

An Abridged History of On-Site Wastewater

Early Years to Present

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On-Site Wastewater Section

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NC Department of Environment and Natural Resources

The Big Questions? Where & How?

Where and How to dispose of waste and sewage has been the bane of mankind since the beginning of time.

Evolution of Sewage Treatment

Tales of
De-urbanization & urbanization



Antiquity to the Modern World

Domestic Wastewater Treatment

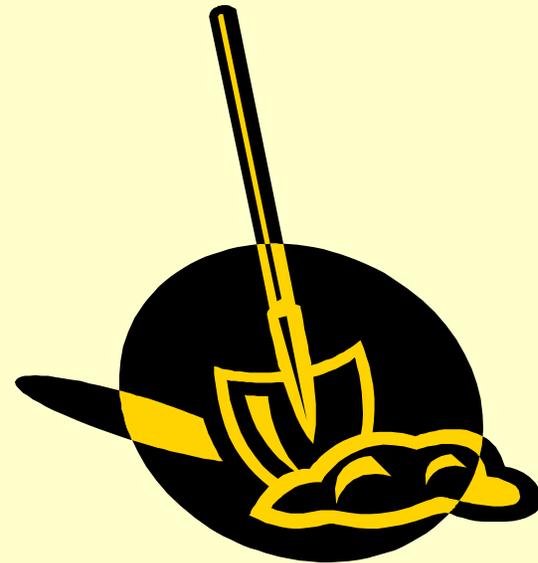
- Nomadic Period – Moving People ~10,000 - 3500 B.C.E.
 - **Moving tribes**
 - **Soil Treatment**
- Ancient World – Moving Waste ~ 3500 B.C.E. – 500 C.E.
 - **Various Waste Technologies**
 - **Bury it, flush it , sewers, public conveniences, port-a-potties, pay toilets, modesty capes**
 - **Urbanization (e.g. 62,000 people /sqmi)**
 - **Economic differences / facilities within cities**
 - **Improved hygiene to a point**

The Early Years of Sanitation— Ancient World – LAWS e.g.

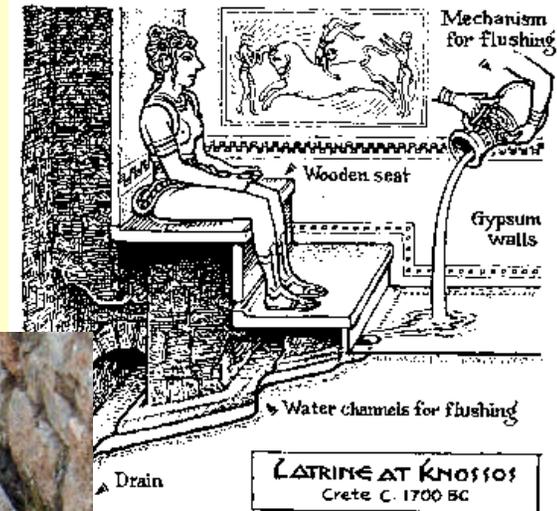
Mosaic Law of Field
Sanitation (BCE 1300)

Deuteronomy 23:13

“When thou wilt ease
thyself abroad, thou
shalt take a shovel and
dig therewith, and
shalt turn back and
cover that which
cometh from thee”



Ancient World Moving Waste



- Roman Toilet Private
And Public
Elaborate lines
To the water



Latrine
To 'Flush'

The Early Years of Sanitation Ancient World.

- Early Roman Law
 - (governing chamber pots) 500 BCE
 - *Dejecti Effusive Act*
 - A person shall be fined and pay damages to the injured party for throwing or pouring “missiles of mirth” out an open window and hitting someone.
 - Note: Law only applied during daylight hours.
 - Note: Does not cover soiled clothes.



