DECENTRALIZED / CLUSTER WASTEWATER TREATMENT

A 'GREEN' DEVELOPMENT TOOL

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EPA Region 4 – Atlanta

MS GULF COAST WORKSHOP

November 26-27, 2007

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1988 Yugo GVX

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What is a Decentralized System?

- A.K.A.:
  - Septic Systems
  - Onsite System
  - Individual Sewage Disposal System
  - Cluster System
  - Package Plant

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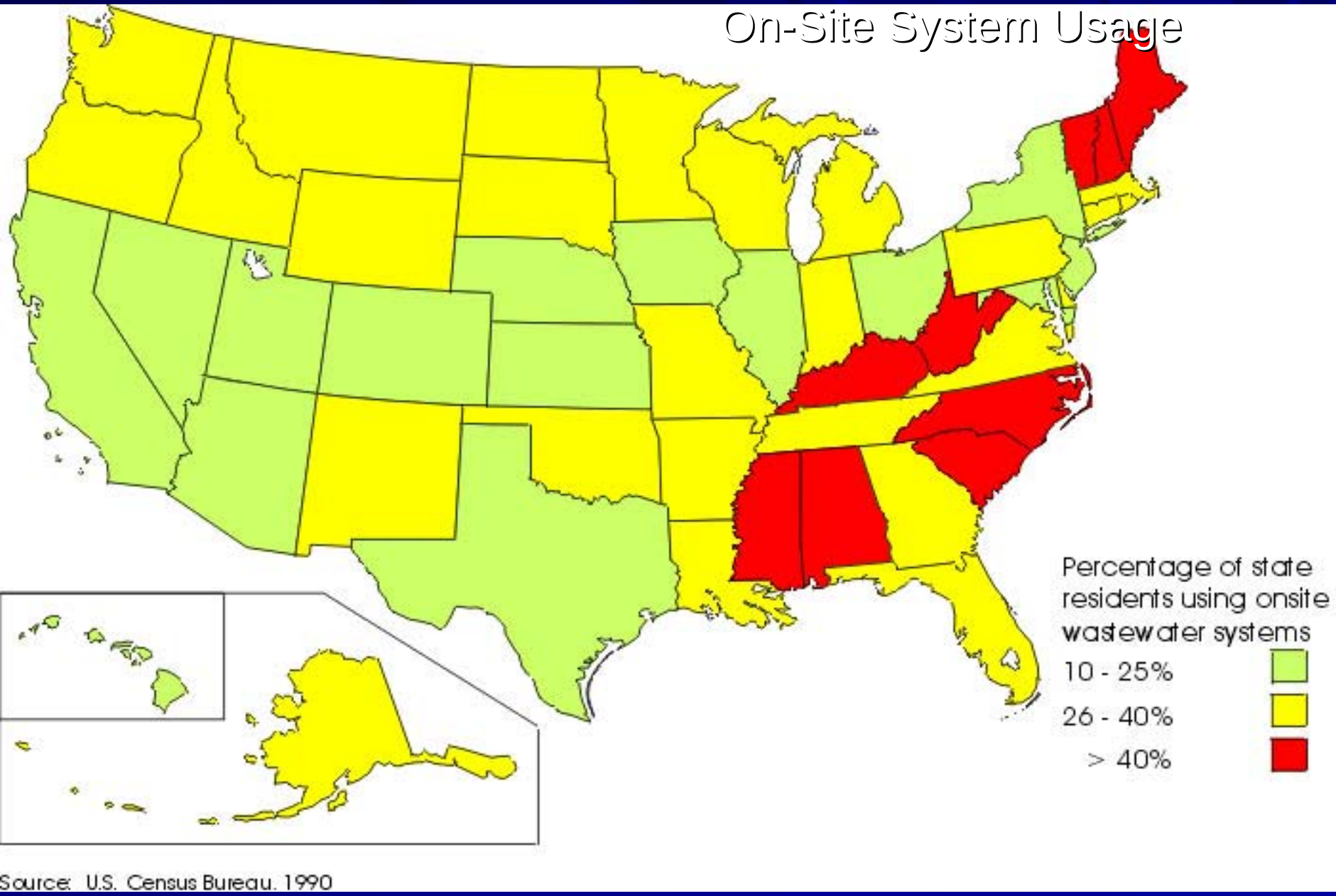
On-Site System Usage



Source: U.S. Census Bureau, 1990

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	Sewered Households	Onsite Systems	% Onsite
Alabama	910,782	728,690	44.4%
Florida	5,100,000	2,300,000	31.1%
Georgia	1,638,979	970,686	37.2%
Kentucky	849,491	600,182	41.4%
Mississippi	**585,185**	**387,406**	**39.8%**
North Carolina	1,403,033	1,365,632	49.3%
South Carolina	825,754	578,129	41.2%
Tennessee	1,213,934	781,616	39.2%
Totals	12,527,158	7,712,341	38.1%

