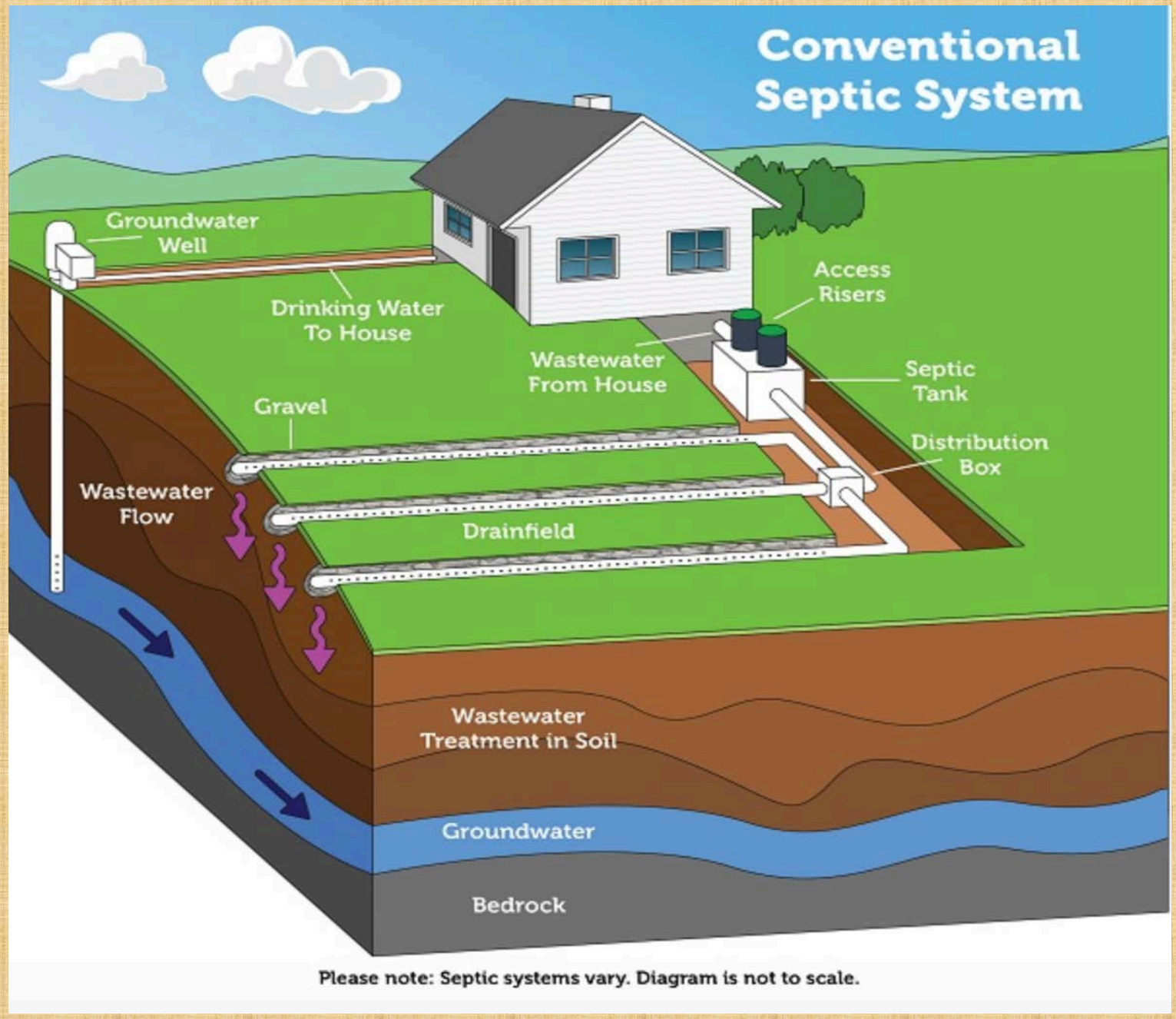
Troubleshooting and Resolving Onsite Wastewater System Malfunctions

Mark Gross


Conventional
Septic System
Groundwater
Well
Drinking Water
To House
Access
Risers
Wastewater
From House
Septic
Tank
Gravel
Distribution
Box
Wastewater
Flow
Drainfield
Wastewater
Treatment in Soil
Groundwater
Bedrock
Please note: Septic systems vary. Diagram is not to scale.

A Caveat

- This presentation addresses systems that are “properly sized” based upon the soil and site conditions. That is, the system has adequate soil dispersal area based upon the design flow rate and the design surface area loading rate.

Generally Two Causes for Malfunctions

- Hydraulic Overloading – too much liquid
- Organic or Chemical Overloading - the wrong kind of liquid

A place to start

- Obtain the permit for the system
- Obtain the as-built if it’s available
- Try to locate the system components…. Sometimes a good start is at the tank.
  - Look for a cleanout in the sewer line between the house and the tank
  - I usually look for the tank about 10 ft from the building and straight out from a roof vent