Antiquity - Modern World

Domestic Wastewater Treatment

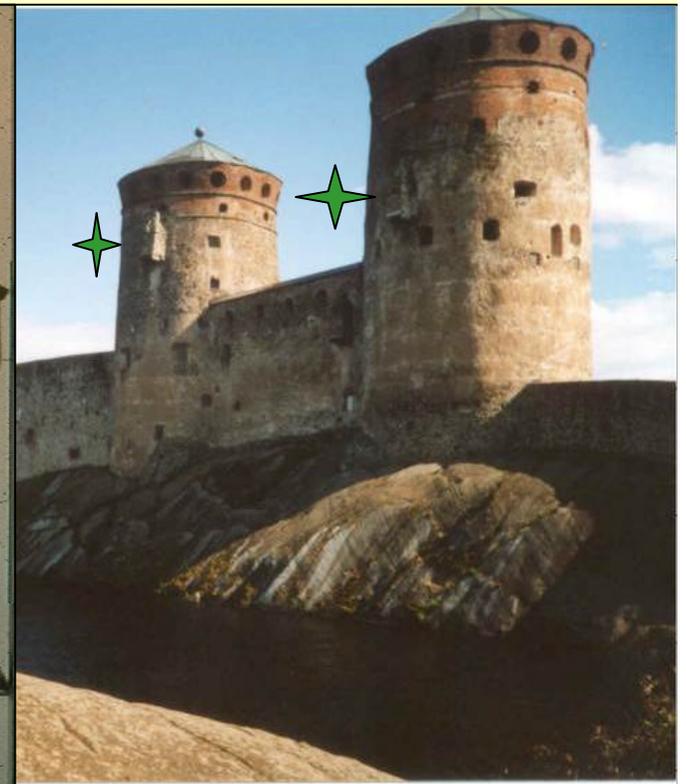
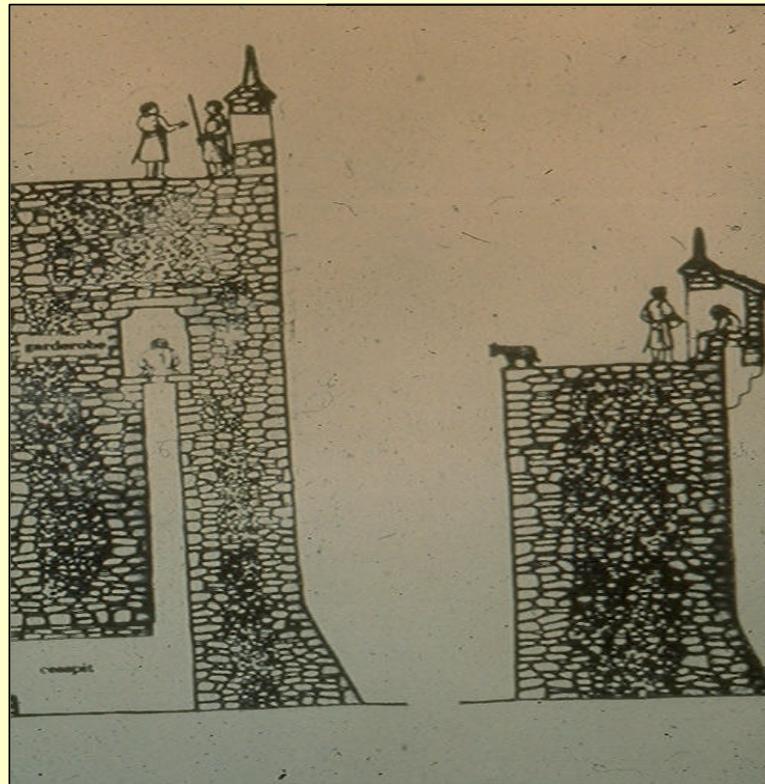
- In the Middle Ages- “Dark Ages” ~500 C.E.-1500 C.E.
 - (ex. Fall of the Roman Empire) urban societies to rural societies
 - Reduced population density --traditional methods disposal
 - Demise in sanitation
 - Return of the “outhouse”, open trenches, chamber pot - at all levels of society
 - However Mesopotamia, Babylonia inventions battery, flush toilet, etc.....

