Onsite Sewage Treatment System Maintenance, Health and the Environment

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LOUISIANA DEPARTMENT OF ENVIRONMENTAL QUALITY
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Presentation

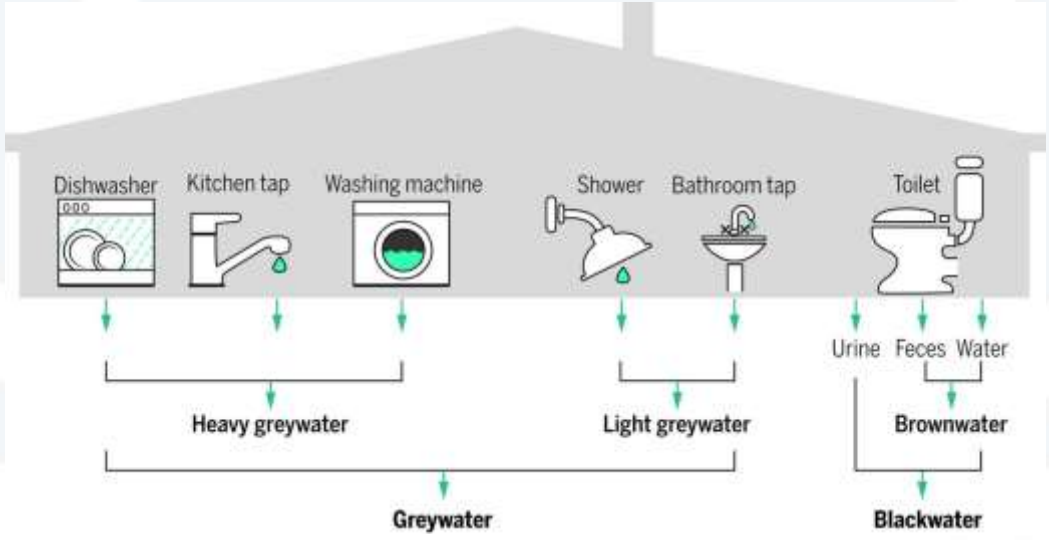
- Define sewage and define/identify onsite sewage treatment systems
- Maintenance and regulations
- Environmental and health effects
- How to identify system failures
- Benefits of treating maintenance

Sewage

- **Sanitary Sewage is**
  - All human waste and/or domestic waste
  - Conveying liquid and solids
  - Toilet, bath, laundry, lavatory & kitchen sink wastes

Sewage

- **Black** water is wastewater from toilet flushing.
- **Gray** water is wastewater from sinks, washing machines & showers/tubs.
- Black & Gray water are disease carrying sewage and require complete treatment.



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Water Use = Sewage

The USGS estimates that people use 80-100 gallons per day for indoor home uses









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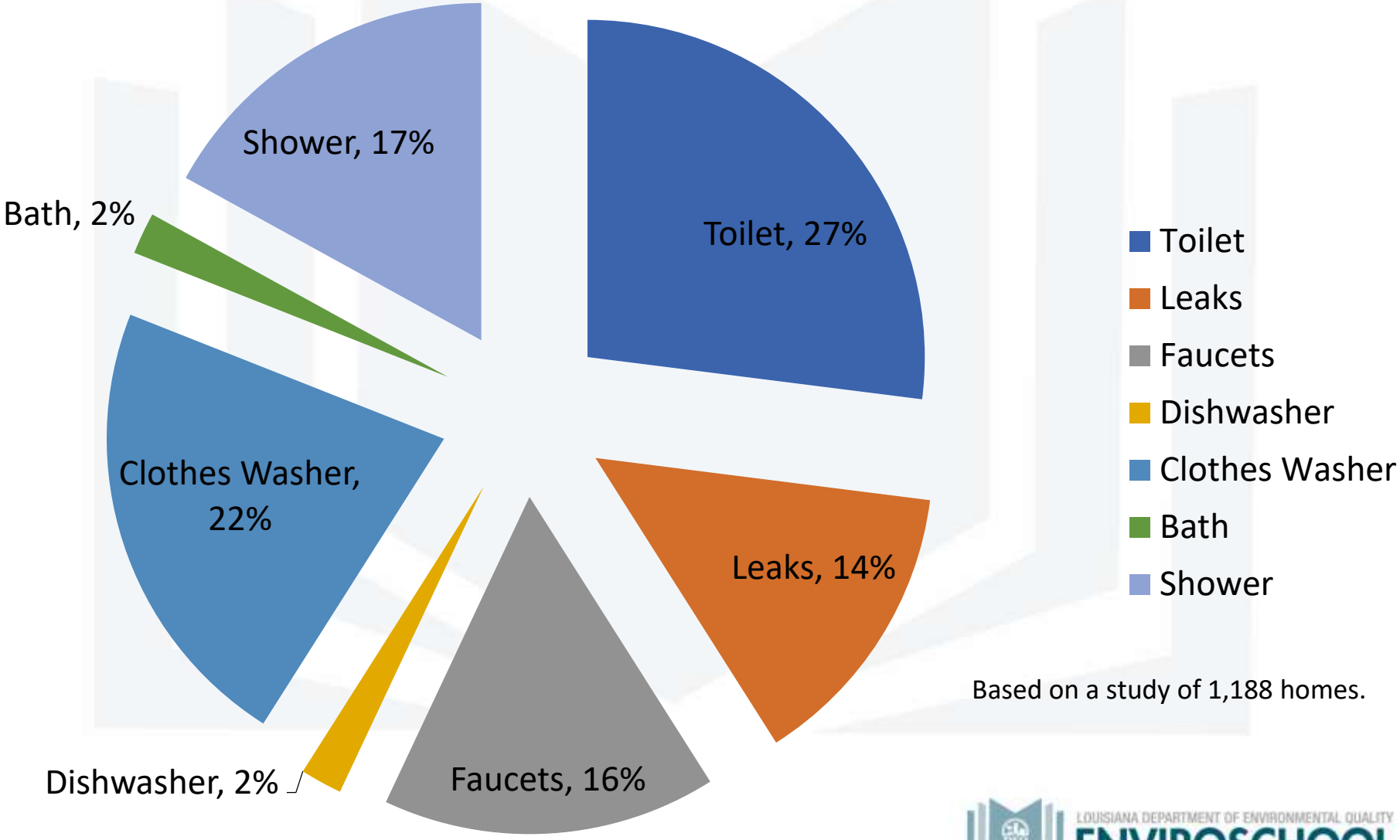
INDOOR WATER USAGE



Based on a study of 1,188 homes.