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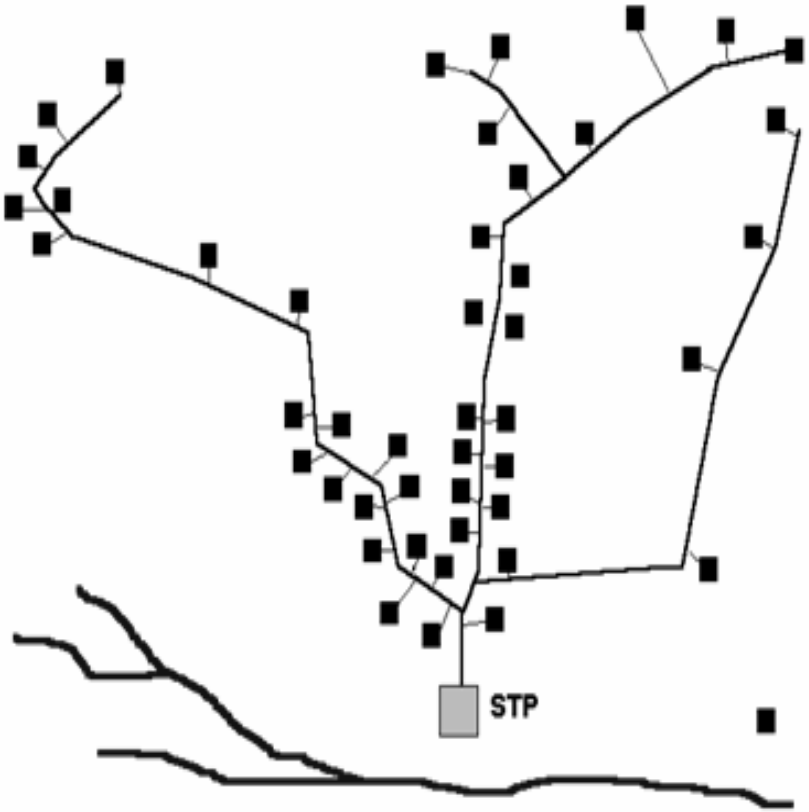
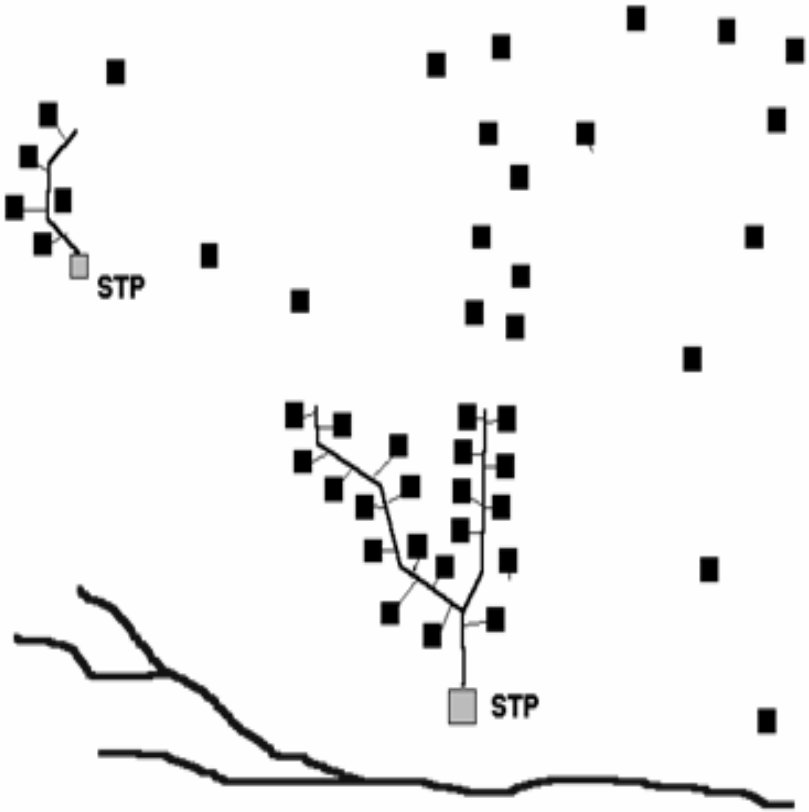
What Does '*Decentralized*' Look Like?

Centralized wastewater treatment



Decentralized approach



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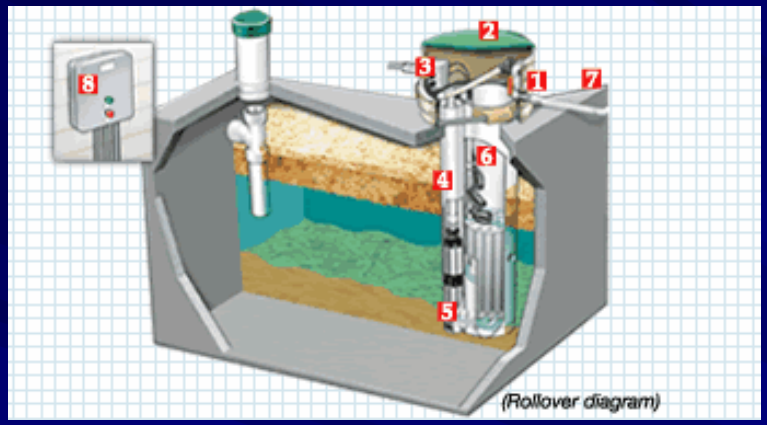
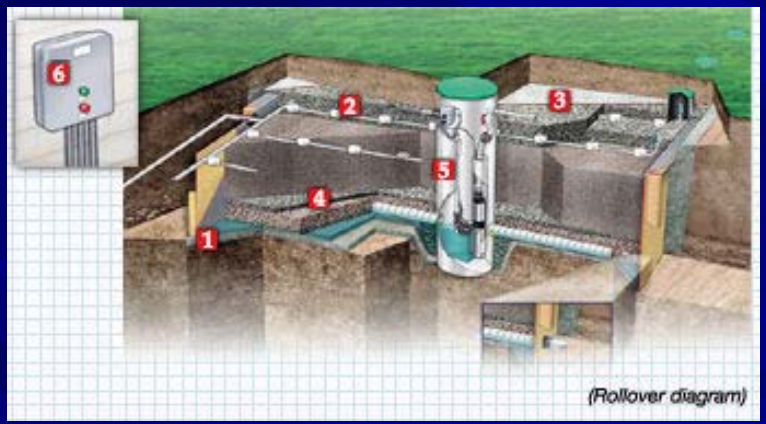
Lots of technology options