The Early Years of Sanitation

Middle Ages / Dark Ages

- Medieval Houses - Toss it out of the house!
- Medieval Castles- B.C.E. 500

- Don't Swim
in the Moat
(Free-fall privies
overhung moats)



Modern World

Domestic Wastewater Treatment

- In the Modern World –Early to Late Modern
~1500 – 1900's C.E.
 - **Early modern – Europe - Little change**
 - **These practices brought to the new world “Throw wastes outside the fort”**
 - **Epidemics!**
 - **1900's waste treatment practices**
 - **Waste Treatment Diversifies?**

The Early Years of Sanitation

Modern World

- Law of King Richard II (circa 1380)
 - *Statuto quo nul ject dung*
 - Writ that no one is to dump dung
 - Note: Repealed 1856
- Public Health Act of 1848 England
 - Every house shall have a sanitary method for sewage (Toilet, Privy, Ash Pit)



The Early Years of Sanitation Modern World

"Moule's Patent Earth Commode" Pat. 1869

From A Sign

Things to be observed:

The Earth must be dry and sifted.

Sand must not be used.

Rise from the seat **QUICKLY!**

No "slops" must be thrown down.

Before using,

let one fall of earth be in the pail.

SJS/BHG/OSWW/DEH/NCDENR

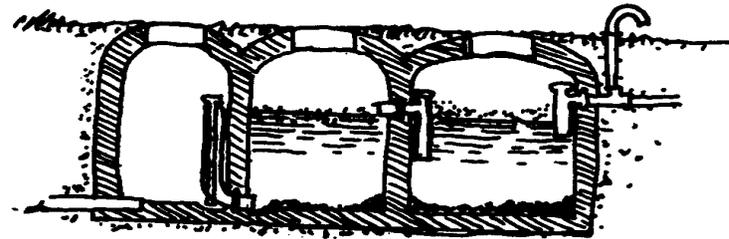
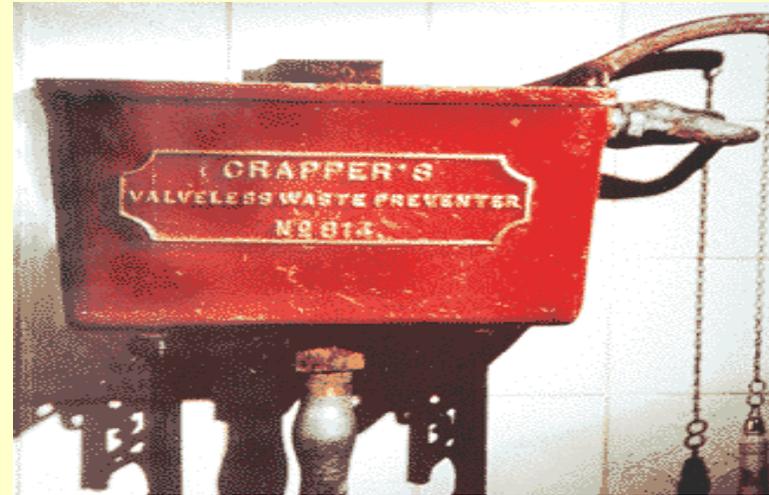
The Early Years of Sanitation

Modern World - Terms

- Plumbing; from the Latin term ‘*plumbus*’ for lead. Romans used lead pipe for waste drains (also clay, wood).
- Plumber; skilled worker in lead.
- Sewer; Means “seaward” in Old English.
 - Open drains became tubular with water supplies to eliminate cleaning
 - Flush toilet in Europe