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Onsite Sewage Treatment Systems

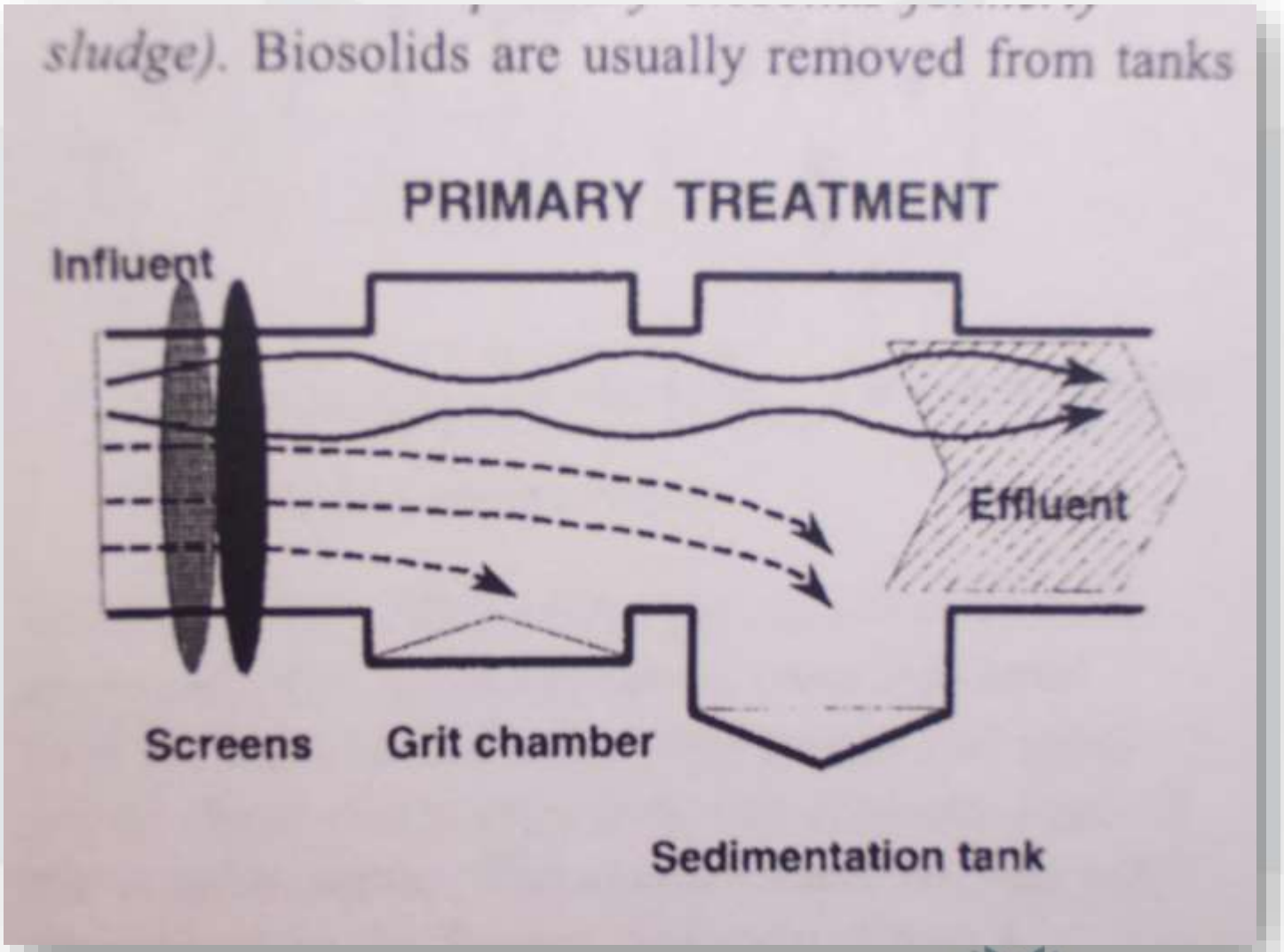
- Any system used to collect, transport, pump, treat, and/or dispose of sanitary sewage and which is located on the property where the sewage originates.
- Serves one home, camp, business, etc.
- Aren't connected to a municipal/centralized/community treatment facility (decentralized)

Sewage Treatment

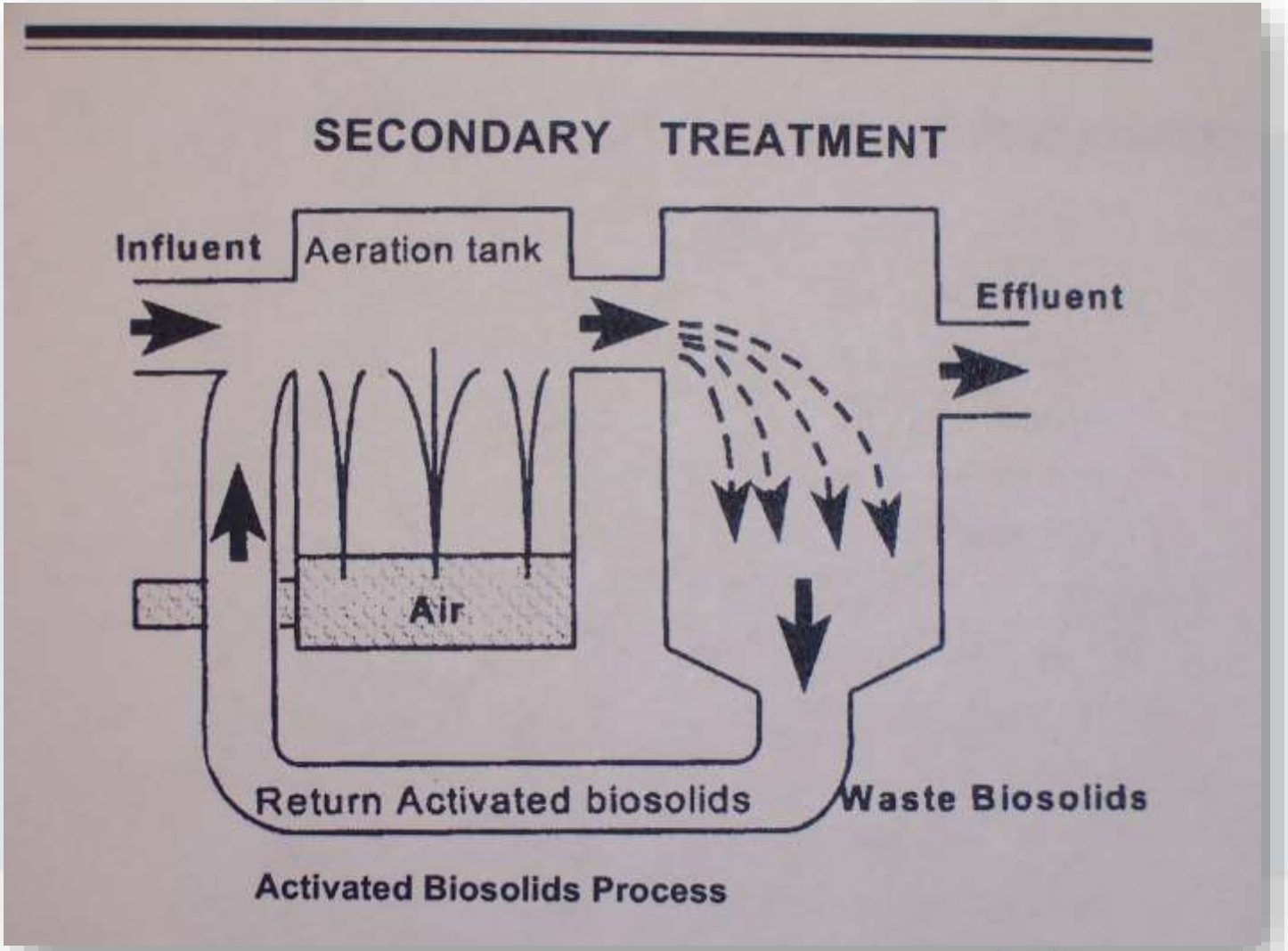
- Primary – physical separation to remove solids
- Secondary – biological process to remove dissolved and organic compounds
- Disinfection – significant percentage of pathogenic organisms are killed or controlled