Diagnosing or Finding the Source of the Malfunction

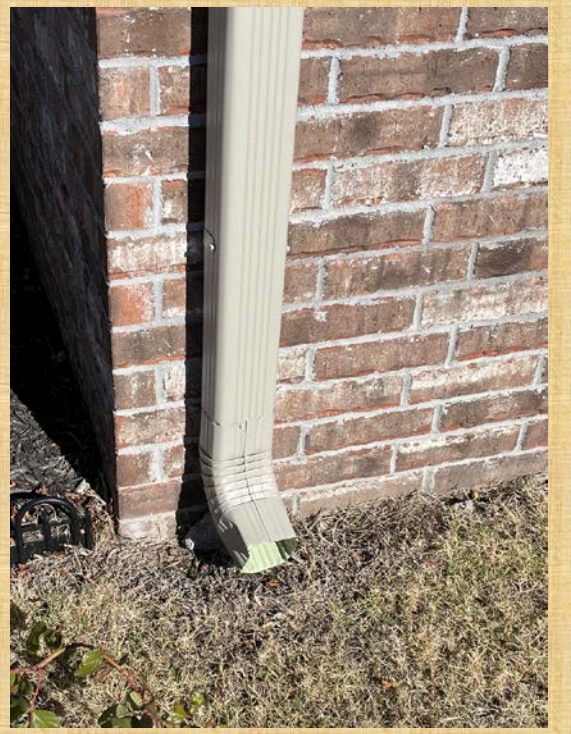
- Start at the least intrusive and the least disruptive and work toward more intrusive and complex causes.

  - Is the water coming from the house?
  - Is the water coming from outside?
  - Is there something going down the drains that can clog or upset the system?

Hydraulic Overloading

- From interior sources

- From outside sources



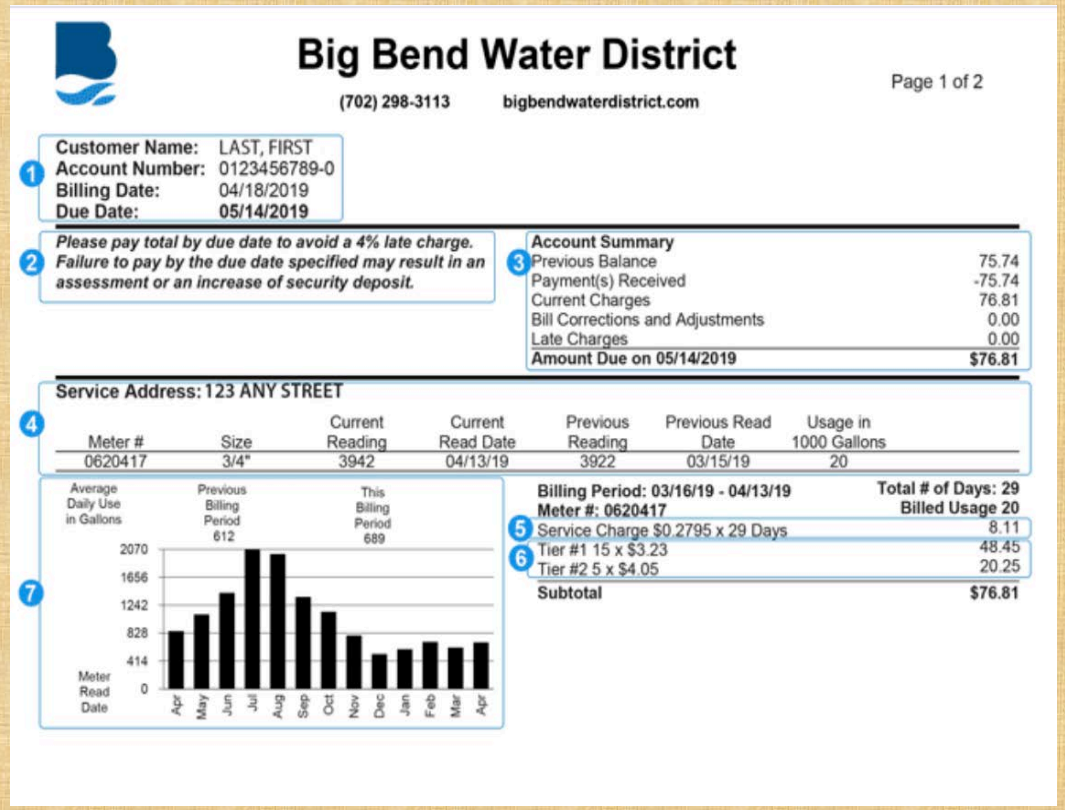
Diagnosing hydraulic overloading

If you know the pumping rate, you can calculate the amount of water being dosed each day.

Calculating volume of water per day

- Pump Flow rate X time per dose = volume of water per dose
- Number of doses per day X volume per dose = volume per day

Diagnosing Hydraulic Overloading from Interior Sources



Big Bend Water District

(702) 298-3113 bigbendwaterdistrict.com

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1 **Customer Name:** LAST, FIRST
Account Number: 0123456789-0
Billing Date: 04/18/2019
Due Date: 05/14/2019

2 ***Please pay total by due date to avoid a 4% late charge. Failure to pay by the due date specified may result in an assessment or an increase of security deposit.***

3 **Account Summary**

Previous Balance	75.74
Payment(s) Received	-75.74
Current Charges	76.81
Bill Corrections and Adjustments	0.00
Late Charges	0.00
Amount Due on 05/14/2019	**$76.81**

Service Address: 123 ANY STREET

4

Meter #	Size	Current Reading	Current Read Date	Previous Reading	Previous Read Date	Usage in 1000 Gallons
0620417	3/4"	3942	04/13/19	3922	03/15/19	20

