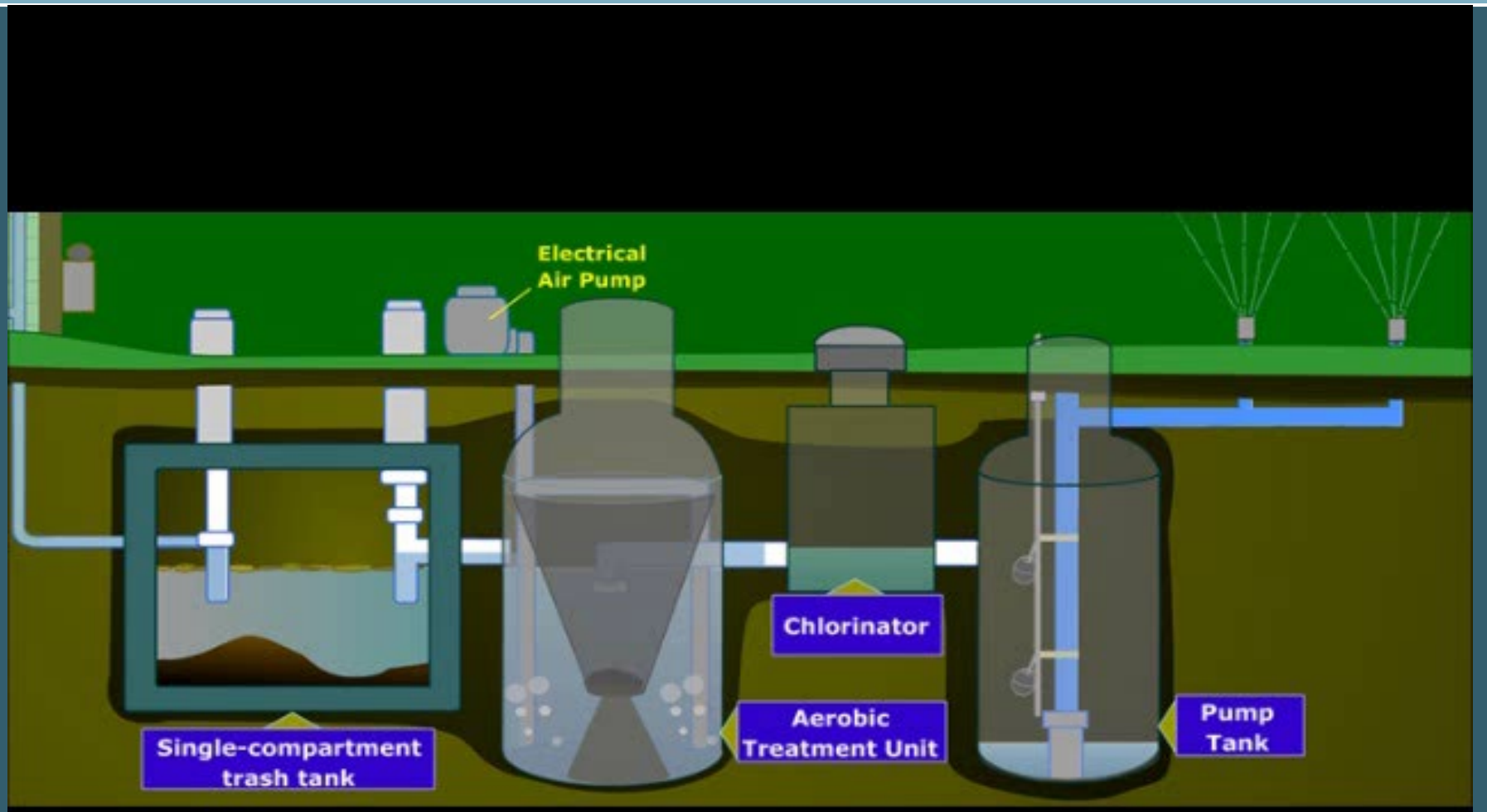
Mound Distribution Field



Role of Vegetative Cover in Treatment System

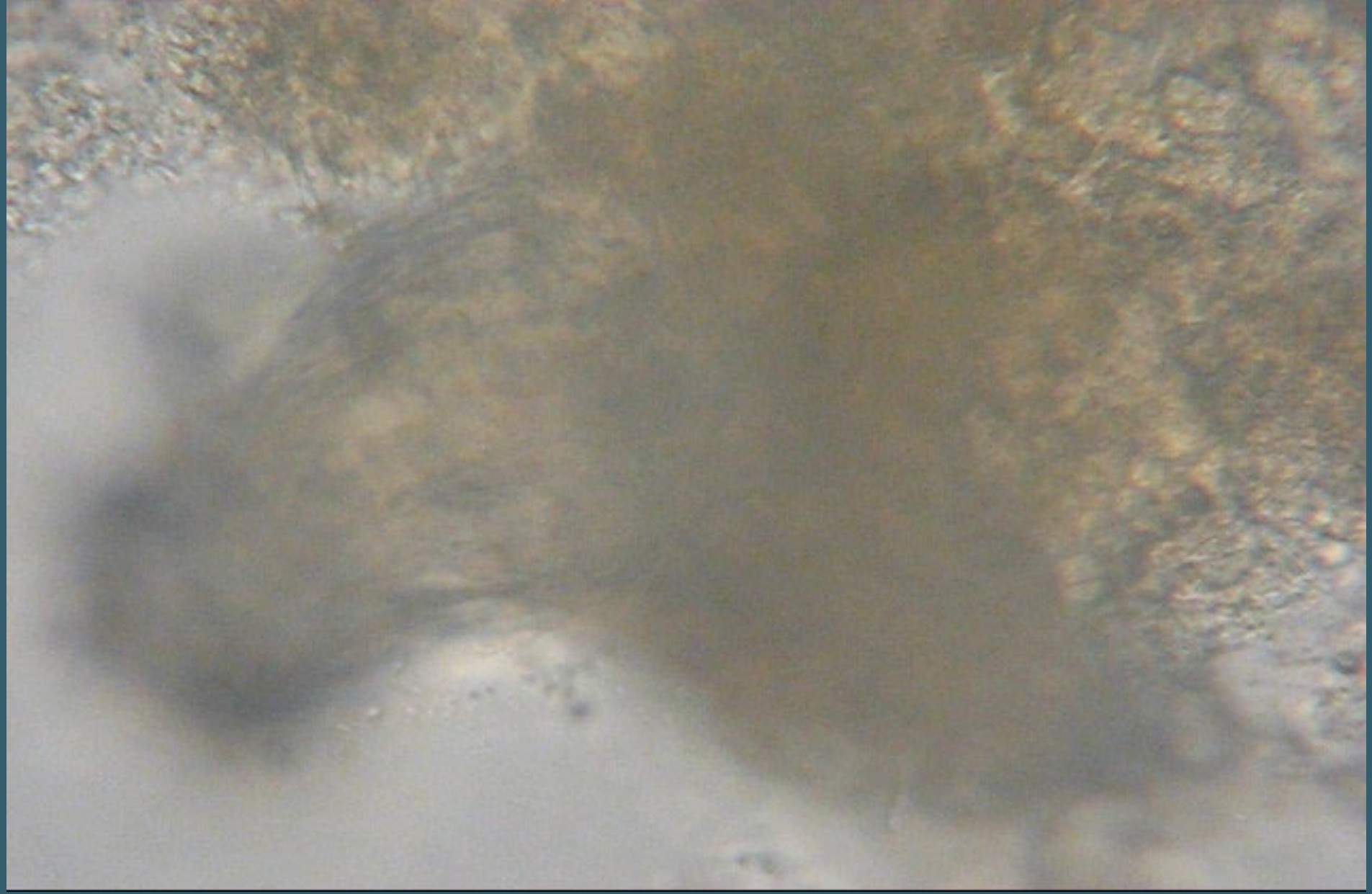
- A healthy cover crop is essential for the system to function properly.
- Plants will:
  - Take up water and nutrients
  - Stabilize the soil and prevent erosion
  - Support beneficial soil organisms
- Do NOT park vehicles on drainfield
- Do NOT construct decks, driveways or buildings over drainfield
- NO woody vegetation over drainfield

What is an Aerobic Treatment Unit?