Sewage Treatment

sludge). Biosolids are usually removed from tanks



Sewage Treatment



Sewage Treatment

Disinfection

Calcium Hypochlorite Tabs

CHLORINATOR

STACK FEED CHLORINATORS

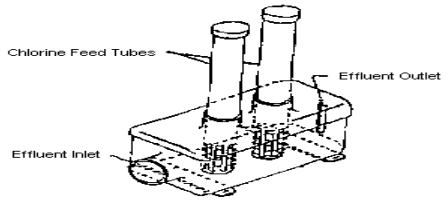


Figure 11

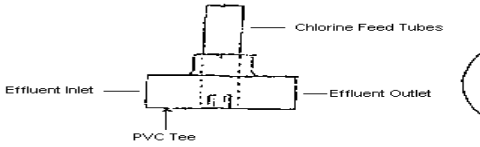


Figure 12

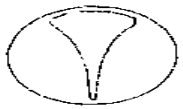
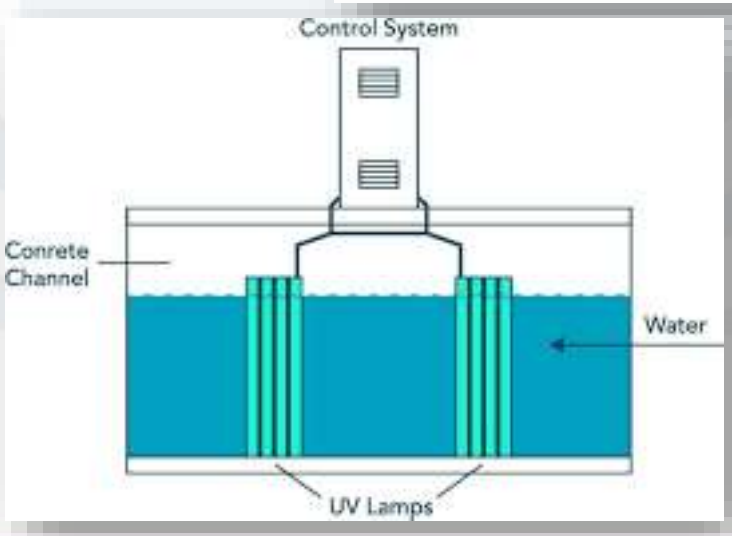


Figure 13

Chlorinators can be purchased premanufactured (as in Figure 11), or can be constructed onsite using the following minimum criteria - (Figure 12) Use a four-inch minimum PVC Tee with a restrictive insert (see Figure 13) to control the effluent flow. This allows the tablets to be contacted by the effluent in proportion to the amount of flow. The insert is cemented onto the PVC Tee with the restriction pointing down.



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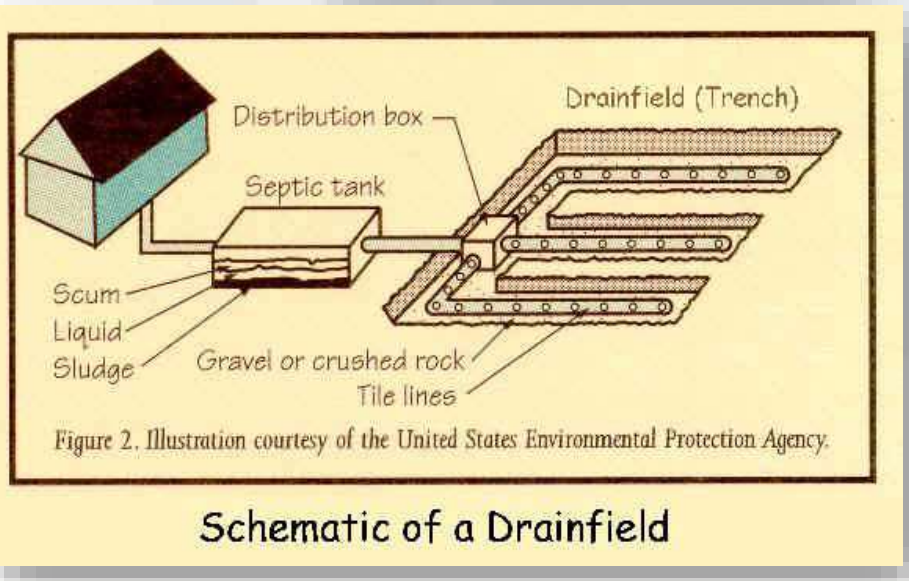
Onsite Sewage Treatment Systems