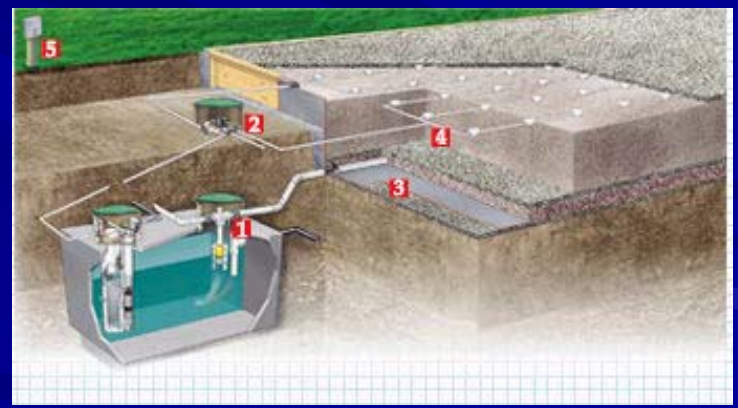


Effluent Pumping

Textile Filter



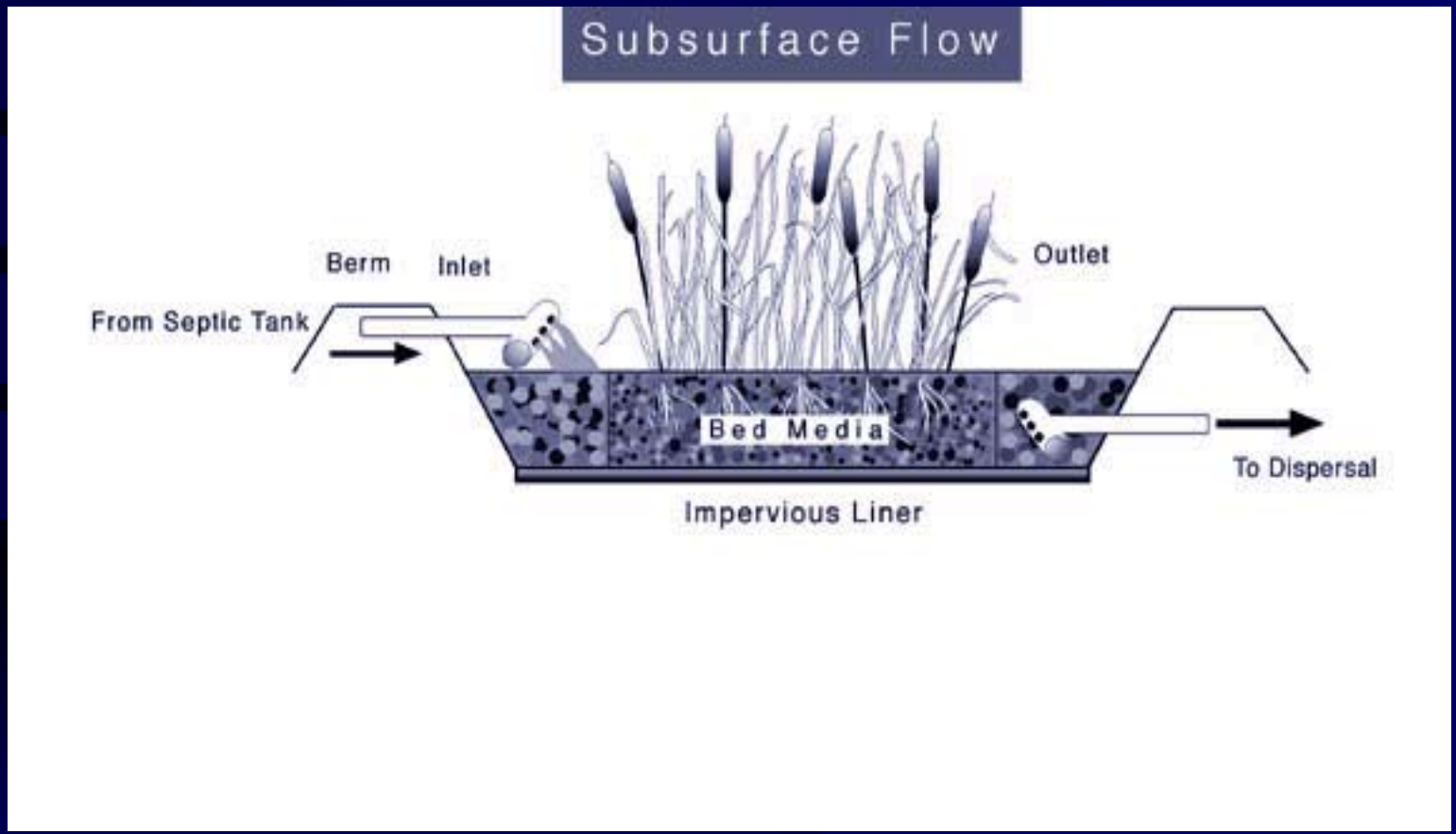
Intermittent Sand Filter



Recirculating Sand Filter

VEGETATED SUBMERGED BED

AKA: SUBSURFACE FLOW WETLAND



Subsurface Drip Irrigation

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Drip tube testing – note wetting at each emitter opening

Conventional Sewer

Decentralized Sewer

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Characteristics of Decentralized WW Systems

- Minimized Collection Systems – Significant Cost Savings
- Simple, Low O & M Treatment Technologies
- Minimized Solids Handling
- Enhances Opportunity for Reuse of Wastewater

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Characteristics of Decentralized WW Systems

- Enable 'Green Development' – Conservation Subdivisions – Preserve Green Space – ***Manage Land Use***
- Watershed Protection Tool – Target Problem Areas Without Encouraging More Development

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Decentralized – Low Impact Development

- Decentralized Systems can be a *tool to manage growth*

- Central Systems assure high density growth – otherwise the cost is too high

Conservation Subdivisions

- Reduced lot sizes with Clustered Systems
- Dedicated Green Space
- Nashville, TN; Metro Atlanta area

- Lower Cost for Development – Higher Price for Homes – Greater Appreciation in Value

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What's The Problem???

- *The "Been there – Done that" mind set*
- *I remember package plants and the memories still hurt!!!*
- *Sewers are a sign of modern civilization – aren't they???*