7 Average Daily Use in Gallons — Previous Billing Period 612 — This Billing Period 689

2070 1656 1242 828 414 0

Meter Read Date: Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr

Billing Period: 03/16/19 - 04/13/19 **Total # of Days: 29**
Meter #: 0620417 **Billed Usage 20**

5 Service Charge $0.2795 x 29 Days	8.11
6 Tier #1 15 x $3.23	48.45
Tier #2 5 x $4.05	20.25
Subtotal	**$76.81**

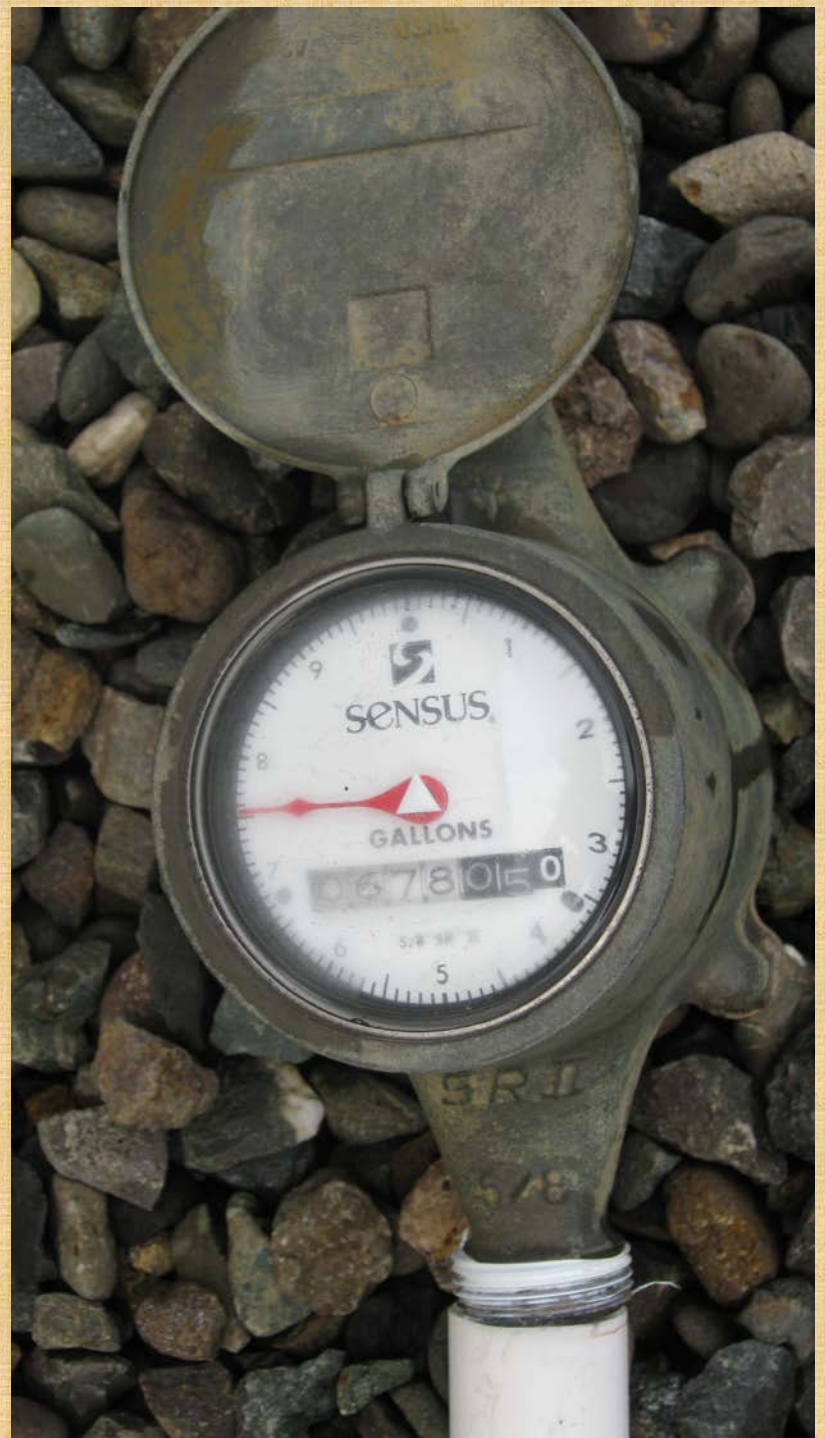
Obtain water use records

If the home is on public water, and the water is metered, the water utility should have water bill records.

Generally, the person who pays the water bill will need to request the records/copy of the bill

If the Water Bill is Unavailable

- Try reading the meter at intervals
- This meter reads 678058 gallons.
  - The fixed zero is read on the red dial, so it is at 8
- Typical 5/8” or ¾” house meters can sense about 1 quart per minute
- Some water utilities have remote-read meters that can sense near-instantaneous flows.