Water Carried Waste

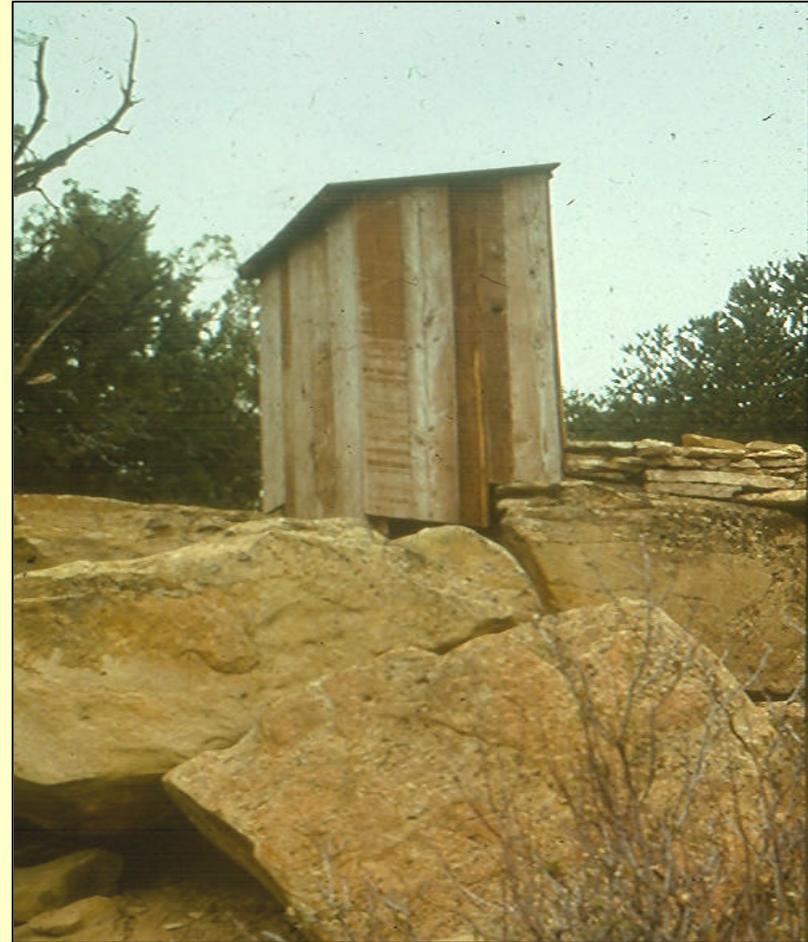
- Sir Thomas Crapper
(Actually by Albert Giblin in 1819)
 - Development of the Siphon Flush Toilet
- Jean-Louis Mouras
 - Development of Les Fosse Septique or Septic Tank (Circa 1860)



The first septic tanks appeared in the United States about 1883, when a two-chamber, round, vertical tank equipped with a dosing siphon for discharge was designed by Edward S. Philbrick of Boston, Mass.

The Privy Arrives in NC

- Rockefeller Program (1900's)
 - A Privy at Every School
 - Became First Public Health Program in NC & the Start of LHDs and NC State Board of Health
 - Guilford-1st county health department
- Works Progress Administration (1933-45)
 - Privy Reconstruction



The Privy Law in NC

- NC Law (Circa 1919)
 - *“Every residence located within 300 feet of another residence must have an improved privy of a type approved by the NC State Board of Health.”*

(300 feet = How far a hookworm can crawl from the “source”)



Septic Systems: The Early Years

- 1920's USDA Published Rural Sanitation Guides
- 1940-50's USPHS basic research on
Septic Systems
- 1950-60 Manual Of Septic System Practice
- 1970's Environmental Movement
- 1980 EPA On-Site Wastewater Management
Manual
- 2000's EPA Decentralized Wastewater
Manual/Web/etc.

Rural Sanitation in NC

- Rural Electrification
 - *Change from Water by the Bucket Full to Electrical Pumps in Wells*
- Indoor Plumbing
 - *Bathrooms added to Rural Homes*