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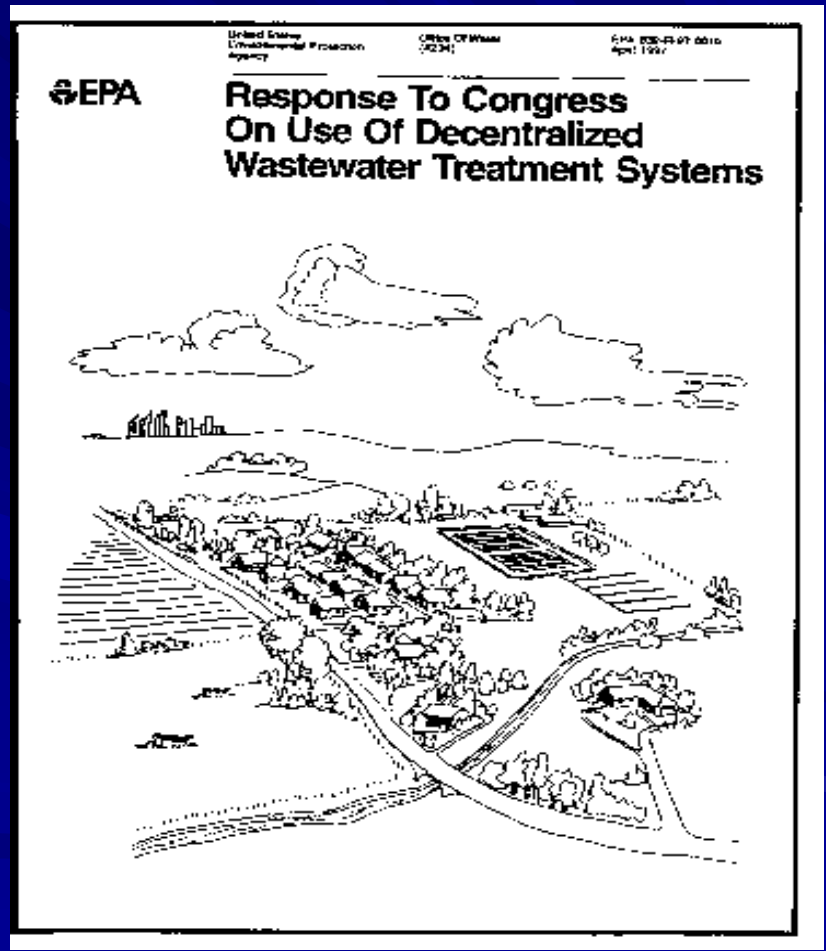
Decentralized Systems Can and Do Work!

"Adequately managed decentralized wastewater systems are a *cost-effective and long-term option* for meeting public health and water quality goals."

EPA, 1997



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KEY TO SUCCESS WITH DECENTRALIZED / CLUSTER SYSTEMS

- **MANAGEMENT** AT PLANNING STAGE
- **MANAGEMENT** DURING DESIGN
- **MANAGEMENT** OF CONSTRUCTION
- **MANAGEMENT** OF O&M
- **MANAGEMENT** OF USER CHARGES
- **OWN & OPERATE ENTIRE SYSTEM**

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PRESCRIPTION FOR POSSIBLE PROBLEMS

- HOMEOWNERS ASSOCIATION MANAGEMENT OF SYSTEM
- DEVELOPER RESPONSIBLE FOR PLANNING-DESIGN-O&M

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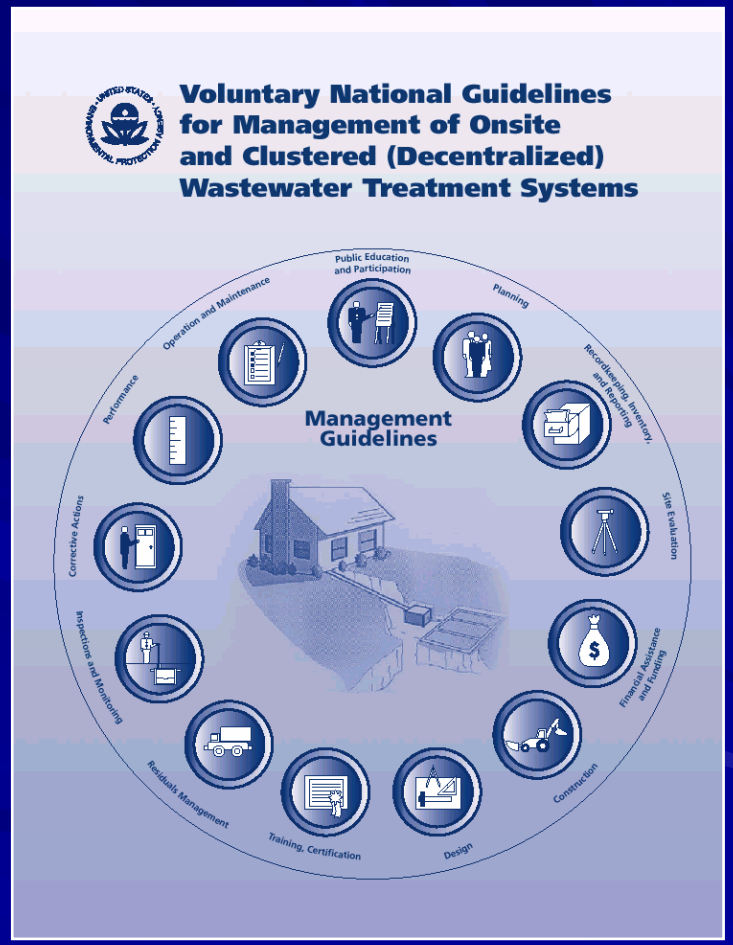
EPA Voluntary Management Guidelines

- Published in March 2003
- Objective

  Better & More Consistent Management

- 5 Management models



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EPA Management Guidelines

Management Models:

1 - Homeowner Awareness

2 - Maintenance Contracts

3 - Operating Permits

4 - Responsible Management Entity (RME) Operation and Maintenance

5 - RME Ownership and Management

MANAGEMENT MODELS

SYSTEMS OWNED & OPERATED BY RME – PUBLIC OR PRIVATE UTILITY

- TENNESSEE SYSTEMS
- MOBILE, AL AREA
  - MOBILE AREA WATER & SEWER SYSTEM
  - SOUTH ALABAMA UTILITIES
- NEWNAN UTILITIES – Newnan,GA