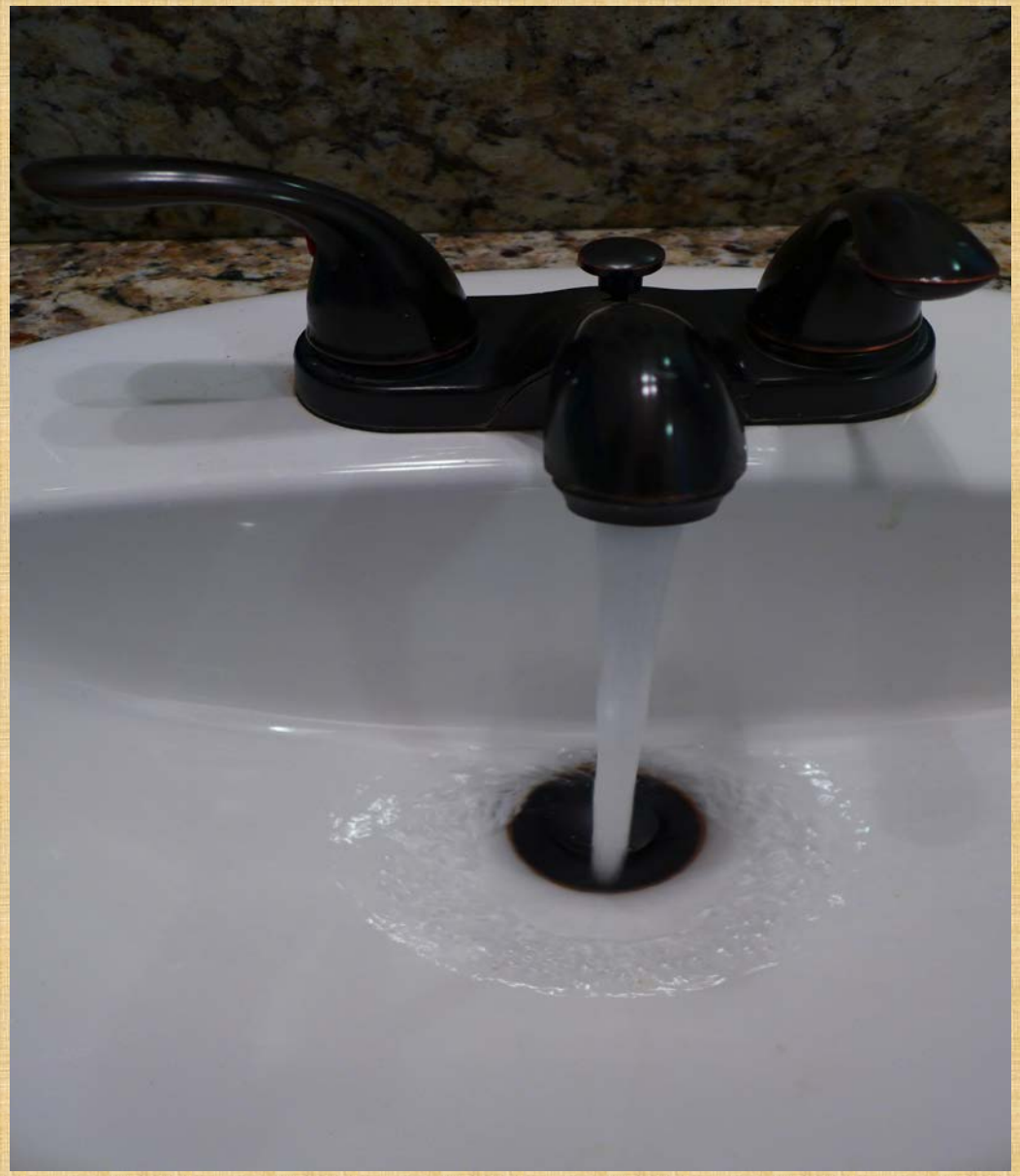


How much water use is reasonable?

Typical residential water use is 50 to 70 gallons per person per day.

When we design sewers, we use around 280 gallons per day per home for modern subdivisions.

10-States' Standards says 100 gallons per person per day to account for a reasonable amount of I & I



Pressure Gauge to Detect a Leak

1. Connect the pressure gauge to an outside hose bibb and turn on the hose bibb
2. Turn off the water to the house
    1. At the meter box
    2. At the valve between the house and the hydropneumatic tank (bladder tank)
    3. At the valve between the pump and the hydropneumatic tank
    4. Try to isolate the house from any other buildings or uses (livestock tanks, cabana, outside hydrants)
3. If the pressure drops at all, there's a leak

Home water pressure should be between 20 psi and 70 psi. If it's really high, the overpressure can cause leaks in faucets and plumbing fittings.

Solutions for overpressure:

Lower the pressure settings on the well pump/bladder tank system

Lower the pressure at the pressure regulating valve between the meter and the house

Install a pressure regulating valve between the meter and the house

Special challenge:

Multi-story home

What if the pressure gauge drops to about 4 psi?

The leak is on the second floor ☺

The old tried and true food coloring in the toilet tank

Put the dye in the tank and wait to see if it shows up in the bowl without flushing

So you have a leak, but can’t find it….

- Try listening. Wait until late at night when everyone’s still and quiet

- Maybe try a stethoscope on various pipes around the house to zero in on the leak

How many people are in the home?

- Look for the permit to see how many bedrooms the system is supposed to serve.
- Ask about past gatherings of lots of people

Ask about intermittent malfunctions

- Is all of the laundry done in one day?
- Does everyone bathe on the same day
- Other usage patterns

- In 1998, the reported volume for one load of laundry ranged from 30 to 50 gallons.