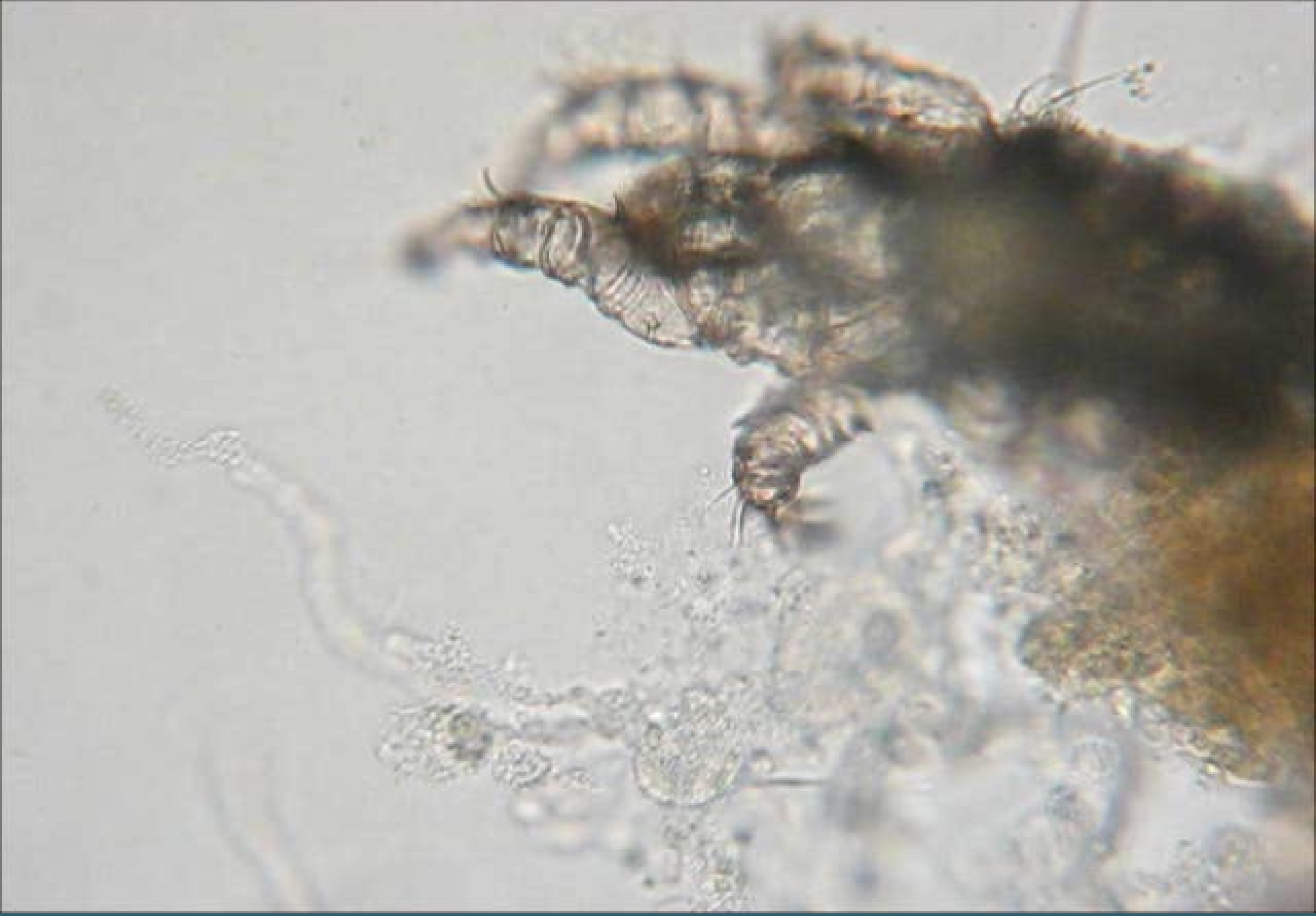


Aerobic Treatment Unit

- Aerobic Microbes
  - Require oxygen to live and grow
  - Consume waste and bacteria
- Air supply
  - Compressor / Aerator
  - Diffusers
  - Oxygen transfer to wastewater
  - Mixing of food and organisms
- Clarifier



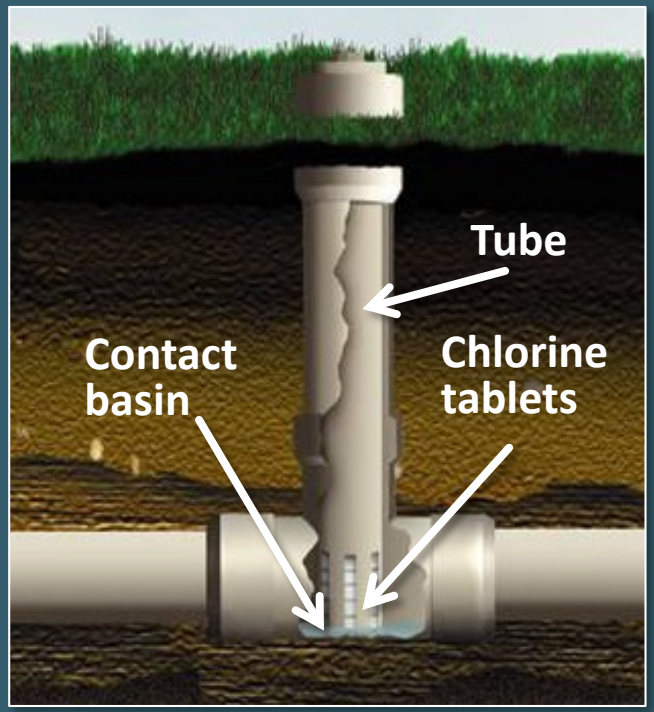
Large rotifers attached to aerobic treatment media feeding on bacteria and organic nutrients pH 6.94, DO 4.54 ppm