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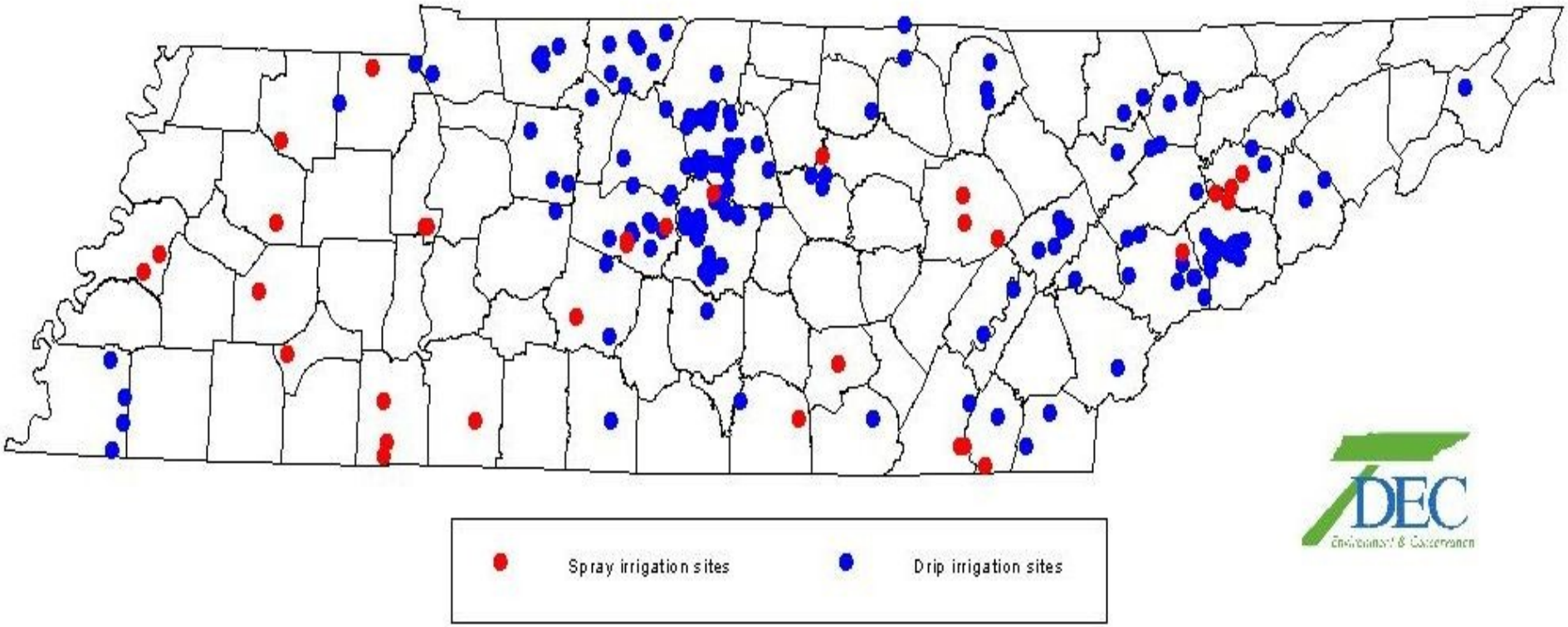
TENNESSEE SYSTEMS



~200 SYSTEMS PERMITTED

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Size of TN Systems
(Based on Design Capacity)

	Flow (Gal/Day)	Homes/Units Served	People Served
Median	18,000	50	290
Largest	675,000	1,930	6,750
Statewide Capacity	6,600,000	18,000	77,000

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TDEC Environment & Conservation

How Well Do the Systems Work?

- Recent 2 Year Record for 10 Systems in Rutherford County

Parameter	Avg	Max
BOD_5	<5	<5
Ammonia	<0.1	2.2
Fecal Coliform	<2	3300

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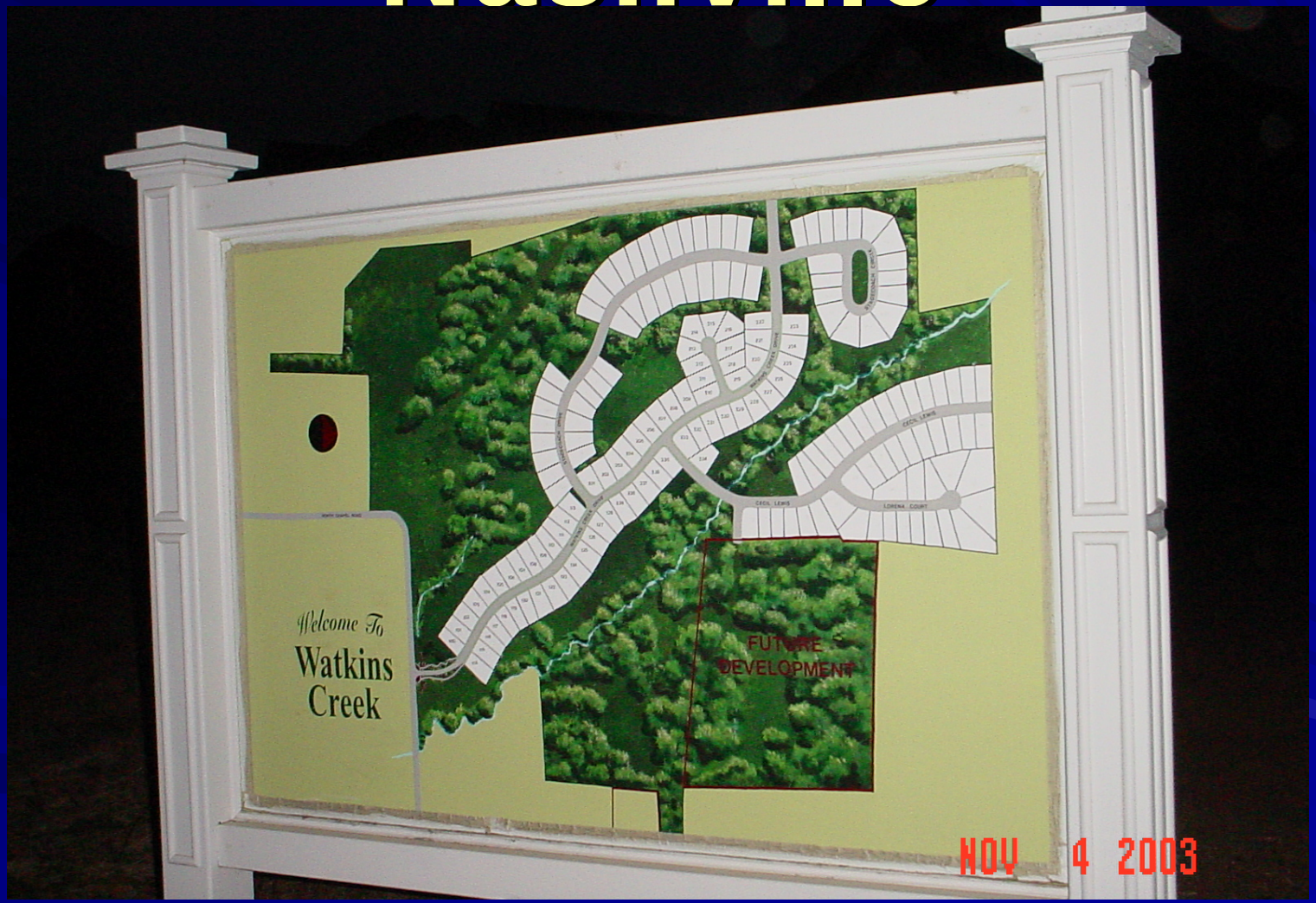
TDEC Environment & Conservation