Ask about intermittent malfunctions

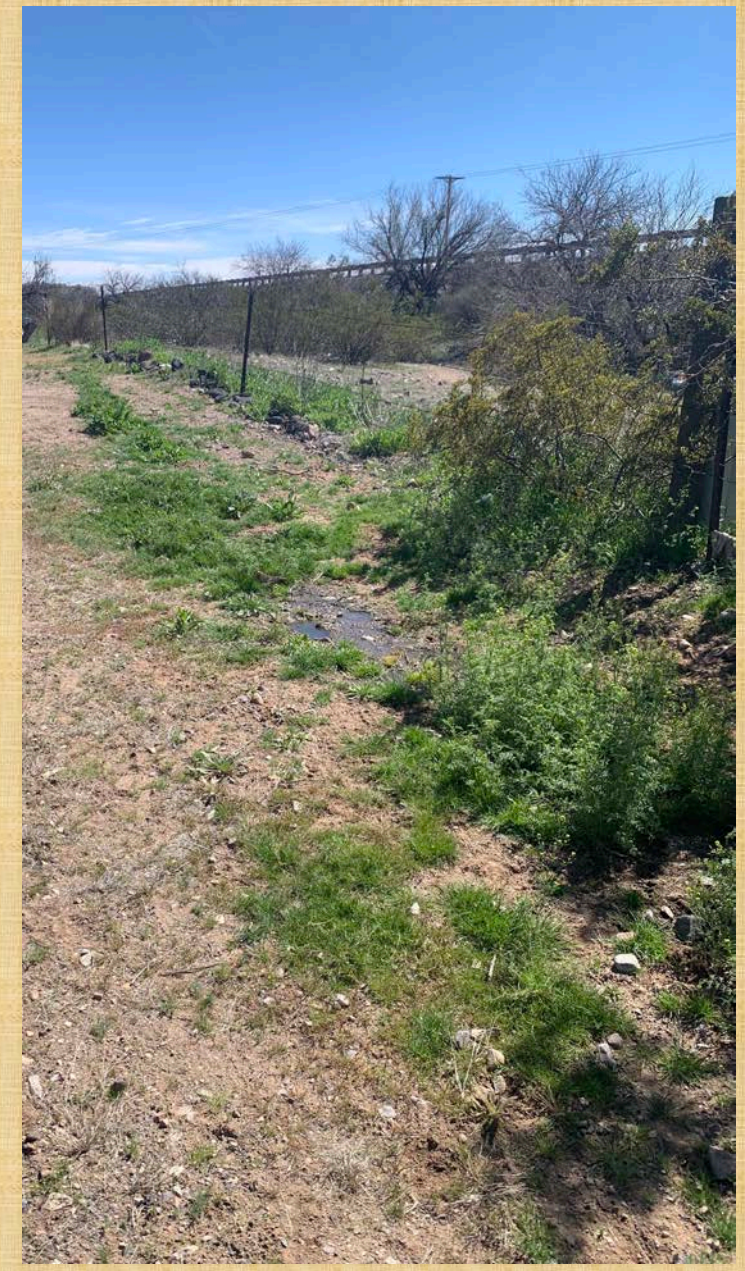
- Is the dose size too large?
- The dosing protocol should allow for small, frequent doses rather than large infrequent doses.
- Try resetting the dose size using the dose timer (if there is one) or resetting the on/off levels in the dosing tank.
- Or adding a dose timer.
- Timed dosing is our friend ☺

Turn off the Water!!!!

Outside Sources of Hydraulic Overload

These may be more interesting

……..And challenging



Cleanout between the house and the septic tank

Sometimes the cleanout is in a low area and rainwater enters the sewer pipe

Sometimes the cleanout cap is missing or broken

Raise or repair the cleanout with an adapter and cap

Rain Gutter Downspouts

A 1500 sq foot house produces 935 gallons of runoff from a 1-inch rain

They may be directed toward the soil dispersal area

They may be directed toward the trenches excavated for the system piping – water will run down the soft trenches and into the soil dispersal system

Redirect the down spouts with solid-pipe extensions

Broken pipes from the home to the tank, from the tank to the D-box

- Some plumbers have camera equipment they can insert in pipes
- May have to dig if there's no surface evidence.