Mite on aerobic treatment media pH 6.94, DO 4.54

Aerobic Treatment Unit System

- Disinfection
  - Disinfection, NOT sterilization!
  - Chlorinator
    - NOT SWIMMING POOL TABLETS!
  - UV light
- Distribution
  - Pump tank
  - Spray field
  - Subsurface drip



Water Quality – Spray Field

- High potential for human contact
- This is effluent – **NOT DRINKING WATER!!!!**
- Soil microbes are the final treatment!
- A healthy cover crop is essential for the system to function properly.
  - Take up water and nutrients
  - Stabilize the soil and prevent erosion
  - Provide food and habitat for beneficial soil organisms

Subsurface Drip Distribution

FEEDING THE SYSTEM

Conventional and Aerobic Systems

FATS, OILS AND GREASE

Constituent	State at room temperature	Comments
Fats	Solid	Non-toxic to the system, origin – animals, will separate in water
Oils	Liquid	Non-toxic to the system, origin – plants, trouble separating in water
Grease	Solid	Residual material on appliances; solid material on pans/equipment; petroleum products; moisturizers; bath oils; tanning oils; Toxic to the wastewater system

Kitchen

- Dishwasher
  - Hydraulic surges of wastewater
    - Space out loads
  - Organic load
    - Clean/scrape plates
- Garbage Disposal
  - Increases scum by 20%
  - Pumping required 1-2 years sooner
  - Organic matter has not been digested, so it will take longer to break down
  - Small particles take longer to settle

Laundry

- Use should be spread out
  - Returning from vacation
- Liquid soap is recommended
  - Use less
  - Remove risk of fillers in powders
  - Use bleach sparingly
- Consider a high efficiency washer

Bathroom

- Only urine, feces, soap, toilet paper and limited amounts of cleaner should go down the drain
- No feminine products, prophylactics, cigarette butts, etc.
- No every-flush toilet bowl sanitizers
- Bath and body oils
  - Increases fats, oils and grease
  - If usage is great, may need more maintenance

Septic Safe?

Toilet Paper

- Excessive use results in faster sludge build up
- Treated toilet paper (with lotions) prevents paper from settling
- Wet wipe disposal is discouraged

Prescription Drugs and Antibiotics

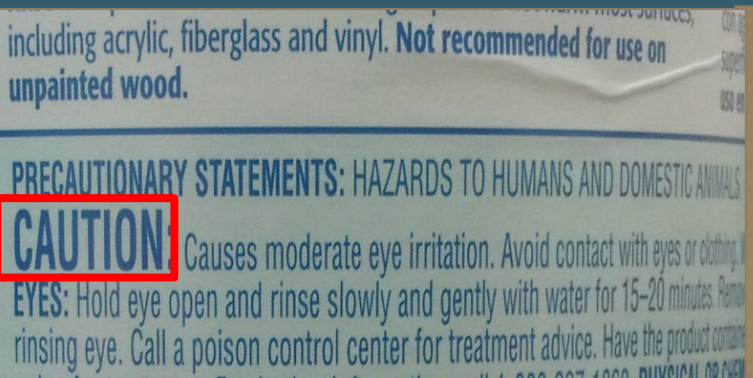
- Can kill microbes living in system
  - Won't discriminate helpful organisms living in the system
- Additional treatment components may be necessary
- Increase maintenance
- Do not pour unused medicines down the drain

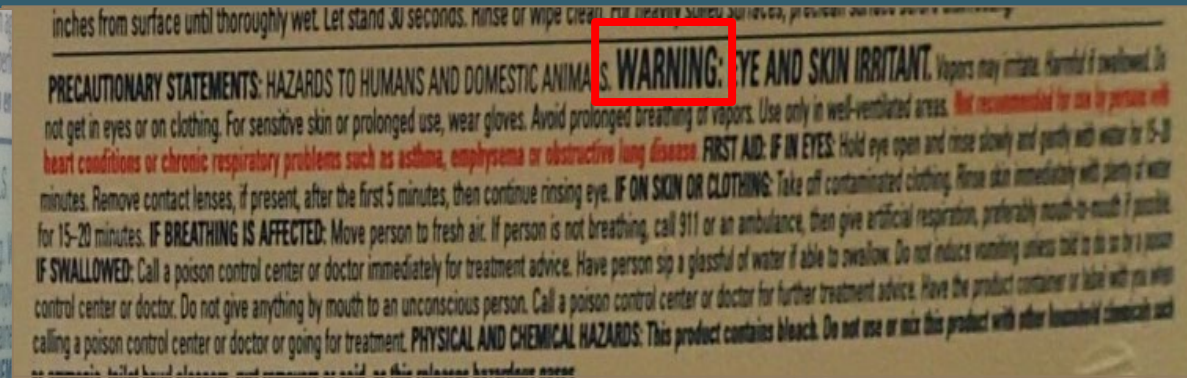
Septic System Additives

- ***Not*** been proven to be beneficial to system performance
- **Not recommended**
- Breaks up particles that are settled at the bottom and may suspend them
- Suspended solids may load to downstream components