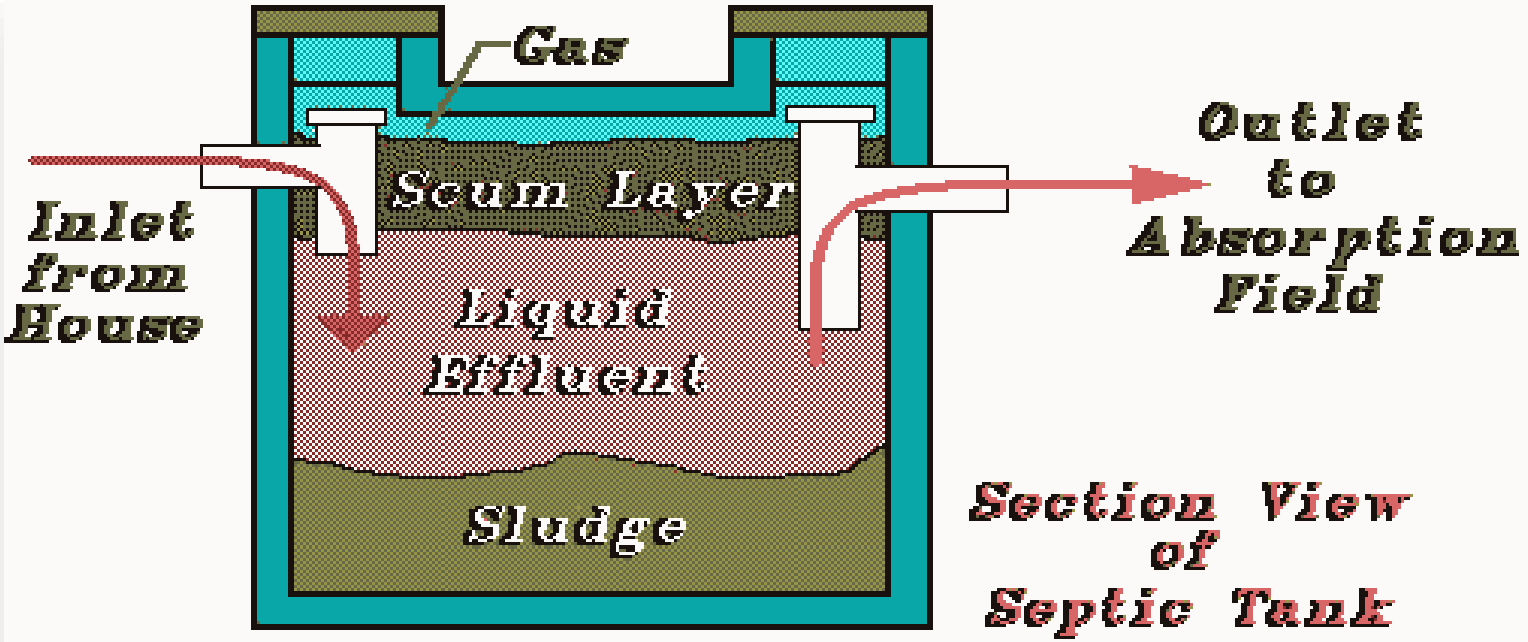
Conventional Septic Systems – septic tank and subsurface absorption field (percolation test)



Schematic of a Drainfield

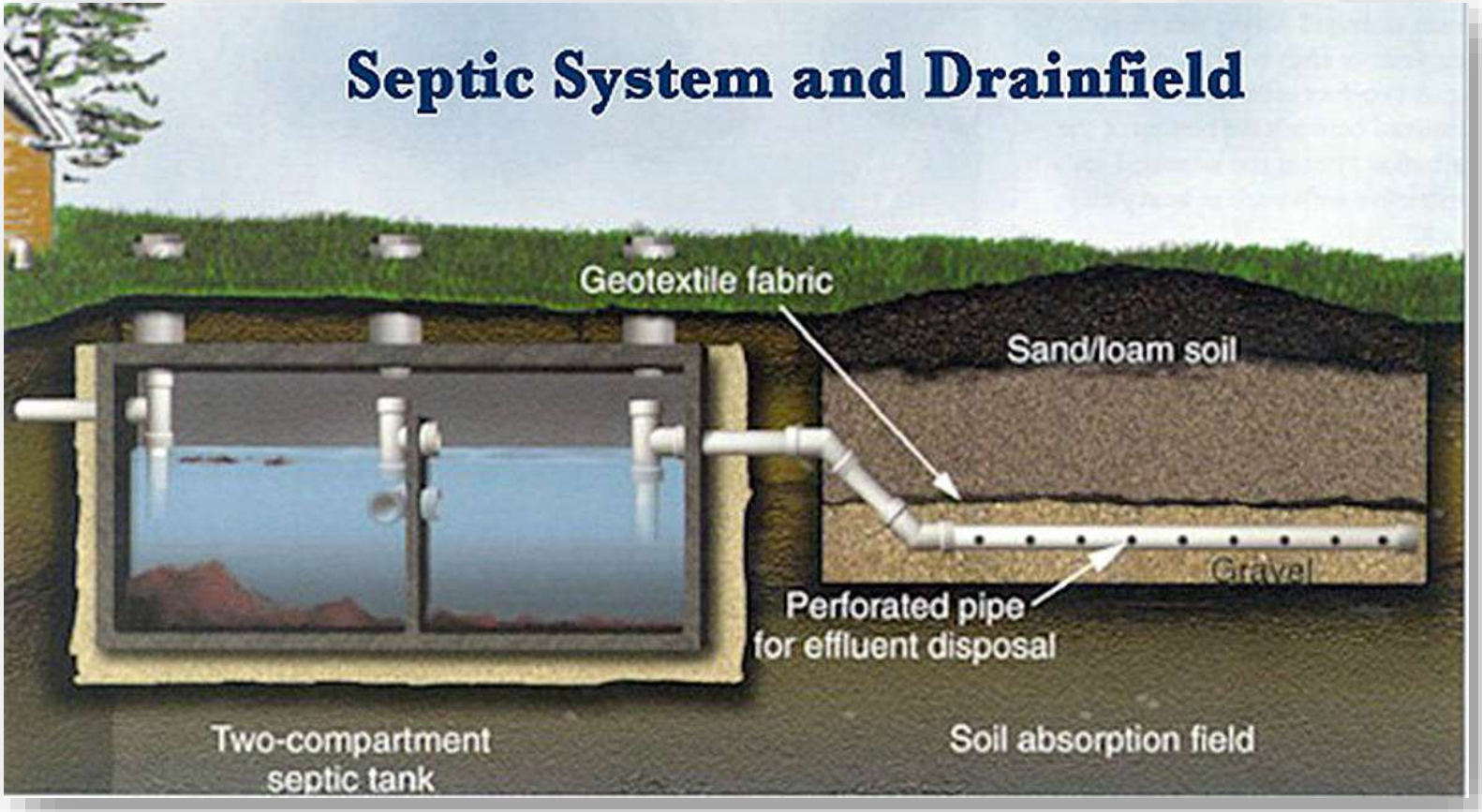
Onsite Sewage Treatment Systems

Conventional Septic Systems



Onsite Sewage Treatment Systems

Conventional Septic Systems



Onsite Sewage Treatment Systems

Mechanical Treatment Systems (aerobic treatment unit)