Watkins Creek – Metro Nashville



Watkins Creek – Metro Nashville

- Conventional Septic Tanks Subdivision – 2 acre lots
- Decentralized Cluster System – < ½ acre lots
- Homeowner "sewer bill" approx $40 / month

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Effluent From Recirculating Gravel/Sand Filter & UV Disinfection System Subsurface Drip Field in Background

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YUGO

1985 base price of $3990

Toyota Corolla Deluxe

1985 - $7133

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AutoTrader Results Aug. '07

- 1981-1986 -- Anywhere in the US
- Number of Cars For Sale
- 0 Yugos
- 235 Toyotas
- 42 Datsuns
- ***IF YOU BUILD IT RIGHT – YOU BUILD IT ONCE -- IF YOU BUILD IT CHEAP – YOU WILL BUILD IT TWICE***

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www.epa.gov/owm/onsite

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Some Words About Tanks

- Watertight, watertight, Watertight, ***WATERTIGHT!!***
- Tanks, connections, penetrations, riser connections
- Structurally sound

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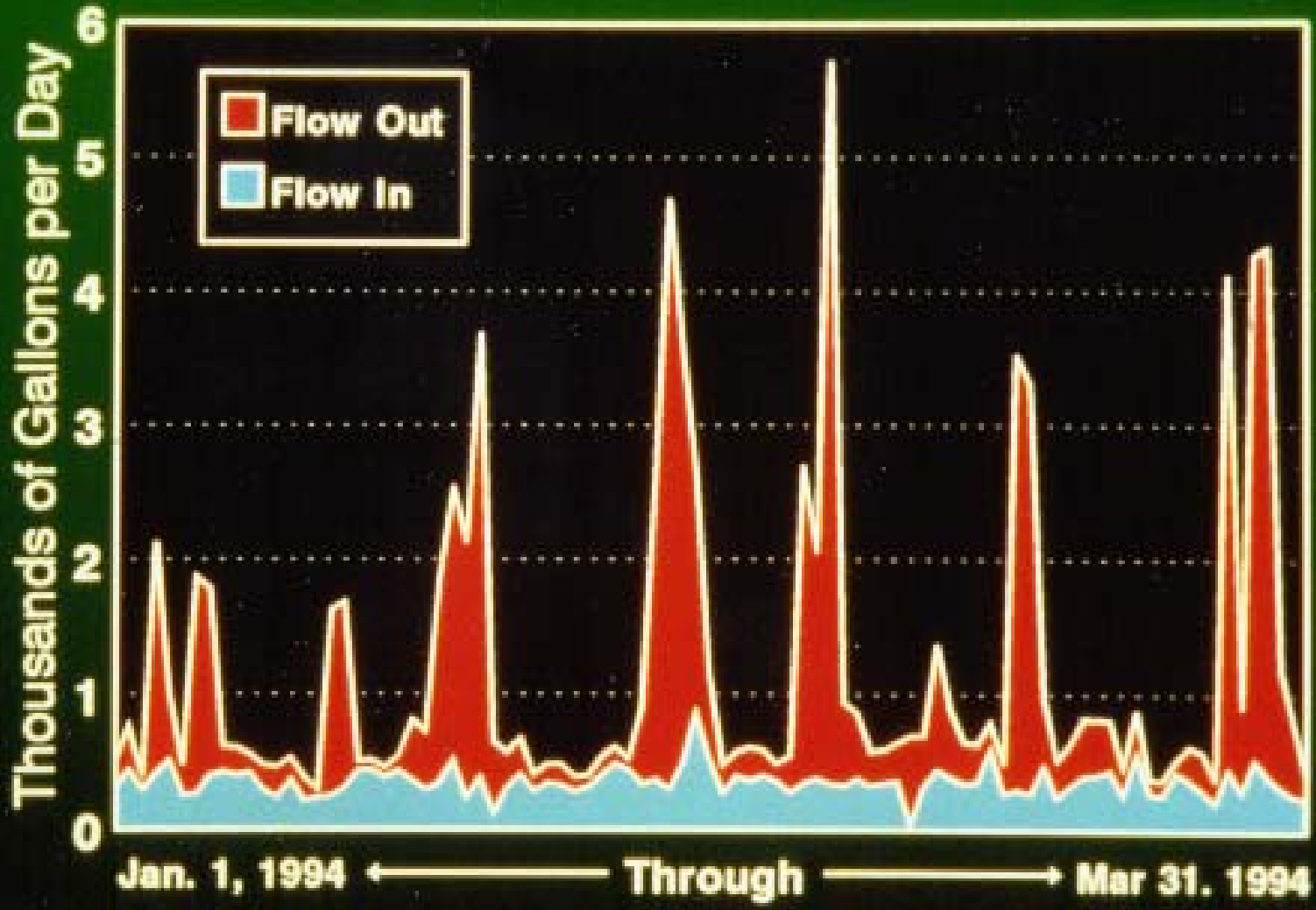
Flows Through a Leaking Septic Tank