Cleaning Products

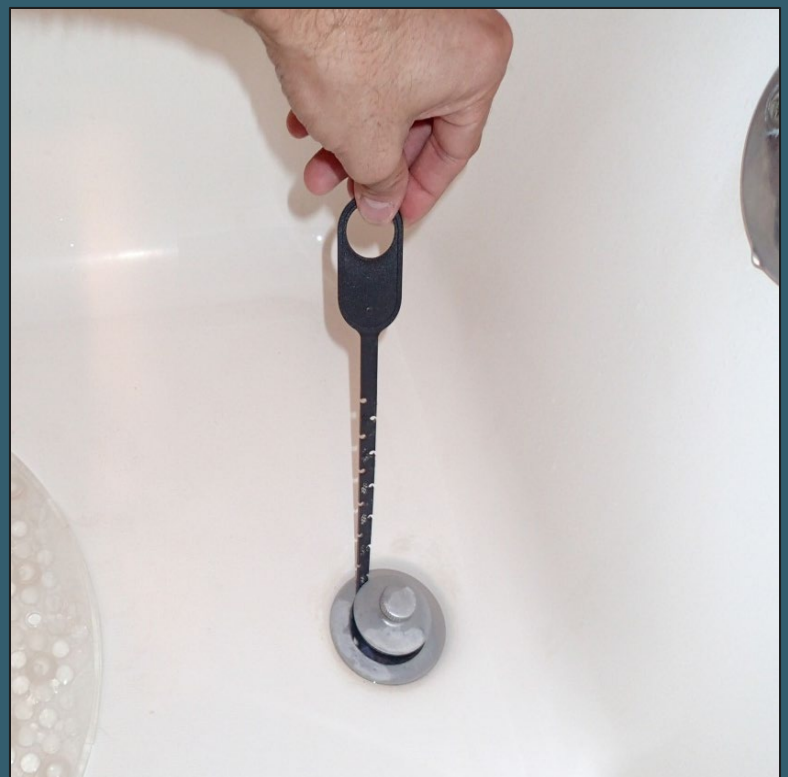
- Cumulative effects on system performance
- Look at labels!
  - DANGER: means the chemical will kill the bacteria, and its use should be minimized or eliminated
  - WARNING: means limited use should have a minimal impact on the system.
  - CAUTION: typically means the product will have little effect.





Drain Cleaner

- Toxic drain cleaners can impact ability to properly treat wastewater
- Affect bacteria activity



Operation and Maintenance of Septic Systems

Gases and Chemicals of Concern

- Hydrogen sulfide
- Sulfuric acid (converted from H_2S)
- Chlorine gas
- CO(X)s
  - Carbon dioxide
  - Carbon monoxide
- Methane