-provides primary and secondary treatment by use of aerobic bacterial action sustained by mechanical means

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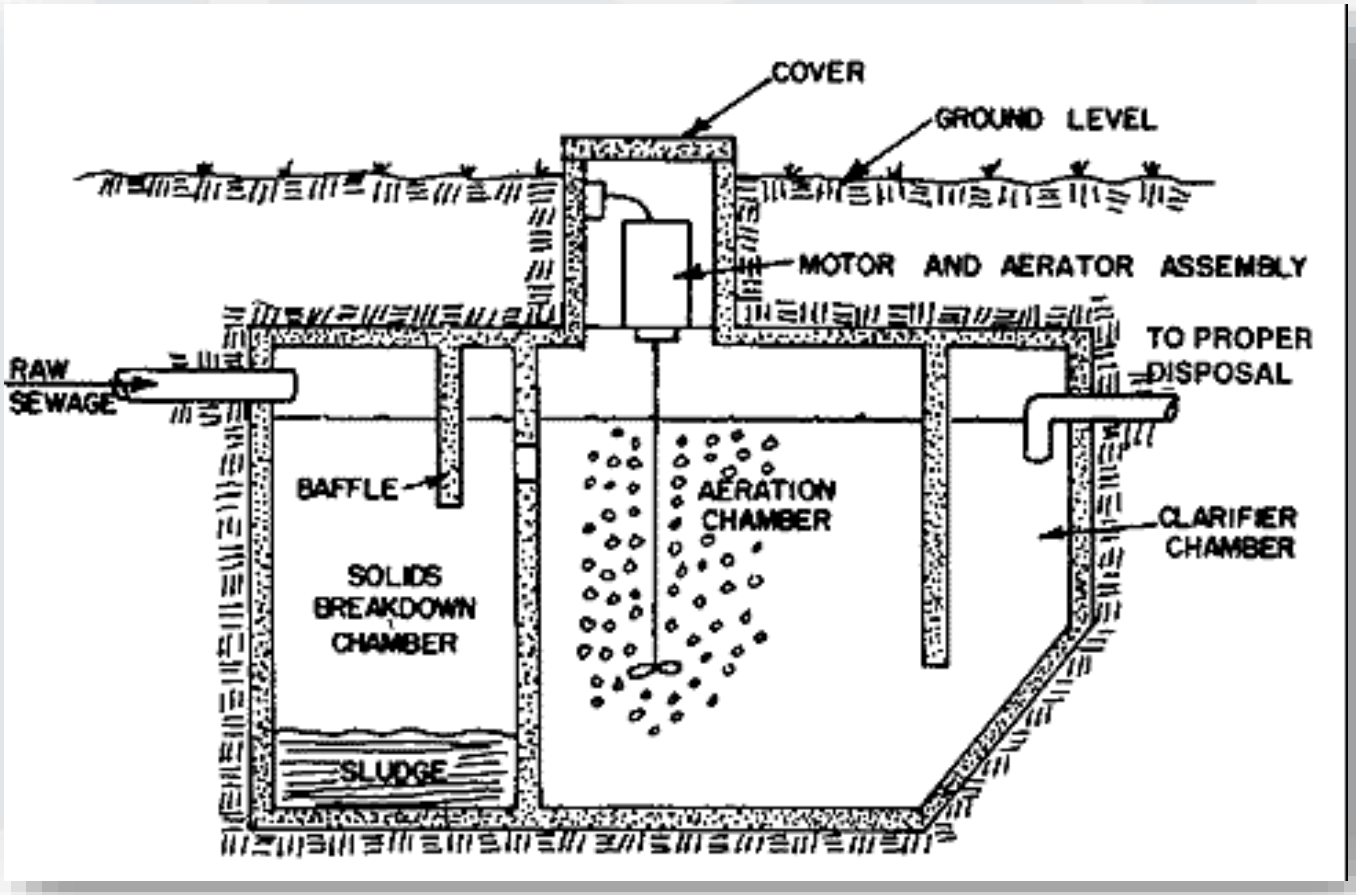
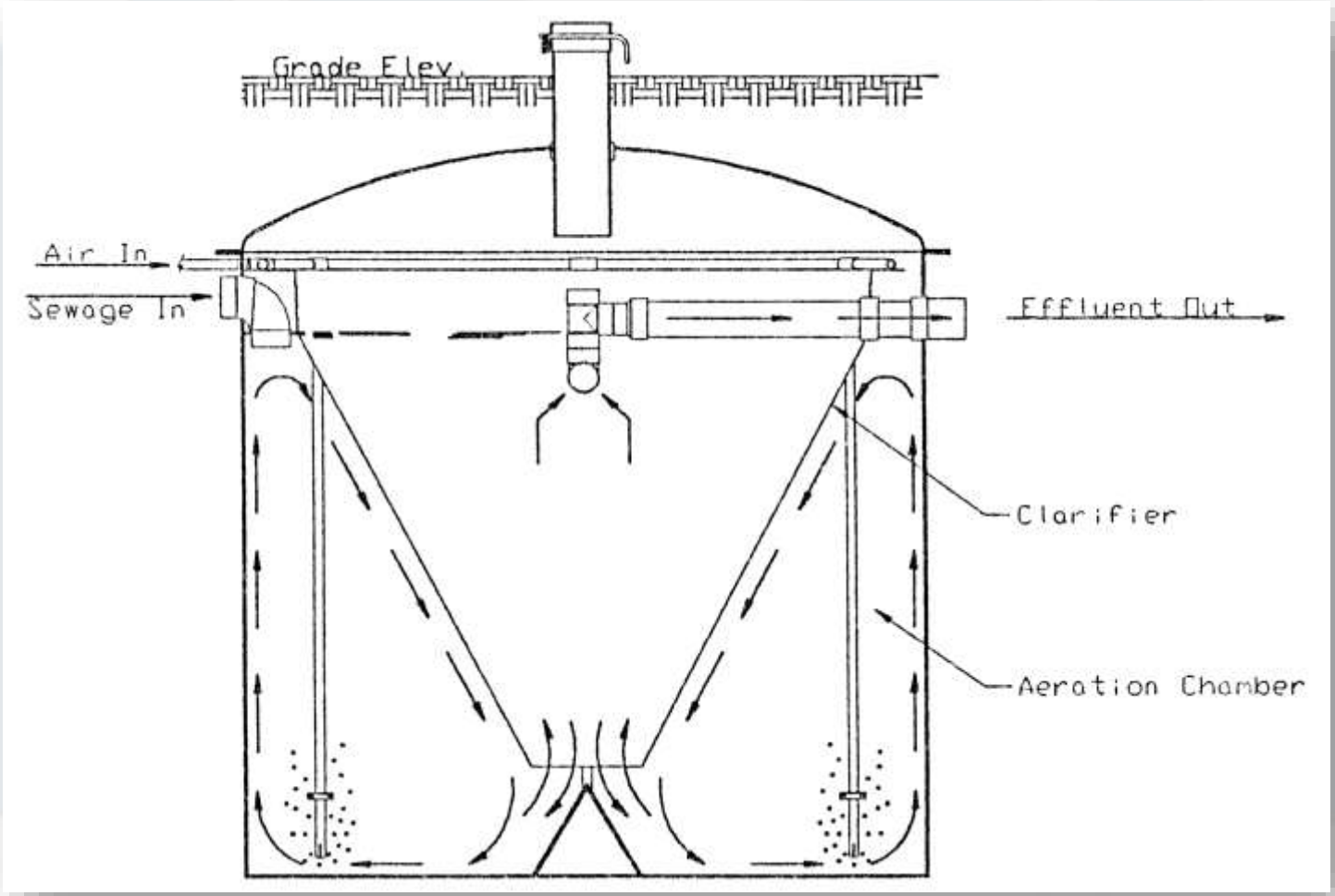
Onsite Sewage Treatment Systems