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Fiberglass Tank –

They don't leak, *do they???*

Concrete tank from a manufacturer whose tanks are certified as watertight

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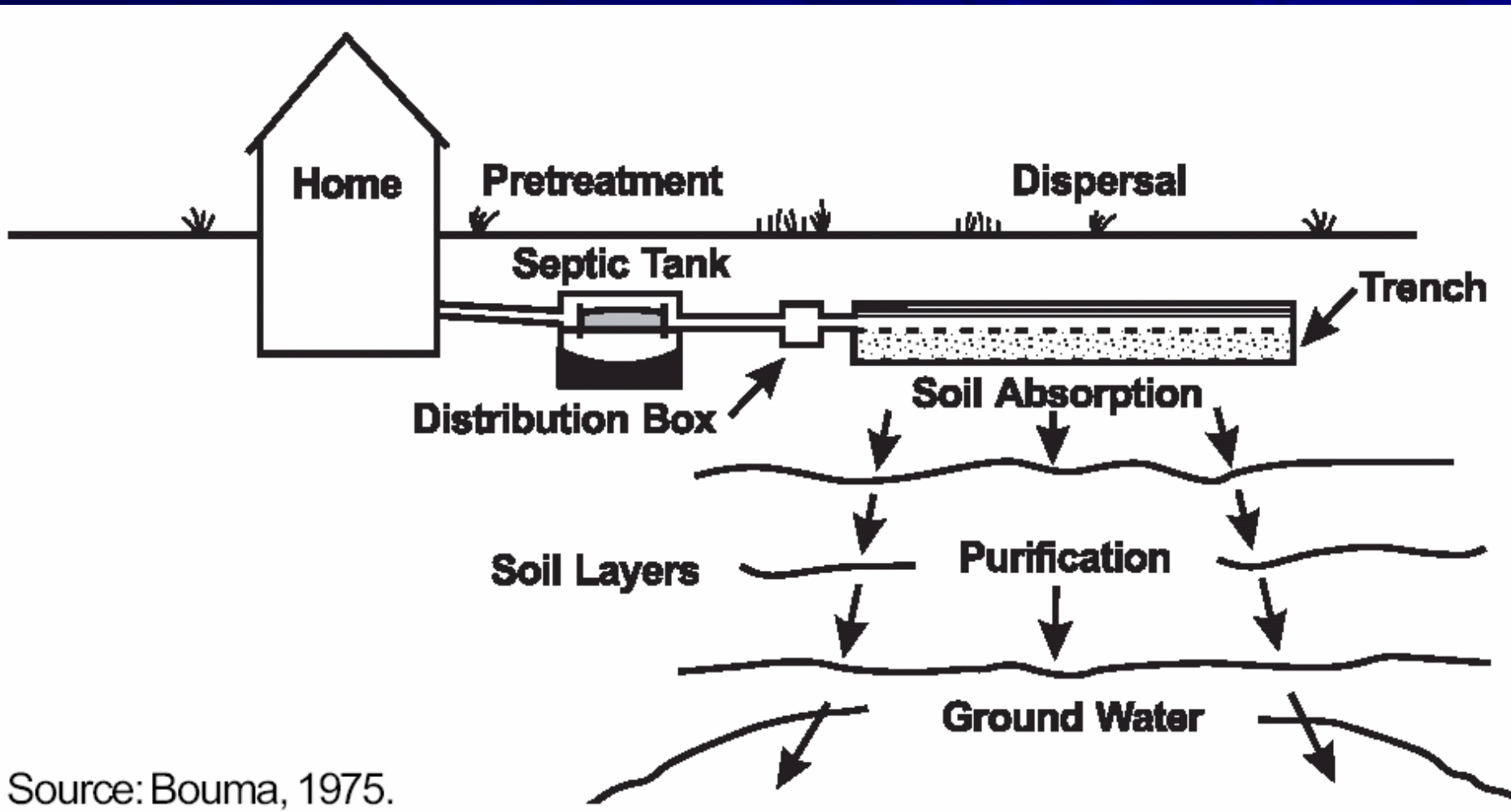
TRADITIONAL SEPTIC SYSTEMS



Source: Bouma, 1975.

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BETTER PRETREATMENT CAPABILITY

- May allow onsite systems on lots that don't meet code for conventional septic systems in most states
- Can lower concentrations of suspended solids, organics (BOD, COD), nutrients (nitrogen, phosphorus), and pathogens (bacteria, virus, and parasites) applied to the soil
- All improved pretreatment systems require higher levels of management than traditional septic systems