Common Biological Hazards Near Site

- Kids
- Pets
- Insects
- Snakes
- Vegetation
- Pathogens

Accessibility Issues

Accessibility = ease of maintenance

- Depth of installation
- Inspection ports and risers
- Encroachment

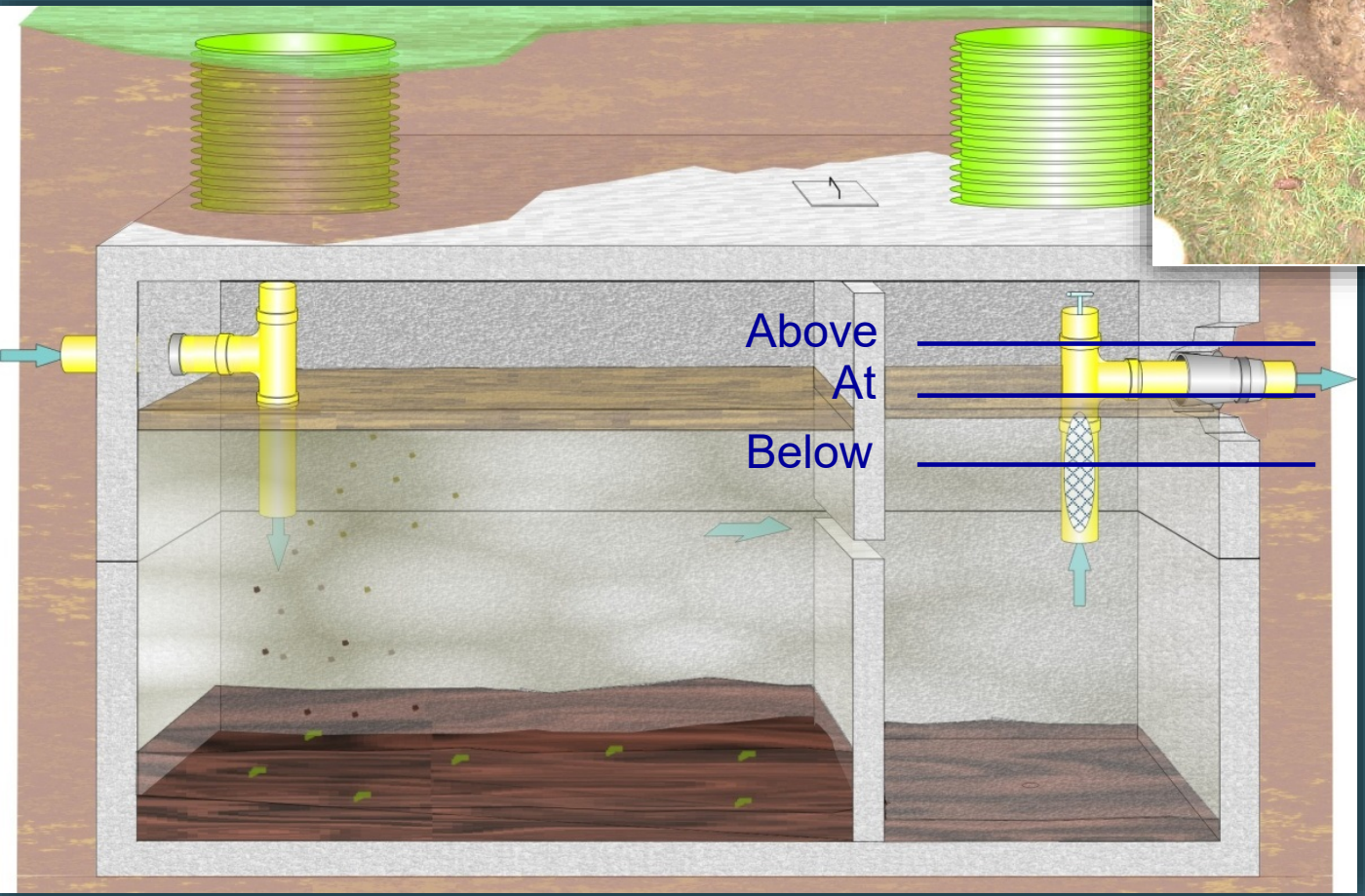
Site Conditions

- Divert stormwater away from all OSSF components
- Odors?

Operating Condition

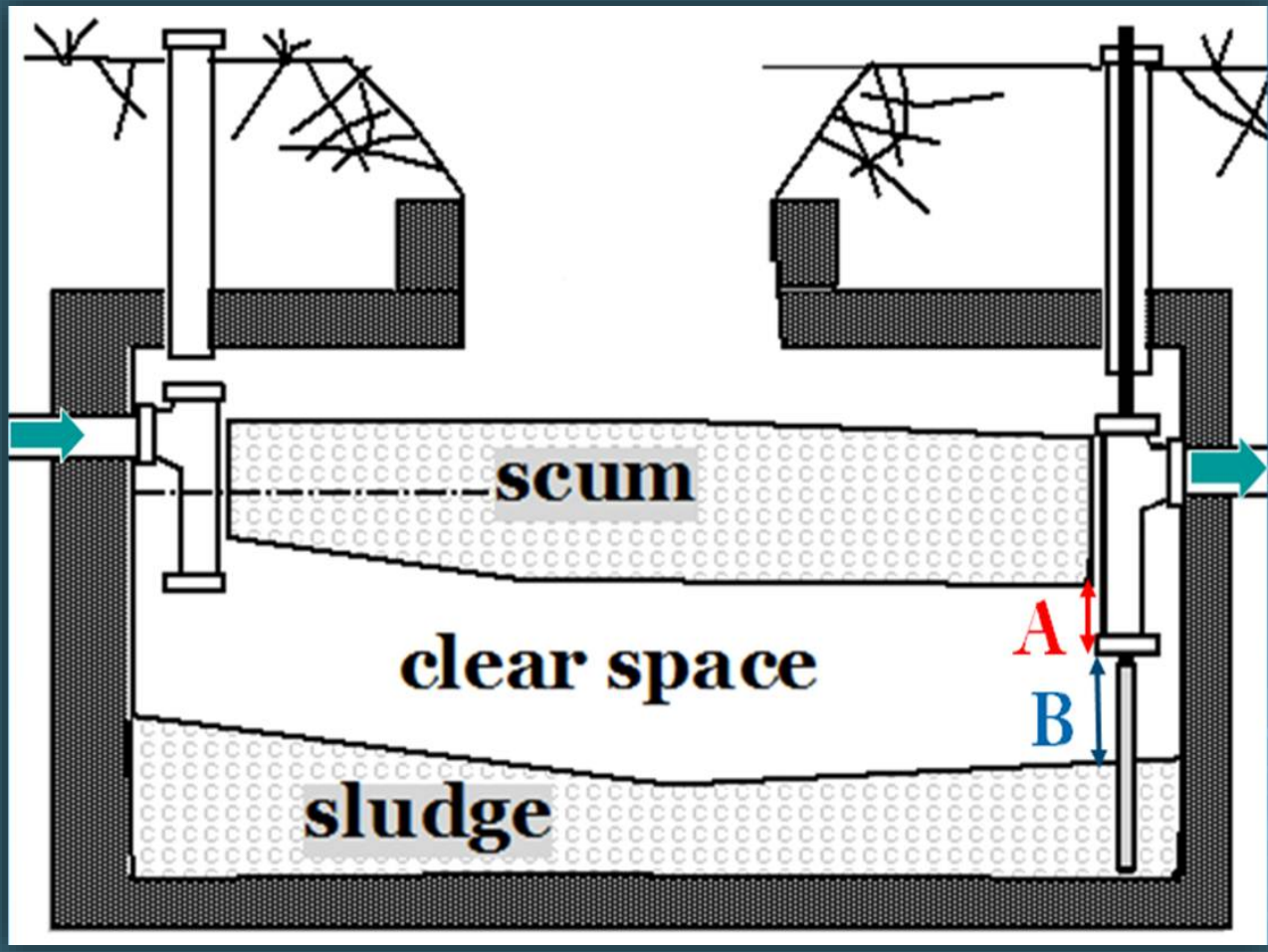
Liquid level with respect to outlet (inches):