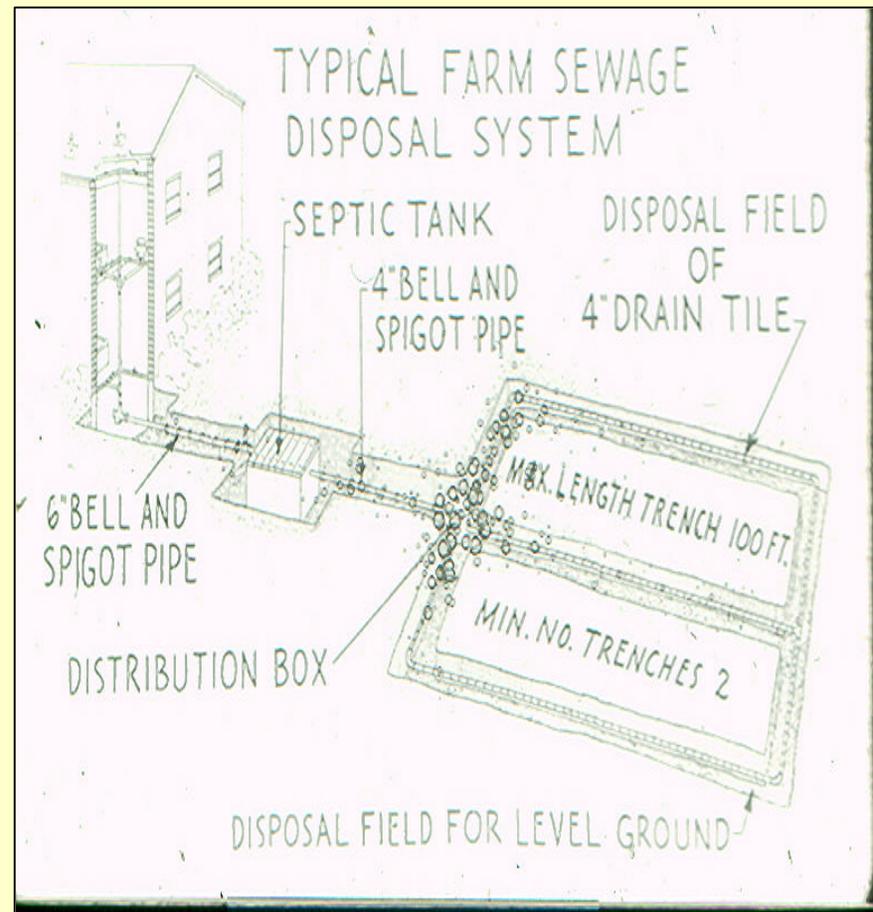


Rural Sewage Systems in NC

- Pre-WW II
Rural Residents Advised by Farm Agencies on Septic System Installation with No Siting or Soil Criteria.