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TRADITIONAL SEPTIC SYSTEMS

SEPTIC TANK EFFLUENT

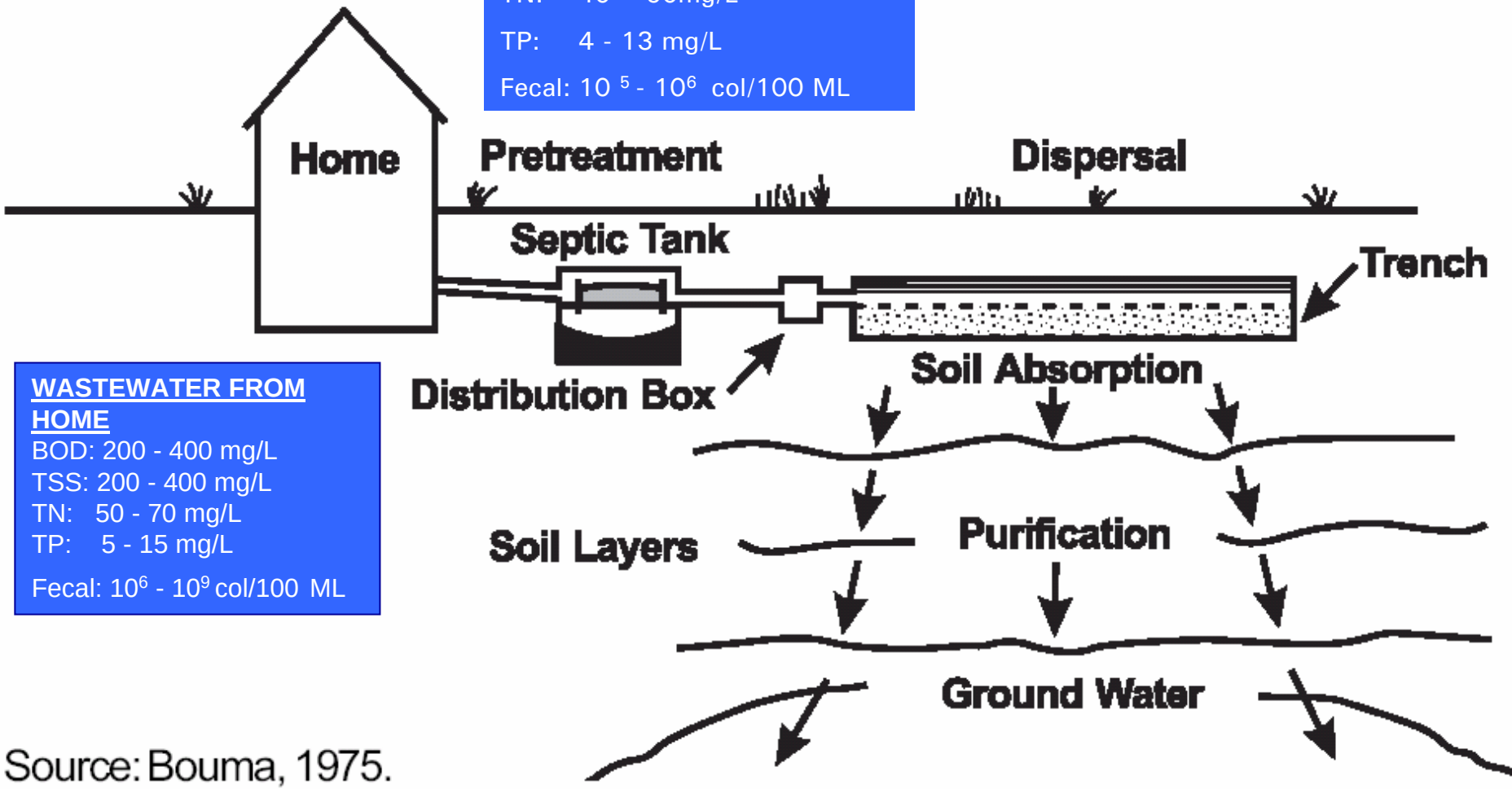
BOD: 100 - 200 mg/L

TSS: 50 - 70 mg/L

TN: 40 - 50mg/L

TP: 4 - 13 mg/L

Fecal: 10^5 - 10^6 col/100 ML



WASTEWATER FROM HOME

BOD: 200 - 400 mg/L

TSS: 200 - 400 mg/L

TN: 50 - 70 mg/L

TP: 5 - 15 mg/L

Fecal: 10^6 - 10^9 col/100 ML

Source: Bouma, 1975.

WHAT ARE SOME OF THESE DECENTRALIZED TECHNOLOGIES?

- More reliable and low-cost improved pretreatment systems prior to soil dispersal or reuse
- Improved soil dispersal systems that greatly improve soil treatment efficiency
- Low-cost (alternative) collection systems to convey wastewater from the sources to the treatment facility

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Champion Hills Subdivision
30,000 gpd

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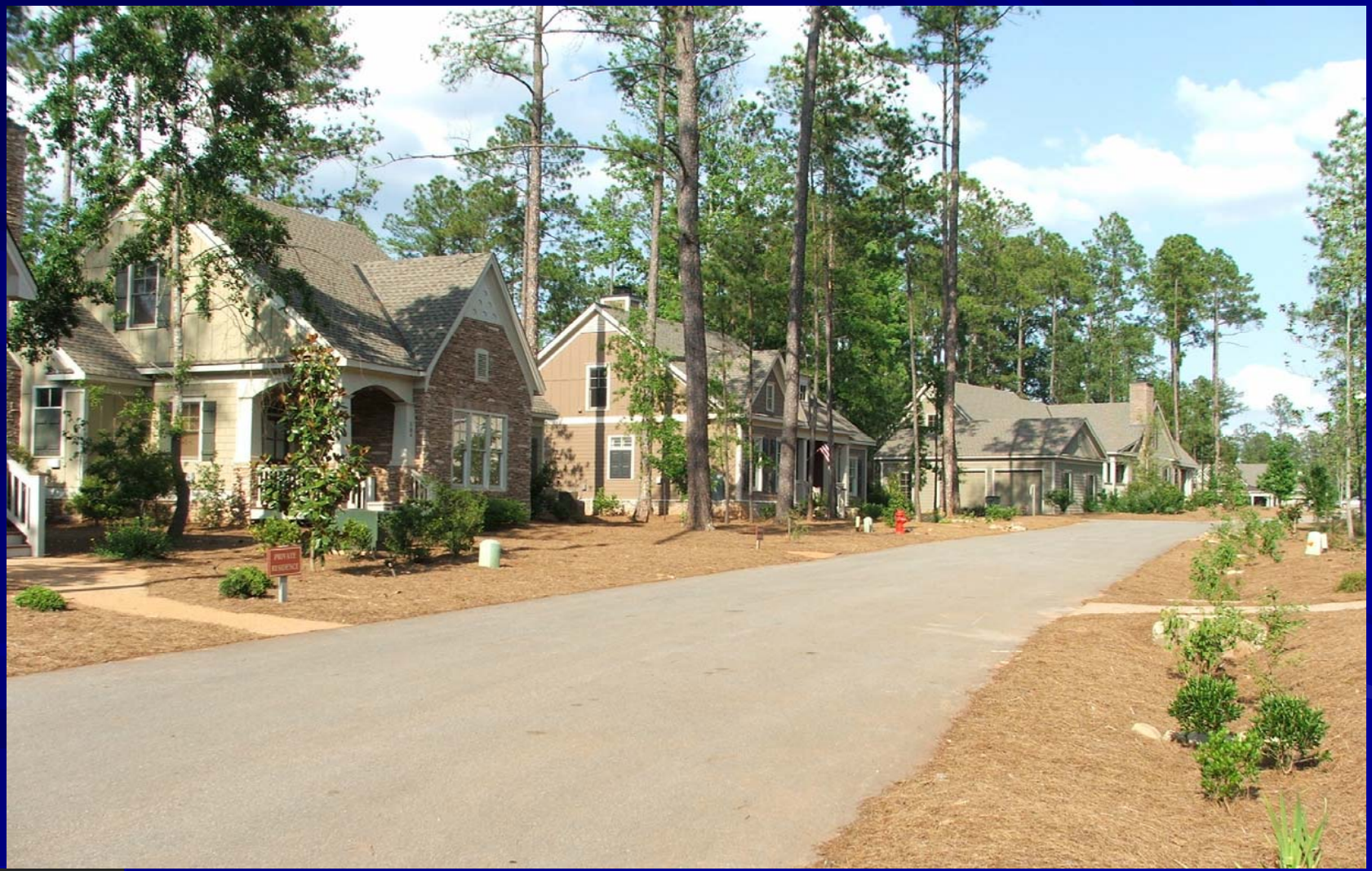
Low Impact Development

No Grass, No Curb/Gutter



Calloway Gardens – Longleaf

Low Impact Development