- At, above and below

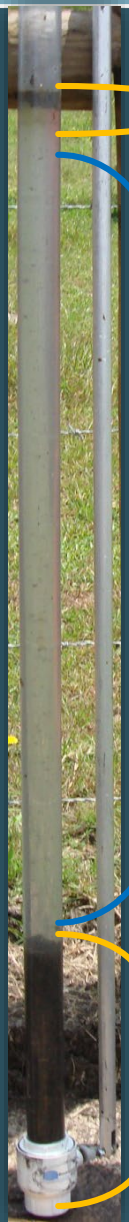


Septic Tank Pumping Recommended?

- Should be pumped when total solids reach 25-33% of tank capacity
  - If ‘A’ is less than 3”
  - If ‘B’ is less than 12”
- Typically required every 3 to 5 years
- Pump during dry seasons to reduce the risk of tank floatation



Measuring Solids



Septic Tank Pumping Recommended?

Tank Size	Household Size (Number of People)									
(gals)	1	2	3	4	5	6	7	8	9	10
500	5.8	2.6	1.5	1.0	0.7	0.4	0.3	0.2	0.1	—
750	9.1	4.2	2.6	1.8	1.3	1.0	0.7	0.6	0.4	0.3
1,000	12.4	5.9	3.7	2.6	2.0	1.5	1.2	1.0	0.8	0.7
1,250		7.5	4.8	3.4	2.6	2.0	1.7	1.4	1.2	1.0
1,500		9.1	5.9	4.2	3.3	2.6	2.1	1.8	1.5	1.3
1,750			6.9	5.0	3.9	3.1	2.6	2.2	1.9	1.6
2,000			8.0	5.9	4.5	3.7	3.1	2.6	2.2	2.0
2,250				6.7	5.2	4.2	3.5	3.0	2.6	2.3
2,500					5.9	4.8	4.0	4.0	3.0	2.6

Note: More frequent pumping needed if a garbage disposal is used.

What happens if you don't maintain OSSF

Your tanks will fill up and begin to back up into your home-possibly causing backflow flooding into the house via showers and toilets.

Pumping

- Removal of septage from a wastewater treatment system component
- Necessary to prevent accumulated solids from moving into downstream components
  - Drain fields
  - Pumps
- TCEQ Registered Sludge Transporter