S

- No Laws or Rules



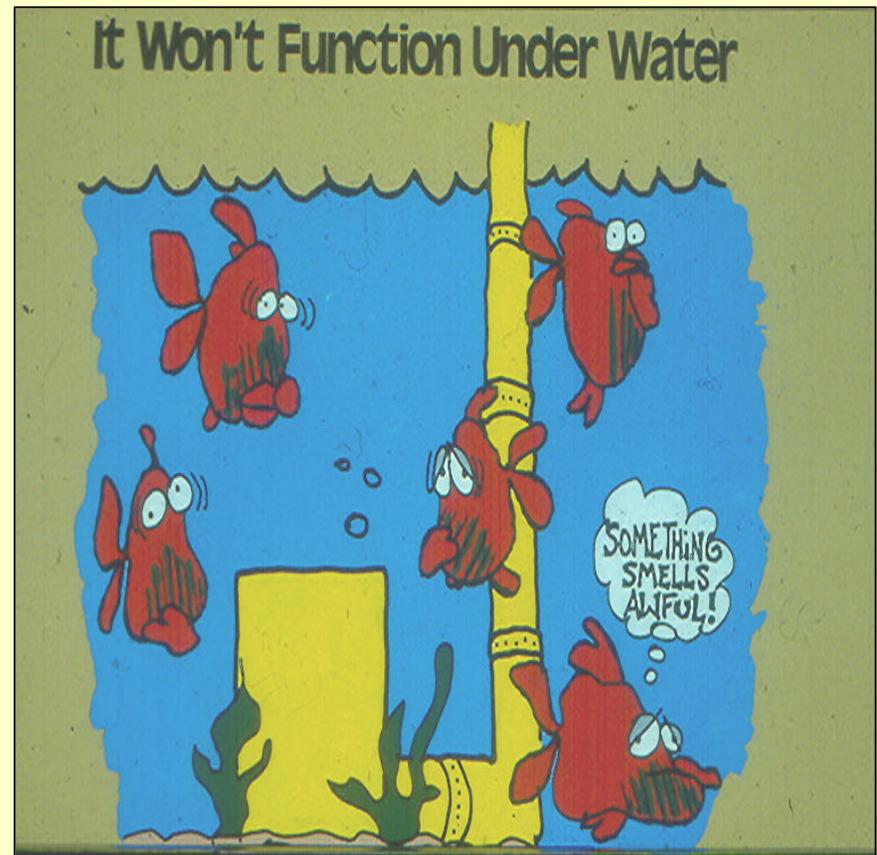
Early NC Regulatory Program

- 1957 Law Required Local Board of Health Regulations
 - *Permits-contractor sewage disposal record*
- State Board of Health
 - *Percolation 'Perc' Test*
- 1976 First full time OSW Program Employee
 - Steve Steinbeck*



NC Laws for OSWS in the 1970's

- Ground Absorption
 - Act of 1973
 - *Site Evaluation*
 - *Improvement Permit*
 - *Certificate of Completion*
 - *OSWS Permits Required Before Other Construction Permits*
 - *Limit Electricity/cut off*

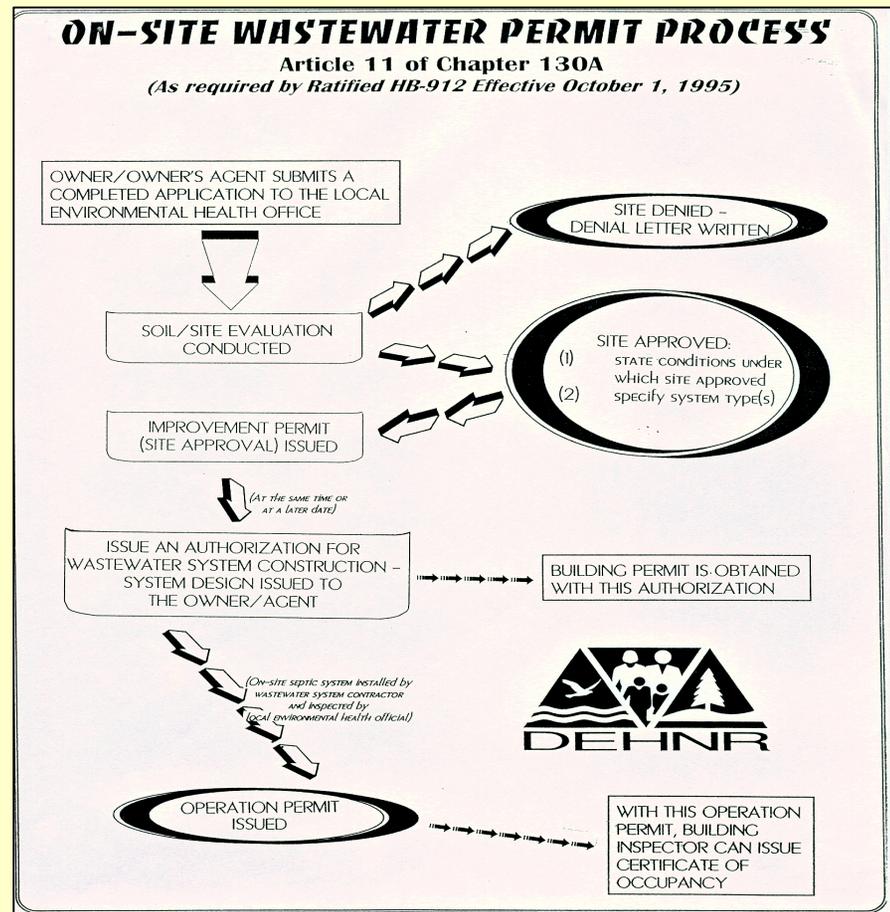


NC Laws for OSWS in the 1980's

- Ground Absorption Act of 1981
 - Responsibilities
 - Change >3000GPD
 - Management of OSWS
 - System Classification
 - Operation Requirements
 - Enabling Legislation for Rules Detailed
 - Legal Remedies
 - Revocation & Suspension of Permits
 - Civil Penalties
 - Injunctive Relief
 - Criminal Misdemeanor
 - Experimental and Innovative Systems