Leaking septic tank in shallow seasonal perched water table

Leaking seals around the septic tank risers and lids

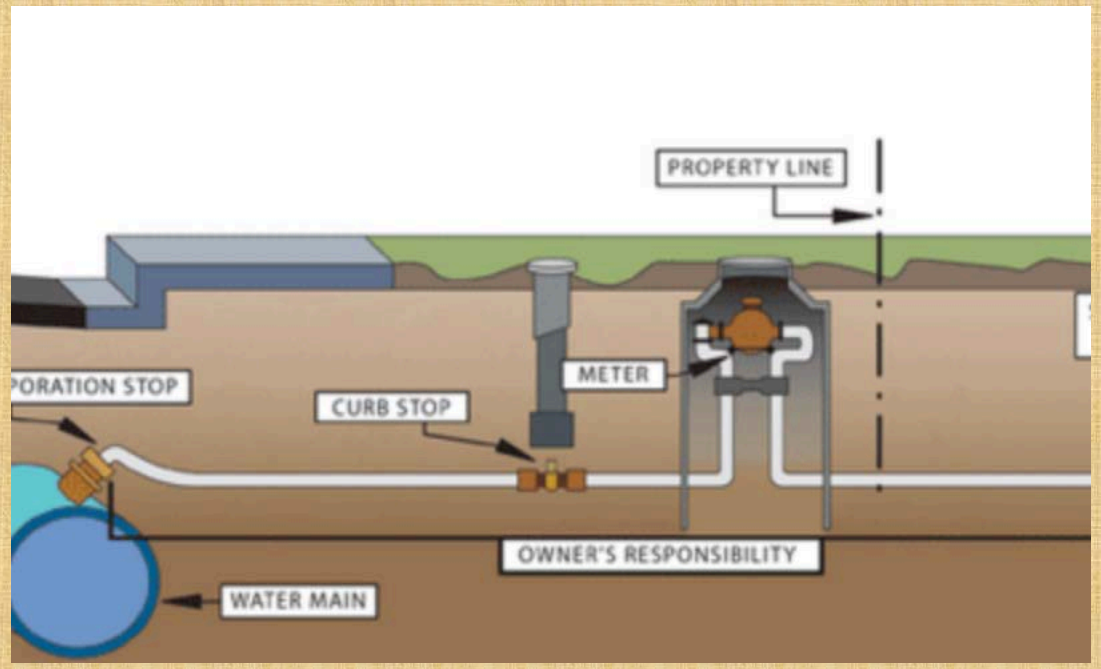
Leaking water service line between the main and the meter or the well and the house

These may be difficult to find.

Walk and look – particularly during dry weather

Many water utilities have ultrasonic listening devices

Private water leak detection services and companies



Landscape position…..

Surface water can run onto the soil dispersal system

- Construct a berm and/or curtain (French) drain upslope to direct the water away from the system

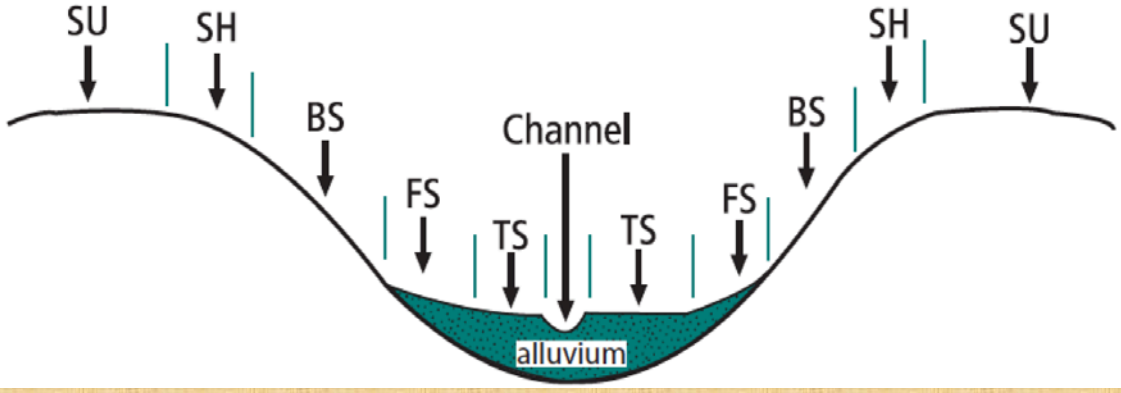
Subsurface water can enter the system

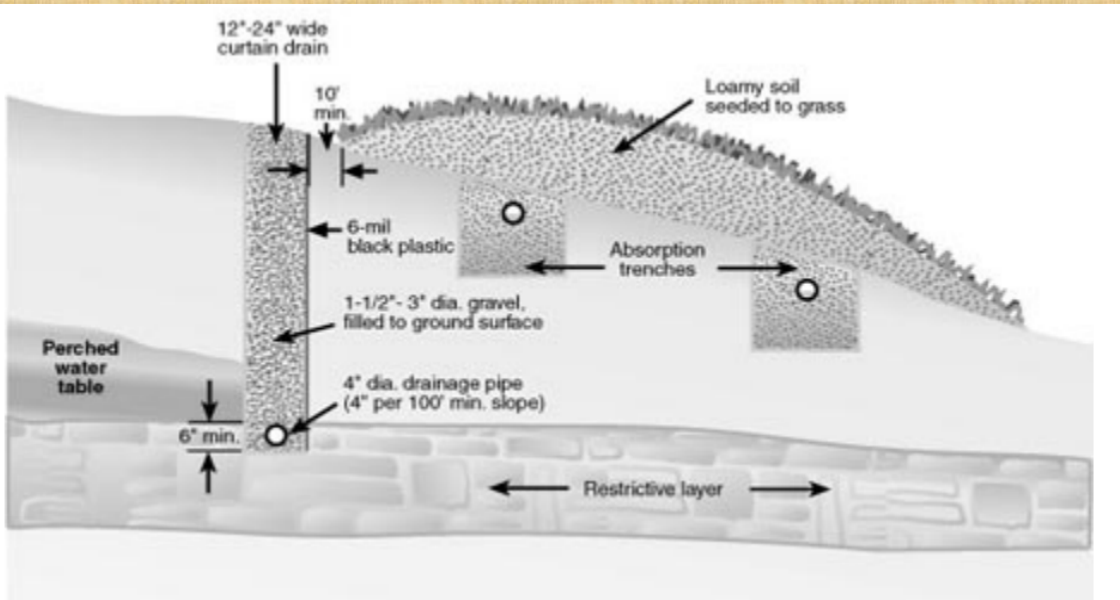
- Construct a curtain (French) drain upslope to direct the water away from the system

Hillslope - Profile Position

Two-dimensional descriptors of parts of line segments (i.e. slope position) along a transect that runs up and down the slope; e.g. backslope (BS)

Position	Code
summit	SU
shoulder	SH
backslope	BS
footslope	FS
toeslope	TS





Oh, Good Grief!