Mechanical Treatment Systems



Onsite Sewage Treatment Systems

Mechanical Treatment Systems



Parts of Your System

- **Pretreatment:** Optional all systems do not have. If present, solids settle here. Examples: septic tank, primary settling compartment, trash trap
- **Aeration Chamber:** Oxygen mixes with wastewater. Beneficial bacteria thrive & breakdown sewage
- **Clarification:** Solids settle, scum rises, clear water leaves the system as effluent
- **Disinfection**: Optional component homes, but is recommended. Calcium hypochlorite labeled for wastewater disinfection. Maintain minimum residual of 0.5 ppm total chlorine
- **Effluent Reduction:** Configurations vary by system based on design due to lot size, easements & ordinances

Aeration Chamber

Parts of Your System

- Aerators
  - Introduce air to your system
  - Brand system has specific approved models
  - The **heart of the system**
  - May have alarm attached
- Agitators
  - Motors which operate paddles or stirrers

Parts of Your System

- Controls and Alarms
  - Alerts of malfunctions
  - Visible & Audible
  - Reset buttons to grant temporary relief until problems addressed
  - On ATU and on lift stations

Alarms & Aerators With Alarms

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Lift Station

-used to transfer effluent to sprinkler system or discharge point

Effluent Reduction
Effective Date October 20, 2000

- Required on individual sewage systems with a capacity up to and including 1,500 gpd, that produce treated effluent and which, by design, do not significantly reduce the amount of off- site effluent

Onsite Sewage Treatment Systems

Septic Tank Systems
Oxidation Ponds

Maintenance

- Septic Tanks
  - Inspected every 6 years (LDH san. code)
  - Pump out sludge periodically
- Mechanical Systems
  - Inspections for electrical, mechanical, effluent, odor
  - Pump out sludge
  - Maintain power supply
- Oxidation Ponds
  - Keep it sunny
- Replacement parts must be approved for use with your system by ANSI, the manufacturer and LDH.

Mechanical System Maintenance

- Learn what **normal** is
- Check how the aerator sounds/feels/looks like when it is properly operating
- Check it often for proper **agitation**.
- Observe air line integrity/effectiveness of agitator
- View aeration chamber for color of water and proper agitation and scum distribution
- **Check effluent** for quality of water and odors
- Have system **pumped** according to LDH guidelines (4 years).

Mechanical System Maintenance

- Maintaining the blower is essential to the treatment process of the ATU, as the level of aeration is the main design criteria.
  - Keep the blower and motor running
  - Check and clean filter as necessary
  - Ensure there is agitation
  - Keep all ants away from unit
  - Take care when cutting grass/landscaping to protect blower

Maintenance

- Effluent Handling-
  - Field lines must be kept undisturbed
    - Don’t drive equipment on them,
    - Don’t landscape over them (roots clog lines)
    - Don’t allow surface waters to accumulate over them
  - Lift stations
    - Check alarm systems for proper operation
    - Replace with approved parts

Maintenance

- Sprinklers
  - Check for proper spray pattern
  - Clean sprinkler heads as necessary
  - Clean pre-filters if provided
  - Replace with approved parts (in compliance with ASAE Standard S-398.1)
- Disinfection
  - Monitor for effective tablet use
  - Use approved calcium hypochlorite tabs labeled for wastewater disinfection

Maintenance

- **Do keep records**:
  - Model name
  - Capacity
  - Date installed
  - Contract service agreements including pump out receipts
  - Records of service visits
  - Maintenance performed

Maintenance

- **Do conserve water** to avoid hydraulic overload:
  - Repair leaky faucets & toilets
  - Use water saving features on appliances
  - Limit clothes washing & dish washing loads

Maintenance

- **Do divert water** away from the system:
  - Roof drains
  - House footing drains
  - Storm water flow
  - Sump pumps
- **Do become familiar** with how your system operates. Know the way it looks, smells and sounds when operating.

Maintenance

- **Don't park or drive** over any part of your system.
- **Don't make** or allow **unauthorized repairs** or changes to your ATU without obtaining an LDH permit
- **Don't open** or attempt to clean or perform maintenance on any **sealed components**.

Maintenance

- **Don't flush or pour** harsh chemicals into your system.

- **Don't use a garbage disposal** if your system wasn't designed to accommodate this type of waste.

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Maintenance

- The Health Department **does not recommend** adding any additives to your system.
  - Their use is not documented as offering any improvement to solid digestion or “line clearing” properties.

Maintenance

Don’t flush items such as

- Coffee grounds
- Dental floss
- Disposable diapers
- Baby or Disinfecting wipes
- Disposable dust/mop cloths
- Kitty litter
- Sanitary napkins
- Tampons
- Cigarette butts
- Condoms
- Gauze bandages
- Fat, grease or oil
- Paper towels

Maintenance

Don’t flush/pour chemicals such as

- Paints
- Varnishes
- Thinners
- Waste oils, fat or grease
- Photographic solutions
- Pesticides/Herbicides

These items can destroy the biological processes taking place in your sewage treatment system.