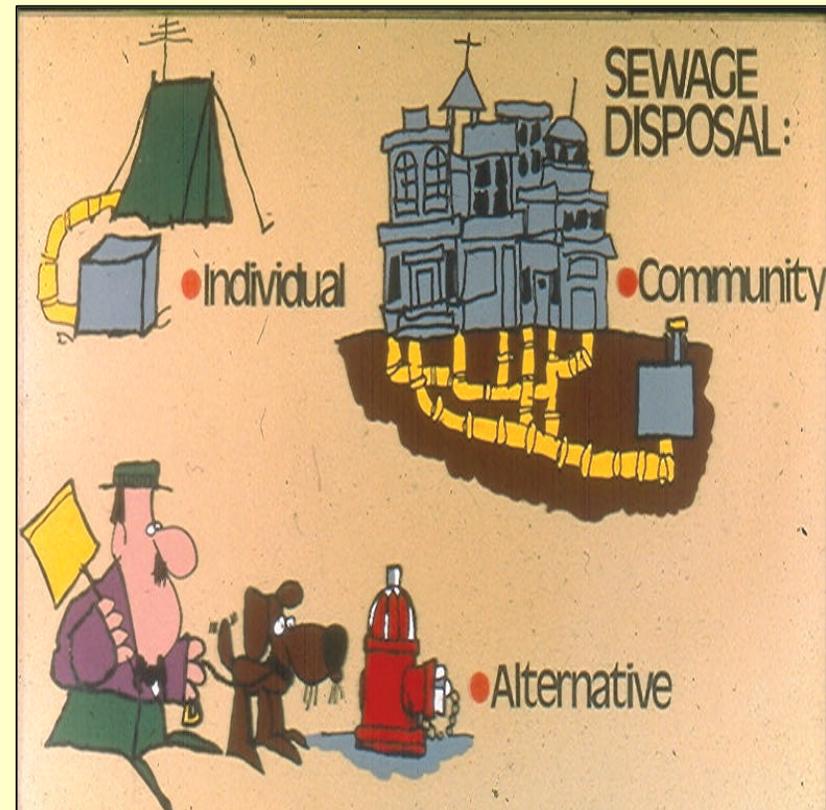
NC Laws for OSWS in the 1990's

- 1995 Amendment
 - Three Tier Permit
 - Improvement Permit
 - Site Approval
 - Construction Authorization
 - Design Approval
 - Operation Permit
 - Installation Approval



NC Research & Demonstration

- 70-80's TJ COG
Individual Wastewater System Project- trench shapes – push for marginal soils
- 80's *LPP and Mound Studies*
- 80's *Early Fate and Transport Studies* pathogen & nutrients
- 80's *NC Septage Management Study*
- 2000's *Fate, Transport, Transformation*
Indicators, Systems, Emerging Contaminants , Tracking.....