Cleanout behind House-Backing Up

2nd Cleanout Full

Looking for the clean out port

Almost there

45 minutes later-clean out port

Tank is completely full

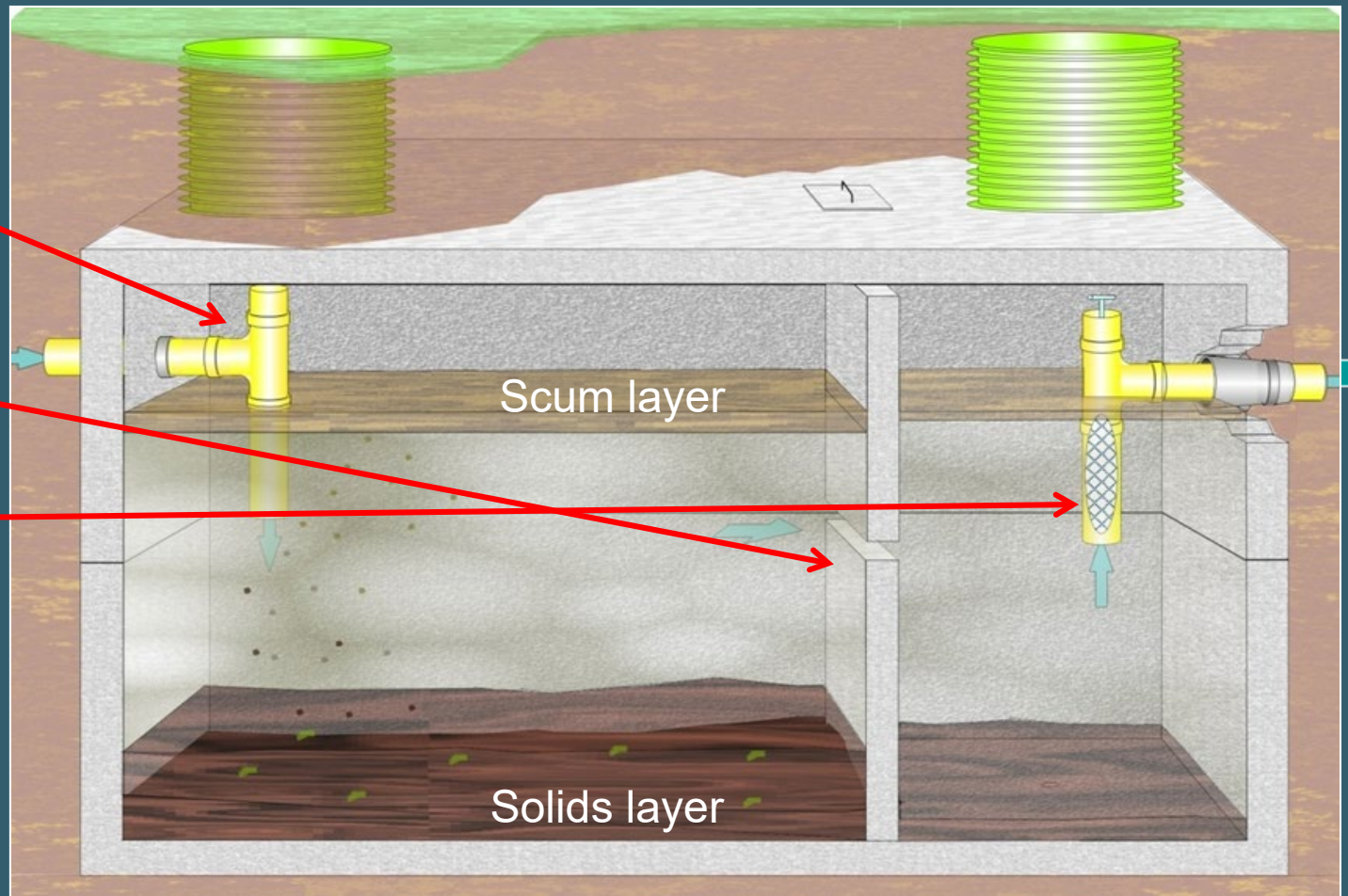
Pumping out tank

Pump out in full swing

Looking for 2nd tank

Baffles

- Critical to retention of solids in the septic tank
- Determine if baffles are in place



Baffles

- Concrete
- Plastic
- Fiberglass
- PVC tee

Inspection of outlet T

Effluent Screens

- Installed at the septic tank outlet
- Trap solids trying to leave the septic tank
- Protect the drainfield
- Screen is washed off directly into the inlet side of the septic tank

Locating 2nd Tank

Pumping out 2nd tank

Good contractors do it right!

Tank Structural Condition

- Watertight (no visual leaks)
- Rebar exposed
- Root intrusion
- Corrosion or spalling present
- Cracks or Flex

Clean out is clear

Clear

Why Perform Maintenance?

- Keep systems functioning properly
- Maintain effluent quality
- Early detection of problems
- Public health
- Environmental protection
- System reliability

Early plumbers

TWON

TEXAS Well Owner NETWORK

Questions?

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ARROYO COLORADO

Know it. Respect it. Enjoy it.

Conócelo. Respétalo. Disfrútalo.

On-Site Sewage Facility Website: ossf.tamu.edu