ON-SITE SEWAGE DISPOSAL SYSTEMS
Regulatory Jurisdiction of Sewage Disposal Systems

Who Regulates in CT?

CT Department of Energy & Environmental Protection

Local and State Department of Public Health
Local and State Health Departments

- Conventional Septic Systems with Design Flows of 5,000 Gallons Per Day (GPD) and Less
Department of Energy and Environmental Protection

- Design Flows Exceeding 5,000 GPD, and Alternative & Community Systems
PHC Section 19-13-B100a (e.g., Building Conversions, Changes in Use, Building Additions)

Effective August 3, 1998

PHC Section 19-13-B103 (Design Flows 5,000 Gallons per Day or Less)

Effective August 16, 1982

Technical Standards for Subsurface Sewage Disposal Systems

Effective August 16, 1982


Revised January 1, 2015

PHC Section 19-13-B104 (Design Flows Greater than 5,000 Gallons per Day)

Effective August 16, 1982

State of Connecticut
Department of Public Health
Environmental Engineering Program
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P.O. Box 340308
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(860) 509-7296

www.ct.gov/dph/subsurfacesewage

January 2015
Source: U.S. Census Bureau. 1990

Percentage of state residents using onsite wastewater systems:
- 10 - 25%
- 26 - 40%
- > 40%
Why A Septic System?

- Septics vs Sewers
  - Low density – towns wish to remain rural
  - Sewers too costly in rural areas
  - The goal - avoid groundwater pollution
  - Typically cause less pollution
  - Cost effective with proper maintenance
Domestic Sewage
Domestic Sewage

- Water and human excretions
  - Toilets
  - Bathing water
  - Cooking and cleaning
  - Laundry
- Toilet wastes, laundry wastes, kitchen wastes, shower/tub water
- Waste from restaurants and commercial buildings
Pollutants in Domestic Sewage

- Coliform Bacteria
- Suspended Solids
- Bio-chemical Oxygen Demand (BOD$_5$)
- Total Nitrogen
- Total Phosphates
- Grease and Oils
Coliform Bacteria

- indigenous to the tract of humans and warm-blooded animals
- may not be harmful themselves, but indicates that pathogenic organisms and/or viruses may be present
- viruses are smaller than bacteria and not as easily filtered out
Bio-Chemical Oxygen Demand

- **BOD**
- measure of the amount of bio-degradable organic chemicals in the wastes
- High BOD = strong waste
- Low BOD = weak waste
Bio-Chemical Oxygen Demand

- Properly functioning septic tank will reduce the BOD in the effluent by about 25 to 30 percent (more with a two compartment tank)
- Further reduction occurs when the effluent comes in contact with bacterial growth in the leaching system (biomat)
- Amount of reduction depends on the volume of bacterial growth in the leaching system
Nitrogen

- Hazardous to infant children (methemoglobinemia or “blue baby disease”)
- Septic systems remove approximately 30% of total nitrogen with the remaining 70% being discharged to the groundwater.
- Separation distances to wells must be maintained
Phosphate

- Stimulates plant growth (lush green grass or algae growth in surface water)
- Readily removed by filtration through only a foot or two of most soil types
Chemical Pollutants in Sewage

- Paints, solvents, refinishing agents, cleaning chemicals, chlorinated hydrocarbons, etc.
- Considered to be hazardous chemicals since they can readily pass thru a septic system and enter the groundwater
- Amount of these chemicals in domestic sewage should be extremely small
Non-Typical Domestic Sewage

- Kitchen wastes – extremely high in grease
- Wastes from garbage disposal systems contain large amounts of settleable solids and therefore the septic tank should be pumped more frequently
- Laundry wastes high in phosphates, clothing fibers, oils and bacteria shed from the body.
Conventional “Septic Systems”

- Serve approximately 1 million people in CT
- Defined as Subsurface Sewage Disposal Systems in CT regulations
Alternative Treatment Systems

- Wastewater Management District Legislation may allow for broader use
- Requires DEP permit

Intermittent Sand Filter

Aerobic Treatment
What is a Septic System?

- Building Sewer
- Septic Tank
- Distribution Piping
- Leaching System
- Necessary pumps, grease traps and groundwater control systems
• Septic effluent percolates at a steady rate into the surrounding soil.
Septic Tank

- Provides the primary treatment: separates, settles and digests
Typical Septic Tank

- **Inlet**
- **Inlet Baffle**
- **Grease and Scum**
- **Clarification Zone**
- **Clarified Effluent**
- **Outlet**
- **Outlet Filter Device**
- **Minimum 17” Diameter Manhole**
- **Inspection Opening (optional)**
- **Mid-Depth Connection**
Concrete Septic Tank
Plastic Septic Tank
Septic Tank with Effluent Filter
Perforated Piping
Perforated Piping

4" Diameter Distribution Piping
Distribution Box
Distribution Box Installed
Properly functioning leaching system should treat and disperse effluent (liquid from the septic tank) into the surrounding soils without breaking out on the ground surface or polluting the groundwater.
Leaching Types

- Trench
- Pits
- Galleries
- Proprietary products
  - Plastic chamber
  - Mats
  - Forms
  - Cardboard
How does a leaching system work?

- Effluent from the tank is directed to the leaching system by the distribution piping.
- A layer of biological slime is formed on the interface between the soil and the leaching system surface (BIOMAT).
- The growth of the slime layer reduces the rate at which sewage passes into the soil.
Formation of a Biomat (Gravity Distribution)

- One Day
- 1-3 Month
- 3-6 Months
- 6 Months - 1 Year
Biomat Growth
Stone Trenches
Leaching Pit or Dry Well
Galleries – 12-inch high
Galleries – 4’ x 4’
Plastic Chambers-Infiltrators
Cultec
Form Cell: Living Filter
Cur-Tech Systems

Concrete Chambers

Combination of concrete chamber and plastic parts
Lay distribution pipe over system per design
Set form in trench
Prepare site

GST Leaching System
S-Box
Cesspools – Not Allowed

- **Influent (waste) from building(s)**
- **Cover** (sometimes at ground surface or buried)
- **Excavation**
- **Fluid Level**
- **Brick, stone, concrete Block, Ring, or Precast Chamber, or other sidewall material, with Open Joints**
- **Leachate**
- **Backfill Material**
- **Sludge Accumulation**
- **Water Table**
SITING AND DESIGN
How is a system sized?

- Residential buildings
  - Number of bedrooms
- Commercial and non-residential buildings
  - Actual flow times a factor of safety
  - Design flow table
Vertical Separation Distances

- Bottom of the Leaching
  - 18” above water, redox or compact layer (restrictive layer)
    - 24” if a large system over 2000 GPD
  - 4’ over ledge rock, 24” of which is natural

Ground Water Layer
Vertical Placement

- Utilize soil-based identification of redoximorphic (redox- discoloration of the soil indicative to seasonal high groundwater) features to identify groundwater

- Redox features form by the biogeochemical processes of reduction, movement, and oxidation of Iron and Manganese.
Site Hydraulics

- Important factor when designing a septic system
  - The naturally occurring soil surrounding leaching systems should be capable of hydraulically dispersing the entire volume of sewage effluent discharged into it on a continuous basis.
Overtime even properly installed systems can experience difficulties if misused or not maintained.
Sewage Holding Tank
Thanks