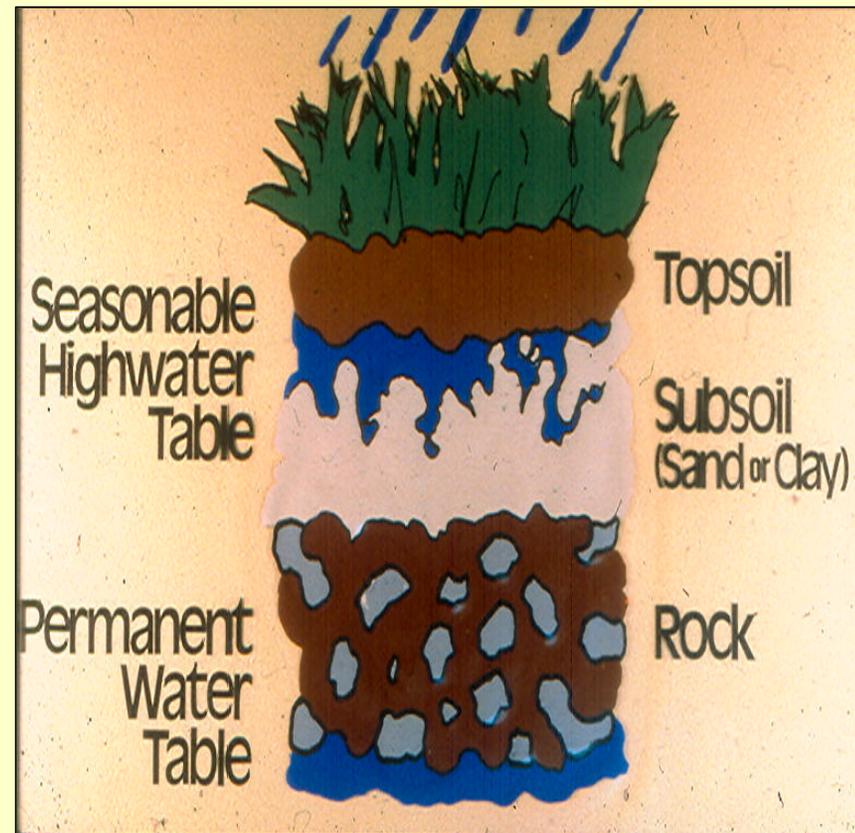


NC Rules for OSWS

- From 1977 -----
- Good Decades!

NC Rules for OSWS

- Modern Era Rules
 - 1 July 1977
 - Site Evaluation (Technical Guide)
 - Suitability Classes (3)
 - Using 'Perc' Tests
 - Increased Setbacks
 - LTAR Based on Site Classification (3)
 - Sanitary T cast or not



NC Rules for OSWS

- 1979 Two-Compartment Septic Tank Required
 - Solid baffle wall slotted at mid-point
 - Placed so that inlet compartment is $\frac{2}{3}$ the liquid capacity
 - Reduced solids and made a stronger Septic Tank



NC Rules for OSWS

- 1 July 1982

-----today continues to be modified

- Complete Rewrite of 1977 Rules
- NO 'Perc' Tests
- Site Evaluation Revised
(more specific soil criteria)
- Repair Area Required
- LTAR Reduced & Based on
Texture of Soil (wider
range)
- Design Flows Reduced
- LPP System Added to
Rules

NC Rules for OSWS

- Amendments to '82 Rules (ongoing)
 - LPP & PPBPS Modified Systems
 - Fill Systems (New & Existing prior 1977)
 - Aerobic Treatment Units (ATU)
 - O & M Required
 - Restrictive Horizons-clarified
 - Saproliite Option
 - Monitoring & Modeling for Soil Wetness (.1942)
 - I & E Systems
 - More forthcoming (accepted systems)

NC Rules for OSWS

- 1999 Effluent Screens/Filters Required/Risers
 - Risers if 6" under
 - Tank Tags & Markers
 - Screen 1/16 in. (solids)
 - Installed to allow routine maintenance
 - Designed to require O & M not less than a 3 year frequency
 - Cast in place T's removed



Other Laws Affecting OSWS

- 1974-Coastal Area Management Act (CAMA)
- 1983-Septage Program Established In Solid Waste Division (DENR)
- 1985- Office of Administrative Hearings (OAH)
 - Rules Review
 - Hearings

OTHER LAWS

- Wetlands
- Stormwater/Riparian Buffers

OTHER REGULATORY ACTIVITIES

- DWQ/EPA - TMDL's
Total Maximum Daily Loads
Basinwide Planning, etc...

Future of OSWS?

- Law and Rule Amendments
 - Licensed Installers
 - Enhanced O & M
 - Improved QA/QC
 - Tort Reform
- Better Training and Education
- Performance vs Prescriptive



Remember (SJS)

- 1. Every day above ground is a great day.*
- 2. Live each day so that when you are gone your life will have mattered.*





Future of Wastewater Management ?

*Striving
Healthy,
Clean Water*