Regulations

- Placement
  - Water wells – 50 ft. setback for septic tanks, 100 ft. for mechanical plants, oxidation ponds, etc.
  - Reservoirs – 50 ft. setback
  - No component of a sewer system shall be installed where ground water may be contaminated
- Installation Permits
- Conventional septic tank systems are preferred
- Mechanical plants – specifications must be approved, a minimum two-year service policy must be provided, and the owner is responsible for perpetual maintenance
- Must be kept in service and in a serviceable condition
- Discharge from septic tanks is prohibited
- DEQ discharge permit

Regulations

- LDH regulates construction, installment, maintenance.
- DEQ regulates the discharge from anything other than an individual residence or camp.

Installation & Service

- With the purchase of any ATU, the first two years* of service visits are included.
- After those two years, either:
  - Contract with licensed installer of your brand of system
  - Become certified through OSWW program to provide maintenance on the system at your primary residence

*All components of the system are not necessarily covered by a two year warranty.

Becoming Your Home System Maintainer

- Attend an Onsite Wastewater Workshop
  - Homeowner Maintenance or
  - Onsite Installer workshop
- Test & achieve a minimum passing grade of 70%.
- Submit an Application Packet:
    - Homeowners Maintenance Application
    - Notarized and signed affidavit
    - Passing Grade Letter (70%).
- Repeat all above every five years.
- Only qualifies you to service your primary residence

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DISCLAIMER:

- This class in no way replaces the need to seek professional assistance from licensed individuals such as onsite installers, electricians or plumbers.

- When issues are beyond routine maintenance, you should still seek the services of trained professionals.

DISCLAIMER:

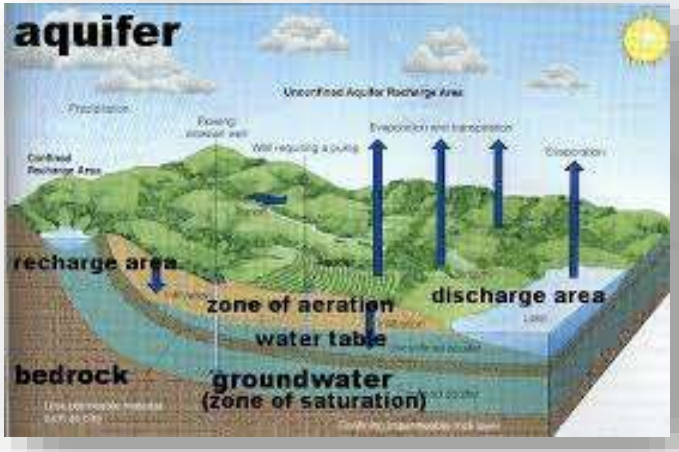
- Proper electrical connections must be made to the air pump/blower and/or any other electrical components that are integral parts of an Individual Mechanical Sewage Treatment Plant

- A qualified electrician should perform or examine the installation(s) for appropriate wiring and installation, as well as connection to the GFCI.

LAC Title 51 Part XIII. §701.D.

DEQs Water Quality Program

- The control of the introduction of pollutants into waters of the state
- Waters of the state includes all surface and underground waters within Louisiana
- Includes the following
  - Rivers, bayous, lakes, creeks, etc.
  - Aquifers, the water table
  - Intermittent streams
  - Man-made ditches and ponds (except those that are part of a waste treatment system)



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Surface Water Use Designations

- Primary Contact Recreation (PCR) – all water bodies
- Secondary Contact Recreation (SCR) – all water bodies
- Fish and Wildlife Propagation – most water bodies
- Drinking Water Supply
- Oyster Propagation
- Agriculture
- Outstanding Natural Resource Waters (ONRW)

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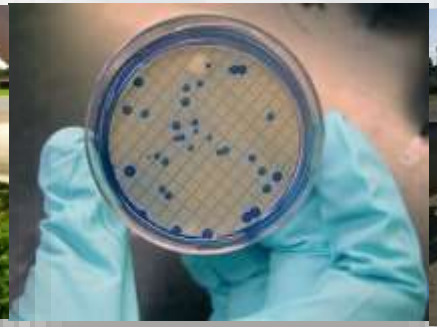
Surface Water Quality Standards

- Provide protection and preservation of natural resources and aquatic ecosystems
- Protect the public health and welfare
- Enhance the quality of water
- Meet requirements of the Clean Water Act

Fecal Coliform

- Sample waterways for fecal coliform and to see if its standards are met
- Bacteria found in the intestines of warm-blooded animals, excreted in feces
- Potential sources include humans (sewage), wildlife, waterfowl, agriculture/livestock (manure), pet waste
- Does not identify sources of fecal contamination – only its presence
- Used as an indicator organism - generally not harmful but presence suggests pathogenic microorganisms may be present





Fecal Coliform Issue

DEQ's 2018 Integrated Report

- Fecal coliform second most common listed suspected cause of impairment for 148 watersheds (499 total)
- Suspected sources of impairment in # of watersheds
  - On-site sewage treatment systems (septic systems and other decentralized systems) - 93
  - Package plants or other permitted small flows discharges - 51
  - Sewage discharges in unsewered areas - 38
  - Municipal point source discharges - 31
  - Sanitary sewer overflows (collection system failures) - 13

Fecal Coliform Issue

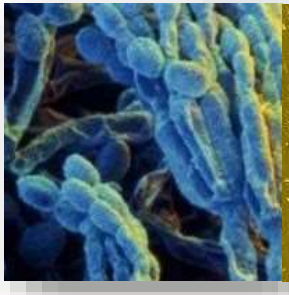
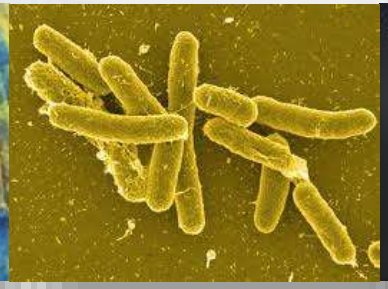
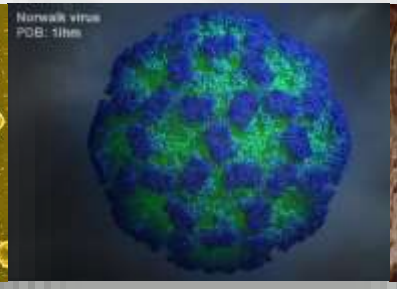
What do the numbers mean?