Yes, really…. It happens

Someone waters the lawn over the soil dispersal field

This may take some sneaky sleuthing to find.

If only part of the soil dispersal system is overloaded

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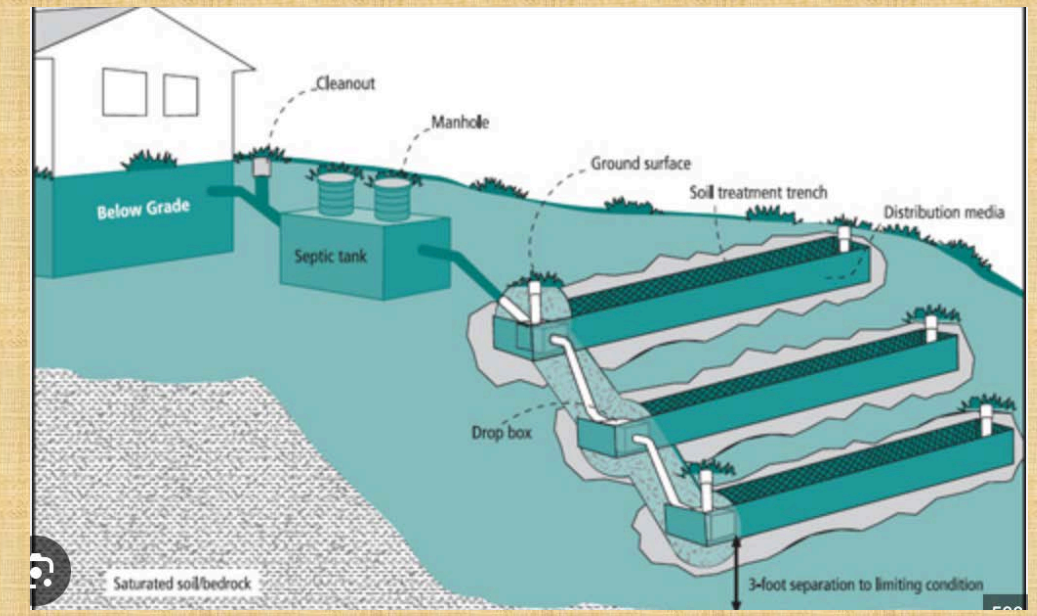
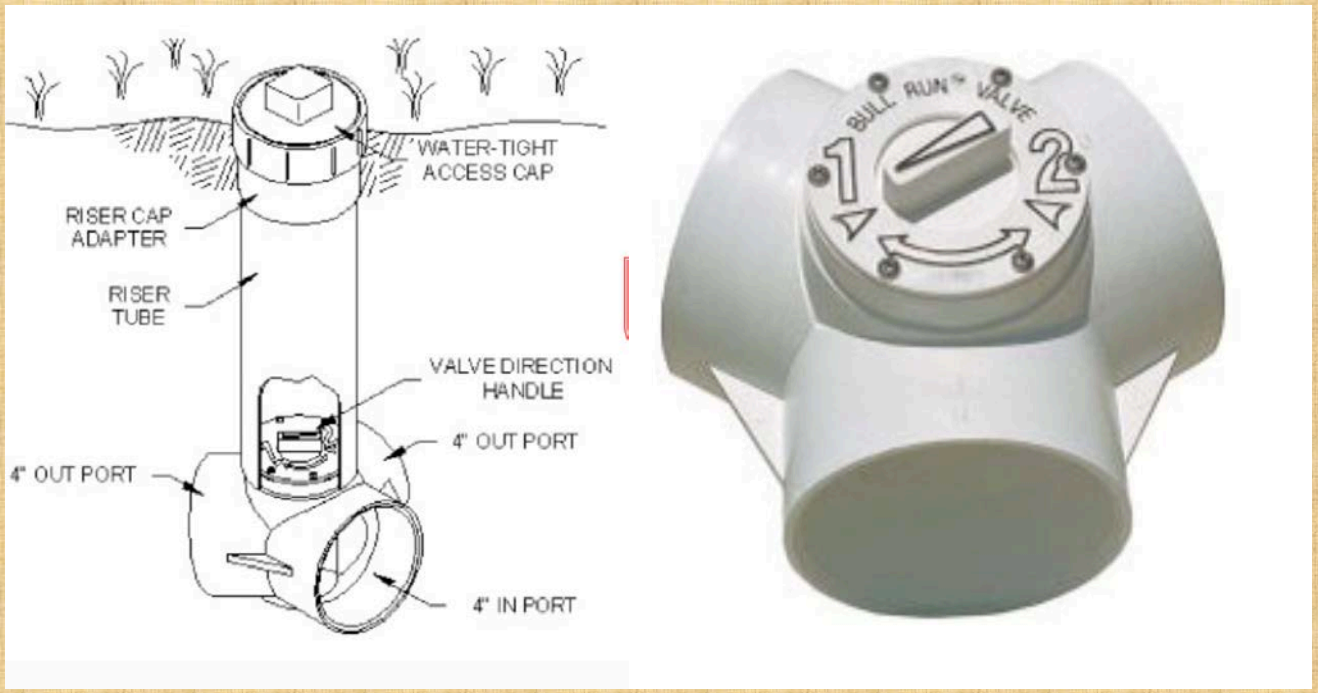
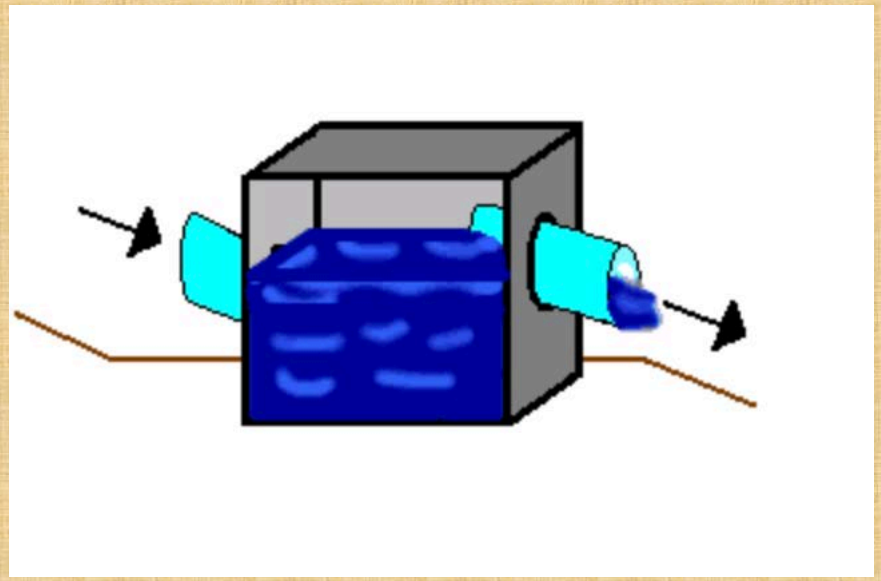
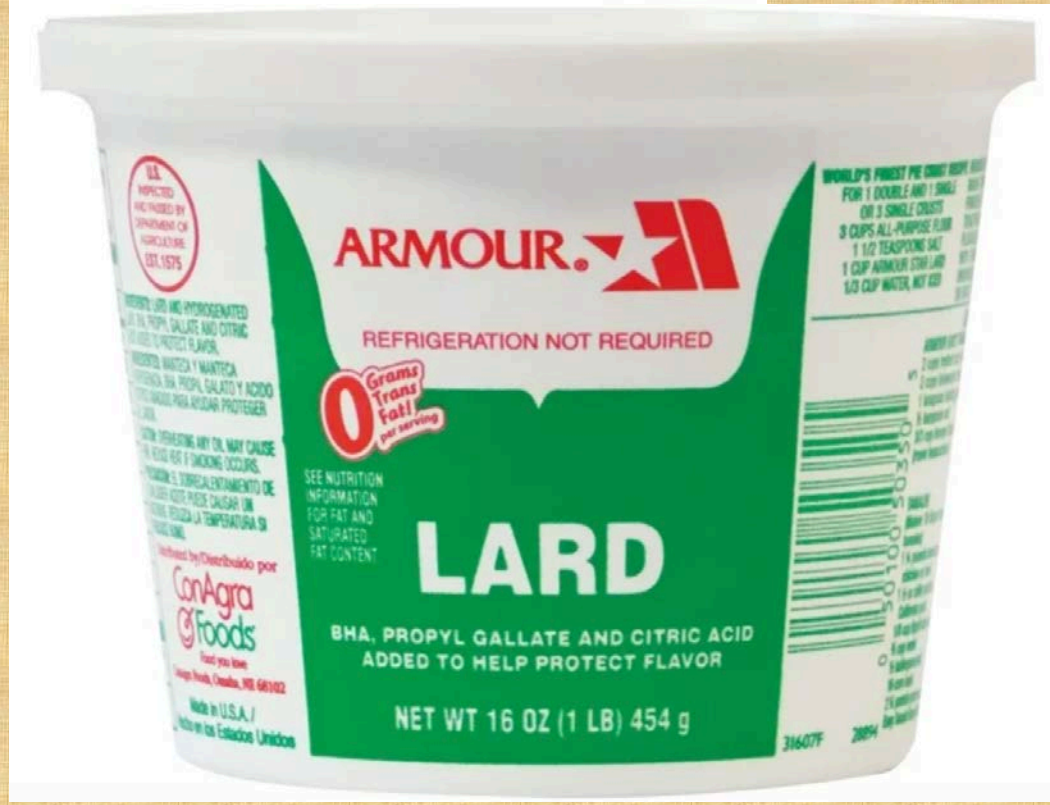






Organic and other loading

Animal fats and cooking oil



It might be liquid when it goes down the drain hot or washed down with hot water

Typical ground temperature is around 54^0F to 56^0F

Maybe warmer in the shallow desert soil.

Is it really domestic wastewater?

Wet wipes

They are indeed flushable,

But they’re not biodegradable

Meat processing may generate lots of blood

Does anyone here hunt and process their own game?

A surprising source of high BOD_5

No matter how many politicians and TV cameras, sometimes you just have to go to work and fix it.

Thanks, Everyone!

- You probably have as many ideas, insights and experiences as I