- Can indicate the presence of sewage




Health Effects From Exposure To Sewage

- Wide variety of illnesses (including diarrhea and infections) from pathogens (bacteria, parasites, and viruses) and from algal blooms
- Pharmaceuticals
- Mostly short-term with no lasting effects, but can be violent and unpleasant
- Some long-term illnesses and deaths (especially children, elderly, and those with weakened immune systems) Example: cryptosporidium – diarrheal disease, can be life threatening to immunocompromised

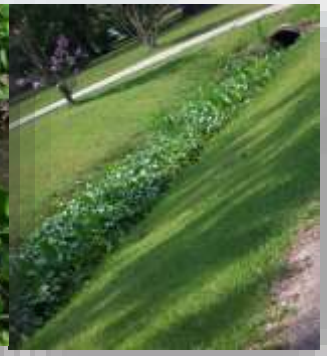




Potable Water Supply Issues

- Water is treated by the public water systems and potable water is constantly tested to assure it is safe for consumption
- Additional treatment required
- Chlorine by-products
- Increased cost

Environmental Effects of Sewage

- Low dissolved oxygen
- Algal blooms
- Release of pollutants that are toxic or that affect growth/reproduction
- Increased turbidity
- Change in water temperature
- Soil/vegetative degradation



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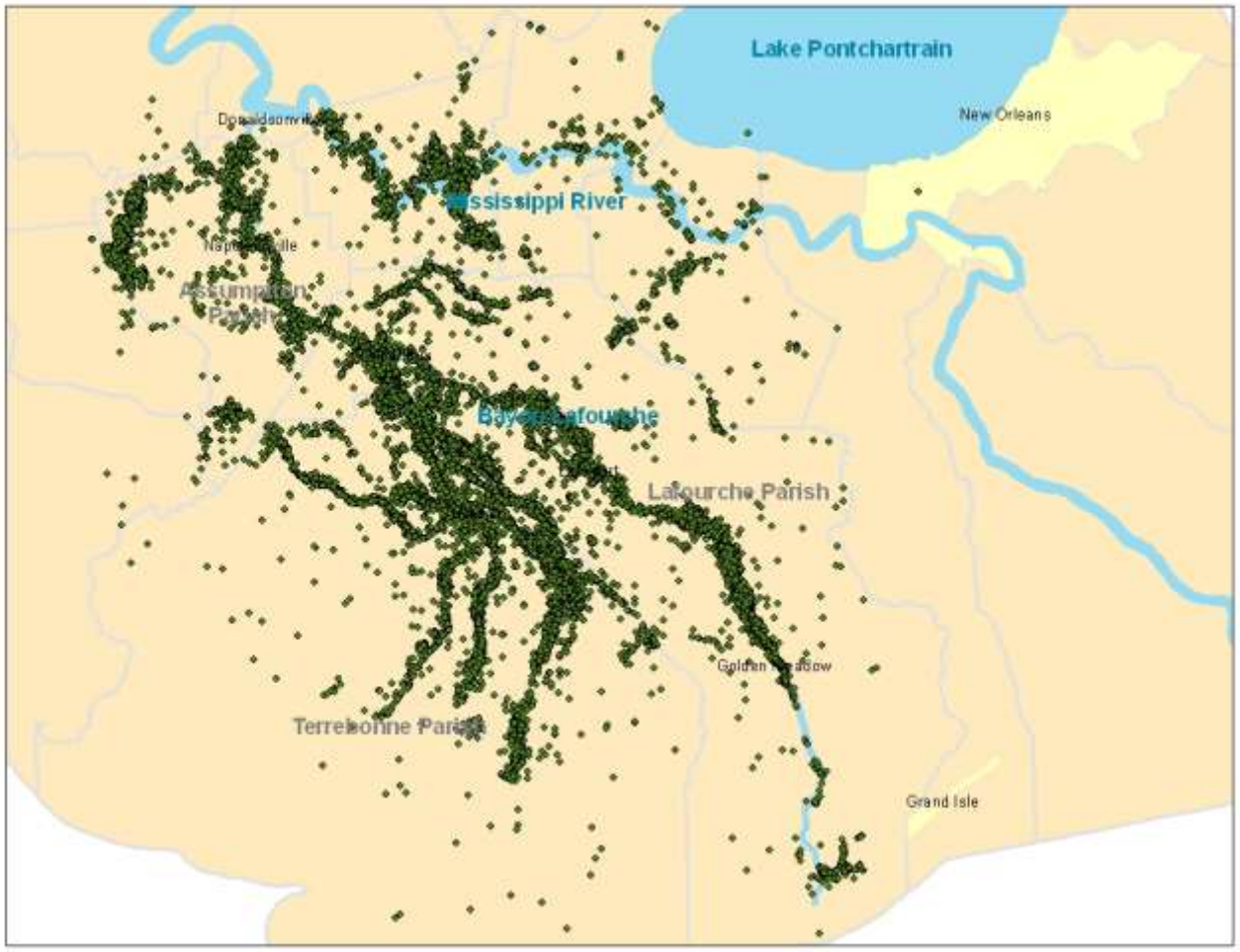
How Contamination Occurs

- Poor placement of septic leachfields
- Badly constructed percolation systems
- System failure
- High density
- Site specific
  - Soil properties
  - Water table
  - Geology
  - Vegetation

Louisiana Department of Health Permitted On-Site Sewerage Systems



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Onsite Sewage Treatment System Failure - Noticeable Signs

- Back-ups/slow drains/toilets
- Discharge in ditches
- Sewage odors

Onsite Sewage Treatment System Failure - Noticeable Signs

- Sewage surfacing over drainfield/tank

Onsite Sewage Treatment System Failure - Noticeable Signs

- Lush, green growth

Onsite Sewage Treatment System Failure - Noticeable Signs

- Monitoring Data
  - Total Fecal Coliform
  - Dissolved Oxygen
  - Total Phosphorous
  - Nitrate/Nitrite
  - Turbidity
- Algae
- Fish Kills




Why is it important to keep untreated sewage out of water bodies?

- Mitigates degraded environmental conditions that affect both fish and wildlife and human health
- Decreased treatment requirements for water systems, associated costs, and chlorine by-products (drinking water)
- Waterways remain open for recreation
- Financial burdens for communities due to cleanup expenses, lost tourism revenue, lost productivity, and medical treatment

Benefits of properly maintaining your sewage system

- Reduces odor, back-ups, and standing wastewater above drainfields
- Better environmental conditions benefitting both fish and wildlife and human health
- Removal of untreated sewage from ditches increasing quality of life
- Maintenance vs repair cost
- Self management vs enforcement (public health issue)

Review/Questions

- Defined sewage and individual sewage treatment systems
- Maintenance and regulations
- Environmental and health effects
- How to identify system failures
- Benefits of maintenance
- Questions?

Contact Information

Louisiana Department of Environmental Quality
Drinking Water Protection Program
P. O. Box 4301
Baton Rouge, LA 70821
(225) 219-3510
http://www.deq.louisiana.gov/aeps

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